Progress beyond

2019
Annual Integrated Report

At Solvay…

We are more than scientists and engineers in labs; we are all around you. You'll find us in the small details of everyday life – that's where we really come into our own. Because for Solvay it's the unknown, unseen and invisible that makes us who we are. And through our customers, our elements touch lives. From the car you drive every day, to your holiday. We enable human exploration to happen on this planet and beyond. A phone call to a loved one or a safe car-ride home – we make it happen. We keep your family warm and provide them with clear air and water. We ensure that nutrient rich soil and long lasting crops can feed a growing population. We're consistently present in the small acts of daily life enabling people to do things like washing their hair and caring for their homes, ensuring we're all safe, clean and healthy. We provide doctors and nurses with the tools they need to save peoples' lives. We make life more colourful and better tasting; we enrich imagination and unleash possibilities. At Solvay there are countless ways we facilitate the significant, small and even the miraculous moments of human life.

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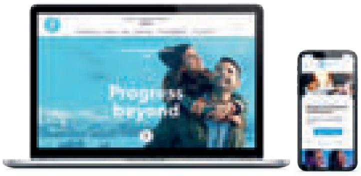
606

Free Cash Flow to Solvay shareholders from continuing operations
in € million

→Page 78



This report is also available online with expanded content, including interactive GRI Content Index: **annualreports.solvay.com/2019/en**

For greater insight into the Group, visit our corporate website: **www.solvay.com**

Presidents' Message

2019 was a year of notable progress, in which we delivered on our financial and environmental commitments in a challenging environment by focusing on customers, cost discipline and cash management. We also made step changes on three fronts – Strategy, Structure and Culture.

Our Group overcame significant external headwinds, demonstrated resilience through the delivery of stable underlying EBITDA and generated record free cash flow with improved phasing relative to prior years. Solvay proposed to its shareholders to maintain the 2019 dividend at 3.75 euros per share. In terms of the Group portfolio, we completed the divestment of the Polyamides activities to BASF and Domo Chemicals, which closed in early 2020. Proceeds will help us to deleverage our balance sheet and decrease pension liabilities in 2020.

We initiated a comprehensive strategy review of all our businesses and our operating model. We confirmed our strong foundation in science, sustainability and innovation – a core part of our DNA! We challenged and validated the alignment of key businesses to powerful megatrends that will drive superior growth in important end markets, where we hold leadership positions.

Yet, we want to better respond to challenges and opportunities – and to develop our path to achieving greater value, faster. Our review resulted in the G.R.O.W. strategy, founded on three new business segments which will operate with distinct strategic mandates.

The pure-play Materials segment, which comprises the high performance, high margin specialty polymers and composites businesses, has a sole mission to "accelerate topline Growth".

The Chemical segment comprises "mono-technology" businesses, each has a leading market position with

"I am very satisfied with our progress in 2019. We have set an ambitious course for Solvay and defined clear objectives to unleash our full potential, while at the same time remaining focused and addressing short term challenges."

Nicolas Boël

"What a year! 2019 had its share of challenges and it helped to bring us together as a ONE Solvay team, to overcome and to propel us forward. We redefined who we are, we agreed how we will thrive together in a sustainable way, and we committed to each other to always aim high, to deliver fast. We started to confront complexity that was holding us back and we're well on the way to driving the cultural transformation that will help each and every one of us to be at our best, at the service of customers, employees, communities and shareholders. Thank you."

Ilham Kadri

competitive global advantage. The mandate is to consistently deliver "Resilient cash".

The Solutions segment represents a mix of different businesses operating in diverse, niche markets. Its strategic mandate is to "Optimize" its return on capital employed.

The new Operating Model will realise more synergy transversally, will fully leverage the strength and competencies across businesses to "Win together", to unlock the full value of our Group, fast.

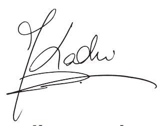
Many stakeholders – our employees as well as clients and investors – contributed to the development of our Purpose: "We Bond People, Ideas and Elements to Reinvent Progress". It calls on all of us to go beyond who we are, to bond together as teams and with all our stakeholders, as we know that what brought us here today will not take us there tomorrow.

Looking ahead, we began aligning our organization structure to our G.R.O.W. strategy, leveraging procurement, manufacturing & supply chain opportunities, leading to additional efficiency plans and measures that will enable us to operate as a leaner, nimble organization, better positioned to support our customers and create value.

Critical in helping Solvay unleash its full potential are our new sustainability goals included in Solvay ONE Planet, to help our Group positively shape our impact in three areas: climate, resources, and quality of life, through the next decade and beyond. Solvay ONE Planet is ambitious as we are aligning our emissions with the Paris agreement trajectory and we are stopping any future investment in coal-powered energy plants.

But we are also raising the bar in natural resources management and are equally supporting a better life for our people and the communities in which we work. In short, Solvay ONE Planet is a concrete example of our new Purpose, as we seek to go beyond anything we've ever done before.

Indeed, every day, we seek to "progress beyond". We look into the microscope, to 2020 and to the imperative of overcoming our short term challenges and, at the same time, we look into the telescope, at our mid-term targets, and our long-term aspiration to unleash our potential, fast. We owe it to our stakeholders today, tomorrow and to the generations that will follow.



Ilham Kadri
President of the Executive Committee and CEO

Nicolas Boël
President of the Board of Directors

Manifesto

1863 .... **Future**

Humanity is on an ongoing journey.

And though we all experience only one stage of it, a journey of **continuous progress** has brought us to where we begin.

Progress is more than business innovation and growth.

It's how we create **sustainable shared value** in the world of today and tomorrow.

A world connected to nature, preserving resources.
A world that is **empowered** to take on its many challenges.

Progress takes shape through **bonding between people, ideas and elements.**

These bonds are not binds; they connect.

They create **positive reactions** that fuel progress and drive the **human journey forward.**

At Solvay, the bonds we make every day unleash potential to reinvent progress.

SOLVAY. PROGRESS BEYOND.

Our Purpose

In 2019, the largest listening effort in our history gave rise to our Purpose, the *why* that gives meaning to our individual and collective work. Experience and research demonstrate that Purpose-driven companies earn the engagement of their people, challenge the status quo, correct their mistakes and make bold moves earlier than others.

At Solvay, we know our reason to be:

We bond people, ideas and elements to reinvent progress

Bonding people, ideas and elements

Bonding has always been an essential feature of the Solvay spirit. Solvay has been creating bonds since its creation, connecting the best scientists of its time through the – still continuing – Conseils de Physique and Chimie. To this day, we are in business to bond: our scientists and chemists bond elements into molecules that become our products, to serve our customers. We bond among colleagues, we bond with customers and suppliers, with academics, with communities, with our families, connecting people and ideas.

Reinvent progress

"From science will derive the progress of mankind." Like our founder Ernest Solvay, we have faith in science. However, the nature of progress which he evoked in his time is different today. The world is changing at a phenomenal speed, amid mounting volatility. Defining our Purpose was the opportunity to create a new model in the way we do business, manage the planet and prioritize our investments. Based on bonds, this model will give us the opportunity to go beyond "inventing" as engineers, as scientists... and to start reinventing ourselves as a company. This is part of our DNA: Solvay has progressed, transformed ... reinvented itself continuously, for 156 years.

Our Purpose statement is inspired by our past and is intensely focused on the future because we reinvent progress to unleash our full potential. It is idealistic and pragmatic, humanist and business-oriented. What differentiates us is our ability to recognize the duality of our world and be curious and creative as we reconcile seemingly opposite ideas – such as past and future, caring and daring – to form fundamentally new models for the future.

Our Vision and Core Beliefs

Our Purpose comes with our Vision, a unique set of Core Beliefs and a new Code of Business Integrity.

Our vision

By living our Purpose **in everything we do at Solvay, we create sustainable shared value for all**. Value that can benefit entire communities – for example the guar farmers of India – and improve the lives of people all over the world. Because Solvay's products are potentially in the hands of hundreds of millions of people holding a smart device, because they are in cars and in planes, because they save lives through medical devices such as hemodialysis equipment. And we create value in the form of prosperity for our employees, their families, and ultimately for our shareholders.

Our Vision calls us to go beyond where we are today. To reinvent the next forms of progress, because progress tomorrow will take a different form than progress today. We will go beyond being a market leader to become a market maker.

At Solvay, we create sustainable shared value for all

Our Core Beliefs

Our three Core Beliefs express the soul of Solvay and what we have faith in. They are the values that have driven us over the past 156 years and that will keep driving us in the future.

Purposeful responsibility

Our commitment to uncompromising ethics, safety and wellbeing, and sustainability.

Unity, not uniformity

Our belief in the power of ONE Solvay, inclusion and diversity. We have our greatest impact as individuals when we work together. We value the unique contribution of each individual.

Passion for performance

Our fire to take our achievements further, to challenge the status quo, and manage through meritocracy.

Our Code of Business Integrity

Our Passion for performance does not mean achieving results at any cost: integrity is the only way to do business. We have launched our new Code of Business Integrity, providing guidelines for what the Group means by integrity. Employees are all required to take an on-line training course and sign off that they understand and accept the code.

→ *goto.solvay.com/code-of-business-integrity*

About this report

In 2019 we took major steps to unleash Solvay's full potential, adapting our strategy – aligned with our newly unveiled Purpose – and revising our key policies accordingly. These major new steps are outlined in this Annual Integrated Report, along with our continued integrated management progress.

ReInventing Solvay

2019 opened a new chapter in the story of our Group. Ilham Kadri, our new CEO, has been writing its first pages, bringing a fresh viewpoint to a comprehensive review of our strategy and culture. Inspired by our teams, she has worked with them to unveil Solvay's Purpose – the *why* that unites us all and gives us a shared direction. This report shares those pages and details how they dovetail with our complex and fast-changing business environment. How they have shaped our new G.R.O.W. strategy and new sustainability program (Solvay ONE Planet), our new operating model (Solvay ONE), our new employee engagement model (Solvay ONE Team), our governance and our sustainable value creation model.

Much was new in 2019, but connecting with stakeholders remains at the heart of our business and fundamental to achieving our Purpose. And this report also tells their stories, how Solvay has met their expectations, and what we need to improve.

Your guide to this report

This is the fourth edition of Solvay's Annual Integrated Report, based on the International Integrated Reporting Council (IIRC) principles and elements of content. The ReInventing Solvay section takes an integrated thinking approach, putting selected contents into the perspective of our Vision and strategy, linking material information, and looking ahead to the future. It also highlights how we create sustainable value for all stakeholders in the short, medium and long terms.

This edition takes integration further by introducing our Purpose and how it meshes with our model and our medium-term strategy. It also outlines our value chain, giving an overview of Solvay's core business activities, and strengthens our stakeholder engagement by showcasing our response to their needs.

Links in the ReInventing Solvay section open detailed analyses in the Management Report, including a focus on high materiality issues.

"Our approach to integrated thinking continues to evolve and gain momentum. Our new sustainability targets, Solvay ONE Planet and our new Purpose will support the delivery of superior, long-term value as an integral part of our G.R.O.W. strategy. We continue to welcome initiatives to standardize disclosures by corporates and utilization by investors in relation to Environmental, Social, and Governance as an integral part of value creation – indeed we particularly commend and appreciate the recent Consultation Draft 'Towards Common Metrics and Consistent Reporting of Sustainable Value Creation' prepared by the World Economic Forum's International Business Council."

Karim Hajjar,
Member of the Executive Committee,
Chief Financial Officer

Navigating our 2019 Annual Integrated Report

The ReInventing Solvay section provides a brief review of our Purpose, business environment, strategy, governance and performance, a holistic assessment of the Group's ability to create value. Some of these contents[1] are only available in the online report – the full version of the annual integrated report.

Presidents' message
Nicolas Boël, President of the Board of Directors and Ilham Kadri, President of the Executive Committee and CEO, highlight Solvay's key achievements and prospects.
→ *Page 2*

Our Purpose
The arrival of a new CEO in 2019 created an opportunity to reflect on who we are and why we exist as a Group: to formulate the Purpose that gives us all a compelling sense of direction and encapsulates the reasons why we come to work for Solvay every morning.
→ *Page 6*

Bonding stories[1]
Just some of the many examples of how Solvay bonds with its key stakeholders to create more value.

2019 at a glance
Key information to help the user understand who we are and the key events of 2019.
→ *Page 10*

Business environment[1]
We connect with our stakeholders, constantly listening to our customers, so that we can better meet their fast-changing needs and address the megatrends that will shape our future.

Strategy
In this challenging business environment, we must change the way we operate to thrive and achieve our Purpose. This begins with the implementation of G.R.O.W., our new strategic roadmap driven by innovation, our sustainability program, Solvay ONE Planet, and our new operating model, to fully unleash Solvay's potential.
→ *Page 16*

Governance[1]
Strong governance is paramount to spur on this strategic journey with a new mindset, working together to achieve the Group's Purpose and Vision.

Value creation
Generating superior growth, innovating for our customers, and creating value for all our stakeholders.
→ *Page 26 and online*

1: only available in the online report – the full version of the annual integrated report

The scope of this report

The 2019 Annual Integrated Report provides material information on Solvay for the year ending December 31, 2019. It builds on last year's report, integrating feedback from our stakeholders, including several recognized bodies such as the Global Reporting Initiative (GRI), the International Integrated Reporting Council (IIRC) and the World Business Council for Sustainable Development (WBCSD).

It is aligned with GRI Standards, the Recommendations of the Task Force on Climate-related Financial Disclosures (TCFD), and the WBCSD's ESG Disclosure Handbook. Its contents also serve as a progress report on the implementation of the ten principles of the UN Global Compact and the Sustainable Development Goals (SDGs). Unless otherwise stated, all social and environmental indicators are consolidated using the "financial control" approach described in the Greenhouse Gas Protocol Corporate Standard.

GRI Community

TCFD TASK FORCE ON CLIMATE-RELATED FINANCIAL DISCLOSURES

wbcsd

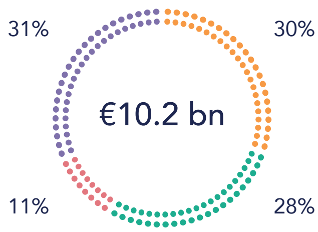
UN GLOBAL COMPACT
COMMUNICATION ON PROGRESS

2019 Key Figures

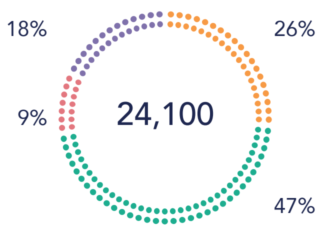
Solvay is a science company whose technologies bring benefits to many aspects of daily life. With more than 24,100 employees in 64 countries, Solvay bonds people, ideas and elements to reinvent progress. The Group seeks to create sustainable shared value for all, notably through its Solvay ONE Planet plan crafted around three pillars: protecting the climate, preserving resources and fostering better life. The Group's innovative solutions contribute to safer, cleaner, and more sustainable products found in homes, food and consumer goods, planes, cars, batteries, smart devices, health care applications, water and air purification systems. Founded in 1863, Solvay today ranks among the world's top three companies for the vast majority of its activities.

Solvay around the world

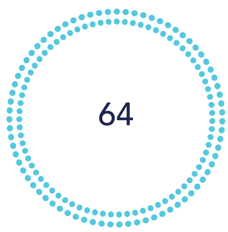
Net sales
by zone



Employees
by zone



Number of countries



Industrial sites • Major Research & Innovation centers • North America • Latin America • Europe • Asia and Rest of the World • Global

Our Research & Innovation in figures

2,100	**€ 336 M**	**18%**	**75%**
Employees	R&I effort	New sales ratio*	of R&I pipeline revenue to be from "Sustainable solutions"

* % of products / applications < 5 years

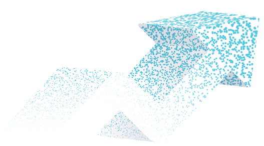
Financial indicators

2,322

Underlying EBITDA
in € million
-2.8% organic basis[1]

27.8%

Free cash flow conversion[2]
+1.8 pp



8.1%

ROCE[3]
-0.1 pp

3.75[4]

dividend
in € per share
Stable

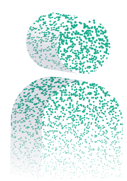
Social and environmental indicators

12

Greenhouse gas emissions[5]
in Mt CO_2eq.
-5% compared to 2018, at constant scope

53%

Sustainable solutions (SPM)
as percentage of Group sales



0.44

Occupational accidents at Group sites[6]
per million hours worked
-18% compared to 2018

47%

Employees involved in societal actions
as percentage of employees

1: Organic growth excludes forex conversion and scope effects, as well as the effect from the implementation of IFRS 16. Reported growth compares to the published 2018 pro forma figures, adjusted for the implementation of IFRS 16, 2: Free cash flow to Solvay shareholders is the free cash flow after payment of net interests, coupons of perpetual hybrid bonds and dividends to non-controlling interests. This represents the cash flow available to Solvay shareholders, to pay their dividend and/or to reduce the net financial debt. The free cash flow conversion ratio is calculated as the ratio between the free cash flow to Solvay shareholders (before netting of dividends paid to non-controlling interest) and underlying EBITDA. 3: Return on Capital employed, 4: Recommended to the Shareholders meeting on May 12, 2020, 5: total emissions (scopes 1 and 2), 6: Rate of accidents with medical treatment, with or without work stoppage.

10 Highlights of 2019

Solvay opened a new chapter in 2019. We welcomed our new CEO and took major steps forward to unleash the Group's full potential: we unveiled our Purpose, introduced a new G.R.O.W. strategy and sustainability goals along with a new operating model. Meanwhile we continued to strengthen our strategic businesses, pushing ahead on collaboration with our customers, and expanding on new high-potential markets. Here is a selection of ten highlights of the year.

1

Ilham Kadri, Solvay's new CEO

Ilham Kadri's arrival gave a new impetus to the Group's transformation to unleash its full potential. She began by listening to employees, managers and stakeholders around the world, their insights forming the foundation for our Purpose and Vision and for an in-depth strategic review.

→ *Page 2*

2

Solvay and Safran raise the temperature

Solvay strengthened its collaboration with Safran through a long-term agreement to supply high temperature composites and adhesives for several critical engine components. We also extended our supply agreement on demanding applications for the LEAP Engine.

3

Improving competitiveness in soda ash and bicarbonate businesses

Solvay decided to develop 1.4 million tons capacity in soda ash and sodium bicarbonate to meet customers' growing needs while improving energy efficiency and advancing energy transition projects at its sites to reduce CO_2 footprint.

4

Speeding up the development of thermoplastic composites

Solvay opened two dedicated thermoplastic composites (TPC) innovation centers in the US and Europe to speed up the development of these materials. The Group opened a production line in California to help meeting aerospace customers' growing demand for our unique proprietary TPC technology.

5

Launching our G.R.O.W. strategy

Our G.R.O.W. strategy will drive growth, cash and high return investments. Based on distinct business mandates with capital and resources discipline, and enabled by our new operating model, it will help us serve and innovate with our customers more effectively.

→ Page 18

6

Meeting booming demand in lithium batteries

Solvay is reinforcing its leadership in the lithium-ion battery market by more than doubling its production capacity of high-performance polymer Solef® PVDF at its site in Changshu, China. This investment in high-growth sustainable solutions supports our G.R.O.W. strategy.

7

Seven Solvay products awarded the Efficient Solutions labels

The World Alliance for Efficient Solutions created by the Solar Impulse Foundation recognized the value of seven Solvay products as sustainable (and profitable) solutions for a cleaner environment.

7x

8

Unveiling our Purpose

We bond people, ideas and elements to reinvent progress. Inspired by insights from our teams, our Purpose expresses the connection, collaboration, innovation and progress inherited from our founder, and embodies our Vision to create shared, sustainable value for all.

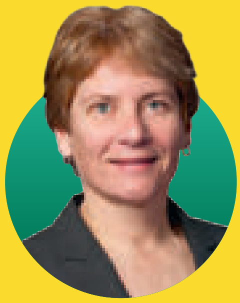
→ Page 6

9

Ten goals focused on climate, resources and better life

An integral element of the Group's G.R.O.W. strategy, our new 2030 sustainability program, Solvay ONE Planet, is aligned with Solvay's Purpose. Ten goals will help us improve our impact on climate, resources and better life.

→ Page 20



10

Carolyn Bertozzi, Chemist of the Future

Professor Carolyn Bertozzi of Stanford University won our 2020 Chemistry of the Future prize for her invention of bioorthogonal chemical reactions performed in living cells and organisms. This will ultimately help diagnose and treat cancer as well as infectious diseases.

Strategy

How we reinvent through our G.R.O.W. strategy and our 2030 sustainability program Solvay ONE Planet, enabled by a new operating model to unleash our potential and win.

Winning together as ONE Group

Solvay has embarked on a new chapter in its transformation, a chapter that will allow us to unleash our full potential as a single, coherent group. Our people, our businesses now bond as ONE Group to progress beyond.

To support this unified approach, we have unveiled our Purpose – the *why* that motivates us to be our best. We have redefined our strategy and designed a new shared operating model – together, these are *how* we will achieve our goals. And, as ever, we will continue to develop innovative solutions – our *what* – closely aligned with our customers' needs and with the key challenges facing our world.

Why

Solvay ONE Purpose

We bond people, ideas and elements to reinvent progress

Our Vision

Sustainable shared value for all

Our Purpose is our 'WHY' – why we exist as a company. It captures our greatest impact on society and gives meaning to our work, today and for the next generations.

See page 6

How

Our Strategy

Business strategy

- **G** Growth
- **R** Resilience
- **O** Optimization
- **W** Win

Solvay ONE Planet

Sustainability goals

As the foundation for all of our activities, our Purpose comes to life in our business and sustainability strategies, which lay out our 'HOW'– how we will create sustainable shared value for all, including our employees, customers and shareholders, within the next business cycle of 5-10 years.

See page 18

Solvay ONE

New common operating model to help us work more efficiently & effectively together

Changing our behaviors to be more "customer-obsessed"

Our Strategy provides a roadmap for our operating model (Solvay ONE) to leverage our potential as a ONE Group and better serve customers through initiatives like Customer Engagement Model, End-to-End value chain, digitization. Our new People Engagement Model (Solvay ONE Team) features a new set of behaviors to support our performance.

See page 20

What

Our Solutions

We align our technologies to customer and societal needs on markets where we are uniquely positioned to make a difference and a profit at the same time.

Automotive & Aerospace
Mineral resources & Environment
Healthcare & Consumer Goods
Agro, Feed & Food
Electronics & Electrical
Building
Industrial applications

Our Strategy drives decisions about which markets to serve and investments to make. Our Solutions take form in our 'WHAT' – the products and services we provide to the world through our customers. These are in constant evolution, as is our business portfolio.

Our G.R.O.W. strategy

To navigate the changing landscape around us, Solvay's new strategic roadmap is built around powerful trends. It points us to where we want to be leaders and create value. Our G.R.O.W. strategy will shape our success in the years to come and beyond, unleashing our full potential.

Solvay's G.R.O.W. midterm strategy to drive growth, cash and returns

Differentiated business mandates for the 3 segments

G.

Accelerate Growth

Prioritize investments in high margin MATERIALS businesses with high growth potential, which are also our most sustainable solutions

MATERIALS comprises Specialty Polymers and Composite Materials businesses.

Key asset
Unique high-performance polymers & composites technologies

Strategic intent
Our ambition is to extend our leadership as the #1 pure play advanced materials business, while leveraging synergies between the polymers and composites technologies to create a leading thermoplastic composites platform. Solvay will prioritize investment and innovation in this segment.

Key levers
- Realign organization around growth opportunities
- Accelerate innovation with highest-growth customers
- Reallocate resources to thermoplastic composites and battery platforms to accelerate customer wins
- Improve operational efficiencies through simplification, order to cash optimization and digitalization

Innovating for a new market
In 2019, we signed an agreement with the energy technology company Baker Hughes to partner on the use of our thermoplastic composite (TPC) materials in offshore flexible pipes and risers in ultra-deep waters for the Oil & Gas industry. This partnership is a landmark in our strategy to expand the use of TPC into new markets, leveraging its lightweight and non-corrodible properties versus metal.

Track record

+7% EBITDA growth	~28% EBITDA margin	>25% Vitality index[1]	Returns >WACC[2]
organic 2014-2019	2019	2018	average 2014-2019

Business trends

Light-weighting · Electrification · Healthcare · IoT/Digitalization · Resource efficiency

1: % of sales coming from newly developed products in last 5 years
2: Weighted Average Cost of Capital

R.

Deliver Resilient cash

Maximize cash flow generation from our resilient CHEMICALS businesses where we have a competitive advantage

CHEMICALS comprises the Soda Ash & Derivatives, Peroxides, Silica and Coatis.

Key asset
World-leaders in chemicals that are essential to daily life

Strategic intent
Solvay will continue to focus on delivering resilient cash flows and selectively invest in these businesses to become the #1 cash conversion chemicals player.

Key levers
- Refocus organization on cash and returns
- Drive focused productivity and rationalization programs
- Prioritize Capex to maintenance and invest selectively for compelling cash returns
- Focus R&I on process innovation

Targeted investments to meet increasing global demand
Solvay will develop 1.4m tons capacity in soda ash and sodium bicarbonate to meet its customers' needs, while reducing its CO_2 footprint and improve further its competitiveness. We will increase our soda ash production capacity by 600,000 tons at our best-in-class, competitive Green River site in the US, and expand our sodium bicarbonate capacity by 200,000 tons at our plant in Devnya, Bulgaria. Additional volumes of soda ash and bicarbonate will result from excellence programs and digitalization. Against a backdrop of growing global demand, these investments will deliver resilient cash and strong returns.

Track record

+9% cash flow growth	~79% cash conversion[3]	~27% EBITDA margin	Returns at WACC
organic 2014-2019	2019	2019	average 2014-2019

Business trends

Healthcare · Resource efficiency

3: The free cash flow conversion ratio is calculated as the ratio between the free cash flow to Solvay shareholders (before netting of dividends paid to non-controlling interest) and underlying EBITDA.

A new way to G.R.O.W. together

Solvay has great foundations to build on: strong market leadership positions and sustainable solutions driven by megatrends, a heritage of innovation, a history of success, proven knowledge, committed and talented employees.

Based on our industrial know-how and our technological and scientific expertise, we have built strong relationships with our customers and we will continue to develop, focusing on their needs and the idea of bringing them tangible value. We will be ever more customer focused.

We must transform the way we operate to better embody our Purpose. In 2019, we initiated a comprehensive business review, which gave us a clear understanding of our strengths and challenges. From this we built G.R.O.W., the strategic roadmap for each business that will inform our resource allocation and allow us to drive profitable growth, create superior value for all our stakeholders while generating resilient cash flow. G.R.O.W. defines our strategy on every single market: investing for growth, focusing on cash or improving value creation. Solvay will operate in three distinct business segments: Materials, Chemicals and Solutions, each with a new, distinct mandate and ambition. Our new common operating model, Solvay ONE, will help us work more efficiently and effectively together, and to leverage synergies across the Group.

O.

Optimize returns

Optimize our SOLUTIONS and businesses to unlock value and increase returns

SOLUTIONS includes Novecare, Technology Solutions, Aroma Performance and Special Chem.

Key asset

Unique formulation & application expertise

Strategic intent

Solvay will optimize these businesses, leverage its leadership positions, drive better returns and unlock value.

Key levers

- Innovate and invest selectively in specialty niche markets, focusing on three specific areas:
  - Consumer food and crop care, where we have leading positions in vanillin and guar for home & personal care
  - Industrial markets such as coatings, where we offer unique solutions for waterborne applications
  - Resources, where we are the leaders in improving the yield of metals and minerals for the mining industry
- Achieve turnaround in shale oil & gas and other low-return businesses
- Drive efficiency and address fragmented industrial footprint

Caring for both hair and the planet

With Jaguar® C162, a derivatized cationic guar produced from a bean grown mainly in India, Solvay has developed a non-ecotoxic and vegetable-based ingredient caring for both our ecosystems and damaged hair.

Track record

Returns < WACC average 2014-2019	**Flat net sales & EBITDA growth** average 2014-2019	**~17% EBITDA margin** 2019

Business trends

IoT/Digitalization | Resource efficiency | Eco-friendly solutions

Enabled by Solvay ONE operating model

W.

Solvay ONE to Win

Create a winning team and operating model to support a performance-driven culture and win with our customers

The way we will win with our Solvay ONE operating model is an equally important element of our value creation. Solvay ONE entails a completely new way of working that will leverage the many strands and competencies across our enterprise and not just within each business, to build a single strong Group and take us from a decentralized model to Enterprise leadership with robust performance management. Our new operating model means targeted and disciplined resource allocation, a tailored approach to customers, and a repeatable cost and cash playbook.

Bold steps in sustainability

Solvay ONE Planet is an integral part of our Strategy. Sustainability is already at the heart of our operations at Solvay, and we are now setting our bar even higher across our entire value chain, with a new policy that extends our focus to our impact on climate, resources, and a better life for our employees and communities.

Responsible for change

The chemicals industry is increasingly being challenged to re-invent its sustainability agenda. The rise in Environmental, Social, and Governance (ESG) expectations from investors highlights the growing strategic importance of this area in medium and long-term shareholder value creation. A leader in our industry, at Solvay we have always believed that solutions to the major challenges facing humanity will be driven by science and innovation. We have developed robust tools and processes to support our commitment to sustainability – Solvay Way, Sustainable Portfolio Management, integrated thinking and reporting – and have also forged strong partnerships in this field. We will continue to leverage and optimize these fundamentals going forward.

Committed to impact

Solvay ONE Planet, our new sustainability approach takes our previous achievements a bolder step forward. It will build on our recognized expertise, tools, processes and partnerships, and focus firmly on impacts.

We have identified three main areas where we have strong impacts, positive and/or negative, through our products portfolio or our operations:

- **Climate:** €2.2bn of our sales already help reduce our customers' overall climate impact. We are working on accelerating our climate and energy transition to ultimately reach carbon neutrality.
- **Resources:** Resources is about Circular Economy. €3.5bn of our sales help reduce resource consumption worldwide. We aim to reduce waste, re-using it as by-products or in energy production, and use water more efficiently via excellence projects and recycling initiatives.
- **Better Life:** €3.3bn of our sales help improve quality of life, through caring for our employees and our communities.

To achieve our Solvay ONE Planet goals, we pledge to reallocate investments to promote sustainability within our portfolio, operations and workplace.

Solvay Way will remain our internal sustainability reference framework and our teams will be encouraged to play their own part in Solvay ONE Planet through actions that have a positive impact on the world around them and their daily lives. Externally, we will improve the way we measure the impact of our solutions and continue to innovate to tackle the urgent challenges facing society today. Our contribution to our customers' sustainability journey will be a cornerstone of our relationship, working with them to produce more sustainability-positive solutions across the value chain.

"With Solvay ONE Planet, we are setting bolder objectives to solve key environmental and societal challenges through science and innovation. Beyond climate change, we will tackle resource scarcity and promote a better life. Together with our customers, we will create sustainable shared value for all. This is Progress Beyond. This is G.R.O.W."

Ilham Kadri,
Solvay CEO

Stepping up our commitment

Solvay ONE Planet is inspired by the United Nations Sustainable Development Goals (SDGs). It includes ten measurable commitments in three key focus areas, to be achieved by 2030[1].

10 Sustainability Goals

Climate

1 Lowering greenhouse gas emissions worldwide.

Solvay will double the rate at which it reduces emissions, with a goal of curbing greenhouse gas emissions by 26% and aligning its trajectory with the "well below 2°C temperature increase" goal outlined in the 2015 Paris Agreement.

2 Eliminating the use of coal.

Solvay will not build new coal-powered plants and commits to phase out coal usage in energy production wherever renewable alternatives exist.

3 Reducing pressure on biodiversity.

Solvay plans to reduce its pressure by 30% on biodiversity in areas such as terrestrial acidification, water eutrophication and marine ecotoxicity.

CONTRIBUTES TO

7 AFFORDABLE AND CLEAN ENERGY · 13 CLIMATE ACTION · 14 LIFE BELOW WATER · 15 LIFE ON LAND

OUR INTERNAL ACTIONS

Solvay will start switching to electric or hybrid company cars as of 2021.

Resources

4 Increasing water use efficiency.

Solvay will diminish its impact on freshwater withdrawal by reducing its intake of freshwater by 25%.

5 Accelerating the circular economy.

Solvay will leverage its partnership with the Ellen MacArthur Foundation to more than double the sales of products based on renewable or recycled resources to 15% of Group sales.

6 Increasing waste recovery.

The Group will reduce by a third its non-recoverable industrial waste, such as landfill and incineration without energy recovery.

7 Leveraging innovation to grow sustainable solutions.

Solvay will upgrade its sustainable portfolio to reach 65% of Group sales, in collaboration with the Solar Impulse Foundation.

CONTRIBUTES TO

12 RESPONSIBLE CONSUMPTION AND PRODUCTION

OUR INTERNAL ACTIONS

A new "Stop Office Waste" plan includes phasing out single-use plastic, generating zero food waste at canteens, and aiming to become a paperless company.

Better Life

8 Prioritizing safety.

Solvay targets a zero accident policy, to protect the safety and security of its employees.

9 Embedding inclusion and diversity.

Solvay will work to achieve gender parity for mid- and senior-level management by 2035. Solvay's code of business integrity paves the way towards an inclusive work environment that welcomes diversity of any kind such as thoughts, race, color, national origin, religion, gender identity or sexual orientation.

10 Extending maternity and paternity leave.

Solvay is adapting its global policy of 14 weeks maternity leave to 16 weeks, extending it to co-parents employed by the company regardless of gender, by 2021.

CONTRIBUTES TO

3 GOOD HEALTH AND WELL-BEING · 6 CLEAN WATER AND SANITATION · 8 DECENT WORK AND ECONOMIC GROWTH · 17 PARTNERSHIPS FOR THE GOALS

OUR INTERNAL ACTIONS

Solvay is establishing a "Better Life Observatory" with managerial training to support work-life integration.

1: Baseline 2018

Together through Solvay ONE

Solvay's extensive portfolio transformation has given us a stronger base, but also led to a decentralized operating model, with multiple cultures. We are now taking the last major step in our transformation, simplifying our Group to unleash its full potential and rally our teams around a shared single Purpose and culture. We have a new Group operating model: Solvay ONE.

Solvay ONE will support our performance-driven culture to help us win together as ONE Group. This new shared operating model is the *how* that will help us inform everything we do, from how we collaborate with our customers, to how we allocate our capital, R&I and talents, and how we leverage the operational synergies throughout the Group.

Shift to Enterprise leadership

Solvay is moving from a decentralized operating model to one of Enterprise leadership. Our business units will remain empowered, with responsibility for generating profits, cash and returns, each one with its own specific mandate. In addition, leaders of entities will be focused on unleashing the full potential of Solvay through key cross-Group initiatives, and incentives will be changed to include impact on Solvay as a whole, as well as business delivery.

We will leverage the many advantages of being one Group to enhance our collective performance. We will adopt a Group-level approach to our business support activities, sharing best practices and expertise across the Group and developing simplified processes.

We listened to our customers. We want to bring them the best of Solvay by refocusing our attention and resources, optimizing our end-to-end value chain process, smartly reducing indirect costs to invest in growth and optimizing asset utilization.

Manage our resources in a centralized and disciplined manner

We will manage resources, investments, R&I and talents centrally. Capex and R&I will target the highest growth opportunities, with strong discipline over total investment size, containing Capex to 7-8% of sales. Better choices, not higher spend, will generate more growth, cash and returns. For example, 60% of Capex and over 50% of R&I will go to Materials, to support growth investments in fields like thermoplastic composites, where the addressable market (for the aerospace and oil&gas markets) is worth some €500 million. This also applies to our talent management, where we want to ensure we have our people in the position where they contribute best to the Group's success.

Improve our customer experience

We have opened a new chapter in customer relations: we want to be "customer-obsessed", with a cross-functional approach that aligns the entire Group. We aim to fully understand who our customers are and tailor our approach accordingly. We have identified strategic key accounts that represent ~50% of our growth opportunities. These will be managed at Group level, with a single key account management team handling all of their needs. This will bring immediate benefits for the customer, facilitate collaboration, streamline Solvay's resources and increase the share of wallet.

We will measure our progress using Net Promoter System, embarking, for strategic accounts, all our frontline employees. This combines digital surveys with personal interaction between customers and Solvay's frontline teams and will be followed up by action plans. We will also develop our talent and management pipeline and leverage digital tools and analytics capabilities, introducing a new group-wide e-commerce platform for order placement and delivery management.

Acting as ONE Group

Create a repeatable cost and cash playbook

We are committed to simplification and synergies, coupling delivery on the simplification program already underway with the launch of a new synergy program. This will create a consistent structure across Solvay, decreasing indirect spend through improved group-wide policies and implementing an order-to-cash program, by reducing our logistics and packaging costs. Our target is to achieve €100 to €150 million of cost savings by 2024.

We will also step up productivity by increasing yield in our manufacturing plants and improving raw materials and energy efficiency. While reducing costs, we optimize asset utilization, focusing on operational efficiencies and have begun deploying a series of digital processes. Some use data analytics and modelling to increase efficiency and others are more customer focused. Rollout has begun in 20 plants already, with another 30 soon to come. Our productivity measures target a run rate of €200 million by 2024.

Together, these two programs are slated to generate cumulative structural gross cost savings of €300 to €350 million yearly by 2024.

Besides the cost savings, we target additional measures on cash. We aim to generate €500 million more cumulative cash from our operations in the next five years via three levers:

- Reduced pensions cash cost, at €40 million yearly as of 2020, by redeploying part of the net proceeds from the polyamide divestment to reduce pension liabilities.
- Continued decrease in financial charges, reaching €35 million by 2024, as we further optimize and reduce the debt structure through strong operational free cash flow delivery and benefiting from the remaining net proceeds from the polyamide divestment.
- A one-time €100 million release of working capital by our order-to-cash program, driven by a leaner supply chain and more effective inventory management.

Building a Purpose-led culture

Solvay ONE Team is a pillar of our Solvay ONE operating model. We have a long tradition of care for our people and we aim to strengthen it even more with a new People Engagement Model. Through one common approach we will build stronger bonds and develop diverse, inclusive and talented teams, defining how we operate, how we manage and how we lead.

Profoundly rooted in our Core Beliefs – Purposeful responsibility; Unity, not uniformity; Passion for performance – our new People Engagement Model is based on a set of behaviors which will build the culture to live our Purpose and achieve our G.R.O.W. strategy.

These behaviors will progressively become part of our day by day life and will be embedded in our performance assessment and compensation processes: they will form the expectations we have of every employee and every leader in our Group.

AT OUR BEST, as Solvay citizens, individually and collectively:

- **We are customer obsessed**
  We are relentlessly driven by anticipating the needs of our internal and external customers, keeping our commitments, and focusing on the service, the quality and the sustainable value we bring to them in every decision we make and process we design.
- **We care and collaborate**
  We show a genuine interest in people, the planet and human progress, and bond within work groups (of both colleagues and stakeholders) to achieve more together for the success of our customers and the Group.
- **We make it happen**
  With an ownership mindset, we are accountable for setting priorities, acting with appropriate urgency, measuring our results in terms of valuable impact, and delivering on our promises every time. We strive to simplify our own work and challenge the complexity of the rest of the organization.
- **We go beyond**
  We bring our whole selves to work, ready to go the extra-mile, even beyond our comfort zone, every time there is an opportunity for us to learn or to help a colleague or the Group.

AT OUR BEST, as Solvay leaders – top executives and all people managers, from shop floor employees to project leaders –, individually and collectively:

- **We lead with purpose, heart and mind**
  We inspire our teams with a clear Purpose and future Vision that contribute to our Group strategy. We gain trust by role modeling care, openness and honesty, and behaving consistently within Solvay's ethical, professional and organizational guidelines.
- **We passionately coach people to reach their potential**
  We build great teams, attracting and retaining top talents, by planning, supporting, and developing our people's knowledge, skills, and abilities so that they can fulfill their current and future job responsibilities and be the best they can be – all within a true culture of feedback.
- **We learn, unlearn and relearn**
  We embrace change and challenge the status quo, considering other possibilities, approaching all situations with curiosity, looking for insights, reinventing and embracing new solutions.

Our Behaviors

"Our new People Engagement Model will build stronger bonds with our people, so they enjoy a great employee experience throughout their career, empowered to bring their whole self to work. They are at the heart of achieving our G.R.O.W. strategy and making our Purpose a living reality."

Hervé Tiberghien,
Member of the Executive Committee, Chief People Officer

Behaviors as leaders

We lead with purpose, heart and mind

We passionately coach people to reach their potential

We learn, unlearn and relearn

Behaviors as Solvay citizens

We are customer obsessed

We care and collaborate

We make it happen

We go beyond

Our sustainable value creation model

Resources we use

PEOPLE

More than 100 nationalities. 47% of our employees are located in Europe, 18% in Asia and the rest of the world, 26% in North America and 9% in Latin America. 8% work in Research & Innovation.

24,100
Employees

23%
of women

FINANCIAL

We have invested €826 million of Capex from continuing operations and €336 million in our Research & Innovation activities.

€7.7 bn
Equity attributable to Solvay share[1]

€5.4 bn
Underlying net debt

NATURAL RESOURCES

Our energy costs represented €611 million. Excluding energy, the Group overall raw materials expenses amounted to circa €2.7 bn.

123 pj
Energy consumption

435 M m³
Total water intake

How we win

Why

Solvay ONE Purpose
We bond people, ideas and elements to reinvent progress

Our Vision
Sustainable shared value for all

How

Our Strategy
Business strategy

G R O W

Growth
Resilience
Optimization
Win

Solvay ONE Planet
Sustainability goals

Solvay ONE
New common operating model to help us work more efficiently & effectively together

Changing our behaviors to be more "customer-obsessed"

1: excluding hydrid bonds

At Solvay we are committed to optimizing the use of our resources to reduce our impact on the planet. Our new G.R.O.W. business strategy and our sustainability program are aligned with the powerful trends driving growth in our end-markets. And our Solvay ONE operating model helps us work more efficiently and effectively together to achieve our Purpose and create the greatest shared value for society, our employees, our customers and our shareholders.

How we create value

Our businesses are closely aligned to powerful trends that drive growth in our end-markets

MATERIALS

Unique high-performance polymers & composite technologies

Providing solutions for sustainable mobility, light-weighting, CO_2 and energy efficiency

35%
of Group EBITDA[2]

CHEMICALS

World-leaders in essential chemicals to daily life

Lead in chemical intermediates through scale & technology, developing applications & industrial innovation for optimized costs

38%
of Group EBITDA[2]

SOLUTIONS

Unique formulation & application expertise

Customized specialty formulations for surface chemistry & liquid behavior, maximizing yield and efficiency and minimizing eco-impact

27%
of Group EBITDA[2]

Where we create value

Aerospace, Industrial, Automotive, Building, Healthcare, Electronics, Mining, Consumer goods, Oil & Gas, Food, Agro

Value we create

Providing sustainable solutions to CUSTOMERS

53%
Net sales with Sustainable solutions

33%
Net Promoter Score

Caring for and empowering our EMPLOYEES

0.44[3]
Occupational accidents per million hours worked

9.3%
Employee turnover

Delivering return & profits to INVESTORS & SHAREHOLDERS

€2.3 bn
Underlying EBITDA

€606 M
FCF to Solvay shareholders from continuing operations

€3.75 per share
Dividend 2019 recommended[4]

Reducing our ENVIRONMENTAL FOOTPRINT

-5%
Greenhouse gas emissions[5]

86.6 thousand tons
Industrial hazardous waste

AIR EMISSIONS

6.2 thousand tons
Nitrogen oxides

2.9 thousand tons
Sulfur oxides

Strengthening COLLABORATION WITH SUPPLIERS

38,500
Suppliers

625
Core suppliers

Supporting our LOCAL COMMUNITIES

47%
Employees involved in local societal actions

2: excluding the contribution from corporate and business services, 3: Rate of accidents with medical treatment, with or without work stoppage, 4: Recommended to the Shareholders meeting on May 12, 2020, 5: (scope 1 & 2) at constant perimeter vs. Y-1

Manage ment report

Solvay Management Report presents the Group's social, environmental and financial performance in 2019, as well as its achievements in terms of governance.

2

Corporate Governance Statement

Corporate Governance Statement

1. Introduction

Solvay SA – headquartered in Belgium – is committed to the highest governance principles and seeks to consistently enhance corporate governance performance, emphasizing transparency and promoting a sustainable culture of long-term value creation.

Solvay's governance bodies are responsible for the Group's long-term approach, pursuing the vision of Solvay's founder, and implementing the Group's strategy. The Board of Directors is entrusted with steering Solvay's development strategy while advising the Executive Committee, which oversees its business operations.

This Corporate Governance Statement applies the recommendations of the 2009 Belgian Corporate Governance Code's "comply or explain" principle. It includes additional factual information with respect to Solvay's corporate governance and relevant modifications thereto, together with details on directors and executive compensation and of relevant events that took place during the preceding year.

In accordance with this principle, none of the rules described in this Corporate Governance Statement depart from the 2009 Belgian Corporate Governance Code.

The Corporate Governance Charter (the "Charter") adopted by the Board of Directors of Solvay is available on Solvay's website and describes the main aspects of the Solvay Group's corporate governance, including its governance structure and the internal rules of the Board of Directors, the Executive Committee, and other committees set up by the Board of Directors. From January 1st, 2020, Solvay has applied the recommendations of the 2020 Belgian Corporate Governance Code which has been applicable from that date. The Board of Directors has amended the Charter in order to be compliant with the new Corporate Governance Code.

2. Capital, Shares and Shareholders

2.1. Capital

Solvay's capital amounts to €1,588,146,240 and comprises 105,876,416 issued shares. No changes were made to the Company's capital in 2019.

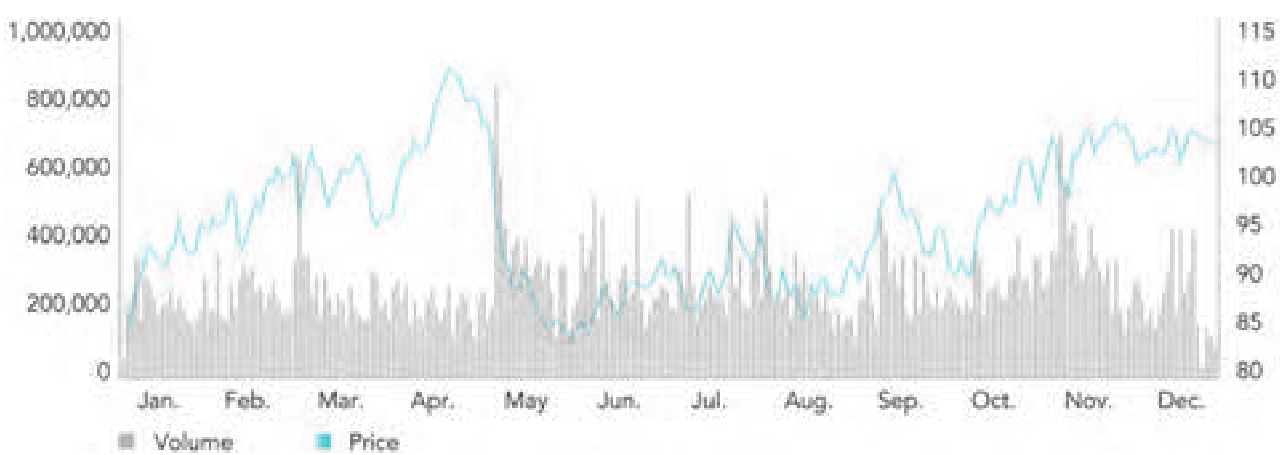
2.2. Solvay Shares

Solvay (SOLB.BE) is listed on Euronext Brussels, its primary listing stock exchange. Solvay has a secondary listing on Euronext Paris. Solvay shares are also traded over the counter (OTC) as a Level 1 sponsored American Depository Receipt (ADR) through Citibank, since October 1, 2016.

Solvay's stock is a constituent of the BEL20, the main Belgian index. In September 14, 2018 it became part of the Next20 index following the exit from the CAC40 index. The Group is still considered to be the largest (specialty) chemicals company on the Paris stock exchange. Solvay shares are part of other major indexes including the BEL Chemicals, STOXX family (DJ STOXX and DJ Euro STOXX), MSCI index, Euronext 100, Dow Jones Sustainability TM World Index, and FTSE4Good Index.

During 2019, the average share price (at end of day close) was €95.7 while the 52-week range was €84.1 – €110.8 per share. Average daily trading volume as reported by Euronext was 256,047 shares in 2019, compared to 277,313 shares in 2018.

Solvay share prices and trading volumes from January 1, 2019 to December 31, 2019

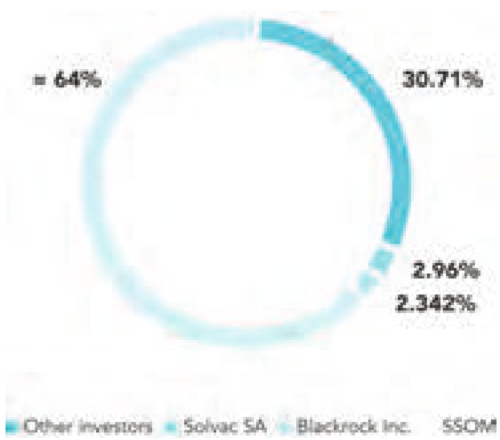


2.3. Shareholders

2.3.1. Shareholder Structure

The chart below represents Solvay's shareholder structure as of December 31, 2019, based on the notifications made by its shareholders. These transparency notifications are required by Belgian law or pursuant to Solvay's bylaws, when the shareholding crosses the thresholds of 3%, 7.5% or any multiple of 5%.

Shareholder structure



The latest declarations received by Solvay in 2019:

- Solvac SA gave notice that it held 30.71% of Solvay's capital on March 28, 2018.
- Solvay Stock Option Management SRL notified Solvay, through Solvac SA, that its shareholding amounted to 2.342% on March 28, 2018.
- Blackrock Inc., an institutional investor, gave notice on November 27, 2019, that it holds a 2.96% interest.

The remaining shares for approximately 64% are thereby held by institutional and retail shareholders.

At the Ordinary Shareholders' Meeting held on Tuesday, May 14, 2019, shares were deposited and votes casted in respect of 63.40% of Solvay SA's capital.

Solvac

Solvay's major shareholder is Solvac SA, which holds more than 30% of Solvay's share capital. Solvac SA is a public limited liability company established under Belgian law, founded in 1983 and its assets consist exclusively of the Solvay shares.

Solvac's shares are traded on Euronext Brussels. It has approximately 13,000 shareholders. Among them, more than 2,300 persons are related to the founding families of Solvay, which combined hold approximately 77% of the Solvac shares.

Solvac has proven that the long-term success of the Company for the benefit of all shareholders has been, and continues to be, the primary purpose of their involvement. This long-term focus is essential for sustained success in our industry. The Board believes that our ownership structure has helped insulate our Company from business cycles and related short-term pressures, while allowing the Board and senior management to focus on our long-term success.

Solvac's CEO, Bernard de Laguiche, is a non-independent and non-executive director on Solvay's Board of Directors.

The percentage of capital and the number of shares owned by Solvac SA are published on Solvay's website.

Solvay Stock Option Management

Solvay Stock Option Management SRL, is an indirect subsidiary of Solvay, and holds 2.342% of Solvay's capital through shares and purchase options combined. These are held as part of the Group's strategy to hedge the risk linked to stock options granted by Solvay to senior executives of the Group.

2.4. Relations with investors and analysts

Solvay facilitates an open dialog with the investment community to build long-term relationships. Following the guidelines issued by the FSMA (Belgian Financial Services and Markets Authority) it complies with disclosure obligations defined by Belgian law and contained in the Market Abuse Regulation (MAR).

Solvay provides accurate information in a transparent, timely, and meaningful manner to help the investment community understand Solvay's business and strategy, leading to a fair valuation by the market. Extensive information about Solvay's business operations, strategy, and financial performance may be found in a wide variety of regulatory and other publications, such as the Annual Integrated report, financial reports and press releases, as well as on the company's website (www.solvay.com).

The investor relations team is readily accessible by the investment community via email or phone throughout the year. Executive Committee members and the investor relations team also directly interact with various members of the investment community throughout the year via roadshows and investor conferences.

On November 7 2019, Ilham Kadri, CEO released Solvay's G.R.O.W. strategy, with a clear objective of unleashing the Group's full potential and accelerating value creation. The value will be generated through differentiated resources allocation and distinct business mandates (Materials, Chemicals and Solutions) together with transversal initiatives enabled by our new Operating Model, Solvay One.

2.4.1. Interactions with Solvac and Solvay founding families

Solvay has regular meetings with its major shareholder Solvac. Solvay gives presentations to Solvac's Board of Directors and participates to events organized by the founding family shareholders. All these interactions are based on public information and new presentation material is always shared on Solvay's website.

In 2019, Solvay's management representatives participated at three Solvac board meetings and participated at five events organized by Solvay's founding families.

2.4.2. Interactions with institutional investors

Solvay undertakes specific actions to interact with institutional investors. Roadshows are organized with Executive Committee members and Investor Relations representatives. They attend investor conferences around the world. The resulting face-to-face interactions enable dialog with the investment community on Solvay's strategy and business performance.

In 2019, Solvay participated in 37 events (among which 17 interactions were with senior management), consisting of 13 roadshows and 24 conferences in countries across Europe, America and Asia, as well as reverse roadshows at Solvay's offices.

2.4.3. Interactions with sell-side analysts

Solvay is covered by 24 sell-side analysts who publish active research on the stock. The up-to-date list of covering analysts can be found on Solvay's website.

Besides the regular individual meetings, emails, phone contacts, Solvay organizes quarterly conference calls between Executive Committee members and the sell-side analysts base following the Group's results publication. Although specifically geared to analysts, these conference calls are accessible live to all investors and available through replay or transcript on Solvay's website afterwards. Twice a year, following full and half year results, Solvay also organizes face-to-face meetings in London and Brussels.

2.4.4. Interactions with individual investors

Every investor has access to clear, comprehensive, transparent information tailored to his or her individual needs through a dedicated Shareholders' corner (available in French, Dutch and English). Every investor can also subscribe to the Solvay Investors' Club. In addition the Solvay Investors Relation team (investor.relations@solvay.com) and Solvay Service (shareholders@solvay.com) responds to all queries and requests for information and services.

In 2019, Solvay participated to six conferences including three investors' events in Belgium (in Brussels and Antwerp) and in France (Paris).

Solvay also engages with private banks, regularly interacting with their analysts and occasionally participates in their events dedicated to private investors.

3. Board of Directors and Board Committees

The Charter defines the role and mission, functioning, size, composition, training, and evaluation of the Board of Directors. The internal rules of the Board of Directors are attached to the Charter.

3.1. Board of Directors

3.1.1. Structure and composition

As at December 31, 2019 the Board was composed of 15 Directors:

- 14 of the 15 directors on the Board are non-executive,
- 10 of the 15 directors have been recognized as independent by the Ordinary Shareholders' Meeting, according to the criteria defined by the Belgian law and further refined by the Board of Directors,
- Directors represent seven different nationalities; and 46,6% are women.

Board meeting attendance is 94,66%.

- The mandates of Ms. Marjan Oudeman and Mr. Charles Casimir-Lambert were renewed for a four-year term at the Ordinary Shareholders' Meeting of May 14, 2019. These mandates will expire at the end of the Ordinary Shareholders' Meeting to be held in May 2023,
- Mr. Yves-Thibault de Silguy left the Board at the Ordinary Shareholders' Meeting of May 14, 2019, and has not been replaced,
- The Shareholders' Meeting of May 14, 2019 confirmed the appointment of Ms. Ilham Kadri as a Board member in replacement of Mr. Jean-Pierre Clamadieu. Ms. Ilham Kadri will complete the mandate of Mr. Jean-Pierre Clamadieu according to article 16 of the Solvay By-Laws until the Ordinary Shareholders' Meeting of 2021.

At the end of the Ordinary Shareholders' Meeting of Tuesday, May 12, 2020, the mandate of Jean-Marie Solvay will expire.

Mr. Jean-Marie Solvay is not a candidate for a term renewal and will be replaced by Ms. Aude Thibaut de Maisières.

At the same Ordinary Shareholders' Meeting of Tuesday May 12, 2020, it will be proposed to replace Mr. Jean-Marie Solvay by Ms. Aude Thibaut de Maisières.

Year of first appointment   Presence at Board meetings in 2019

Nicolas Boël
Belgian
Non independent Director
1998   10/10

Born in: 1962

Solvay SA mandates: Chairman of the Board of Directors, Chairman of the Finance Committee, Chairman of the Compensation Committee, Member of the Nomination Committee.

Directorship expiry date: 2021

Diplomas: MA in Economics (Université catholique de Louvain, Belgium). Master of Business Administration (College of William and Mary, Virginia, US).
Activities outside Solvay: Director of Sofina.

Year of first appointment | Presence at Board meetings in 2019

Jean-Pierre Clamadieu
French
Non independent Director
2012 | 1/1

Born in: 1958

Solvay SA mandates: Chairman of the Executive Committee and CEO, Director and Member of the Finance Committee.

Directorship expiry date: 2019

Diplomas: Engineering degree from the École des Mines (Paris, France).
Activities outside Solvay: Director of Axa, Airbus. Chairman of Cytec Industries Inc. Chairman of Engie SA. Chairman of the Opéra de Paris.

Ilham Kadri
French
Non independent Director
2019 | 9/9

Born in: 1969

Solvay SA mandates: Chairman of the Executive Committee, Director, Member of the Finance Committee.

Directorship expiry date: 2021

Diplomas: Degree in chemical engineering from l'Ecole des Hauts Polymères in Strasbourg, PhD in macromolecular physico-chemistry from Strasbourg's Louis Pasteur Uiversity.
Activities outside Solvay: Board member at A.O. Smith (US).

Bernard de Laguiche
French/Brazilian
Non independent Director
2006 | 10/10

Born in: 1959

Solvay SA mandates: Member of the Executive Committee until September 30, 2013, Director, Member of the Finance Committee & Member of the Audit Committee since May 13, 2014.

Directorship expiry date: 2021

Diplomas: MA in Economics and Business Administration, HSG (Universität St. Gallen, Switzerland). MBA in Agribusiness, University of São Paulo (USP ESALQ).
Activities outside Solvay: Managing Director of Solvac SA. Chairman of the Board of Peroxidos do Brazil Ltda, Curitiba (Brazil). Mandates in non listed companies in Brazil and Europe.

Jean-Marie Solvay
Belgian
Non independent Director
1991 | 10/10

Born in: 1956

Solvay SA mandates: Director, Member of the Innovation Board, Member of the Compensation and Nomination Committees since March 2018.

Directorship expiry date: 2020

Diplomas: Advanced Management Programme – Insead.
Activities outside Solvay: Chairman of the Board of the International Solvay Institutes. Member of the Board of the Innovation Fund, Brussels. CEO of Albrecht RE Immobilien GmbH & Co. KG., Berlin (Germany).

Year of first appointment   Presence at Board meetings in 2019

Charles Casimir-Lambert
Belgian
Non independent Director
since May 12, 2019
2007   10/10

Born in: 1967

Solvay SA mandates: Independent Director (since May 12, 2019 he is no longer an Independent Director), Member of the Audit Committee.

Directorship expiry date: 2023

Diplomas: MBA Columbia Business School (New York, USA)/London Business School (London, UK). Master's degree (lic.oec.HSG) in Economics, Management and Finance (Universität St. Gallen, Switzerland).
Activities outside Solvay: Management of family's global interests.

Hervé Coppens d'Eeckenbrugge
Belgian
Independent Director
2009   10/10

Born in: 1957

Solvay SA mandates: Independent Director, Member of the Finance and Audit Committees.

Directorship expiry date: 2021

Diplomas: MA in Law from the Université catholique de Louvain (Belgium). Diploma in Economics and Business, ICHEC (Belgium).
Activities outside Solvay: Until June 30, 2013, Group Director Petercam SA, Director of Vital Renewable Energy Company LLC (Delaware). Independent Director, VISONARITY AG (Basel, Switzerland) until April 2018.

Yves-Thibault de Silguy
French
Independent Director
2010   3/3

Born in: 1948

Solvay SA mandates: Independent Director, Member of the Compensation Committee and Chairman of the Nomination Committee, Member of the Finance Committee.

Directorship expiry date: 2019

Diplomas: MA in Law from the Université de Rennes (France). DES in public law from Université de Paris I (France), graduate of the Institut d'Études Politiques de Paris and the École Nationale d'Administration (France).
Activities outside Solvay: Former European Commissionner of the Economics, Monetary and Financial Affairs (1995-1999). Director and Vice-Chairman of the Board of the Vinci Group. Director of LVMH. Chairman of the Supervisory Board of Sofisport (France). Director of VTB bank (Moscow, Russia) and Chairman of YTSeuropaconsultants.

Year of first appointment | Presence at Board meetings in 2019

Evelyn du Monceau
Belgian
Independent Director
2010 9/10

Born in: 1950

Solvay SA mandates: Independent Director, Member of the Compensation and Nomination Committees.

Directorship expiry date: 2021

Diplomas: MA in Applied Economics from the Université catholique de Louvain (Belgium).
Activities outside Solvay: Chair of the Board and Chair of the Governance Nomination and Compensation Committees of UCB SA. Member of the Board of Directors of La Financière de Tubize SA. Member of the Corporate Governance Commission.

Françoise de Viron
Belgian
Independent Director
2013 10/10

Born in: 1955

Solvay SA mandates: Independent Director, Member of the Compensation and Nomination Committees.

Directorship expiry date: 2021

Diplomas: Doctorate of Science (Université catholique de Louvain, Belgium). Master in Sociology (Université catholique de Louvain, Belgium).
Activities outside Solvay: Professor at the Faculty of Psychology and Education Sciences and Louvain School of Management (Université catholique de Louvain, Belgium). Academic Member for Center in Research Entrepreneurial Change and Innovative Strategies, and of the Interdisciplinary Group for Research in Socialization, Education and Training, of the Interdisciplinary Research Group in Adult Education at the Université Catholique de Louvain (Belgium). Chairman and Director of AISBL EUCEN – the European Universities Continuing Education network.

Amparo Moraleda Martinez
Spanish
Independent Director
2013 9/10

Born in: 1964

Solvay SA mandates: Independent Director, Member of the Compensation and Nomination Committees.

Directorship expiry date: 2021

Diplomas: Degree in Industrial Engineering, ICAI (Universidad Pontifica Comillas, Spain) PDG. IESE Business School (Universidad de Navarra, Spain).
Activities outside Solvay: Former General Manager of IBM Spain, Portugal, Greece, Israel and Turkey. Former Chief Operating Officer International Division (Spain) and Acting CEO, Scottish Power (UK) part of Iberdrola Group. Member of the Boards of the following listed companies: Airbus SE (The Netherlands), Faurecia (until oct.2017) (France), Caixabank SA (Spain), Vodafone plc (UK). Member of the Consejo rector of Consejo Superior of Investigaciones Cientificas. Member of the Spanish Royal Academy of Economics and Financial Sciences.

Year of first appointment   Presence at Board meetings in 2019

Rosemary Thorne
British
Independent Director
2014 10/10

Born in: 1952

Solvay SA mandates: Independent Director, Member of the Audit Committee (Chairman since May 2018).

Directorship expiry date: 2022

Diplomas: Honours Degree in Mathematics and Economics from the University of Warwick (UK). Fellow of the Chartered Institute of Management Accountants FCMA and CGMA. Fellow of the Association of Corporate Treasurers FCT.
Activities outside Solvay: Former Chief Financial Officer of J. Sainsbury, Bradford & Bingley, and Ladbrokes (UK). Member of the Board and Chair of Audit Committee of Merrill Lynch International (UK). Former Independent Director of Royal Mail Group, Cadbury Schweppes, Santander UK, First Global Trust Bank (all UK) and Smurfit Kappa Group (Ireland).

Gilles Michel
French
Independent Director
2014 8/10

Born in: 1956

Solvay SA mandates: Independent Director, Member of the Finance Committee, Member of the Compensation and Nomination Committees since March 2018.

Directorship expiry date: 2022

Diplomas: École Polytechnique (France). École Nationale de la Statistique et de l'Administration Économique (ENSAE) (France). Institut d'Études Politiques (IEP).
Activities outside Solvay: Former CEO Ceramics & Plastics, Saint-Gobain, France. Former member of the Management Board, PSA, France. Former CEO, Fonds stratégique d'Investissement (FSI), France. Former Chairman & CEO, Imerys, France (listed); Former non executive Chairman of the Board. Independent Director IBL Ltd, Valeo: Independent Director.

Marjan Oudeman
Dutch
Independent Director
2015 9/10

Born in: 1958

Solvay SA mandates: Independent Director, Member of the Audit Committee since May 12, 2015.

Directorship expiry date: 2023

Diplomas: Law degree, Rijksuniversiteit Groningen (the Netherlands). Masters Degree in Business Administration, Simon E. Business School, University of Rochester (New York, USA), and Erasmus Universiteit Rotterdam (the Netherlands).
Activities outside Solvay: Former member of the Board of Exco, Tata Steel and Akzo Nobel. Former executive President of Utrecht University. Former member of the Board of Statoil ASA (now known as Equinor ASA), ABN Amro. Chairman of the Board of Ronald McDonald Children's Fund. Member of the Supervisory Board of the Rijksmuseum, the Netherlands. Member of the Supervisory Board of Aalberts Industries NV and SHV Holding NV. Board member of UPM-Kymmene Corporation and PJSC Novolipetsk steel.

Year of first appointment   Presence at Board meetings in 2019

Agnès Lemarchand
French
Independent Director
2017 9/10

Born in: 1954

Solvay SA mandates: Independent Director, Member of the Audit Committee.

Directorship expiry date: 2021

Diplomas: Ecole Nationale Supérieure de Chimie de Paris (France). Chemical engineering degree from MIT (Boston, US). MBA degree from INSEAD.
Activities outside Solvay: Former CEO IBFbiotechnics, Rhône-Poulenc (France). Former CEO Prodical, Ciments-Français, (France). Former CEO Lime Division, Lafarge (France). Former Executive Chairman of Steetley Dolomite Ltd (UK). Independent Director of the following listed companies : CGG Veritas (until Oct 2017) (USA/France), Compagnie de SaintGobain (France), BioMérieux (France).

Matti Lievonen
Finnish
Independent Director
2018 9/10

Born in: 1958

Solvay SA mandates: Independent Director.

Directorship expiry date: 2022

Diplomas: BSc (Eng.), Savonia University of Applied Science. EMBA, Aalto University. DSc (Tec.) h.c Aalto University.
Activities outside Solvay: CEO, Oiltanking GmbH. Chairman of the Board of Fortum. Vice Chairman of the Board of SSAB. Member of the Shareholder Committee of Wintershall Dea.

Philippe Tournay
Belgian
Independent Director
2018 9/10

Born in: 1959

Solvay SA mandates: Independent Director.

Directorship expiry date: 2022

Diploma: MA in economics LSM-UCL (Université Catholique de Louvain, Belgium).
Activities outside Solvay: Presa SA Owner & Managing Director (since 2003). Fondation Tournay Solvay, Vice Chairman (since 2007).

3.1.2. Director skills and qualification Matrix

The Board of Directors members collectively bring a wide set of competences required by the Group's activities.

These competences range from strong experience of international industries and markets, for many of them at executive level, to functional domains like human resources.

The qualifications and expertise of the directors are presented in a Board Skills Matrix which can be found below:

	Chemical Industry expertise	Financial expertise	Corporate manage-ment	Industrial expertise	Research & develop-ment	Digital/IT expertise	Sustainable develop-ment	Human resources	Inter-national experience
Nicolas Boël		x	x				x	x	
Ilham Kadri	x	x	x	x	x		x	x	x
Bernard de Laguiche	x	x	x	x			x		x
Jean-Marie Solvay	x		x		x		x	x	
Charles Casimir-Lambert	x	x	x				x	x	x
Hervé Coppens d'Eeckenbrugge	x	x	x				x	x	
Evelyn du Monceau	x	x	x				x	x	
Françoise de Viron	x		x		x	x	x	x	
Amparo Moraleda Martinez	x		x	x			x		
Rosemary Thorne		x	x				x		x
Gilles Michel	x	x	x	x			x		
Marjan Oudeman	x	x	x	x			x	x	x
Agnès Lemarchand	x	x	x	x			x		
Matti Lievonen	x	x	x	x		x	x		x
Philippe Tournay	x	x	x				x		

3.1.3. Functioning of the Board of Directors

In 2019, the Board held ten meetings. Each director's attendance is shown in the table in section 3.1.1. Structure and composition.

The Board of Directors' discussions, reviews, and decisions were focused on the annual review of Group strategy, strategic projects (acquisitions, divestments, capital expenditures, etc.), quarterly financial reporting, approving quarterly financial statements and proposing a dividend to the Ordinary Shareholders' Meeting, Board Committees reports, corporate social responsibility and sustainability policy, risk management, compensation policy and the long-term incentive plan, Board and management succession planning (reviewed periodically), intra group restructuring, and the reports and resolution proposals to the Shareholders' Meeting.

In particular, the year 2019 was marked by the transition with the new CEO, Ms. Ilham Kadri who took the helm on March 1st. She underwent with the Executive Committee an in-depth Group's strategic review that resulted in new specific mandates and targets for the various Global Business Units (GBUs). The Operating model of the Group was adapted accordingly, based on delegation and accountability of the Solvay Leadership Team (ExCom, Heads of GBUs and Functions) . The Group Purpose definition exercise was also launched with the objective to involve all the employees.

All this was done in close, open and transparent dialogue with the Board of Directors which was associated to each major step.

Application of article 523 of the Companies Code:

Art 523 of the Belgian Companies Code was applied by the Board of February 26, 2019 in the context of the decisions relating to the CEO remuneration:

"Prior to any discussion or decision by the Board of Directors on this agenda item, Jean-Pierre Clamadieu stated that he has a direct financial interest in carrying out the Board's decision on his 2018 Bonus.
In accordance with Article 523 of the Belgian Companies Code, Jean-Pierre Clamadieu withdrew in order not to attend the Board's deliberations on this decision and not to take part in the vote.
The Board has established that Article 523 of the Belgian Companies Code is applicable to this decision.
Bonus 2018: The Board has an exchange on the 2018 performance of the CEO and on the score to be attributed to each of the individual and collective objectives. In line with the recommendation of the Compensation Committee, the Board sets the 2018 STI of the CEO at 133.5% of its Base Salary i.e. €1,602,000.
The Board congratulates Mr. Jean-Pierre Clamadieu for the results achieved in 2018."

As from January 1, 2020, article 523 of the Companies Code has been replaced by article 7:96 of the Code of Companies and Associations.

3.1.4. Evaluation

Board evaluations are undertaken every two to three years with the objective to identify how it can improve its own functioning and better follow best practices. They focus primarily on the Board composition (including diversity and skills considerations), its functioning, disclosures and interactions with executive management, and the composition and functioning of the Committees it creates.

Due to the transition in the management and the appointment of the new CEO, an internal evaluation based on an external questionnaire was launched in 2019. It focused on any areas raised for further improvement in the prior year evaluation and how the Board handled the transition with the new CEO and the related topics in 2019 (see above 3.1.3).

3.1.5. Training

An Induction Program is in place for the new Directors and open to each Director who wishes to participate.

The program includes a review of the Group's strategy and activities and of the main challenges in terms of growth, competitiveness and innovation, as well as finance, research & innovation, human resources management, legal context, corporate governance, compliance and the general organization of operations.

Site visits are also part of the programme, combining meetings with management and local teams, business presentations and field tours.

In 2019, the Board made a one week trip to the USA with a focus on Specialty Polymers and Composite activities. The Directors met local operational teams as well as leadership teams and young talents. These site visits gave the opportunity to the Board members to connect with Solvay's industrial and R&I team and to take the Group's pulse from the ground.

Every year the Board dedicates a specific session to an update on trends in global sustainable development issues (the Group's strengths and weaknesses, including climate change risks and opportunities) that impact the Group, its actions, and its performance – including progress on Solvay's five priorities, ratings by sustainable rating agencies, the Solvay Way auto-evaluation, and the Integrated Report.

The setting up of a new ambition for sustainability to create a shared and sustainable future for all at Solvay has been discussed this year.

3.2. Board committees

The Board of Directors has set up the following permanent Committees: Audit Committee, Finance Committee, Compensation Committee, and Nominations Committee.

The terms of all the various Committee members expire on May 12, 2020.

	Independent Director	Audit Committee	Finance Committee	Compensation Commitee	Nomination Committee
Mr. Nicolas Boël			Chairman Attendance: 4/4	Chairman Attendance: 2/2	Member Attendance: 6/6
Ms. Ilham Kadri			Member (1)* Attendance: 3/3		
Mr. Jean-Pierre Clamadieu			Member (2)* Attendance: 1/1		
Mr. Bernard de Laguiche		Member Attendance: 6/6	Member Attendance: 4/4		
Mr. Jean-Marie Solvay				Member: Attendance: 2/2	Member Attendance: 6/6
Mr. Charles-Casimir Lambert	(5)*	Member Attendance: 6/6			
Mr. Hervé Coppens d'Eeckenbrugge	X	Member Attendance: 6/6	Member Attendance: 4/4		
Mr. Yves-Thibault de Silguy	X		Member (3)* Attendance: 2/2	Member (3)* Attendance: 1/1	Member (3)* Attendance: 2/2
Ms. Evelyn du Monceau	X			Member Attendance: 2/2	Member Attendance: 4/6
Ms. Françoise de Viron	X			Member Attendance: 2/2	Member Attendance: 6/6
Ms. Amparo Moraleda Martinez	X			Member Attendance: 2/2	Chairwoman (4)* Attendance: 6/6
Ms. Rosemary Thorne	X	Chairwoman Attendance: 6/6			
Mr. Gilles Michel	X		Member Attendance: 4/4	Member Attendance: 2/2	Member Attendance: 5/6
Ms. Marjan Oudeman	X	Member Attendance: 6/6			
Ms. Agnès Lemarchand	X	Member Attendance: 6/6			
Mr. Matti Lievonen	X		Member Attendance: 3/4		
Philippe Tournay	X				

(1)* from March 1, 2019
(2)* until March 1, 2019
(3)* until May 12, 2019
(4)* since May 12, 2019
(5)* since May 12, 2019 he is no longer an independent director

3.2.1. The Audit Committee

Composition:

- All members are non-executive directors, a majority of whom are independent.
- The members must fulfill the competency criterion by virtue of the training and the experience they gained in previous functions (see section 3.1.1. regarding the composition of the Board of Directors).
- The secretary is a member of the Group's internal legal department.

Meetings:

- Six in 2019, including four before the Board meetings scheduled to consider the publication of periodic results (quarterly, semiannual and annual).
- Meeting attendance was 100%.

Activities:

- Review and consider reports from the Chief Financial Officer, the head of the Group Internal Audit, and the auditor in charge of the external audit (Deloitte, represented by Mr. Michel Denayer and Ms. Corine Magnin).
- During the period under review, the Audit Committee reviewed the independence and effectiveness of the external auditor, Deloitte.
- Examine the quarterly report by the Group General Counsel on significant ongoing legal disputes and reports on tax and intellectual property disputes.
- Meet with the auditor in charge of the external audit whenever such a meeting is deemed useful.
- Monitor and assess risk exposure as well as the effectiveness of internal controls and mitigation plans.
- Meet once a year with the Chairman of the Executive Committee and CEO (Ms. Ilham Kadri); all other Board members are invited on that occasion to discuss the major risks facing the Group.

3.2.2. The Finance Committee

Composition

- Six members,
- Mr. Karim Hajjar (Executive Committee member and CFO) is invited to attend the Finance Committee meetings.
- The Secretary is Mr. Michel Defourny, Group Corporate Secretary.

Meetings:

- This Committee met four times in 2019.
- Attendance was 93%.

Activities

- Gives an opinion on financial matters such as the amounts of the interim and final dividends, the levels conditions and currencies of indebtedness, monitoring the credit strength of the Group's balance sheet, hedging foreign exchange and risks, the hedging policy for the long-term incentive plans, the content of financial communication, and financing major investments.
- Finalizes the preparation of the press releases announcing the Group's results.
- When called upon, it gives opinions on Board policies on the above matters.
- Makes recommendations to the Board of Directors.

3.2.3. The Compensation Committee

Composition:

- The majority of members are non-executive independent directors.
- The Compensation Committee has the expertise necessary to perform its mission.
- The Chairwoman of the Executive Committee is invited to each meeting, except in the case of matters that concern her personally.
- The Secretary is Mr. Michel Defourny, Group Corporate Secretary.

Meetings:

- Meetings are prepared by the Group General Manager Human Resources, who attends the meetings.
- Two meetings were held in 2019.
- Meeting attendance was 100%.

Activities:

The Compensation Committee fulfills the duties imposed on it by Article 526 quarter, of the Companies Code (as from January 1, 2020, this article has been replaced by article 7:100 of the Code of Companies and Asoociations). It advises the Board of Directors on:

- The preparation of the Company's compensation policy and compensation report,
- The compensation levels for members of the Board of Directors and the Executive Committee,
- The Chairwoman of the Executive Committee's compensation, short-term incentives and long-term incentives, and performance assessment,
- The allocation of long-term incentives (performance share units and stock options) to the Company's senior management.

It prepares the annual compensation report for the Corporate Governance Statement and receives a yearly report about the compensation of General Management.

3.2.4. The Nominations Committee

Composition:

- The majority of members are non-executive independent directors.
- The Chairwoman of the Executive Committee is invited to meetings, except in the case of matters that concern her personally.
- The Secretary is Mr. Michel Defourny, Group Corporate Secretary.

Meetings:

- Six meetings were held in 2019.
- Meeting attendance was 90%.

Activities:

The Nomination Committee gives its opinion on the composition and appointments to the Board of Directors (chairwoman, new members, renewals, and committees), to Executive Committee positions (chairwoman and members), and to general management positions.

4. Executive Committee

The role, responsibilities, composition, procedures and evaluation of the Executive Committee are described in detail in the Charter. In addition, the internal rules of the Executive Committee are attached to the Charter.

As at December 31, 2019, the Executive Committee was composed of the following six members.

Year of first appointment   Presence at meetings in 2019

Ilham Kadri
French
2019 13/13

Born in: 1969

Term of office ends: 2021

Diplomas and main Solvay activities: Degree in chemical engineering from l'Ecole des Hauts Polymères in Strasbourg. PhD in macromolecular physico-chemistry from Strasbourg's Louis Pasteur University.

Vincent De Cuyper
Belgian
2006 13/13

Born in: 1961

Term of office ends: 2020

Diplomas and main Solvay activities: Chemical engineering degree (Catholic University of Leuven). Master's in Industrial Management (Catholic University of Leuven). AMP Harvard Executive Committee member.

Karim Hajjar
British
2013 13/13

Born in: 1963

Term of office ends: 2021

Diplomas and main Solvay activities: BSC (Hons) Economics (The City University, London). Chartered Accountancy (ICAEW) Qualification. Executive Committee member and CFO.

Year of first appointment   Presence at meetings in 2019

Hua Du
Chinese
2018 13/13

Born in: 1969

Term of office ends: 2020

Diplomas and main Solvay activities: BS Chemistry (Being University) PhD. Organic Chemistry (University of Illinois, UrbanaChampaign), Comex member.

Augusto Di Donfrancesco
Italian
2018 13/13

Born in: 1959

Term of office ends: 2020

Diplomas and main Solvay activities: Gratuated from Pisa University with a Master's degree in Chemical Engineering, Senior Executive program from London Business School. Comex Member Solvay, Member of the Plastics Europe steering Board.

Hervé Tiberghien
French
2019 5/5

Born in: 1964

Term of office ends: 2022

Diplomas and main Solvay activities: Master in Human Resources, HEC St Louis, Brussels, Belgium.

During the year 2019, the following changes occurred:

- Jean-Pierre Clamadieu left the Group on March 1, 2019 and was replaced by Ms. Ilham Kadri who was appointed as Deputy CEO on January 1, 2019 and CEO on March 1, 2019.
- Cécile Tandeau de Marsac left the Executive Committee on April 1 , 2019 and has been replaced by Hervé Tiberghien on September 1, 2019.
- Pascal Juéry left the Executive Committee on April 1, 2019.

On October 1, 2019, the Board of Directors renewed for a two-year term the mandate of Karim Hajjar. His mandate will expire in October 2021.

On December 11, 2019, the Board of Directors renewed the mandates of MM Hua Du and A. Didonfrancesco for a two-year term ending on March 1st, 2022, as well as the mandate of Mr. V. De Cuyper for a two- year term ending on April 1st, 2022.

5. Compensation report

Introduction and updates

Smooth transition with the new CEO

Solvay's Board of Directors appointed Ms. Ilham Kadri as Chairman of the Executive Committee, member of the Board of Directors and CEO of the Group, with effect from March 1, 2019. On that date, Ms. Ilham Kadri officially succeeded Mr. Jean-Pierre Clamadieu, who then relinquished his executive duties and his mandate as Director of Solvay. Ms. Ilham Kadri joined Solvay on January 1, 2019 and spent two months transitioning with Mr. Jean-Pierre Clamadieu, before taking the leadership and continuing Solvay's transformation strategy.

Shareholders engagement and aligning remuneration with shareholder expectations

Solvay continues to actively reach out to shareholders to discuss its approach to governance, including remuneration matters. Such exercise forms part of the Company's ongoing shareholder engagement program, which Solvay will continue to undertake as part of its commitment to build upon this constructive dialog with its shareholders. Solvay's executive Compensation policy and Compensation report, bolstered by increased disclosure, was supported by 96.7% of its shareholders at last year's Annual General Meeting.

The increased disclosure in this year's Compensation Report reflects the input received from Solvay's shareholders over the years as well as developments in the legislative framework towards further transparency on remuneration matters, including disclosure regarding remuneration of Executive Committee members, principles and performance of short-term and long-term incentives. Detailed changes are disclosed in appropriate sections of the Compensation Report.

In consideration of Solvay's new G.R.O.W. strategy and new purpose statement, the Compensation Committee has reviewed the performance measures used to incentivize executive leaders to ensure they are aligned with the new strategic direction of the Company effective January 2020.

Solvay believes that the increased disclosure, together with the existing compensation practices and aligning the performance measures with the renewed strategic direction, will result in a compensation structure that incentivizes the executive team on delivery of sustained long-term performance in line with the Company's strategy and shareholders' interests.

5.1. Governance

The Compensation Report for the corporate governance has been prepared by the Compensation Committee.

5.2. Board of Directors compensation

Solvay SA directors are remunerated with fixed emoluments, the common basis of which is set by the Ordinary Shareholders' Meeting, and any complement thereto by the Board of Directors on the basis of Article 26 of the bylaws, which states that:

- "Directors shall receive emoluments payable from overhead costs.
- The Shareholders' Meeting shall determine the amount and terms of payment.
- That decision shall stand until another decision is taken.
- The Board of Directors shall be authorized to grant directors with special duties (the Chairman, vice-Chairmen, directors charged with day-to-day management, members of the Executive Committee) fixed emoluments in addition to those provided for in the above paragraph.
- Each of the Directors responsible for day-to-day management is also entitled to variable compensation determined by the Board of Directors on the basis of their individual results and of the consolidated results of the Solvay Group.
- The sums referred to in the two preceding sub-sections are also paid out of overhead costs".

5.2.1. Board of Directors individual compensation

- The Ordinary Shareholders' Meetings of June 2005 and May 2012 (for Board attendance fee) decided to set directors' pay, starting from the 2005 financial year, as follows:
  - an annual gross fixed compensation of €35,000 per director and additionally an individual attendance fee of €4,000 gross per Board meeting attended,
  - €4,000 gross for members of the Audit Committee and €6,000 gross for its Chairman for each meeting of the committee attended,
  - €2,500 gross per member of the Compensation Committee, Nominations Committee and Financial Committee and €4,000 gross for the Chairmen of these committees for each meeting attended, on the understanding that a director sitting on both the Compensation Committee and the Nominations Committee does not receive double compensation,
  - no attendance fees for the Chairman of the Board, the Chairman of the Executive Committee and the executive directors taking part in these committees.
- For the Chairman of the Board, the Board of Directors used its authorization under Article 26 of the bylaws to grant an additional yearly fixed compensation of €250,000 gross, unchanged since 2012, by reason of the workload and the responsibility attached to this.

- Non-executive directors do not receive variable compensation linked to results or other performance criteria. More specifically, non- executive directors are not entitled to annual bonuses, stock options or performance share units, or to any supplemental pension scheme.
- The Company reimburses directors' travel and expenses for meetings and when they exercise their Board and Board Committee functions.

The Chairman of the Board is the sole non-executive director for whom the Group provides administrative support (including the provision of an office, use of the General Secretariat, and a car). The other non-executive directors receive logistical support from the General Secretariat as and when needed. The Company also provides customary insurance policies covering Board of Directors' activities in carrying out their duties.

The Compensation Committee has not proposed any changes in the current structure of the compensation packages for the Board Members and does not foresee any changes for 2020.

5.2.2. Amount of the compensation and other benefits granted directly or indirectly to directors (executive and non-executive) by the Company or by an affiliated company

Gross compensation and other benefits granted to directors

	2019		2018	
	Total gross amount including fix fees	**Board of Directors and Committees attendance fees**	Total gross amount including fix fees	Board of Directors and Committees attendance fees
N. Boël				
Fixed emoluments + attendance fees	75,000	40,000	75,000	40,000
"Article 26" supplement	250,000		250,000	
Ilham Kadri(1)	65,165	36,000		
J-P. Clamadieu(2)			33,430	21,000
D. Solvay(3)	9,833	4,000	71,000	36,000
J-M. Solvay	90,000	55,000	92,500	57,500
B. de Laguiche	95,000	60,000	83,000	48,000
B. Scheuble(4)	109,000	74,000	109,000	74,000
C. Casimir-Lambert			46,430	34,000
H. Coppens d'Eeckenbrugge	99,000	64,000	99,000	64,000
E. du Monceau	109,000	74,000	101,000	66,000
Y-T. de Silguy(5)	81,000	46,000	100,000	65,000
A. Moraleda	37,935	25,000	148,500	113,500
F. de Viron	92,000	57,000	130,000	95,000
G. Michel	90,000	55,000	93,500	58,500
R. Thorne	89,500	54,500	98,500	63,500
M. Oudeman	111,000	76,000	105,000	70,000
A. Lemarchand	95,000	60,000	99,000	64,000
M. Lievonen	81,000	46,000	42,700	20,000
P. Tournay	71,000	36,000	46,700	24,000
	1,650,433	**862,500**	**1,824,260**	**1,014,000**

(1) From March 1, 2019.
(2) Up to March 1, 2019.
(3) Up to May 8, 2018.
(4) Up to May 8, 2018.
(5) Up to May 14, 2019.

5.3. Executive Committee compensation

5.3.1. Solvay's compensation philosophy

Solvay's compensation policy aims to ensure that its Executive Committee is rewarded according to its performance in contributing to Solvay's long-term objectives of becoming a more resilient, more sustainable, and more innovative multi-specialty Group with high added value and future looking perspective in alignment with the new Group strategy.

The Solvay compensation structure is designed in line with the following principles:

- Total compensation is designed to be competitive in the relevant market and sector, so as to attract, retain, and motivate high caliber executives needed to deliver the Group's strategy and drive business performance.
- Short-term and long-term variable compensation is well balanced, tied directly to the achievement of strategic objectives to drive sustainable performance and recognize excellent results once delivered.
- Compensation decisions are compliant and equitable, and balance cost and value appropriately.

5.3.2. Compensation structure and policy

Every year, the Compensation Committee annually obtains compensation data relating to the international market from Willis Towers Watson, a globally recognized compensation consultant.

Solvay's compensation structure for its Executive Committee is designed in accordance with the "pay-for-performance" approach approved by the Board of Directors, focusing on the Company's short-term and long-term performance. The level and structure of the compensation packages are aligned with market practices for similar functions at comparable companies.

Solvay's frame of reference for assessing relevant competitive practice is a selection of European chemical and industrial manufacturing companies whose international operations, annual revenues, and headcount are reasonably close to its own. The Company periodically reviews the composition of this peer group to ensure that it continues to reflect Solvay's strategic direction.

The peer group is currently composed of 17 European multinational companies incorporated in six different European countries (Belgium, France, Germany, Netherlands, Switzerland, and the UK) and active in the chemical and/or the industrial sectors.

- Air Liquide
- BAE Systems
- BASF
- Bayer
- Covestro (new)
- DSM
- Evonik
- GKN (*)
- Johnson Matthey
- Lanxess
- Michelin
- Rolls Royce
- Saint Gobain
- Syngenta (*)
- Umicore
- Valeo (new)
- Vallourec

Compared to previous year two companies have been excluded from the peer group (Akzo Specialty Chemicals (now known as Nouryon) and Plastic Omnium) as comparative data was not available to Executive Compensation consultant. As such, these two companies have been replaced with Valeo and Covestro as relevant peer companies.

Overall, Solvay seeks to position itself at or around the relevant market median for base salary and benefits. Variable compensation, both short-term and long-term, is designed to provide an opportunity to receive top quartile pay if executives deliver superior performance.

(*) Impacted by recent M&A activities but market data still available.

Compensation structure components:

	Fixed Compensation and Benefits		Short and Long Term Variable Compensation		
	Annual Base Salary	Pension & Benefits	Short Term Incentive (STI)	Performance Share Units (PSU)	Stock Options (SO)
Performance Period			1 year	3 years	3 years following the grant year
Performance Measures			• Underlying EBITDA growth • Free Cash Flow conversion • Solvay ONE Planet progress • Individual Objectives	• Sustained underlying EBITDA growth on YoY basis • ROCE % • Reduction in GHG (CO_2) emissions	Share Price increase

Fixed Compensation and Benefits

Base salary

The base salary reflects the individual's experience, skills, duties, and responsibilities, and the contribution of the individual and role within the Group. It is paid monthly.

Base salary is reviewed annually and may increase considering a number of factors, including: (1) comparable salaries in appropriate comparator groups; (2) changes within the scope of the role; and (3) changes in the Group's size and profile.

Pension and other benefits

The primary purpose of pension and insurance plans is to establish a level of security for Solvay's employees and their dependents with respect to age, health, disability, and death. The benefits offered aim to be market-competitive, driving employee engagement and commitment in Solvay's business.

Short and Long Term Variable Compensation

Short-term incentive Plan (STI) 2019

Short-term incentives are linked partly to Group performance and partly to individual performance to drive and reward the overall annual performance of executives. Their short-term incentives have maximum award limits and are denoted as a multiple of their respective base salaries.

Performance is assessed on an annual basis using a combination of pre-determined Group and individual performance targets relevant to Solvay's strategy and set at the start of the year, as approved by the Compensation Committee. More specifically, the performance measures for 2019 were:

- Group performance measured against annual underlying EBITDA (under a specific Free Cash Flow constraint);
- Group progress towards "Solvay Way" Sustainable Development objectives as further explained below; and
- Individual performance: measured against a set of pre-determined annual objectives, approved by the Board of Directors.

2019-STI performance (Targets and Performance)
Underlying EBITDA

	Threshold	Target	Maximum	Actual achievement	Actual Achievement in %(1)
Underlying EBITDA – Target and Actuals (M€)	2,220	2,420	2,620	2,322	51%

(1) The scores 0% and 200% are defined using a range of –/+200M€ with a target set at 2,420M€. With 2,322 M€ underlying EBITDA achieved in 2019 before polyamide reclassification in discontinued operations, the Economic incentive scores is 51% vs target.

Sustainable development
The sustainable development progress has been measured according to "Solvay Way", our internal referential. It addresses the performance of the main sustainability priorities of the Group (GHG Emissions, Safety, Engagement, Business Solutions, Societal Actions) and other material topics. The overall audited achievement for 2019 is 145% of the target as further detailed in Sustainability Management section of Annual Report.

Individual Performance
Individual performance measures against a set of pre-determined annual objectives, approved by the Board of Directors.

2020 Short Term Incentive (STI) plan
To better align our incentivization structure with the Company's new G.R.O.W. strategy, the Board of Directors on the recommendation of the Compensation Committee has approved the following structure to the STI Plan:

1. Payout of Short Term Incentive plan is dependent on the achievement of the Group's performance at 60% of Total for the CEO and at 70% of Total for the other Members of the Executive Committee and respectively Individual performance weighted at 40% for CEO and at 30% of Total for the other Members of the Executive Committee.
2. Group's Performance in 2020 Financial year will be measured against:
   - Organic EBITDA Growth weighted at 70% of the Group's performance with a minimum and maximum threshold as the most important financial priority for the year;
   - Free Cash Flow conversion weighted at 20% of the Group's performance;
   - Achievement of Solvay ONE Planet initiative (measured using metrics like % of Sustainable solutions in sales, freshwater withdrawal, safety, diversity and others) weighted at 10% of Group performance.
4. As before Individual performance: measured against a set of pre-determined annual objectives, approved by the Board of Directors.

Metrics used to measure performance of the Group are being revised by the Board of the Directors for each financial year considering strategic objectives and priorities of the Group.

Long Term Incentive (LTI)
Long-term incentives consist of a 50/50 mix of stock options (SOP) and performance share units (PSU). Each annual LTI plan is subject to prior Board approval.

Board of Directors has the right to exercise discretion to the LTI award amount for the Members of Executive Committee, both upwards and downwards, of 50% of the target for any new grant.

Such discretion is maintained to ensure the Board of Directors has the flexibility to adjust the award level in the event of unique circumstances and the 50:50 split principle between SOP and PSU grants will be respected.

Stock Options
Under Belgian law, unlike other jurisdictions, taxes on stock options need to be paid by the executives at the time of grant. Taxes paid at the time of grant cannot be recouped if the options do not vest, demonstrating executives' commitment and belief in Solvay's long-term strategy and performance. Therefore Solvay, like other Belgian companies, sets no additional performance criteria for determining the vesting of stock options, which nonetheless need to be held for three full calendar years (options become exercisable on the first day of the 4th year after the grant date) followed with four year exercise period.

The stock option plan gives each beneficiary the right to buy Solvay shares at a strike price corresponding to the fair market value of the shares upon grant.

Every year, the Board of Directors determines the volume of stock options available for distribution, based on an assessment of the economic fair value at grant using the Black Scholes financial formula. The total volume of options available is then allocated to the top executives of the Company based on the importance of their individual contribution/position to the success of the Solvay Group.

- Options are granted at the money (or fair market value),
- Options become exercisable for the first time after three full calendar years following grant,
- Options have a maximum term of eight years,
- Options are not transferable inter vivos,
- The plan includes a bad leaver clause.

Performance Share Units (PSU)

The PSU's ensures alignment with market best practices, helping Solvay to remain competitive to attract, retain, and motivate key executives.

The PSU's are settled in cash and vest after three years from the date of grant only if pre-set performance objectives are met at minimum threshold level. The minimum payout will vary from zero if the "threshold" target is not met, to maximum payout of 120% if "upper (maximum) threshold target is achieved.

Each year, the Board of Directors determines the budget available for distribution based on the average closing Solvay's share prices on the Euronext during the 30 days preceding the grant date. The total volume of PSU available is then allocated to executives of the Company based on their individual contribution/position to delivering Solvay's long-term strategy.

Key features of existing PSU program:

- The plan is purely cash-based and does not encompass any transfer of shares to beneficiaries. As such, it does not dilute the shareholders' interests.
- The vesting of the awards is based on meeting pre-set performance targets (see below).
- The performance period is measured over three years.
- Condition of employment up to achievement of performance targets.
- The plan contains a claw-back provision for a period of three years after the payout in case of erroneous results.
- Payout in cash based on the value of Solvay shares at vesting.

The Board of Directors assesses the achievement of the targets based on the audited results of the Group.

The Board of Directors may use discretion to also re-evaluate the targets set in cases of material change of perimeter or other unexpected circumstances. Where such discretion is applied by the Compensation Committee, which will not be used as a matter of routine, the rationale for the use of such discretion will be disclosed. Additionally, discretion, if used, would be subject to the award limit stated under the Compensation policy.

Effective January 1, 2020 the Board of Directors, on the recommendation from the Compensation Committee, has revised the performance indicators used for future PSU grants to align them with Solvay's G.R.O.W. strategy as well as take into account shareholder input:

- Sustained underlying EBITDA growth metric on year over year basis expressed as a % (40% of the award).
- ROCE % as a measurement of efficiency of capital employed as recommended by the investor community (40% of the award) to replace CFROI.
- Greenhouse Gas emission reduction (20% of the award) as a measurement towards Solvay long term sustainability commitment.

The Board of Directors with an intention has elected to use the Underlying EBITDA growth measurement as part of performance metrics for both Short Term Incentive and Performance Share Unit plans to emphasize the importance of the EBITDA growth as the key priority and driving force towards the financial sustainability and long term profitability of the Company so that short term gain is not delivered at a price of long term results.

2016-18 LTI Performance Share Unit plan performance payout

	Threshold	Target	Maximum	Actual	Actual %	Total actual %
EBITDA Growth – 50%	20%	25%	30%	18%	0	60.00%
CFROI bp – 50%	+50 bp	+80 bp	+100 bp	+108 bp	120.00%	

Payout in 2019

The combination of the performance achievement at 60%, the share price differential (grant share price €77.91 vs. €97.85 share price at vesting), and the total dividends over three years (€10.80 per unit) has generated a payout of 84% of the granted PSU amount.

5.3.3. Chief Executive Officer

The remuneration package of the Chairman of the Executive Committee/CEO, Ms. Ilham Kadri, is in full compliance with Article 520 ter of the Companies' Code and article 7:91 of the new Companies and Associations' Code. It is set by the Board of Directors based on recommendations by the Compensation Committee.

Under Article 520 ter of the Companies Code, taken up in article 7:91 of the new Companies and Associations' Code, from 2011 onwards, in the absence of statutory provisions to the contrary or express approval by the General Meeting of Shareholders, at least a quarter of variable compensation must be based on predetermined performance criteria that are objectively measurable over a period of at least two years, and at least another quarter should be based on predetermined performance criteria that are objectively measurable over a period of at least three years.

CEO Compensation structure

Base salary

The CEO's base salary is € 1.15 million, which was determined at the time of appointment and based on pay level of CEOs in Solvay's defined peer group. The Board of Directors does not foresee a revision to the base salary of the CEO in 2020 as it remains aligned with the market median.

Pension & benefits

Regarding Ms. Ilham Kadri extra-legal pension rights, given her self-employed status in Belgium, the CEO has her own separate contractual agreement, with pension, death-in-service, and disability rules.

She is entitled to the following benefits:

- Defined Contribution Pension plan of ~25% of her total cash at target,
- Disability and life insurance plan,
- Medical plan.

Short-term incentive

The short-term incentive target is set at 100% of base salary, with a maximum of 150%. Payout of short-term incentive is based on the achievement of pre-defined performance targets based on:

- for 50% of the award – the Group's underlying EBITDA (under a specific Free Cash Flow constraint).
- for 10% of the award – the Group's Sustainable Development indicators. These indicators include, progress made on the internal sustainable development reference system, "Solvay Way". The "Solvay Way" defines the Group's approach to sustainability and covers all the Group's management system as detailed in Sustainability Management section of the Annual report.
- for 40% of the award – individual objectives such as revision of the Groups purpose, strategy, portfolio management (divestments/acquisitions), and People Engagement.

The weights of the different performance measures for 2019 was maintained at the same level as the previous CEO.

Long-term incentive

The long-term incentives offered to the CEO comprise a 50/50 mix of stock options and PSU, with an annual economic value target set at 150% of the base salary and a maximum guidance set at 200% of such base salary.

2019 Award

In 2019, the face value of CEO's overall LTI award totaled €1.725 million, in line with her LTI target of 150% of base salary. The actual gain on the PSU at the payout date will depend upon on the level of achievement of the performance targets set under the plan as well as of the performance of Solvay shares on the stock market. The resulting numbers of stock options and PSU are calculated using the Black Scholes model.

	Annual Base	x	Target award	=	Grant Value
LTI PSU award	€ 1,150,000	x	(150% / 2)	=	€ 862,500
LTI Stock Option award	€ 1,150,000	x	(150% / 2)	=	€ 862,500
LTI Total Grant value					€ 1,725,000

The design of the Solvay long-term incentive plan offered to the CEO is subject to the final approval of the Board of Directors. Solvay's commitment to offering its CEO a competitive yet challenging compensation package is demonstrated by the pay mix she is offered, with close to 70% of her pay being subject to the delivery of a sustainable value creation for all stakeholders.

CEO total compensation at target for 2019:

Amount of compensation paid and other benefits granted directly or indirectly to the Chairman of the Executive Committee

Based on the Board of Directors' assessment of the extent to which she achieved her individual pre-set objectives the actual total 2019 compensation package of the Chairman of the Executive Committee was as follows:

Total Remuneration summary of the Chairman of the Executive Committee for 2019

	Fixed Remuneration		Variable Remuneration		Extra-ordinary items	Pension	Total Remuneration
Name of Director, Position Start/End date	Base salary	Other Benefits(2)	One-year variable for 2019	Multi-year variable			
Ilham Kadri, CEO & Chairman of the Executive Committee, Start date: March 1, 2019(1)	1,150,000	154,582	1,361,600	NA	903,591(3) 115,795(4)	662,422	4,347,990
Jean-Pierre Clamadieu, former CEO & Chairman of the Executive Committee, End date: March 1, 2019	200,000	19,540	0	NA	11,490(4) 1,960,000(5)	117,916	2,308,946

(1) Member of Executive Committee as of Jan 1, 2019 and as a CEO as of March 1, 2019.

(2) Long-term benefits (e.g. death-in-service, disability & medical benefits) & benefits in kinds (e.g. company vehicle, tax assistance).

(3) One time compensation for the loss of variable remuneration from past employment due to resignation in 2018 and move to Solvay

(4) One time relocation expenses

(5) Non-Compete as reported in the annual report 2018 and paid in 2019.

Short-term incentive calculation

The annual incentive target remained set at 100% of the base salary, with a maximum of 150%.

Each performance measure can vary from 0% to 200% achievement but the maximum total payout is capped at 150% of the target.

The 2019 STI of the CEO corresponds to 118.4% of her base salary and below the maximum of 150% of base salary, as assessed by the Compensation Committee and approved by the Board. This outcome is the result of:

- Group performance:
  - Underlying EBITDA under cash constraint with an achievement of 51% vs target,
  - Sustainable Development with an achievement of 145% (as explained earlier).
- Individual performance: pre-set annual objectives
  - 196%

Performance Measures		% of the STI	Achievement	Payout factor
Underlying EBITDA (under cash constraint)		50%	51%	25.5%
Sustainable Development		10%	145%	14.5%
Individual Objectives	Strategy and Purpose M&A portfolio Organization development	40%	196%	78.4%
Total		100%		118.4%

STI payout calculation

	Base salary	x	Target incentive	x	Performance factor	=	Final Award
STI	€ 1,150,000	x	100%	x	118.40	=	1,361,600

5.3.4. Remuneration of Other members of the Executive Committee

Pension and other benefits

The Executive Committee members are entitled to retirement, death-in-service, and disability benefits on the basis of the provisions of the plans applicable in their home countries. Other benefits, such as medical care and company cars or car allowances, as well as coverage of expenses related to expatriation and/or relocation due to Executive role, are also provided according to the rules applicable in the host country. The nature and magnitude of these other benefits are largely in line with median market practice.

Short-term incentive

Target in % of base salary	Performance Measures	% of the STI
70%	Underlying EBITDA (under cash constraint)	60%
	Sustainable Development	10%
	Individual Objectives	30%
	Total	100%

The target short-term incentive for the members of the Executive Committee is 70% of base salary, with a maximum of 140% of base salary. Payout of short-term incentive is based on the achievement of pre-defined performance targets as explained in the Compensation policy.

The actual annual incentive can vary from 0% in cases of poor performance to 200% of the target in cases of outstanding collective and individual performance.

Long-term incentive

The Executive Committee members are eligible for Long Term Incentive grant value of €500,000 following the principles explained in the Compensation policy with 50:50 split between Stock Options and Performance Share units. Details of 2019 grant for the Members of Executive Committee are detailled in section 5.4 of this report.

Total amount of compensation paid and other benefits granted directly or indirectly to the other members of the Executive Committee by the Company or an affiliated company

	Fixed Remuneration		Variable Remuneration		Extra-ordinary items	Pension	Total Remuneration
Name, Position Start/End date	Base salary	Other Benefits(2)	One-year variable for 2019	Multi-year variable(3)			
Karim Hajjar, CFO & Executive Committee member	871,242	210,717	200,000	209,151	NA	220,973	1,712,083
Vincent De Cuyper, Executive Committee member	683,643	58,431	310,000	209,151	NA	180,542	1,441,767
Hua Du, Executive Committee member(1a)	628,571	137,615	348,000	167,321	NA	62,857	1,344,364
Augusto Di Donfrancesco, Executive Committee member(1b)	550,000	105,775	328,000	209,151	NA	101,898	1,294,824
Herve Tiberghien, Chief People Officer & Executive Committee member, start date: September 1, 2019	106,933	55,039	80,000	NA	58,703(4)	32,479	333,154
Pascal Juery, Executive Committee member, end date: March 31, 2019	170,453	19,822	NA	NA	NA	41,771	232,046
Cecile Tandeau de Marsac, Executive Committee member, end date: March 31, 2019	113,599	7,847	NA	NA	NA	19,716	141,162
Total	**3,124,441**	**595,246**	**1,266,000**	**794,774**	**58,703**	**660,236**	**6,499,400**

(1a) Expatriate assignment in Belgium; compensation determined in Hong Kong (HKD); exchange rate 1Eur = 8.75 HKD

(1b) Expatriate assignment in Belgium from Italy

(2) Long-term benefits (e.g. death-in-service, disability & medical benefits) & benefits in kinds (e.g. company vehicle, expatriation package expenses, tax assistance).

(3) PSU 2016-2018 paid in June 2019

(4) One time relocation expenses

Statements of compliance of remuneration for Chairman and Members of Executive Committee

Variable compensation consisted of an annual incentive based on the performance achieved relative to pre-set collective Group economic and sustainable development performance objectives, and on the performance of the manager as measured against a set of pre-determined individual objectives.

Executive Committee members receive stock options and performance share units as explained above.

The remuneration package of the members of the Executive Committee is in full compliance with Article 520 ter of the Companies' Code and art 7:91 of the new Companies and Associations' Code.

Executive Committee members' expenses, including those of its Chairman, are governed by the same rules as apply to all Group management staff, i.e. the justification of all business expenses, item by item. Private expenses are not reimbursed. In the case of mixed business/private expenses (e.g. cars), a proportional rule is applied in the same way as to all management staff in the same position.

Pensions and retirement and death-in-service coverage for Executive Committee members are based in principle on the provisions of the schemes applicable to senior executives in their base countries.

In the area of insurance, the Company takes out the same type of cover for Executive Committee members as it does for its senior managers.

5.4. Stock options and PSU allotted in 2019 to Executive Committee members

In 2019, at the proposal of the Compensation Committee, the Board of Directors allotted stock options to approximately 50 Top Group executives. The exercise price amounts to €97.05 per option, with a three-year vesting period. Executive Committee members were granted a total of 118.822 options in Feburary 2019.

In combination with the stock option plan, the Board of Directors granted Performance Share Units to approximately 450 Key executives of the Group, for a possible payout in three years' time if pre-set performance objectives (i.e. underlying EBITDA growth, CFROI, and GHG emission reduction) are met. Executive Committee members were granted a total of 21.767 PSU in February 2019.

Country	Name	Function	Number of Options[(1)]	Number of PSU's[(2)]
Belgium	Kadri, Ilham	CEO/Chairman of the Executive Committee	48,537	8,887
Belgium	De Cuyper, Vincent	Member of the Executive Committee	14,069	2,576
Belgium	Hajjar, Karim	Member of the Executive Committee	14,069	2,576
Belgium	Di Donfrancesco, Augusto	Member of the Executive Committee	14,069	2,576
Belgium	Du, Hua	Member of the Executive Committee	14,069	2,576
Belgium	Juéry, Pascal	Member of the Executive Committee	14,069	2,576
Total			**118,882**	**21,767**

(1) Stock options: Black Scholes fair value for February 2019 grant was at €17.77

(2) PSU's share price for February 2019 grant was at €97.05

Stock Options granted and held by Executive Committee Members as on December 31,2019

		Stock-options				31/12/2019		
Country	Name	Held at 31/12/2018	Granted in 2019	Exercised in 2019	Expired in 2019	Held[(1)]	Exercisable	Non exercisable
Belgium	Kadri, Ilham	0	48,537	0	0	48,537	0	48,537
Belgium	De Cuyper, Vincent	109,770	14,069	18,088	0	105,751	33,641	72,110
Belgium	Hajjar, Karim	94,348	14,069	0	0	108,417	21,164	87,253
Belgium	Di Donfrancesco, Augusto	95,938	14,069	0	0	110,007	37,897	72,110
Belgium	Du, Hua	78,930	14,069	1,320	0	91,679	27,913	63,766
Total		**378,986**	**104,813**	**19,408**	**0**	**464,391**	**120,615**	**343,776**

(1) Held = Exercisable + Non exercisable

5.5. Comparative information on the change of remuneration and company performance

In an interest to increase transparency of past, current and future remuneration programs and in alignment with investor interest and legislative environment the following table demonstrates the change of remuneration for members of the Board, Chief Executive Officer, Members of Executive Committee in comparison to performance of the Group and average remuneration of Solvay employees over period of 5 years.

	2015	2016	2017	2018	2019	Remuneration for 2019 (Amount)
Remuneration for Member of the Board(1)						
Remuneration of CEO						
Annual Base on year over year basis	10%	0%	0%	9%	NA(2)	1,150,000
Variable STI payout vs Target	137%	121%	149%	134%	118%	1,361,600
PSU Payout value vs Target	NA	54%	111%	108%	NA(2)	NA(2)
LTI Grant value vs Target	100%	100%	100%	100%	100%	1,725,000
Remuneration for Members of Executive Committee						
Annual Base on year over year basis (includes mandatory increase in Belgium)	3.3%	3.5%	3.5%	12.2%(3)	3.6%	3,124,441
Variable STI payout vs Target	128%	112%	144%	120%	72%	1,266,000
PSU Payout value vs Target	NA	54%	111%	108%	84%	794,774
LTI Grant value vs Target	100%	100%	100%	200%	100%	2,500,000(7)
Solvay performance						
EBITDA growth vs Target for the Year	109%	96%	138%	105%	51%	
Progress towards Sustainable Development objective vs Target for the Year	174%	140%	181%	165%	145%	
Average remuneration of a full-time equivalent basis of employees(8)						
Employees of the Group	3%	16%(5)	7%	0.6%(6)	5%	

(1) as indicated in Compensation Report remuneration for Board of Directors has not been changed from 2012 and is dependend only from number of meetings.

(2) New CEO

(3) Extension of the Executive Committee and related market adjustment for C.Tandeau de Marsac, A.Di Donfrancesco, H.Du from March 1st;

(5) Full Integration of Cytec in 2016

(6) Oxygen restructuring impact

(7) Including grant for K.Hajjar, V.De Cuyper, A.Di Donfrancesco, H.Du, P.Juery.

(8) Average remuneration of employees is calculated on basis of "Wages and direct social benefits" divided by the number of employees on year over year bases for continues operations.

5.6. Key provisions of Executive Committee members' contractual relationships with the Company and/or an affiliated company, including provisions relating to compensation in the event of early departure

Executive Committee members, including its Chairman (or CEO), have directorships in Group subsidiaries as a function of their responsibilities. Where such directorships are compensated, they are included in the amounts given above, regardless of whether the position is deemed to be salaried or undertaken on a self-employed basis under local legislation.

Executive Committee members will not benefit from any contractual departure indemnity linked to the exercise of their office. In case of early termination, only the legal system applies. In case of early termination, only the legal system applies. In the event of a decision to terminate Ms. Ilham Kadri's contract, she will be eligible for a contractual indemnity of 12 months of her total compensation target. In the event Ms. Ilham Kadri resigns after January 2021, she is subject to a non-competition clause of 12 months with no extra compensation.

As it was disclosed in the Annual report of 2018 Jean-Pierre Clamadieu received two months base salary €200,000 while in the role and according to previous contractual terms. In addition a 24-months non-compete undertaking was provided for in his contract and has been activated by the Company, resulting in the payment to Mr. Jean-Pierre Clamadieu of a non-compete indemnity of €1,960,000.

There was no accelerated vesting applied to his existing LTI, which remain subject to Group performance.

The above is in line with Belgian Corporate governance requirements.

Mr. Pascal Juery and Ms. Cecile Tandeau de Marsac left the Executive Committee on March 31st, 2019 without any termination indemnity related thereto.

6. Main characteristics of risk management and internal control systems

Solvay leaders and managers are accountable for the adequacy of the risk management and internal control framework in their respective entities (businesses, functions).

The Internal Audit & Risk Management Department (IA/RM) advises and ensures that leaders are well supported. The team is in charge of setting up a comprehensive and consistent system of risk management and internal control across the Group.

The extent to which Solvay is willing to take risks in the pursuit of its business strategy and objective to create shareholder value is defined by a number of qualitative and quantitative expressions of risk appetite, operated through measures such as limits, triggers and indicators. The Internal Audit & Risk Management Department (IA/RM) communicates directly with the Audit Committee, which plays a key role in the foundation of the Group's risk culture, helping to align the risk appetite of management with the Board. The risk management function is responsible for reviewing the scope and operation of these risk appetite measures regularly to determine that they remain relevant.

Solvay has set up an internal control system designed to provide reasonable assurance that (i) current laws and regulations are respected, (ii) policies and objectives set by general management are implemented, (iii) financial and extra-financial information is accurate, and (iv) internal processes are efficient, particularly those contributing to the protection of its assets.

The five components of the internal control system are described below.

6.1. The control environment

As the foundation of the internal control system, the control environment promotes awareness and compliant behavior among all employees. Its various elements create a clear structure of principles, rules, roles, and responsibilities, while demonstrating general management's commitment to compliance.

- The **Solvay Management Book** lists guiding principles and defines the roles and responsibilities of the Executive Committee, Global Business Units, and functions;
- The new **Code of Business** Integrity is available on Solvay's website. More information can be found in the Charter on Corporate Governance.
- An **Ethics Helpline**, managed by a third party, enables employees to report potential Code of Business Integrity violations if they cannot go through their managers or through the Compliance organization, or if they wish to remain anonymous. More information can be found in the Charter on Corporate Governance and extra-financial section.
- **Standardized processes** are in place for financial and non-financial activities.

6.2. The risk assessment process

The process of risk management takes into account the organization's strategic objectives and is structured into the following phases:

- Risk analysis (identification and evaluation),
- Decision on how to manage the critical risks,
- Implementation of risk management actions, and,
- Monitoring of those actions.

The approach to designing internal controls for major processes includes a risk assessment step defining which key control objectives to tackle. This is the case in particular for processes at subsidiary, shared service, GBU, or corporate level, leading to the production of reliable financial reporting.

More information on Enterprise Risk Management, including a description of the Group's main risks and the actions taken to avoid or mitigate them, can be found in the "Risk management" section.

6.3. Control activities

Solvay uses a systematic approach to designing and implementing control activities for the most relevant Solvay processes.

After a risk analysis and a risk assessment phase, the controls are designed and described by the corporate process managers with the support of the Risk Management team. The controls descriptions are used as a reference for the internal control assessment and roll-out across the Group.

At each level of the Group (corporate, Shared Services platforms, and GBUs), the manager operating the process is responsible for the control execution.

Agile internal control governance has been set up under the CFO sponsorship: Corporate Process Owners and GBU representatives (Process Risk Coordinators) are part of a network aiming to promote an Internal Control system tailored to the risks of each GBU.

Solvay implements policies, processes, and red lines applicable to all employees in the following domains: management control, financing and cash flow, financial control, financial communication, tax, and insurance policies. Control activities are defined for all these financial processes and in major cross-Group projects, like acquisitions and divestitures. Furthermore, an online Financial Reporting Guide explains how the IFRS rules should be applied throughout the Group.

Financial elements are consolidated monthly and analyzed at every level of responsibility in the Company (Solvay Business Services, the finance director of the entity, Group Accounting and Reporting, and the Executive Committee). Elements are analyzed using various methods, such as a variance analysis, plausibility and consistency checks, ratio analysis, and comparison with forecasts.

Besides the monthly reporting analysis prepared by Group Controlling teams, the Executive Committee thoroughly reviews GBU performance every quarter in the context of business forecast reviews.

6.4. Information and communication

Group-wide information systems are managed by Solvay Business Services. A large majority of Group operations are supported by a small number of integrated ERP (Enterprise Resource Planning) systems. Financial consolidation is supported by a dedicated tool.

All financial reporting procedures and internal controls ensure that all material information disclosed by Solvay to its investors, creditors, and regulators is accurate, transparent, and timely, and that it fairly represents the Group's most relevant developments, financial fundamentals, and performance.

The Group Accounting and Reporting department circulates written detailed instructions to all financial actors involved before each quarterly closing.

The publication of the quarterly financial results is subject to various checks and validations carried out in advance:

- The Investor Relations team designs, develops, and issues messages and information about the Group with the needs of financial markets in mind. It does so under the supervision and control of the Executive Committee;
- The Audit Committee ensures that financial statements and communications by the Company and the Group, conform to generally accepted accounting principles (IFRS for the Group, Belgian accounting law for the Company);
- The Board of Directors approves the consolidated periodic financial statements and those of Solvay SA (quarterly – consolidated only, semiannual and annual) and all related communications.

6.5. Internal control monitoring

The Audit Committee is in charge of monitoring the effectiveness of internal control systems. It supervises the work of Internal Audit and Risk Management with regard to financial, operational, and compliance monitoring. It is kept informed of the scope, programs, and results of the internal audit work, and it verifies that audit recommendations are properly implemented. The role and responsibilities of the Audit Committee are further detailed in the Charter.

Internal audit assignments are scoped, planned and defined on the basis of a risk analysis; due diligence focuses on the areas perceived as having the highest risks. All the consolidated entities within the Group are inspected by Internal Audit at least every three years. Internal Audit recommendations are implemented by management.

The Ethics and Compliance department coordinates investigations of potential Code of Business Integrity infringements.

7. External audit

The audit of the Company's financial situation, its financial statements, its extra-financial statements, and the conformity of those statements – and the entries to be recorded in the financial statements in accordance with the Companies Code and the bylaws – are entrusted to one or more auditors appointed by the Shareholders' Meeting from among the members, either natural or legal persons, of the Belgian Institute of Company Auditors.

The responsibilities and powers of the auditor(s) are set by law.

- The Shareholders' Meeting sets the number of auditors and their emoluments in accordance with the law. Auditors are also entitled to reimbursement of their travel expenses for auditing the Company's sites and administrative offices.
- The Shareholders' Meeting may also appoint one or more alternate auditors. Auditors are appointed for three-year renewable terms, which may not be revoked by the Shareholders' Meeting other than for good reason;
- The Audit Committee assesses the effectiveness, independence and objectivity of the external auditor having regard to the:
  - Content, quality and insights on key external auditor plans and reports; in particular those summarizing audit work performed on risks identified by the Company;
  - Engagement with the external auditor during Committee meetings;
  - Robustness of the external auditor in their handling of key accounting principles; Provision of non-audit services.

At the Ordinary Shareholders's meeting of Tuesday May 14, 2019, the mandate of Deloitte has been renewed for a further three years. Deloitte is represented by Michel Denayer and by Corine Magnin as alternate auditor.

Please note that at the request of Deloitte, the Board of Directors acknowledged on November 6, 2019 that Deloitte will now be represented jointly by Michel Denayer and Corine Magnin.

The yearly 2019 audit fees for Solvay SA were set at €1.2 million. They include the audit of the statutory and consolidated accounts of Solvay SA. Additional audit fees for Solvay affiliates in 2019 amount to €4.9 million. Supplementary non-audit fees of €1.5 million were paid in 2019 by Solvay SA and affiliates of which:

a. Invoiced by the statutory auditor of the Group:
   – Other assurance missions: €0,6 million,
b. Invoiced by other Deloitte entities:
   – Other assurance missions: €0.4 million,
   – Tax advisory and compliance: €0.5million.

8. Items to be disclosed pursuant to Article 34 of the Belgian Royal Decree of November 14, 2007

According to Article 34 of the Belgian Royal Decree of November 14, 2007, the Company hereby discloses the following items:

8.1. Capital structure and authorizations granted to the Board

As at December 21, 2015, the capital of the Company amounted to €1,588,146,240 represented by 105,876,416 ordinary shares with no par value, fully paid up.

All Solvay shares are entitled to the same rights. There are no different classes of shares.

8.2. Transfer of shares and shareholders' arrangements

Solvay's bylaws do not contain any restriction on the transfer of its shares.

The Company has been informed that certain individual shareholders who hold shares directly in Solvay have decided to consult one another when questions of particular strategic importance are submitted by the Board of Directors to the Shareholders' Meeting. Each of these shareholders, however, remains free to vote as he or she chooses. None of these persons, either individually or in concert with others, reaches the initial 3% transparency notification threshold.

Solvay is not aware of any other voting agreements among its shareholders or of the existence of a concert between its shareholders.

8.3. Holders of securities with special control rights

There are no such securities.

8.4. Control mechanism of any employee share scheme where the control rights are not exercised directly by the employees

There is no employee share scheme with such a mechanism.

8.5. Restrictions on the exercise of voting rights

Each Solvay share entitles holders thereof to exercise one vote at Shareholders' Meetings.

Article 11 of the Company's bylaws provides that the exercise of voting rights and other rights attached to shares that are jointly owned, or of which the usufruct and bare ownership rights have been separated or are pledged, are suspended pending the appointment of a single representative to exercise the rights attached to the shares. Such article 11 will be come article 10 after the changes to the By- Laws which will be proposed to the next Shareholders' Meeting.

The voting rights attached to the shares in Solvay held by Solvay Stock Option Management are, as a matter of law, suspended.

8.6. Appointment, renewal, resignation and dismissal of directors

The bylaws of the Company provides that the Company is to be managed by a Board of Directors composed of no less than five members, their number being determined by the Shareholders' Meeting (Article 14). Which will become article 12 after the changes to the By-Laws which will be proposed to the next Shareholders' Meeting.

Directors are appointed by the Shareholders' Meeting for four years (and may be reappointed).

The Board of Directors submits directors' appointments, renewals, resignations or dismissals to the Ordinary Shareholders' Meeting for approval. It also invites such Shareholders' Meetings to vote on the independence of the directors fulfilling the related criteria, having first sought the advice of the Nominations Committee, whose mission is to define and assess the profile of any new candidate using its criteria for appointment and for specific competences.

The Ordinary Shareholders' Meeting decides on proposals made by the Board of Directors in this matter by a simple majority.

If a directorship becomes vacant during a term of office, the Board of Directors may appoint a new member, subject to ratification by the next Ordinary Shareholders' Meeting.

8.7. Amendment of Solvay's bylaws

Amendments to the Company's bylaws must be submitted as a resolution to the Shareholders' Meeting, at which at least 50% of the share capital or Solvay must be present or represented, and in principle must be passed by a 75% majority of the votes cast.

If the attendance quorum is not met at the first Extraordinary Shareholders' Meeting, a second Shareholders' Meeting may be convened and will decide without any attendance quorum requirement.

For certain other matters (e.g. amendment of the purpose of the Company), higher voting majorities may apply.

8.8. Powers of the Board of Directors, in particular to issue and buy back shares

8.8.1. Powers of the Board of Directors

The Board of Directors is the highest management body of the Company.

It is entrusted with all the powers that are not reserved, by law or under the bylaws, to the Shareholders' Meeting.

The Board of Directors has kept responsibility for certain key areas for itself and has delegated the remainder of its powers to an Executive Committee (further detailed in the Charter).

In all matters for which it has exclusive responsibility, the Board of Directors works in close cooperation with the Executive Committee, which in particular is responsible for preparing most of the proposals for decisions by the Board of Directors.

8.8.2. The Board's authorizations to issue and buy back shares

The Board of Directors was authorized, until December 31, 2016, to increase the capital by contributions in cash up to a maximum of €1.5 billion, of which a maximum amount of €1,270,516,995 to be allocated to the "capital" account and the remainder to the "issuance premium" account in the framework of the acquisition of Cytec Industries Inc. Said acquisition was completed on December 9, 2015, and in order to finance part of it, the Board of Directors proceeded with a share capital increase for an amount of €317,629,245 by issuing 21,175,283 new ordinary Solvay shares, with an issuance premium of €1,182,216,050. This special authorization is therefore no longer relevant.

The Shareholders' Meeting has currently not authorized the Board of Directors to acquire Solvay's own shares.

At the next General Assembly, the Board of Directors will propose to add in the By-Laws of the Company the following provisions :

- The authorization to acquire Solvay's own shares under the following conditions:
  - Limitation to 10% of the shares,
  - Any purchase to be made at market price,
  - Five year duration,
  - It can be used for any purpose except as an anti take-over defence measure.
- The authorization enabling the Board of Directors to increase the Capital of the Company under the following conditions :
  - Limitation to 10% of the shares,
  - Five year duration,
  - The Board of Directors can cancel the preference right of existing shareholders at the occasion of any increase it decides under the authorization.
  - It can be used for any purpose except as an anti take-over bid defence.

8.9. Significant agreements or securities that may be impacted by a change of control of the company

The Ordinary Shareholders' Meeting of May 10, 2016 approved the change of control provisions relating to the December 2015 euro- denominated senior and hybrid bonds and the USD-denominated senior notes issued to finance the acquisition of Cytec and the general corporate purposes of the Solvay Group.

8.10. Agreements between the Company and its directors or employees providing for compensation if directors resign or are good leavers, or in the case of a public takeover bid

Not applicable

3

Risk management

Risk management

1. Introduction

In a context of global economic and political uncertainty, evolving power balances, changing growth dynamics, shortening market cycles, rapid technological evolution, and increased sensitivity and expectations related to climate change and energy transition, Solvay believes that effectively monitoring and managing risks is key to achieving its strategic objectives.

2. Risk management process

The risk assessment process – endorsed by the Solvay's Board of Directors – helps the Group achieve its business objectives, both financial and extra-financial, while respecting laws, regulations, and the Solvay Code of Business Integrity.

Solvay's Enterprise Risk Management (ERM) approach is a key mechanism for achieving short, medium-, and long-term objectives.

Solvay's business is diverse, entrepreneurial, and international. Operations face a number of significant risks. Accordingly, Solvay has designed a dynamic process in which key players assess the risks in their area of responsibility and/or expertise.

All GBUs conduct risk assessments as an integral part of their annual strategic review process

Risk analysis

Solvay's systematic risk management approach is integrated within its strategy, business decisions, and operations. It ensures that Group leaders proactively identify, assess, and manage all potentially significant risks. Risk assessment helps create value in the short, medium, and long term, and always takes sustainability into consideration. Two of the four main impact types used to assess risks reflect our growing sensitivity to extra-financial issues, namely impacts on people and on the environment. The other two – economic and reputational impacts – directly affect the Group's operational and financial performance. In line with Solvay's strategic objectives, risks are then categorized as follows: "main risks" (rated as the most critical), "emerging risks", and "other risks".

Economic impact	Impact on people	Impact on the environment	Impact on reputation

Deciding how to manage critical risks

Both day-to-day and strategic decision-making take all key risks and opportunities fully into account using financial and extra-financial criteria.

Implementation of risk management actions

Risk management is a key success factor for Solvay. Improvements to Solvay's Enterprise Risk Management methodology are allowing individual GBUs and Functions – and the Group as a whole – to more effectively prioritize risks and focus their risk response. A dedicated dashboard is updated twice a year to reflect both progress on mitigating actions and new developments in the risk environment.

Monitoring of risk management actions

Critical risks for the Group are closely monitored by the Group Risk Committee – members of the Executive Committee are appointed as Risk Sponsors – to ensure that these risks are adequately addressed. Particular attention is paid to cross-checking the analysis with the materiality analysis performed by the Sustainable Development & Energy Function.

A sound risk management system embedded at all levels of the Group

GBUs and Function leaders are accountable for identifying, monitoring and managing the key risks in their domains. Risk management is therefore strongly embedded in the day-to-day running of each entity, and operational managers can react rapidly when circumstances change. The risk management process is a valuable mechanism for GBUs and Functions because it guides their priorities and makes it more likely they will achieve their business goals.

1		2	3	4	5
Global Business Units	Functions	Senior Leadership Team[1]	Group Risk Committee[2]	Executive Committee	Board of Directors
• Reviews and updates its own risk matrix • Defines risk owners to lead mitigation of most critical risks		Identifies a list of Group risks – the most relevant ones – to be submitted to an assessment phase	Assesses, decides on and closely monitors these Group risks	Each of these Group risks is sponsored by an Executive Committee member	Oversees and endorses
Corporate Risk Department					
Supports and coordinates risk management throughout Solvay					

1 Executive Committee, GBU Presidents, Function General Managers
2 General Managers for the Industrial, Legal and Compliance, Sustainable Development & Energy functions and Communication

Group level risks are managed with contributions from the Senior Leadership Team for identification, the Group Risk Committee for assessment, and the Executive Committee members for sponsorship for treatment and risk response. The Audit Committee meets once a year with the Chairman of the Executive Committee, the CEO, and other members of the Board to discuss the major risks facing the Group. During the year, the Audit Committee benefits from Risk Owners' presentations on Group risks, for example on industrial safety, security, cyber risk, ethics, and compliance.

Assessing major projects linked to Solvay's transformation

An appropriate risk assessment methodology is applied to significant projects, such as acquisitions, major capital investments, and transversal projects.

Internal control is one aspect of risk management. Please refer to the Corporate Governance section of this Annual Report for a detailed description of Solvay's risk management and internal control system.

Crisis preparedness operates a structured network within the Group. Assigned members perform tasks and implement programs to ensure the readiness of their business units and functions. These programs include crisis simulations, media training for potential spokespersons, maintenance of key databases, and analysis of relevant internal and external events. The risks identified through the Enterprise Risk Management approach influence the scenarios used in the simulations.

3. Solvay's main risks

The Group Risk Committee has assessed the level of control over Group risks and their impacts, using a four-level scale for each criterion.

The Committee considered four main types of impact: economic impact, impact on people, impact on the environment, and impact on reputation. It assessed the level of control by considering the following questions:

- Are the mitigation/controlling actions defined?
- Are the actions implemented, fully or partially?
- Is the effectiveness of those actions monitored?

The criticality level is determined by combining the risk's two ratings (impact and level of control) at the time of the assessment.

Criticality	Risk	Trend	Sustainable development high materiality aspects	Stakeholders
High	Security	↘	Data security and customer privacy Critical incidents management	Employees Local communities Customers
	Ethics and Compliance	↘	Management of the legal, ethics & regulatory framework	Suppliers Employees Planet Investors
	Industrial	→	Critical incidents management Employee health and safety	Employees Local communities
	Transport accident	→	Waste and hazardous materials Critical incidents management	Suppliers Employees Local communities
	Climate change	→	Greenhouse gas emissions Energy Sustainable business solutions Water and wastewater	Customers Local communities Employees Planet Investors
Moderate	Chemical product usage	→	Waste and hazardous materials Sustainable business solutions	Employees Customers
Emerging	Environmental impact	Emerging	Energy Water and wastewater Greenhouse gas emissions Sustainable business solutions	Planet
	Geopolitical risks	Emerging	Management of the legal, ethics & regulatory framework	Planet

Emerging risk: newly developing or changing risk that may have, on the long term, a significant impact which will need to be assessed in the future.

The description of the risks relevant to Solvay and the Group risk-reduction actions are listed below. The mitigation efforts described do not guarantee that risks will not materialize or impact the Group, but they show how Solvay proactively manages risk exposures.

Security

Trend: Decrease

Risk description

A security event such as terrorism, crime, violence, vandalism, theft, or cyber attack, which would impact employees, sites, assets, critical information, or intellectual property and could have negative consequences for the business.

Prevention and mitigation actions

- Solvay has a threat-, risk-, and compliance-based security approach to protecting sites, information, and people.
- A Group Security Director coordinates all security activities globally in order to ensure efficient security risk mitigation.
- Two governance bodies lead the security risk management effort:
  - a Security Board, chaired by the CEO and
  - a Security Coordination Working Group, chaired by the Group Security Director, which aims to run a continuous security threat monitoring program and an optimized security program for the Group.

Cyber security program

The two Governance bodies leading the security risk management effort also supervise the Cyber security program.

- External experts conduct independent assessments, including penetration tests.
- Solvay Business Services (SBS) has renewed its ISO 9001:2015 quality management program for all its activities and obtained its ISO 27001:2013 certification. The latter encompasses cybersecurity for the majority of its information systems activities.
- All SBS information systems professionals have completed training on information system security policies and best practices.
- End-user security training remains mandatory for all employees. Cybersecurity tips are published regularly to increase employee awareness.

A significant cyber-attack could negatively impact the company's operations and results. Therefore, the Company will continue to solidify its cyber defenses to manage the evolving cyber threat landscape.

Insurance

Solvay is insured against the potential financial impact of a cyber event stemming from damage to assets, business interruptions, and cases of fraud.

2019 main actions

- The Group created the role of Security Champion in the GBUs and Functions to facilitate a coordinated approach to managing security risks in the Group. These Champions are the voice of their entities within the Security Coordination Working Group. They ensure that governance is implemented in a consistent manner with business priorities.
- The Group is launching a Data Protection Plan to protect its sensitive information and has completed projects to make high-risk sites more secure.
- Solvay continues to enhance its overarching cyber security strategy and governance, develops its corporate information security program, and explores other functions/capabilities to enrich the company's security posture and ability to respond to a cyber-related threat.

Ethics and compliance

Trend: Decrease

Risk description

Risk arises from a potential failure to comply with:

- Solvay's Code of Business Integrity and all supporting policies and procedures,
- Laws and regulations in the jurisdictions in which Solvay operates.

Examples:

- Failure to implement good governance in a joint venture,
- Direct or indirect involvement in human rights violations,
- Intentional misstatement of financial reporting,
- Corruption and by-passing of internal controls.

Prevention and mitigation actions

Solvay's Code of Business Integrity, policies, and procedures:

- Has been updated and supplemented, and the new version has been deployed in early 2020, and
- Applies to all employees, critical suppliers, and majority-owned joint venture partners.
- In addition, Solvay has deployed several training courses and communication actions to address behavioral risks.

Specific training courses to mitigate specific risks include:

- Anti-bribery and anti-corruption, Anti-competition, and the Gift & Entertainment Tracking System Policy,
- Human Rights in Business Policy: implementation, governance and training,
- The Group-wide Speak Up program for reporting non-compliance, either directly to management or to a third-party helpline.

2019 main actions

- More than 96% of employees received training on Solvay's Code of Conduct. A new Code of Conduct, renamed the Code of Business Integrity, has been launched in January 2020.
- A Global Human Rights Committee has been appointed to oversee implementation, compliance, and training on the Group Human Rights policy.
- More than 97% of pre-identified leaders and employees in sensitive positions have attended Anti-Bribery and Anti-Corruption (ABAC) training.

Industrial

Trend: Stable

Risk description

A major accident on site (occupational, process) or chronic exposure of employees (industrial hygiene) can cause fatalities, irreversible injuries, or damage to the environment or assets.

Prevention and mitigation actions

During 2018 and 2019 Solvay redefined its strategy for HSE and issued a new set of Solvay HSE Minimum Requirements to create a shared understanding and approach to mitigating our major risks. As part of this new approach, Solvay also implemented a new way of working, including a more collaborative and supportive approach to HSE across the Group.

Solvay's HSE strategy is based on the following four levers:

- Culture: Promoting the desired safety culture across all employees and contractors,
- Continuous improvement: Utilizing networking, best practices sharing, use of common methods and tools, Solvay HSE Minimum Requirements, external watch and benchmarking to grow our HSE performance,
- Competency: Ensuring all employees have the right level of knowledge and understanding to take decisions that impact HSE, beginning with key positions; and
- Compliance: Detecting and mitigating regulatory and non-regulatory compliance issues with a focus on priority risks in both operations and products.

There are three industrial risks considered:

1. An occupational safety incident which results in a fatality or irreversible (life-altering) injury.
2. A significant process safety incident which results in fatalities, irreversible injuries, environmental harm, and/or loss of physical assets.
3. A chronic release of chemicals that results in irreversible harm to people or the environment.

Occupational safety

Solvay has always maintained a strong focus on occupational safety. While the Group has seen a consistent reduction in the number of workplace injuries over the years, Solvay has averaged one fatal injury (including contractors) per year since 2010. In order to make a sustainable change, in 2018, Solvay began its journey to creating a Safety Culture where all employees work together and care for one another. The initial results have been positive with a 30% reduction in the number of injuries over two years and no fatalities for the past two years (first time since 2000 that the Group has had two consecutive years without a fatality).

Solvay's Safety Excellence Plan supports the development of a strong safety culture through the involvement and engagement of all Solvay employees. The Safety Excellence Plan includes such activities as Safety Days, Leadership Safety Visits, Behavior Based Safety programs, and an individual HSE objective for each employee.

All Solvay HSE Minimum Requirements for the Solvay Life Saving Rules (SLSR) have been implemented. The implementation process included onboarding, gap assessments, and follow-up audits at the local level.

Occupational Safety results are reviewed monthly by GBUs and at the Executive Committee level.

Process safety management

Solvay applies a preventive risk-based approach founded on systematic process safety risk analyses and management of change processes.

Industrial hygiene

Solvay has implemented a comprehensive approach to reducing chemical exposure risk in the workplace. Our approach includes: chemical risk assessments, risk based medical surveillance, using both qualitative and quantitative methodologies, pandemic preparedness plans, and human biomonitoring when warranted. In addition, for some chemicals (e.g. nano materials), Solvay defines more conservative exposure limits.

Environment

As a minimum requirement, the discharges of substances from our plants meet all local applicable emission limit values. In addition, for chronic releases of potentially dangerous chemicals, risk assessments are made on a periodic basis to ensure that the impact on the environment or on the neighbouring population falls within strict limits, determined by environmental quality standards or by exposure limits.

2019 main actions

Occupational safety

- Release of new Minimum Requirements for Solvay Life Saving Rules, including onboarding and gap assessments in all sites,
- Ongoing deployment of "Creating Safety" Culture (training and sharing),
- Medical Treatment Accident Rate: 0.44.

More info: 2.3 Health, safety and environmental management

Process Safety

- Over 80 e-learning courses for process safety,
- 26 new Process Safety Risk Analysis leaders trained,
- 92% of all sites have had a process hazard assessment in line with Group requirements within the last five years (2020 target – 100%),
- No high-risk situations (Level 1 risk sheets) older than one year.

Industrial Hygiene

Further roll-out of a new global tool, SOCRATES (Solvay OCcupational Risk Assessment Tool to EmployeeS) to (1) give widespread, easy access to IH methods, tools and databases, (2) consistently perform and document IH risk assessments, (3) enhance traceability of an individual's potential exposures throughout their working life.

Environment

- Detailed reporting of environmental emissions (air, water and waste), as well as water management annually (SERF).
- Report and track environmental releases that exceed permit limits.
- Release and deployment of Group Standards on Waste Management and HSE Management Systems.

Transport accident

Trend: Stable

Risk description

An accident in connection with hazardous chemical transportation poses the risk of injury to neighbors or the public.

Prevention and mitigation actions

- Internal e-learning courses on transport safety,
- Global network of dangerous goods safety advisors,
- Global qualification process for dangerous goods carriers,
- Development of internal procedures and guidelines based on the transport safety recommendations of associations such as CEFIC (European Chemical Industry Council), EUROFLUOR (European Technical Committee for Fluorine), and HFIPI (Hydrogen Fluorine Industry Practices Institute),
- Implementation of programs such as Responsible Care®,
- Follow-up of transport accidents with development of corrective actions and lessons learned bulletins,
- Worldwide emergency response helpline (level 1, available 24 hours a day, 7 days a week) in the language of the caller.

2019 main actions

Continuing Solvay transport safety program to reinforce preventive actions.

Climate change

Trend: Stable

The Group strategy to address climate-related risks (as defined by TCFD[*]) could be ineffective and damage Solvay's reputation, causing business losses, undervaluation, and difficulty attracting long-term investors.

- Policies and legal context: regulations and actions to limit CO_2 emissions, for example increasing the price of greenhouse gas (GHG) emissions,
- Technology: unsuccessful investment in new, lower-emission technologies,
- Markets: failure to adapt to changing customer behavior,
- Reputation: negative stakeholder attitudes if their climate change concerns are not addressed effectively,

Prevention and mitigation actions

- Solvay's strategy focuses on businesses with higher added value and less environmental exposure.
- Every year, the Sustainable Portfolio Management (SPM) tool assesses the environmental exposure of our sales and our innovation projects portfolio. SPM includes climate-related criteria aligned on 2°C scenarios.
- Solvay has a GHG emissions reduction plan.

2019 main actions

Solvay mainly works on four workstreams:

- Review of climate-related risks and opportunities for each product in each market with Solvay Sustainable Portfolio Management tool. 19% of our sales are ranked in climate-related solutions, while 3% of our sales are ranked as climate-related Challenges.
- Realization of a 2040 scenario analysis in line with the TCFD recommendations and using as reference the International Energy Agency's Sustainable Development scenario. The study showed that sales' opportunities could be larger than negative impacts on costs.
- Realization of a mapping of acute climate-related physical risks with insurers. Seven production sites are located in areas with a 2% annual change of exposition to floods. 11 sites production sites are located in wind exposed areas.
- The mapping of water scarcity risks has been updated based on a database from Hoekstra & al (2016). 21 sites have been identified “at risk”, combining location, water consumption and business interruption costs. Action plans are being developed for each plant, based on their specific situation.

Chemical product usage

Trend: Stable

Risk description

- Inappropriate use of one of Solvay products in a customer's plant, or use in applications or markets for which the product is not designed (inappropriate use), or use by the customer that is not endorsed by Solvay can lead to adverse health and environmental impacts, property damage, and resulting litigation.
- The possible consequences of a faulty product include exposure to liability for injury, health impairment and damage, or product recalls. Product liability risk is generally higher for products used in medical devices, healthcare, food contact and feed applications, and sensitive applications in general.
- The inadvertent use or sale of substances that are banned by regulations may occur. In Europe the focus is on Substances of Very High Concern (SVHC).
- Failure to comply with chemical and market regulations in countries where a product is marketed could have negative consequences.

Prevention and mitigations actions

- Solvay Safety Data Sheets (SDS) ensure harmonized content by implementing a common worldwide SAP system for the Group. This SAP system is, however, not yet implemented for Composite Materials; the go-live for this GBU is planned for beginning 2020.
- In particular for SVHC, according to Solvay definition, all GBU perform an annual inventory of those substances in the products they sell. The objective is to have 100% risk assessment and analysis of any available safer alternatives by 2020.
- SDS are constantly maintained and distributed worldwide for all products to all customers in the appropriate languages. Global Business Units ensure that SDS are revised at least every three years for all the products they sell.
- Recall procedures are developed and deployed as prescribed by the product stewardship programs.
- Insurance reduces the financial impact of a product liability risk, including for first-party and third-party product recalls.

[*] : TCFD – Task Force on Climate-related Financial Disclosures

2019 main actions

The Solvay "Product Safety Management Process" (PSMP) identifies risks relating to products marketed by Solvay. It has been updated to integrate new regulatory requirements and additional potential risk causes (legal, supply chain, etc.). All GBUs are currently implementing this process with a specific focus on prioritizing the required risk assessments in the products portfolio and on regularly deploying risk assessments for the most sensitive product applications.

Emerging risks

Environmental impacts

Risk description

Solvay's activities impact the environment through:

- Use of raw materials based on fossil or non-renewable resources,
- Consumption of energy,
- Use of water,
- Production of waste (solid or liquid, hazardous or safe),
- NO_X, SO_X, Volatile Organic Compounds (VOC) or dust emission,
- Greenhouse gas emissions (see "Climate change" risk).

There is a risk not to meet the rising and more stringent expectations from all stakeholders regarding those impacts on environment.

Prevention and mitigation actions

- Solvay One Planet program will set an ambitious long term vision with a intermediary 2030 environmental plan on high materiality environmental aspects.

Geopolitical rivalries

Risk description

The geopolitical rivalries could translate into constraints to the Group operations (tariffs, investments, intellectual property, data ownership, staff mobility…).

4. Other risks

Market and growth – strategic risk

Description

Pertains to Solvay's exposure to developments in its markets or its competitive environment, and the risk of making erroneous strategic decisions.

Prevention and mitigation actions

- Systematic and formal analysis of markets and marketing challenges with respect to investments and innovation project ramp-ups,
- Regular performance review of strategy deployment,
- Development of GDP+ growth markets: Automotive & Aerospace, Resources & Environment, Electrical & Electronics, and Agro, Feed & Food,
- Development of customized, mission-critical solutions with Solvay key accounts,
- Adaptation of operations to new energy and CO_2 markets,
- Strong focus on cash conversion and generation,
- Disposal of businesses that fall below the cyclicality threshold.

Supply chain and manufacturing reliability risk

Description

Risks related to raw materials, energy, suppliers, production, storage units, and inbound/outbound transportation.

Prevention and mitigation actions

For manufacturing reliability:

- Geographic distribution of production units around the world,
- Maintenance,
- Group property loss prevention program focusing on the prevention and mitigation of damage to assets and loss of profit due to fire, explosion, accidental chemical release, and other adverse events.

For supply chain:

Third-party CSR assessment and adherence to the Solvay Supplier Code, ownership of mines and quarries of trona, limestone, and salt, and programs to reduce energy consumption.

Project selection and management

Description

Allocation of resources to projects (capital expenditure, mergers and acquisitions) could be misaligned with Solvay's growth strategy. Major projects may face difficulties and risk falling short of their objectives.

Prevention and mitigation actions

- The Investment Committee provides the Executive Committee with an analytical view of capex allocation efficiency and capex plans. Capex Excellence methodology is used for the project portfolio on smaller projects.
- Investment decisions (capital expenditure above €10 million and acquisitions) made by the Executive Committee or the Board of Directors include a sustainability challenge that encompasses an exhaustive Sustainable Portfolio Management analysis of the potential investment.
- A performance analysis is conducted after implementation.

The combination of these actions has led to much better control over EBITDA conversion into cash and a conversion level comparable to similar companies in the industry.

Regulatory, political, and legal risk

Description

- Laws and regulations can change,
- Solvay may be exposed to circumstances where the normal exercise of public authority is disrupted; or to actual and potential judicial and administrative proceedings (see Important Litigation section),
- Brexit: The content of the FTA (which would manage the future trade relationship) to be negotiated with the UK is very unclear and could have an impact on the laws and regulations applicable to the business,
- Only a limited part of Solvay's activities may actually be impacted (as an indication, the trade flow between the EU and the United Kingdom represents roughly 3% of the Group's net sales and 2% of invested capital),
- Rising protectionism and a weakening of the World Trade Organization has already impacted Solvay's business and will continue to do so in the future.

Prevention and mitigation actions

- The Group's balanced global presence reduces the impact of adverse regulatory and political developments.
- A Government and Public Affairs department works continuously with public officials at the national level, including but not limited to European authorities, as well as through the local Belgian embassy.
- Financial provisions are made based on Solvay's awareness of legal risk.
- A Brexit task force has been established with the participation of impacted GBUs and relevant functions. The GBUs have identified the main risks and are working on mitigation actions under the assumption of a worst case scenario ("no-deal"), aiming to minimize any disruption to our customers.
- Coordination between Corporate Trade, SBS and GBUs has increased to better identify risks and their mitigations.

Financial risk

Description

- Liquidity risk (see note F35 to the consolidated financial statements, Financial instruments and financial risk management),
- Foreign exchange risk (see note F35 to the consolidated financial statements, Financial instruments and financial risk management),
- Interest-rate risk (see note F35 to the consolidated financial statements, Financial instruments and financial risk management),
- Counterparty risk (see note F35 to the consolidated financial statements, Financial instruments and financial risk management),
- Pension obligation risk (see note F35 to the consolidated financial statements, Financial instruments and financial risk management),
- Tax litigation risk (see note F35 to the consolidated financial statements, Financial instruments and financial risk management).

Prevention and mitigation actions

A prudent financial profile and conservative financial discipline:

- Investment Grade status: the Group is rated Baa2/P2 (stable outlook) by Moody's and BBB/A2 (stable outlook) by Standard & Poor's as of the 2019 closing,
- Solvay promotes transparent and regular discussions with leading rating agencies.

Strong liquidity reserves:

- As of the end of 2019, the Group has €0.8 billion in cash and cash equivalents (namely, other current financial instruments), as well as €3.5 billion of committed credit facilities (a multilateral revolving credit facility of €2.0 billion and an additional €1.5 billion from bilateral revolving credit facilities with key international banking partners). All of them were undrawn as of December 31, 2019.
- The Group has access to a Belgian Treasury Bill program for €1.5 billion and, alternatively, to a US commercial paper program for US$500 million.

Currency hedging policy:

- Solvay monitors the foreign exchange market closely and takes hedging measures, principally for terms shorter than one year and generally not exceeding 18 months.

Interest rate hedging policy:

- The Group locks in the majority of its net indebtedness at fixed interest rates. Solvay monitors the interest rate market closely and enters into interest rate swaps whenever they are deemed appropriate.

Energy hedging policy:

- Solvay is hedging energy prices. These transactions go beyond 9 months and up to 3 years.

Monitoring of Group counterparties' ratings:

- For its treasury activities, Solvay works with banking institutions of the highest creditworthiness (selected based on major rating systems) and minimizes the concentration of risk by limiting its exposure to each of these banks to a predefined threshold.
- For its commercial activities, Solvay's external customer risk and cash collection are monitored by a professional network of credit managers and cash collectors located in the Group's various operating regions and countries. Their controls are supported by a set of detailed procedures and managed through Corporate and GBU Credit Committees. These loss mitigation measures have led, over the past few years, to a record low rate of customer defaults.

Pension governance and pension plan optimization:

- Pension governance: Solvay has set guidelines for maximizing its influence over local pension fund decisions within the limits provided by domestic laws.
- Pension plan optimization: reducing the Group's exposure to defined-benefit plans by either converting existing plans into pension plans with a lower risk profile for future services or closing them to new entrants.
- A global ALM (Asset Liability Management) analysis of the Group's pension plans, representing about 90% of the Group's gross or net pension obligations, is performed every three years to identify and manage corresponding risks on a global basis.

Control processes for tax regulation compliance and transfer pricing policies:

- Control processes for tax regulation compliance include monitoring procedures and systems, thorough internal reviews, and audits performed by reputable external consultants.
- Transfer pricing policies, procedures and controls are aimed at meeting the requirements of the authorities.
- Solvay's Tax department pays close attention to the correct interpretation and application of new tax rules to avoid future litigation.

2019 main actions

- Repayment of a €700 million perpetual hybrid bond (first call date in May 2019), partially refinanced by a €300 million perpetual hybrid bond (first call date in March 2024) issued in December 2018.
- Issuance of a €600 million 10 year senior bond at 0.5% coupon maturing in September 2029 and early redemption of a $800 million December 2020 debt.
- Maturity extension till December 2020 of two bilateral revolving credit facilities for a total amount of €1 billion,
- One-year extension of Revolving Credit Facility exercised until 2024;
- Guarantees management: a new dedicated online tool has been developed in order to handle the workflow between the issue and the release, throughout the contract terms. This new tool generates a comprehensive inventory of financial commitments across the whole Group and facilitates efficient and timely management.
- A Voluntary exceptional cash contribution has been made into the Rhodia Pension Trust Ltd (UK): £100 million as an advanced payment of the yearly contributions agreed in 2018. This voluntary contribution will allow Rhodia Pension Trust Ltd (UK) to reduce risks by further hedging liabilities using an appropriate investment strategy.
- Deployment of a Group-wide bank account management tool allowing for a comprehensive inventory of banking structure across entities, enhancing visibility and control as well as facilitating appropriate and more efficient management of cash.

Environmental risk

Description

Managing or remediating historical soil contamination at a number of sites and complying with future changes in environmental legislation.

Prevention and mitigation actions

- Careful monitoring and management of sites with a history of soil contamination,
- Rolling out a risk characterization approach at every affected site when relevant,
- Local regulatory monitoring,
- Strong governance through a dedicated Environmental Board composed of two Executive Committee members, Industrial Function, and Legal and Finance, to lead the environmental risk management effort.

IT risk

Description

Inability to ensure continuity of services or to provide information services adapted to the needs of the business.

Prevention and mitigation actions

- Dedicated data network and regional internet gateways managed by trusted service providers,
- Annual IT audit program to ensure compliance with information system security policies.

Important litigation

With its variety of activities and its geographic distribution, the Solvay Group is exposed to legal risks, particularly in the areas of product liability, contractual relations, antitrust laws, patent disputes, tax assessments, and HSE matters. In this context, litigation cannot be avoided and is sometimes necessary so as to defend the rights and interests of the Group.

The outcome of proceedings cannot be predicted with certainty. It is therefore possible that adverse final court decisions or arbitration awards could lead to liabilities (and expenses) that are not covered or not fully covered by provisions or insurance, and that could have a material impact on the revenues and earnings of the Group.

Ongoing legal proceedings involving the Solvay Group that are currently considered to involve significant risks are outlined below. The legal proceedings described below do not constitute an exhaustive list.

The fact that litigation proceedings are reported below is unrelated to the merits of the cases. In all the cases cited below, Solvay is defending itself vigorously and believes in the merits of its defenses.

For certain cases, Solvay has created reserves/provisions in accordance with the accounting rules to cover financial risk and defense costs (see “Provisions for litigation to the consolidated financial statements” of the present document).

Antitrust proceedings

In 2006, the European Commission imposed fines against Solvay (including Ausimont SpA, acquired by Solvay in 2002) for alleged breaches of competition rules in the peroxygens market for which Solvay was fined.

Joint civil lawsuits were filed before the Court of Dortmund (Germany) in 2009 against Solvay and other manufacturers based on an alleged antitrust violation, claiming damages from the manufacturers on a joint and several basis. The value of the claims is worth €63 million (excluding interest) after settlements were reached between the plaintiff and most of the defendants. Several questions on the jurisdiction of the Court of Dortmund have been submitted to the European Court of Justice, and proceedings before the Court of Dortmund are pending.

In Brazil, CADE (the Brazilian antitrust authority) issued fines against Solvay and others in May 2012 relating to the hydrogen peroxide activity and in February 2016 relating to the perborate activity (Solvay's shares of these fines amount to €29.6 million and €3.99 million respectively). Solvay has filed a claim with the Brazilian Federal Court contesting these administrative fines.

HSE-related proceedings

In October 2009, the public prosecutor of the Criminal Court of Alessandria (Italy) charged several individuals (including employees and former employees of Solvay and Ausimont SpA, now Solvay Specialty Polymers Italy – SSPI) in relation to alleged criminal violations of environmental laws and public health legislation. The provisional claims of civil parties admitted to the trial amounted to about €105 million.

In December 2015, the Assize Court of Alessandria of first instance sentenced three local Solvay/SSPI Managers to imprisonment and awarded civil damages of around €400,000. Appeal was lodged by all parties before the Assize Court of Appeal of Turin which rendered its decision in June 2018 confirming: 1) acquittal of two SSPI Managing Directors; 2) sentence of three Solvay/SSPI Managers reduced to 1 year and 8 months imprisonment, these to now be suspended sentences; 3) damages to €400,000 to civil parties, with rejection of other civil claims; 4) dismissal of charge of remediation omission; 5) SSPI not liable for damages to Alessandria Municipality. The Public Prosecutor Office lodged an appeal before the Cassation Court only limited to the duration of the sentence of the three Solvay/SSPI managers whilst the defendants lawyers requested the charges to be dismissed in the merit. With decision rendered in December 2019 the Cassation Court rejected all the lodged appeals and confirmed the judgement of the Assize Court of Appeal of Turin of June 2018.

As of the end of 2016, 17 civil proceedings have been brought before the Civil Court of Livorno (Italy) by past workers and relatives of deceased workers at the Rosignano site seeking damages (provisionally quantified at €9 million) in relation to diseases allegedly caused by exposure to asbestos. Three of the 17 proceedings have been dismissed so far whilst in a fourth one Solvay has been sentenced to pay a negligible amount of damages (<€20.000).

Pharmaceutical activities (discontinued)

In the context of the sale of the pharmaceutical activities in February 2010, the contractual arrangements have defined terms and conditions for the allocation and sharing of liability arising out of the activities before the sale.

Subject to limited exceptions, Solvay’s exposure for indemnifications to Abbott for liabilities arising out of sold activities is limited to an aggregate amount representing €500 million and is limited in duration.

This includes indemnification against certain potential liabilities for the US testosterone replacement therapy (TRT) litigation focusing on the drug ANDROGEL®. These claims are proceeding at varying rates of resolution.

4

Business review

Business review

1. Overview of the consolidated results

Key financial figures

IFRS 16 has been implemented in the Group's financial statements since January 1, 2019. Comparative information for 2018 in the business review is presented on an unaudited pro forma basis as if the implementation had taken place on January 1, 2018. The information is labelled "pro forma" or "PF".

		IFRS			Underlying		
In € million	*Notes*	**FY 2019**	FY 2018 PF	*% yoy*	**FY 2019**	FY 2018 PF	*% yoy*
Net sales	*B1*	**10,244**	**10,257**	***-0.1%***	**10,244**	**10,257**	***-0.1%***
Net operating costs, excluding depreciation & amortization	*B2*	(8,022)	(8,227)	*+2.5%*	(7,922)	(7,927)	*+0.1%*
EBITDA	*B3*	**2,222**	**2,030**	***+9.5%***	**2,322**	**2,330**	***-0.4%***
EBITDA margin					*22.7%*	*22.7%*	*-0.1pp*
Depreciation, amortization & impairments	*B4*	(1,906)	(1,036)	*-84%*	(818)	(777)	*-5.4%*
EBIT		**316**	**994**	***-68%***	**1,503**	**1,554**	***-3.2%***
Net financial charges	*B5*	(242)	(210)	*-15%*	(332)	(342)	*+2.8%*
Income tax expenses	*B6*	(153)	(73)	*n.m.*	(305)	(303)	*-0.6%*
Tax rate	*B6*				*27.8%*	*26.1%*	*+1.6pp*
Profit from discontinued operations	*B7*	236	201	*+18%*	247	216	*+14%*
Profit/(loss) for the period		**157**	**910**	***-83%***	**1,113**	**1,125**	***-1.0%***
(Profit)/loss attributable to non-controlling interests		(38)	(39)	*-2.9%*	(39)	(40)	*-2.5%*
Profit/(loss) attributable to Solvay shareholders		**118**	**871**	***-86%***	**1,075**	**1,085**	***-1.0%***
Basic earnings per share (in €)	*B24*	**1.15**	**8.43**	***-86%***	**10.41**	**10.51**	***-0.9%***
of which from continuing operations	*B24*	(1.14)	6.49	*n.m.*	8.02	8.42	*-4.7%*
Dividend[1]	*B25*	**3.75**	**3.75**	**-**	**3.75**	**3.75**	**-**
Capex in continuing operations	*B8*				**(826)**	**(794)**	***-4.0%***
Cash conversion	*B8*				*0.6*	*0.7*	*-1.5%*
FCF to Solvay shareholders from continuing operations	*B9*				**606**	**566**	***+7.1%***
FCF to Solvay shareholders	*B9*				801	726	*+10%*
FCF conversion ratio					28%	26%	*+1.8%*
Net working capital	*B10*	1,560	1,557				
Net working capital/sales	*B10*	*16%*					
Net financial debt[2]	*B11*	**(3,586)**	**(2,605)**	**-38%**	**(5,386)**	**(5,538)**	**+2.8%**
Underlying leverage ratio	*B11*				*2.0*	2.1	*-0.1pp*
CFROI	*B12*				***6.5%***	***6.8%***	***-0.3pp***
ROCE					***8.1%***	***8.2%***	***-0.1pp***
Research & innovation	*B13*				(336)	(352)	*+4.7%*
Research & innovation intensity	*B13*				***3.3%***	***3.4%***	***-0.2pp***

(1) Recommended dividend for 2019

(2) Underlying net debt includes the perpetual hybrids bonds, accounted for as equity under IFRS

Historical key financial data

In € million		As published 2015[1]	2016[1]	2017[1]	2018[1]	**2019**
Income statement data						
Sales	a	11,047	11,403	10,891	11,299	11,227
Net sales	b	10,578	10,884	10,125	10,257	10,244
Underlying EBITDA	c	1,955	2,284	2,230	2,230	2,322
Underlying EBITDA margin	d	*18.5%*	*21.0%*	*22.0%*	*21.7%*	*22.7%*
IFRS EBIT	e	833	962	976	986	316
Underlying profit for the period	f		907	992	1,131	1,113
IFRS profit for the period	g	454	674	1,116	897	157
Underlying profit attributable to Solvay share	h	680	846	939	1,092	1,075
IFRS profit attributable to Solvay share	i	406	621	1,061	858	118
Cash flow data						
Capex	j	(1,037)	(981)	(822)	(833)	(967)
of which from continuing operations	k	(969)	(929)	(716)	(711)	(826)
Cash conversion	l = (c+k)/c	50.4%	59.3%	67.9%	68.1%	64.4%
FCF	m	387	876	871	989	1,072
FCF to Solvay shareholders	n	132	527	466	725	801
Balance sheet data						
Net working capital	o	1,557	1,396	1,414	1,550	1,560
Net working capital/sales	p = μ(o/a)[2]	*13.4%*	*15.3%*	*13.8%*	*15.3%*	*16.0%*
Underlying net debt[3]	q = r+s	(6,579)	(6,556)	(5,346)	(5,105)	(5,386)
Perpetual hybrid bonds	r	(2,200)	(2,200)	(2,200)	(2,500)	(1,800)
IFRS net debt	s	(4,379)	(4,356)	(3,146)	(2,605)	(3,586)
IFRS equity	t	9,668	9,956	9,752	10,624	9,625
Equity attributable to non-controlling interests	v	245	250	113	117	110
Perpetual hybrid bonds in equity	u	2,188	2,188	2,188	2,486	1,789
Equity attributable to Solvay share	w = t-u-v	7,234	7,518	7,451	8,021	7,725
Underlying leverage ratio[4]	x = -q/c	*2.82*	*2.60*	*2.17*	*2.01*	*2.00*
Other key data						
CFROI	z	*6.9%*	*6.3%*	*6.9%*	*6.9%*	*6.5%*
Research & innovation	A	(320)	(350)	(325)	(352)	(336)
Research & innovation intensity	B = -A/b	*3.0%*	*3.2%*	*3.2%*	*3.4%*	*3.3%*

(1) These data are not presented on pro forma basis, i.e: excluding Cytec for 2015 and impacts of IFRS16 Leases for 2018

(2) Average of the quarters

(3) Underlying net debt includes the perpetual hybrid bonds, accounted for as equity under IFRS

(4) As net debt at the end of the period does not yet reflect the net proceeds to be received on the divestment of discontinued operations, whereas the underlying EBITDA excludes the contribution of discontinued operations, the underlying EBITDA is adjusted to calculate the leverage ratio. Polyamide's underlying EBITDA was added.

The table above presents the historical figures of the Group as published at the reference date. These data have not been affected by possible subsequent restatements due to perimeter changes, IFRS/IAS standards evolution, changes in definition of APM, etc.

Over the reference periods, the following main changes have occurred:

- 2015:
  - European chlorovinyls activities contributed to the Inovyn joint venture (50% Solvay, 50% Ineos) on July 1,
  - Acquisition of 100% of the shares of Cytec Industries Inc. on December 9. Cytec opening balance sheet has been fully consolidated within the Solvay group as from December 31, 2015. Cytec's results and cash flows for the period between December 9 and December 31 are not material, except for acquisition-related expenses presented as Result from portfolio management and reassessment. Consequently, Cytec did not contribute to the Group's profit or cash flows in 2015.
- 2016:
  - Divestment of Solvay's share in Inovyn joint venture on July 7,
  - Acetow and Vinythai businesses presented as discontinued operations and as assets held for sale,
  - Divestment of Latin American chlorovinyls activities (Indupa) on December 27.
- 2017:
  - Vinythai transaction completed end of February,
  - Acetow transaction completed end of May,
  - Divestment of Polyamide business classified as discontinued operations and assets and liabilities held for sale at the end of September 2017.
- 2018:
  - Divestment of Polyamide business still classified as discontinued operations and assets and liabilities held for sale since September 2017.
- 2019:
  - Implementation of IFRS 16.
  - Divestment of Polyamide business still classified as discontinued operations and assets and liabilities held for sale since September 2017. The transaction was closed on January 31, 2020.

2. Preparation background

Comparability of results & reconciliation of underlying Income Statement indicators

Besides IFRS accounts, Solvay also presents alternative performance indicators to provide a more consistent and comparable indication of the Group's underlying financial performance and financial position, as well as cash flows. These indicators provide a balanced view of the Group's operations and are considered useful to investors, analysts and credit rating agencies as these measures provide relevant information on the Group's past or future performance, position or cash flows. These indicators are generally used in the sector it operates in and therefore serve as a useful aid for investors to compare the Group's performance with its peers. The underlying performance indicators adjust IFRS figures for the non-cash Purchase Price Allocation (PPA) accounting impacts related to acquisitions, for the coupons of perpetual hybrid bonds, classified as equity under IFRS but treated as debt in the underlying statements, and for other elements that would distort the analysis of the Group's underlying performance.

Alternative performance metrics (APM)

Solvay measures its financial performance using alternative performance metrics, which can be found below. Solvay believes that these measurements are useful for analyzing and explaining changes and trends in its historical results of operations, as they allow performance to be compared on a consistent basis. For comparability purposes the 2018 reference figures are on a pro forma basis, as if IFRS 16 had been implemented in 2018. The balance sheet evolution is compared with January 1, 2019, which includes the IFRS 16 impact versus December 31, 2018.

- **Underlying tax rate** = Income taxes / (Result before taxes – Earnings from associates & joint ventures – interests & realized foreign exchange results on RusVinyl joint venture) – all determined on an Underlying basis. The adjustment of the denominator regarding associates and joint ventures is made as these contributions are already net of income taxes. This provides an indication of the tax rate across the Group.
- **Research & innovation** measures the total cash effort in research and innovation, regardless of whether the costs were expensed or capitalized. It consists of research & development costs from the income statement before netting of related subsidies and royalties, and where depreciation and amortization are replaced by related capital expenditure.
- **Research & innovation intensity** is the ratio of research & innovation to net sales.
- **Free cash flow** is calculated as cash flows from operating activities (excluding cash flows linked to acquisitions or disposals of subsidiaries and cash outflows of Additional Voluntary Contributions related to pension plans as they are of deleveraging nature as reimbursement of debt), cash flows from investing activities (excluding cash flows from or related to acquisitions and disposals of subsidiaries and other investments, and excluding loans to associates and non-consolidated investments, as well as related tax elements and recognition of factored receivables) and payment of lease liabilities and increase/decrease of borrowings related to environmental remediation. Prior to the adoption of IFRS 16, operating lease payments were included in the free cash flow. Following the application of IFRS 16, because leases are generally considered to be operating in nature, the free cash flow incorporates the payment of the lease liability (excluding the interest expense). Not including this item in the free cash flow would result in a significant improvement of the free cash flow compared to prior periods, whereas the operations themselves have not been affected by the implementation of IFRS 16.
- **Free cash flow to Solvay shareholders**: Free cash flow after payment of net interests, coupons of perpetual hybrid bonds and dividends to non-controlling interests. This represents the cash flow available to Solvay shareholders, to pay their dividend and/or to reduce the net financial debt.
- **Free cash flow conversion**: Calculated as the ratio between the free cash flow to Solvay shareholders (before netting of dividends paid to non-controlling interest) and underlying EBITDA.
- **Capital expenditure (capex)**: Cash paid for the acquisition of tangible and intangible assets presented in cash flows from investing activities, and cash paid on the lease liabilities (excluding interests paid), presented in cash flows from financing activities. This indicator is used to manage capital employed in the Group.
- **Cash conversion**: is a ratio used to measure the conversion of EBITDA into cash. It is defined as (Underlying EBITDA + Capex from continuing operations) / Underlying EBITDA.
- **Net working capital** includes inventories, trade receivables and other current receivables, netted with trade payables and other current liabilities.
- **Net financial debt**: Non-current financial debt + current financial debt – cash & cash equivalents – other financial instruments. Underlying net debt reclassifies as debt 100% of the hybrid perpetual bonds, considered as equity under IFRS. It is a key measure of the strength of the Group's financial position and is widely used by credit rating agencies.
- **Underlying leverage ratio:** Underlying net debt / Adjusted underlying EBITDA of last 12 months.

- **ROCE**: Return on Capital employed, calculated as the ratio between underlying EBIT (before adjustment for the amortization of PPA) and capital employed. Capital employed consists of net working capital, tangible and intangible assets, goodwill, rights-of-use assets, investments in associates & joint ventures and other investments, and is taken as the average of the situation at the end of the last 4 quarters.
- **Additional Voluntary Contribution related to employee benefits plans**: contributions to plan assets in excess of Mandatory Contributions to employee benefits plans. These payments are discretionary and are driven by the objective of value creation.
- **Mandatory contribution to employees benefits plan**: for funded plans, contributions to plan assets corresponding to amounts required to be paid during the respective period, in accordance with agreements with trustees or regulation, as well as, for unfunded plans, benefits paid to beneficiairies.
- **CFROI**: Cash Flow Return On Investment measures the cash returns of Solvay's business activities. Movements in CFROI levels are relevant indicators for showing whether economic value is being added, though it is accepted that this measure cannot be benchmarked or compared with industry peers. The definition uses a reasonable estimate (management estimate) of the replacement cost of assets and avoids accounting distortions, e.g. for impairments. It is calculated as the ratio between recurring cash flow and invested capital, where:
  - Recurring cash flow = Underlying EBITDA + (Dividends from associates and joint ventures – Underlying Earnings from associates and joint ventures) + Recurring capex + Recurring income taxes;
  - Invested capital = Replacement value of goodwill & fixed assets + Net working capital + Carrying amount of associates and joint ventures;
  - Recurring capex is normalized at 2,3% of the Replacement value of fixed assets net of Goodwill values;
  - Recurring income taxes are normalized at 28% of (Underlying EBIT – Underlying Earnings from associates and joint ventures).

Description of the operational segments

Advanced Materials

Advanced Materials segment offers a unique portfolio of high-performance polymers and composite technologies used primarily in sustainable mobility applications. Our solutions enable weight reduction and enhance performance while improving CO_2 and energy efficiency. Major markets served include next-generation mobility in automotive and aerospace, healthcare and electronics.

Specialty Polymers

With over 1,500 products, Specialty Polymers offers the widest range of high performance polymers in the world, allowing tailor-made solutions such as pushing the limits of metal replacement in the electronics, automotive, aircraft, and healthcare industries. The GBU has unparalleled expertise in three technologies: aromatic polymers, high barrier polymers, fluoropolymers.

Composite Materials

Composite Materials is a top-tier supplier to the aerospace engineered materials market known for its expertise in design materials and process engineering. We deliver optimal material solutions to address our customer's most challenging demand for new high- performance materials that reduce weight, improve aerodynamics, and ultimately lower the total part costs for customers. The business supplies composites technologies to civil and military aircraft manufacturers which comprises the majority of sales, with the balance of sales into various industrial markets.

Special Chem

Special Chem produces fluor and rare-earth formulations for automotive, semi-conductor, and lighting applications. With its industrial know-how, global presence, and R&I proximity, Special Chem has positioned itself as a strategic partner for the automotive sector as a producer of materials used in emission control catalysis and aluminum brazing, and as a producer of cleaning and polishing materials for electronics.

Silica

Silica focuses on highly dispersible silica, used primarily in fuel-efficient and performance tires. The primary focus of the business is to develop innovative solutions for global tire manufacturers.

Advanced formulations

Advanced Formulations includes a broad-based portfolio of surface chemistries focused on improving the world's resource efficiency. The segment offers customized formulations that alter liquid behavior to optimize yield while reducing environmental impact. Major markets include resource efficiency in oil & gas, mining and agriculture, as well as consumer goods, and food.

Novecare

Novecare develops and produces formulations that alter the properties of liquids. It offers solutions to the oil and gas industry using an extensive range of surface chemistries combined with applications expertise. Novecare also provides specialty solutions for home and personal care, agriculture, and coatings markets.

Technology Solutions

Technology Solutions is a global leader in specialty mining reagents, phosphine-based chemistry, and solutions for stabilization of polymers. Its portfolio includes world class, leading-edge technologies and unrivalled technical service and applications expertise that support our customers in developing tailor-made solutions, in particular for mining, where Solvay's products allow customers to extract metal concentrates from increasingly more complex and depleted ores.

Aroma Performance

Aroma Performance is a world's largest integrated producer of vanillin for the flavors & fragrances industries and also produces synthetic intermediates used in pharmaceuticals, agrochemicals, and electronics.

Performance Chemicals

Performance Chemicals hosts chemical intermediate businesses focused on mature and resilient markets. Solvay is a world leader in soda ash and peroxides and major markets served include building and construction, consumer goods and food. It provides resilient profitability thanks to good pricing and market dynamics, underpinned by high quality assets.

Soda Ash & Derivatives

Soda Ash & Derivatives is a world leader for the production of soda ash and sodium bicarbonate, sold primarily to the flat and container glass industries but also used in detergents, agro, and food industries. It provides resilient profitability thanks to good pricing, dynamics growing at GDP rate, underpinned by high-quality assets.

Peroxides

Solvay is a market leader in hydrogen peroxide, both in market share and technology. Hydrogen peroxide (H_2O_2) is used mainly by the paper industry to bleach pulp. Its properties are also of interest to many markets, such as chemicals, food, textiles, and the environment.

Coatis

Coatis is a provider of glycerine-based sustainable solvents solutions and specialty phenols mainly for the Latin American market. It enjoys an undisputed market leadership position in Brazil for Phenol & Derivatives used in the production of synthetic resins employed in foundries, construction, and abrasives.

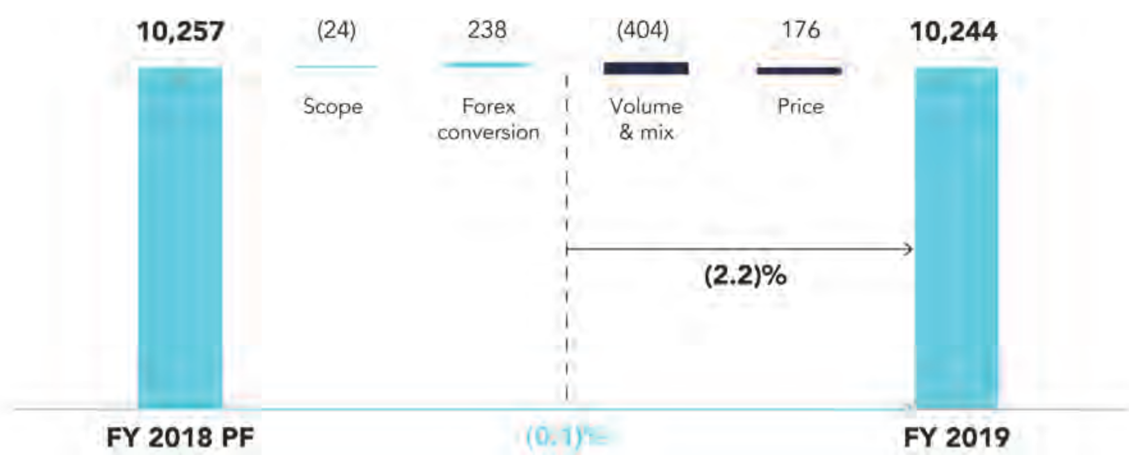
Corporate & Business Services

Corporate & Business Services includes corporate and other business services, such as Group research & innovation or energy services, whose mission is to optimize energy consumption and reduce CO_2 emissions.

3. Notes to the underlying Group figures

NOTE B1
Net sales

Net sales evolution
FY yoy net sales bridge (in €million)



Full year net sales were stable, supported by positive forex conversion effects. Organically[1], net sales were down -2.2%, with lower volumes being partly compensated by higher prices.

The slight reduction in **scope**[2] is mainly related to the divestment of remaining soda ash related activities in Egypt in October 2018.

Volumes were down -3.9%, as demand fell in the automotive, electronics and oil & gas markets, which represents about 25% of Solvay's sales. This was partly offset by the strong demand for composite materials in aerospace applications. Demand for soda ash and peroxide proved resilient.

Prices increased by +1.7%, benefiting from higher prices for soda ash and peroxides.

Net sales by market

[1] Organic growth excludes forex conversion and scope effects, as well as the effect from the implementation of IFRS 16. Reported growth compares to the published 2018 pro forma figures, adjusted for the implementation of IFRS 16.
[2] Scope effects include acquisitions and divestments of smaller businesses not leading to the restatement of previous periods.

NOTE B2
Underlying raw material & energy costs

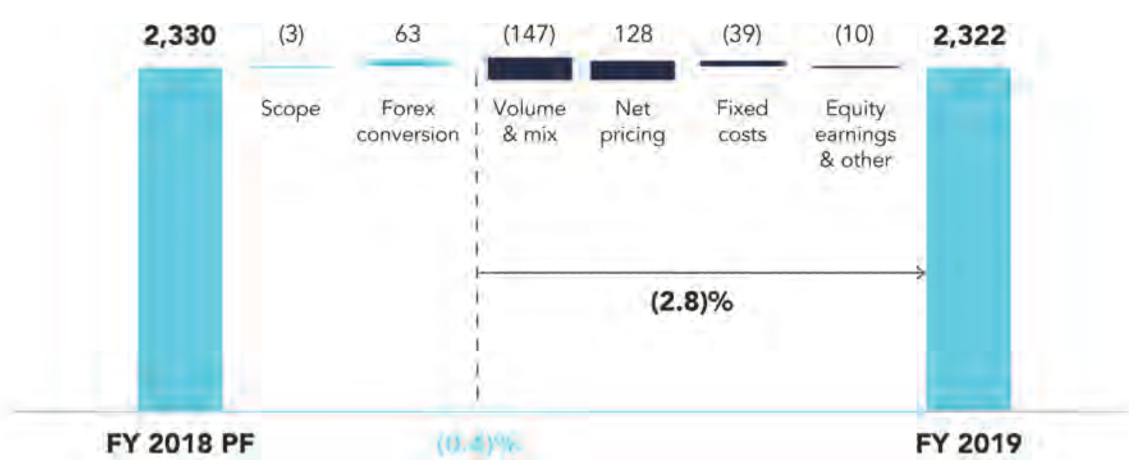
The overall raw materials expense of the Group amounted to circa €2.7 billion in 2019 (vs. €2.8 billion in 2018). The raw materials expense can be split into several categories: crude oil derivatives for 36%, minerals derivatives for 22% (e.g. glass fiber, sodium silica, calcium silicate, phosphorus, sodium hydroxide...), natural gas derivatives circa 11%, biochemicals for 10% (e.g. glycerol, guar, fatty alcohol, ethyl alcohol...) and others for 20% (composites...).

Net energy costs represented about €0.61 billion (vs. €0.65 billion 2018). Energy sources were spread over gas for 68% coke, petcoke, coal, and anthracite for 29%, electricity for 2% and steam, fuel oil, and others for 3%. More than half of the costs were incurred in Europe (52%) followed by the Americas (28%), and Asia and the rest of the world (20%).

On energy supply, Solvay has consistently implemented programs to reduce its energy consumption for many years. While Solvay has industrial activities with high energy consumption, mainly in Europe (synthetic soda ash plants, peroxides), Solvay also operate a range of industrial activities whose energy content is relatively low as a percentage of sales price, especially in the fluorinated polymers business. To reduce the Group's energy footprint Solvay has stepped up its SOLWATT energy efficiency program, which aims to continuously optimize the industrial processes involved in its energy production and supply. Lastly, Solvay set a new greenhouse gas emissions ambition in 2020.

NOTE B3
Underlying EBITDA

Underlying ebitda evolution
FY yoy underlying EBITDA bridge (in € million)



Full year underlying EBITDA was down -0.4%, and -2.8% organically[3], mostly on lower volumes.

Net pricing contributed +5.5%. Higher prices and cost measures more than compensated for higher raw material and energy prices, which were up primarily in the first half.

Fixed costs were up reflecting the expanded production capabilities in Composite Materials for aerospace, as well as the accounting impact of destocking in response to lower demand in other markets, especially in Specialty Polymers. Inflation was compensated by cost containment measures and lower corporate costs. The simplification plan delivered over €100 million of savings since its launch in 2018.

Equity earnings & other elements reflect the positive contribution from the PVC and peroxide joint ventures and the -0.6% net impact of one-time events. These include a €12 million gain on an energy-related settlement in the second quarter of 2019 versus a €23 million pension-related synergy benefit booked in the same period in 2018.

[3] Organic growth excludes forex conversion and scope effects, as well as the effect from the implementation of IFRS 16. Reported growth compares to the published 2018 pro forma figures, adjusted for the implementation of IFRS 16.

NOTE B4
Underlying depreciation & amortization

Amortization and depreciation & impairment charges were €(818) million in 2019, compared to €(777) million in 2018 PF.

NOTE B5
Underlying net financial charges

In € million		FY 2019	FY 2018 PF
Cost of borrowings		(139)	(147)
Interest on lendings & deposits		15	13
Other gains & losses on net indebtedness		(4)	(1)
Net cost of borrowings	a	**(128)**	**(134)**
Coupons on perpetual hybrid bonds	b	(105)	(112)
Interests and realized foreign exchange gains (losses) on the RusVinyl joint venture	c	(18)	(21)
Cost of discounting provisions	d	(85)	(74)
Result from equity instruments measured at fair value through other comprehensive income	e	4	–
Net financial charges	f = a+b+c+d+e	**(332)**	**(342)**

Underlying net financial charges reduced vs 2018PF mainly following (a) the repayment at maturity, in June 2018, of the EMTN bond (€ 382 million balance with a coupon of 4.625%), and (b) the early repayment in 2019 of the US$ 800 million Senior US$ bonds of Solvay Finance America LLC, with the issuance of a 10-year Senior bond (€ 600 million) with a 0.5% yearly coupon. Solvay also modified the quantum of hybrid financing, calling a €700 million hybrid bond at 4.20% in May 2019, partly pre-financed by a €300 million hybrid bond at 4.25% issued in November 2018. Discounting costs Increased as a result of the applicable discount rates for post-employment provisions.

NOTE B6
Underlying income taxes

In € million		FY 2019	FY 2018 PF
Profit/(loss) for the period before taxes	a	1,171	1,212
Earnings from associates & joint ventures	b	92	74
Interests and realized foreign exchange gains (losses) on the RusVinyl joint venture	c	(18)	(21)
Income taxes	d	(305)	(303)
Tax rate	e = -d/(a-b-c)	**27.8%**	**26.1%**

The 1.7 percentage point increase mainly results from an unfavorable mix effect and notably from a lower profit before tax in the United States.

NOTE B7
Underlying profit from discontinued operations

In 2019, discontinued operations mainly consisted of the Performance Polyamides activities to be sold to BASF and Domo Chemicals.

The contribution of discontinued operations to the profit of Solvay amounted to €247 million (+14.4% compared to 2018 PF).

Free cash flow from discontinued operations in 2019 amounted to €195 million.

The transaction has been completed on January 31, 2020. For more information see F42 Events after the reporting period.

NOTE B8
CAPEX

In € million		FY 2019	FY 2018 PF
Acquisition (–) of tangible assets	a	(751)	(691)
Acquisition (–) of intangible assets	b	(106)	(142)
Payment of lease liabilities	c	(110)	(92)
Capex	d = a+b+c	**(967)**	**(925)**
Capex in discontinued operations	e	(141)	(131)
Capex in continuing operations	f = d-e	**(826)**	**(794)**
Underlying EBITDA	g	**2,322**	**2,330**
Cash conversion	h = (f+g)/g	**64.4%**	**65.9%**

NOTE B9
Free Cash Flow

(in € million)		FY 2019	FY 2018 PF
Cash flow from operating activities	a	1,815	1,829
of which additional voluntary contribution related to pension plans	b	(114)	–
Cash flow from investing activities	c	(880)	(784)
of which capital expenditures required by share sale agreement	d	(59)	(38)
Acquisition (–) of subsidiaries	e	(6)	(12)
Acquisition (–) of investments – Other	f	(16)	(4)
Loans to associates and non-consolidated companies	g	10	(3)
Sale (+) of subsidiaries and investments	h	(31)	26
Recognition of factored receivables	i	(23)	(21)
Increase/decrease of borrowings related to environmental remediation	j	8	–
Payment of lease liabilities	k	(110)	(92)
FCF	l = a-b+c-d-e-f-g-h-i+j+k	**1,072**	**1,006**
FCF from discontinued operations	m	195	160
FCF from continuing operations	n = l-m	**878**	**846**
Net interests paid	o	(118)	(130)
Coupons paid on perpetual hybrid bonds	p	(115)	(111)
Dividends paid to non-controlling interests	q	(39)	(39)
FCF to Solvay shareholders	r = l+o+p+q	**801**	**725**
FCF to Solvay shareholders from discontinued operations	s	195	160
FCF to Solvay shareholders from continuing operations	t = r-s	**606**	**566**
Underlying EBITDA	u	**2,322**	**2,330**
FCF conversion ratio	v = (t-q)/u	**27.8%**	**25.9%**

Full year free cash flow to Solvay shareholders[4] from continuing operations was €606 million, up €40 million year on year. Working capital was positive (€7 million) resulting from more disciplined working capital management.

Capex from continuing operations increased by +5.4% compared to €794 million in 2018. Provision payments were largely in line with last year, and taxes were up €(29) million, as expected.

Discontinued operations contributed €195 million, €35 million more than in 2018. These operations consist of the Polyamide activities sold on January 31, 2020 to BASF and Domo.

As a consequence, total free cash flow to Solvay shareholders amounted to €801 million in 2019.

[4] Free cash flow to Solvay shareholders is the free cash flow after payment of net interests, coupons of perpetual hybrid bonds and dividends to non-controlling interests. This represents the cash flow available to Solvay shareholders, to pay their dividend and/or to reduce the net financial debt. The free cash flow conversion ratio is calculated as the ratio between the free cash flow to Solvay shareholders (before netting of dividends paid to non-controlling interest) and underlying EBITDA.

NOTE B10
Net working capital

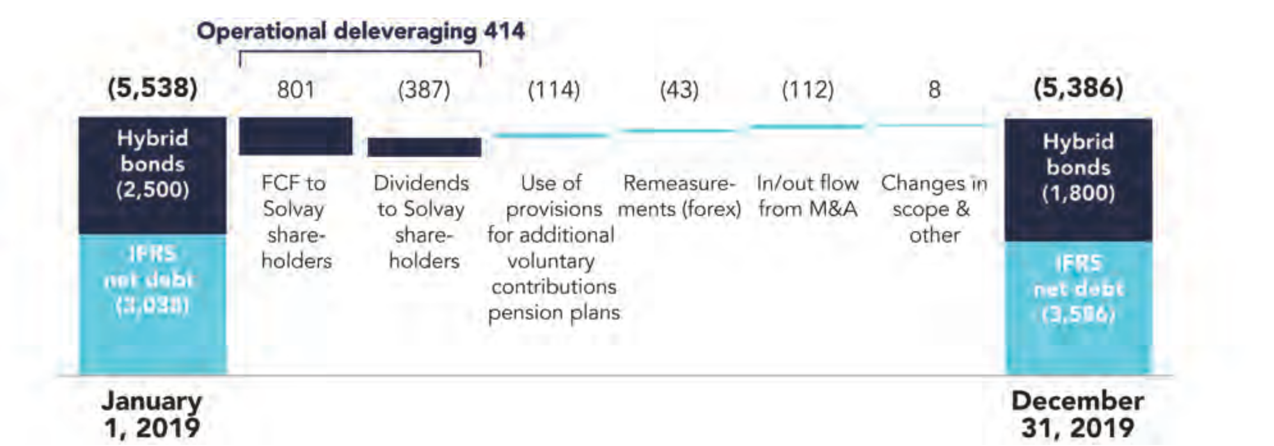
		2019		2018
In € million		**December 31**	**January 1**	December 31
Inventories	a	1,587	1,685	1,685
Trade receivables	b	1,414	1,434	1,434
Other current receivables	c	628	718	719
Trade payables	d	(1,277)	(1,431)	(1,439)
Other current liabilities	e	(792)	(850)	(850)
Net working capital	f = a+b+c+d+e	**1,560**	**1,557**	**1,550**
Sales	g	2,710	2,830	2,830
Annualized quarterly total sales	h = 4*g	10,841	11,321	11,321
Net working capital/sales	i = f/h	**14.4%**	**13.8%**	**13.7%**
Year-to-date average	j = μ(Q1,Q2,Q3,Q4)	16.0%		15.3%

NOTE B11
Underlying net debt

		2019		2018
In € million		**December 31**	**January 1**	December 31
Non-current financial debt	a	(3,382)	(3,520)	(3,180)
Current financial debt	b	(1,132)	(723)	(630)
IFRS gross debt	c = a+b	(4,513)	(4,243)	(3,810)
Underlying gross debt	d = c+h	(6,313)	(6,743)	(6,310)
Other financial instruments	e	119	101	101
Cash & cash equivalents	f	809	1,103	1,103
Total cash and cash equivalents	g = e+f	928	1,205	1,205
Net debt	i = c+g	**(3,586)**	**(3,038)**	**(2,605)**
Perpetual hybrid bonds	h	(1,800)	(2,500)	(2,500)
Underlying net debt	j = i+h	**(5,386)**	**(5,538)**	**(5,105)**
Underlying EBITDA (last 12 months)	k	2,322	2,330	2,230
Adjustment for discontinued operations(1)	l	366	315	305
Adjusted underlying EBITDA for leverage calculation(1)	m = k+l	2,688	2,645	2,536
Underlying leverage ratio(1)		**2.0**	**2.1**	**2.0**

(1) As net debt at the end of the period does not yet reflect the net proceeds to be received on the divestment of discontinued operations, whereas the underlying EBITDA excludes the contribution of discontinued operations, the underlying EBITDA is adjusted to calculate the leverage ratio. Polyamide's underlying EBITDA was added.

FY 2019 underlying net debt bridge
(in €million)



Underlying net financial debt[5] was €(5.4) billion. Strong operational cash flow of €801 million funded dividends of €387 million as well as an additional voluntary pension contribution of €114 million. Taking into account other factors such as forex and M&A impact, net financial debt was reduced by €152 million and the underlying leverage ratio improved to 2.0x.

Solvay called a €0.70 billion hybrid bond at 4.20% in May 2019, which was partly pre-financed by a €0.30 billion hybrid bond at 4.25% issued in November 2018. In September 2019 Solvay also redeemed the outstanding US$800 million 3.400% notes due 2020, and partly replaced it by the issuance of a €600 million new bond at 0.50% in August. These steps contribute to a reduction in financial charges; full effects will be visible in 2020.

[5] Underlying net financial debt includes the perpetual hybrid bonds, accounted for as equity under IFRS.

NOTE B12
CFROI

In € million		FY 2019 As published	FY 2019 Adjustment	FY 2019 As calculated	FY 2018 PF As published	FY 2018 PF Adjustment	FY 2018 PF As calculated
Underlying EBIT	a	1,503		1,503	1,554		1,554
Underlying EBITDA	b	2,322		2,322	2,330		2,330
Underlying earnings from associates & joint ventures	c	92		92	74		74
Dividends received from associates & joint ventures(1)	d	25		25	25		25
Recurring capex(2)	e = -2.3%*m			(409)			(388)
Recurring income taxes(3)	f = -28%*(a-c)			(395)			(444)
Recurring "CFROI" cash flow data	g = b-c+d+e+f			**1,450**			**1,449**
Tangible assets	h	5,472			5,454		
Intangible assets	i	2,642			2,861		
Right-of-use assets	j	447			428		
Goodwill	k	4,468			5,173		
Replacement value of goodwill & fixed assets(4)	l = h+i+j+k	13,028	7,007	20,035	13,915	5,106	19,021
of which fixed assets	m	8,560	9,239	17,799	8,742	8,147	16,889
Investments in associates & joint ventures(5)	n	555	(36)	519	441	1	443
Net working capital(5)	o	1,560	233	1,793	1,550	178	1,728
CFROI invested capital	p = l+n+o			**22,347**			**21,192**
CFROI	q = g/p			**6.5%**			**6.8%**
Advanced Materials				8.9%			9.9%
Advanced Formulations				5.9%			6.8%
Performance Chemicals				8.5%			8.1%

(1) Excluding discontinued operations.

(2) Currently estimated at 2.3% of replacement value of fixed assets.

(3) Currently estimated at 28% of underlying EBIT.

(4) The adjustment reflects the quarterly average over the year.

(5) The adjustment reflects the difference between the estimated replacement value of goodwill and fixed assets, and the accounting value. The changes over time come from foreign exchange variations, new investments and portfolio moves. It also reflects the quarterly average over the year.

NOTE B13
Research & Innovation

In € million		FY 2019	FY 2018
Research & development costs	a	(323)	(297)
Grants netted in research & development costs	b	26	25
Depreciation, amortization & impairments included in research & development costs	c	(83)	(59)
Capex in research & innovation	d	(70)	(89)
Research & innovation	e = a-b-c+d	**(336)**	**(352)**
Advanced Materials		(157)	(171)
Advanced Formulations		(94)	(97)
Performance Chemicals		(25)	(27)
Corporate & Business Services		(60)	(58)
Net sales	f	**10,244**	**10,257**
Advanced Materials		4,512	4,385
Advanced Formulations		2,846	3,057
Performance Chemicals		2,879	2,808
Corporate & Business Services		6	7
Research & innovation intensity	g = -e/f	**3.3%**	**3.4%**
Advanced Materials		3.5%	3.9%
Advanced Formulations		3.3%	3.2%
Performance Chemicals		0.9%	1.0%

R&I effort decreased during 2019 as result of group wide operational cost reduction programs. Corporate R&I efforts were strongly redirected towards the material activities in preparation of the new G.R.O.W strategy.

4. Notes to the underlying figures per segment

Segment overview

in € million	**FY 2019**	FY 2018 PF	*% yoy*
Net sales	**10,244**	**10,257**	***–0.1%***
Advanced Materials	4,512	4,385	*+2.9%*
Advanced Formulations	2,846	3,057	*–6.9%*
Performance Chemicals	2,879	2,808	*+2.5%*
Corporate & Business Services	6	7	*–14%*
EBITDA	**2,322**	**2,330**	***–0.4%***
Advanced Materials	1,143	1,225	*–6.7%*
Advanced Formulations	490	533	*–8.1%*
Performance Chemicals	852	761	*+12%*
Corporate & Business Services	(163)	(189)	*+14%*
EBIT	**1,503**	**1,554**	***–3.2%***
Advanced Materials	801	897	*–11%*
Advanced Formulations	322	381	*–15%*
Performance Chemicals	639	556	*+15%*
Corporate & Business Services	(259)	(280)	*+7.5%*
Capex in continuing operations	**(826)**	**(794)**	***–4.0%***
Advanced Materials	(375)	(379)	*+1.0%*
Advanced Formulations	(155)	(158)	*+1.5%*
Performance Chemicals	(177)	(175)	*–0.9%*
Corporate & Business Services	(119)	(82)	*–44%*
CFROI	**6.5%**	**6.8%**	***–0.3pp***
Advanced Materials	*8.9%*	*9.9%*	*–1.1pp*
Advanced Formulations	*5.9%*	*6.8%*	*–0.9pp*
Performance Chemicals	*8.5%*	*8.1%*	*+0.5pp*
Research & innovation	**(336)**	**(352)**	***+4.7%***
Advanced Materials	(157)	(171)	*+8.5%*
Advanced Formulations	(94)	(97)	*+2.7%*
Performance Chemicals	(25)	(27)	*+5.9%*
Corporate & Business Services	(60)	(58)	*–3.9%*

NOTE B14
Advanced Materials

in € million	FY 2019	FY 2018 PF	% yoy
Net sales	**4,512**	**4,385**	***+2.9%***
Specialty Polymers	1,927	2,009	*-4.1%*
Composite Materials	1,272	1,082	*+18%*
Special Chem	864	852	*+1.4%*
Silica	449	442	*+1.5%*
EBITDA	**1,143**	**1,225**	***-6.7%***
EBITDA margin	*25.3%*	*27.9%*	*-2.6pp*
EBIT	**801**	**897**	***-11%***
EBIT margin	*17.8%*	*20.5%*	*-2.7%*
Capex in continuing operations	**(375)**	**(379)**	***+1.0%***
Cash conversion	*67.2%*	*69.1%*	*-1.9pp*
CFROI	***8.9%***	***9.9%***	***-1.1pp***
Research & innovation	(157)	(171)	*+8.5%*
Research & innovation intensity	***3.5%***	***3.9%***	***-0.4pp***

Net sales evolution
FY yoy net sales bridge (in €million)

Full year net sales increased by +2.9% overall and by +0.3% organically[6]. Lower volumes in Specialty Polymers' automotive and electronics markets were offset by double-digit growth in Composite Material's for aerospace. Prices were up across the segment.

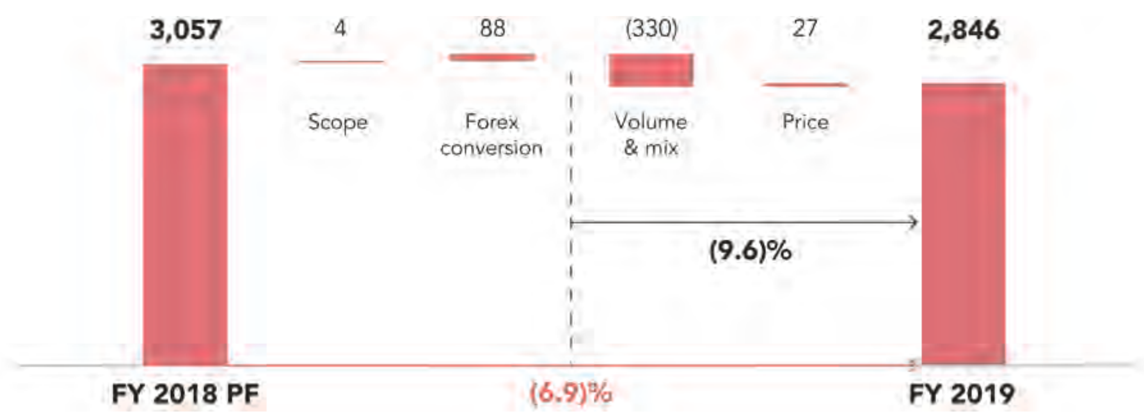
Full year underlying EBITDA was down -6.7% and -9.3% organically[6]. Higher prices, as well as cost containment and productivity measures only partly offset the higher cost base, resulting primarily from destocking and the effect of expanded production capabilities in Composite Materials. The one-time pension-related synergy benefit of €19 million, booked in the second quarter of 2018, had a -1.5% impact on the 2019 full year EBITDA. The EBITDA margin was down -2.6pp at 25%.

[6] Organic growth excludes forex conversion and scope effects, as well as the effect from the implementation of IFRS 16. Reported growth compares to the published 2018 pro forma figures, adjusted for the implementation of IFRS 16.

NOTE B15
Advanced Formulations

in € million	FY 2019	FY 2018 PF	% yoy
Net sales	**2,846**	**3,057**	***–6.9%***
Novecare	1,789	2,000	*–11%*
Technology Solutions	632	643	*–1.7%*
Aroma Performance	425	414	*+2.8%*
EBITDA	**490**	**533**	***–8.1%***
EBITDA margin	*17.2%*	*17.4%*	*–0.2pp*
EBIT	**322**	**381**	***–15%***
EBIT margin	***11.3%***	***12.5%***	***–1.1%***
Capex in continuing operations	**(155)**	**(158)**	***+1.5%***
Cash conversion	*68.3%*	*70.4%*	*–2.1pp*
CFROI	***5.9%***	***6.8%***	***–0.9pp***
Research & innovation	(94)	(97)	*+2.7%*
Research & innovation intensity	***3.3%***	***3.2%***	***+0.1pp***

Net sales evolution
FY yoy net sales bridge (in € million)



Full year net sales were down -6.9% and -10% organically[7]. Prices were slightly up, and volumes declined -11% primarily linked to the challenging shale oil & gas conditions in North America and softer activity in mining in the second half. Aroma Performance sales were up on volumes, notably in natural vanillin, and prices.

Full year underlying EBITDA was down -8.1% and -12% organically[7]. The significant volume declines were mitigated by price increases and cost containment measures, particularly in Novecare, leading to stable EBITDA margin of 17%.

[7] Organic growth excludes forex conversion and scope effects, as well as the effect from the implementation of IFRS 16. Reported growth compares to the published 2018 pro forma figures, adjusted for the implementation of IFRS 16

NOTE B16
Performance Chemicals

in € million	FY 2019	FY 2018 PF	% yoy
Net sales	**2,879**	**2,808**	**+2.5%**
Soda Ash & Derivatives	1,661	1,562	+6.3%
Peroxides	683	654	+4.4%
Coatis	535	591	–9.6%
EBITDA	**852**	**761**	**+12%**
EBITDA margin	*29.6%*	*27.1%*	*+2.5pp*
EBIT	**639**	**556**	**+15%**
EBIT margin	*22.2%*	*19.8%*	*+2.4%*
Capex in continuing operations	**(177)**	**(175)**	**–0.9%**
Cash conversion	*79.3%*	*77.0%*	*+2.3pp*
CFROI	***8.5%***	***8.1%***	***+0.5pp***
Research & innovation	(25)	(27)	+5.9%
Research & innovation intensity	***0.9%***	***1.0%***	***–0.1pp***

Net sales evolution
FY yoy net sales bridge (in € million)

Full year net sales in the segment were up +2.5% and +2.2% organically[8], reflecting the higher contract prices for soda ash and peroxides, and more than offsetting lower sales in Coatis, which compare to a very strong 2018.

Full year underlying EBITDA grew +12% and +10% organically[8] driven by higher prices. Productivity gains, favorable energy costs and a strong contribution from the Russian PVC joint venture also contributed positively to the performance. A one-time gain of €12 million was booked in the second quarter on the settlement of an energy contract in the soda ash business. The EBITDA margin was up +2.5pp at 30%.

[8] Organic growth excludes forex conversion and scope effects, as well as the effect from the implementation of IFRS 16. Reported growth compares to the published 2018 pro forma figures, adjusted for the implementation of IFRS 16

NOTE B17
Corporate & Business Services

in € million	FY 2019	FY 2018 PF	% yoy
Net sales	**6**	**7**	***–14%***
EBITDA	**(163)**	**(189)**	***+14%***
EBIT	**(259)**	**(280)**	***+7.5%***
Capex in continuing operations	**(119)**	**(82)**	***–44%***
Research & innovation	(60)	(58)	*–3.9%*

Full year underlying EBITDA was €(163) million, €26 million better, reflecting cost reductions and austerity measures, favorable conditions on the energy market and lower provisions for bonuses.

5. Reconciliation of underlying and IFRS figures

Besides IFRS accounts, Solvay also presents alternative performance indicators to provide a more consistent and comparable indication of the Group's underlying financial performance and financial position, as well as cash flows. These indicators provide a balanced view of the Group's operations and are considered useful to investors, analysts and credit rating agencies as these measures provide relevant information on the Group's past or future performance, position or cash flows. These indicators are generally used in the sector it operates in and therefore serve as a useful aid for investors to compare the Group's performance with its peers. The underlying performance indicators adjust IFRS figures for the non-cash Purchase Price Allocation (PPA) accounting impacts related to acquisitions, for the coupons of perpetual hybrid bonds, classified as equity under IFRS but treated as debt in the underlying statements, and for other elements that would distort the analysis of the Group's underlying performance.

FY consolidated income statement

	FY 2019			FY 2018 PF		
In € million	**IFRS**	**Adjust-ments**	**Underlying**	IFRS	Adjustments	Underlying
Sales	**11,227**	–	**11,227**	**11,299**	–	**11,299**
of which revenues from non-core activities	983	–	983	1,042	–	1,042
of which net sales	10,244	–	10,244	10,257	–	10,257
Cost of goods sold	(8,244)	2	(8,242)	(8,258)	2	(8,256)
Gross margin	**2,983**	**2**	**2,985**	**3,042**	**2**	**3,043**
Commercial costs	(381)	–	(381)	(373)	–	(373)
Administrative costs	(950)	28	(922)	(1,005)	35	(970)
Research & development costs	(323)	3	(321)	(297)	3	(294)
Other operating gains & losses	(131)	182	51	(123)	197	74
Earnings from associates & joint ventures	95	(3)	92	44	30	74
Result from portfolio management & reassessments	(914)	914	–	(208)	208	–
Result from legacy remediation & major litigations	(61)	61	–	(86)	86	–
EBITDA	**2,222**	**99**	**2,322**	**2,030**	**301**	**2,330**
Depreciation, amortization & impairments	(1,906)	1,087	(818)	(1,036)	260	(777)
EBIT	**316**	**1,187**	**1,503**	**994**	**560**	**1,554**
Net cost of borrowings	(141)	13	(128)	(134)	–	(134)
Coupons on perpetual hybrid bonds	–	(105)	(105)	–	(112)	(112)
Interests and realized foreign exchange gains (losses) on the RusVinyl joint venture	–	(18)	(18)	–	(21)	(21)
Cost of discounting provisions	(105)	20	(85)	(77)	3	(74)
Result from equity instruments measured at fair value through other comprehensive income	4	–	4	–	–	–
Profit/(loss) for the period before taxes	**74**	**1,097**	**1,171**	**783**	**429**	**1,212**
Income taxes	(153)	(151)	(305)	(73)	(230)	(303)
Profit/(loss) for the period from continuing operations	**(79)**	**946**	**866**	**710**	**199**	**909**
Profit/(loss) for the period from discontinued operations	236	11	247	201	15	216
Profit/(loss) for the period	**157**	**957**	**1,113**	**910**	**215**	**1,125**
attributable to Solvay shareholders	118	956	1,075	871	214	1,085
attributable to non-controlling interests	38	1	39	39	–	40
Basic earnings per share (in €)	1.15	9.27	10.41	8.43	2.08	10.51
of which from continuing operations	(1.14)	9.16	8.02	6.49	1.93	8.42
Diluted earnings per share (in €)	1.15	9.25	10.39	8.40	2.07	10.46
of which from continuing operations	(1.14)	9.14	8.01	6.46	1.92	8.38

NOTE B18
IFRS EBITDA

EBITDA on an IFRS basis totaled €2,222 million, versus €2,322 million on an underlying basis. The difference of €99 million is explained by the following adjustments to IFRS results, which are done to improve the comparability of underlying results:

- €(3) million in “Earnings from associates & joint ventures” for Solvay’s share in the financial charges of the Rusvinyl joint venture and the foreign exchange gains on the €-denominated debt of the joint venture, following the 12% revaluation of the Russian ruble over the period. These elements are reclassified in “Net financial charges”.
- €41 million to adjust for the “Result from portfolio management and reassessments”, excluding depreciation, amortization and impairment elements. This result comprises €23 million of restructuring costs, mainly related to the cost booked for the Group simplification plan and results related to past M&A transactions for €13m.
- €61 million to adjust for the “Result from legacy remediation and major litigations”, primarily environmental expenses.

NOTE B19
IFRS EBIT

EBIT on an IFRS basis totaled €316 million, versus €1,503 million on an underlying basis. The difference of €1,187 million is explained by the above-mentioned €99 million adjustments at the EBITDA level and €1,087 million of “Depreciation, amortization & impairments”. The latter consist of:

- €214 million to adjust for the non-cash impact of purchase price allocation (PPA), consisting of amortization charges on intangible assets, which are adjusted in “Cost of goods sold” for €2 million, "Administrative costs" for €28 million, in "Research & development costs" for €3 million, and in "Other operating gains & losses" for €182 million.
- €873 million to adjust for the net impact of impairments, mainly for the Oil & Gas Goodwill and Intangible assets, which are non-cash in nature and are reported in “Result from portfolio management and reassessments”.

NOTE B20
IFRS Net financial charges

Net financial charges on an IFRS basis were €(242) million versus €(332) million on an underlying basis. The €(90) million adjustment made to IFRS net financial charges consists of:

- €(13) million for the costs related to the restructuring of the Group financial debt and the reimbursement of the USD800 million bond,
- €(105) million reclassification of coupons on perpetual hybrid bonds, which are treated as dividends under IFRS, and as financial charges in underlying results,
- €(18) million reclassification of financial charges and realized foreign exchange result on the €-denominated debt of RusVinyl as net financial charges. The €15 million delta with the adjustment made to EBITDA is attributed to unrealized foreign exchange gains,
- €20 million for the net impact of decreasing discount rates on the valuation of environmental liabilities in the period.

NOTE B21
IFRS Income taxes

Income taxes on an IFRS basis were €(153) million, versus €(305) million on an underlying basis. The €(151) million adjustment includes mainly:

- €(252) million to adjust for the tax impacts of the adjustments made to the underlying result before taxes (as described above) and in particular for the deferred tax net income of the Oil & Gas impairment (€(167) million).
- €101 million to adjust for tax elements related to prior periods, resulting mainly from changes in deferred tax assets related to the revision of the forecast of utilization of tax losses.

NOTE B22
IFRS Discontinued operations

Discontinued operations generated a profit of €236 million on an IFRS basis and €247 million on an underlying basis. The €11 million adjustment to the IFRS profit is made for costs related to the divestment of the polyamide activities.

NOTE B23
IFRS Profit for period

Profit attributable to Solvay shareholders was €118 million on an IFRS basis and €1,075 million on an underlying basis. The delta of €956 million reflects the above-mentioned adjustments to EBIT, net financial charges, income taxes and discontinued operations.

6. Notes to the figures per share

Historical key share data

		2015(1)	2016(1)	2017(1)	2018(1)	**2019**
Number of shares (in 1000 shares)						
Issued shares at end of year	a	105,876	105,876	105,876	105,876	105,876
Treasury shares at end of year	b	2,106	2,652	2,358	2,723	2,466
Shares held by Solvay	c	32,116	32,511	32,511	32,511	32,511
Outstanding shares at the end of the year	d = a-b	103,770	103,225	103,519	103,154	103,411
Average outstanding shares (basic calculation)	e	83,738	103,294	103,352	103,277	103,177
Average outstanding shares (diluted calculation)	f	84,303	103,609	104,084	103,735	103,403
Data per share (in €)						
Equity attributable to Solvay share	g = .../d(2)	69.72	72.83	71.98	77.76	74.70
Underlying profit for the period (basic)	h = .../e(2)	8.12	8.19	9.08	10.57	10.41
IFRS profit for the period (basic)	i = .../e(2)	4.85	6.01	10.27	8.31	1.15
IFRS profit for the period (diluted)	j = .../f(2)	4.81	5.99	10.19	8.27	1.15
Gross dividend(3)	k	3.30	3.45	3.60	3.75	3.75
Net dividend(3)	l = k*(1–...%)(4)	2.41	2.42	2.52	2.62	2.62
Share price data (in €)						
Highest(5)	m	141.10	112.30	132.00	120.65	111.45
Lowest(5)	n	88.01	70.52	106.30	85.44	82.26
Average(5)	o = v/u	105.74	89.32	118.69	110.07	95.54
At the end of the year	p	98.43	111.35	115.90	87.32	103.30
Underlying price/earnings	q = p/h		*13.6*	*12.8*	*8.3*	*9.9*
IFRS price/earnings	r = p/i	*20.3*	*18.5*	*11.3*	*10.5*	*90.0*
Gross dividend yield	s = k/p	*3.4%*	*3.1%*	*3.1%*	*4.3%*	*3.6%*
Net dividend yield	t = l/p	*2.4%*	*2.2%*	*2.2%*	*3.0%*	*2.5%*
Stock market data(6)						
Annual volume (in 1000 shares)	u	82,718	86,280	62,642	70,715	65,292
Annual volume (in € million)	v	9,218	7,707	7,435	7,784	6,238
Market capitalisation, end of year (in € million)	w = p*d	10,214.1	11,494.1	11,997.8	9,007.4	10,682.3
Velocity	x = u/a	*78.1%*	*81.5%*	*59.2%*	*66.8%*	*61.7*
Velocity adjusted for free float	y = u/(a-b-c)	*115%*	*122%*	*88.2%*	*100%*	*92.1%*

(1) These data are not presented on pro forma basis, i.e: excluding Cytec for 2015 and impacts of IFRS16 Leases for 2018.
(2) The numerator can be found under the same label in the historic key financial data table in section 1 of the Business review.
(3) Recommended 2019 dividend, pending General Shareholders meeting on May 12, 2020.
(4) Belgian withholding tax applicable in year of dividend payment, i.e. the following year: 25% in 2013–2015, 27% in 2016, 30% from 2017 onward.
(5) The 2015 share price data use the share price adjusted by a factor 93.98% for the period until December 3, 2015. The adjustment reflects the distribution of rights during the capital increase completed in December 2015.
(6) The stock market data are based on all trades registered by Euronext.

NOTE B24
Earnings per share

		FY 2019	FY 2018 PF
Profit attributable to Solvay share (in € m)			
Underlying profit for the period	a	1,075	1,085
Underlying profit from continuing operations	b	828	869
IFRS profit for the period	c	118	871
IFRS profit from continuing operations	d	(118)	670
Number of shares (in 1000 shares)			
Issued shares at end of year	e	105,876	105,876
Treasury shares at end of year	f	2,466	2,723
Outstanding shares at the end of the year	g = e-f	103,411	103,154
Average outstanding shares (basic calculation)	h	103,177	103,277
Average outstanding shares (diluted calculation)	i	103,403	103,735
Data per share (in €)			
Underlying profit for the period (basic)	j = a/h	10.41	10.51
Underlying profit from continuing operations (basic)	k = b/h	8.02	8.42
IFRS profit for the period (basic)	l = c/h	1.15	8.43
IFRS profit from continuing operations (basic)	m = d/h	(1.14)	6.49
IFRS profit for the period (diluted)	p = c/i	1.15	8.40
IFRS profit from continuing operations (diluted)	q = d/i	(1.14)	6.46

Underlying earnings per share[10] from continuing operations were down -4.7% at €8.02. Higher depreciation and amortization charges and the slightly lower EBITDA were mitigated by lower net financial charges, following the repayment of higher interest-yielding debt in June 2018 and May 2019. Total underlying earnings per share in the full year was modestly down thanks to a higher contribution from the discontinued polyamide operations.

NOTE B25
Dividend

The Board of Directors decided to recommend to the General Shareholders' Meeting of May 12, 2020 the payment of a total gross dividend of €3.75 per share.

The dividend for the fiscal year 2019 is in line with the Group's dividend policy of maintaining a stable to increasing dividend whenever possible and, as far as possible, never reducing it.

Given the interim dividend of €1.50 gross per share, with 30% withholding tax, paid on January 20, 2020, the balance of the dividend in respect of 2019, equals €2.25 gross per share, which will be paid on May 20, 2020, provided prior agreement by General Shareholders Meeting.

[10] Earnings per share basis calculation

7. Outlook 2020

Underlying full year **EBITDA** is expected to be flat to modestly down (0% to -3%) organically compared to €2,322 million in 2019, with growth to be back-ended. Against a backdrop of a strong Q1 2019, first quarter 2020 is expected to be down by high single digit as a combined result of the 737MAX production halt, the impact of the COVID-19 virus, and the increasingly challenging oil and gas market.

Key assumptions:

- Focus on mitigation including pricing, headcount efficiency and other cost measures, as well as accelerated technology penetration will deliver more resilience in 2020.
- Solvay assumes Boeing 737MAX production of 200 aircraft in 2020 compared to close to 600 in 2019. The net impact, after mitigation efforts, is expected to be between -€30 million and -€40 million in 2020.
- Disruptions related to COVID-19 are uncertain; Solvay expects approximately -€25 million impact in the first quarter and will update its outlook as the situation becomes clearer.
- Macroeconomic environment headwinds are expected to continue into 2020, with expected improvement in key markets (auto and electronics) in the second half. We expect the oil and gas market to remain significantly challenged again this year.

Free Cash Flow conversion of 28%.

- Continued focus on working capital and on disciplined capex management will support strong cash generation in 2020.
- Pension cash-out will reduce by more than €40 million, following voluntary contributions, and cash-out for financial charges will be about €20 million lower as a result of the reduction and optimization of net financial debt.

ROCE to be stable around 8%.

Efficiency Measures

In 2020, Solvay is accelerating the alignment of its worldwide organization with its G.R.O.W. strategy and is responding to the challenging economic environment, leading to 500 redundancies and 150 new positions to support future growth. The social procedures are launched on February 26 and the savings will commence in the fourth quarter of 2020 and will be fully implemented by the end of 2021. This plan will complement prior measures and raise our mid-term cost reduction target to at least €350 million. Restructuring charges of approximately €70 million will be provisioned in our first quarter financials. It should be noted that, in the fourth quarter of 2019 a provision of €48 million was reversed from the prior program.

Forex sensitivities

Solvay is mostly exposed to the U.S. dollar, with the main sensitivities per US$/€0.10 change:

- EBITDA sensitivity of about €(125) million based on the average rate in 2019 of US$/€1.15, with some 2/3 on conversion and 1/3 on transaction (excluding hedging).
- Net debt sensitivity of about €100 million based on the rate at the end of 2019 of US$/€1.12.

5 Extra-financial statements

Extra-financial statements

This chapter supplements the information provided in the "Understanding Solvay" chapter, with a focus on high materiality aspects.

1. Overview of the consolidated results

1.1. Priority aspects

	Units	*Trends*	**2019**	2018	2017	2016	2015
Sustainable business solutions							
Product portfolio assessed	%		87	87	88	84	88
Solutions	%		53	50	49	43	33
Neutral	%		27	30	31	33	39
Challenges	%		7	7	8	8	16
Not evaluated	%		13	13	12	16	12
Greenhouse gas emissions							
Greenhouse gas intensity	Kg CO_2 eq. per € EBITDA		5.17	5.51	5.53	5.86	7.26
Direct and indirect CO_2 emissions (Scope 1 and 2)	Mt CO_2		10.0	9.8	10.0	10.9	11.6
Other greenhouse gas emissions according to Kyoto Protocol (Scope 1)	Mt CO_2 eq.		2.00	2.44	2.31	2.45	2.61
Total greenhouse gas emissions according to Kyoto Protocol (Scopes 1 and 2)	Mt CO_2 eq.		12.0	12.3	12.3	13.4	14.2
Other greenhouse gas emissions not according to Kyoto Protocol (Scope 1)	Mt CO_2 eq.		0.1	0.1	0.1	0.1	0.1
Carbon dioxide – CO_2 (Scope 1)	Mt CO_2 eq.		8.58	7.96	7.92	8.43	8.76
Total direct greenhouse gas emissions (Scope 1)	Mt CO_2 eq.		10.53	10.35	10.2	10.9	11.4
Total indirect CO_2 emissions – Gross market-based (Scope 2)	Mt CO_2		1.4	1.9	2.1	2.5	2.8
Total indirect CO_2 emissions – Gross location-based (Scope 2)	Mt CO_2		1.5	2.0	2.1	2.3	3

Employee health and safety							
Fatal accidents of Solvay employees and contractors	Number		0	0	1	1	0
Medical Treatment Accident Rate for Solvay employees and contractors (MTAR)	Accident per million hours worked		0.44	0.54	0.65	0.77	0.77
Medical Treatment Accident Rate for Solvay employees (MTAR)	Accident per million hours worked		0.44	0.58	0.63	0.73	0.65
Medical Treatment Accident Rate for Contractors (MTAR)	Accident per million hours worked		0.43	0.48	0.7	0.86	0.94
Lost Time Accident Rate for Solvay employees and contractors (LTAR)	Accident per million hours worked		0.66	0.65	0.65	0.76	0.75
Lost Time Accident Rate for Solvay employees (LTAR)	Accident per million hours worked		0.73	0.71	0.7	0.69	0.67
Lost Time Accident Rate for Contractors (LTAR)	Accident per million hours worked		0.51	0.52	0.52	0.9	0.85
Injuries	Number		34	42	50	68	66
Employee engagement and well-being							
Solvay engagement index	%		–	76	75	77	75
Coverage by collective agreement	%		100	100	100	87.8	77
Societal actions							
Solvay Group donations, sponsorship, and own projects	€ million		3.61	3.92	3.92	7.38	5.25
Employees involved in local societal actions	%		47	33	33	23	20

1.2. High materiality aspects

	Units	*Trends*	**2019**	2018	2017	2016	2015
Energy							
Primary energy consumption	Petajoules low heating value (PJ)		123	127	130	138	175
Secondary energy purchased	Petajoules low heating value (PJ)		38	45	49	53	63
Total energy sold	Petajoules low heating value (PJ)		32	23	22	23	26
Fuel consumption from non-renewable sources	Petajoules low heating value (PJ)		113	101	100	104	107
Fuel consumption from renewable sources	Petajoules low heating value (PJ)		5	4	3	4	5
Energy efficiency index – Baseline 100% in 2012	%		92	93	94	94	96
Air quality							
Nitrogen oxides emissions – NO_x	Metric tons		6,197	7,365	9,432	11,115	12,148
Nitrogen oxides intensity	Kg per € EBITDA		0.0027	0.0035	0.0043	0.0059	0.0062
Sulfur oxides emissions – SO_x	Metric tons		2,888	3,746	4,562	5,343	6,490
Sulfur oxides intensity	Kg per € EBITDA		0.0012	0.0017	0.0021	0.0028	0.0033
Non-methane volatile organic compounds emissions – NMVOC	Metric tons		4,109	5,344	5,173	4,941	6,780
Non-methane volatile organic compounds intensity	Kg per € EBITDA		0.0018	0.0019	0.0019	0.0026	0.0035
Water and wastewater							
Freshwater withdrawal	Million m^3		330	330	326	494	538
Freshwater withdrawal intensity	m^3 per € EBITDA		0.142	0.148	0.147	0.260	0.275
Chemical Oxygen Demand (COD) emissions	Metric tons O_2		5,344	6,248	5,670	–	–
Chemical Oxygen Demand intensity	Kg per € EBITDA		0.0023	0.0027	0.0024	–	–
Waste and hazardous materials							
Non-hazardous industrial waste	1,000 Metric tons		1,596	1,602	1,639	1,463	1,447
Hazardous industrial waste	1,000 Metric tons		86.6	93.1	100.7	189	200
Total industrial waste	1,000 Metric tons		1,682	1,696	1,740	1,652	1,647
Industrial hazardous waste not treated in a sustainable way	1,000 Metric tons		27.2	29.0	40.4	49.0	45.8
Industrial hazardous waste not treated in a sustainable way intensity	Kg per € EBITDA		0.0117	0.0137	0.0185	0.0258	0.0234
Substances of Very High Concern (SVHC) according to REACH criteria present in products sold	Number		29	31	35	20	20
Completion of analysis of safer alternatives program for marketed substances	%		54	39	49	18	5

Diversity and inclusion								
Total headcount	Headcount		24,155	24,501	24,459	27,030	26,350
Percentage of women in the Group	%		23	23	23	23	22
Senior manager	Headcount		369	401	396	428	428
Middle manager	Headcount		2,895	2,915	2,898	3,026	2,819
Junior manager	Headcount		5,246	5,213	5,090	5,348	4,491
Non-manager	Headcount		15,645	15,972	16,075	18,228	18,612
Solvay's workforce under 30 years old	Headcount		2,649	2,800	2,765	3,242	–
Solvay's workforce between 30–49 years old	Headcount		13,422	13,605	13,578	15,107	–
Solvay's workforce 50 years old and older	Headcount		8,084	8,096	8,116	8,681	–
Customer welfare							
Solvay's Net Promoter Score (NPS)	%		33	42	36	27	24
Management of the legal, ethics and regulatory framework							
Total claims made	Number		140	88	83	65	–
Total claims closed including cases for which there was insufficient information or cases that were misdirected or referred	Number		127	81	71	62	–
Unsubstantiated claims among resolved cases	Number		63	37	38	28	–
Substantiated claims among resolved cases	Number		46	34	19	29	–
Critical incident risk management							
Process safety incident rate	%		0.9	1.0	0.9	0.7	0.6
Medium severity incidents with environmental consequences	Number		20	47	59	40	46
Medium severity incidents with environmental consequences with operating permit exceedance	Number		9	12	27	26	26
Medium severity incidents with environmental consequences without operating permit exceedance	Number		11	35	–	–	–

2. Sustainability management

Solvay ONE Planet

The work done in 2019 on Solvay's new purpose led us to reconsider the way we look at sustainability, focusing on what Solvay changes in the world (impacts), instead of focusing on transforming Solvay (internal tools and process).

We have identified three main impacts, positive and/or negative, through our products portfolio or our operations:

- Climate: greenhouse gas emissions throughout the value chain, energy, but also including other potential impacts on biodiversity
- Resources: moving from linear business models to circular economy principles: raw materials, wastes, effluents, emissions throughout the value chain
- Better Life: improving quality of life, in our plants and with our products

Solvay One Planet requires us to better quantify the positive impacts we can have through our products portfolio, i.e. avoided greenhouse gas emissions, alignment to circular economy principles. Solvay One planet also requires us to walk the talk, and address the impacts of our operations in line with the planet and society's expectations.

We also want to embark our workforce, to allow them to have an impact on climate, resources and better life at all possible levels, and we want to become a reference open company, with a welcoming and caring organization.

Integrated thinking, or how Solvay measures value

The Group has progressively developed its approach to integrated thinking, which involves many steps:

- Integrating the most material social and environmental key performance indicators into operational dashboards and into strategic planning, budgeting, and decision-making processes;
- Incorporating the most material financial, social, and environmental key performance indicators into Solvay's sustainable value creation model;
- Adapting Solvay's reporting to integrated reporting principles and elements of contents.

2.1. Solvay Way

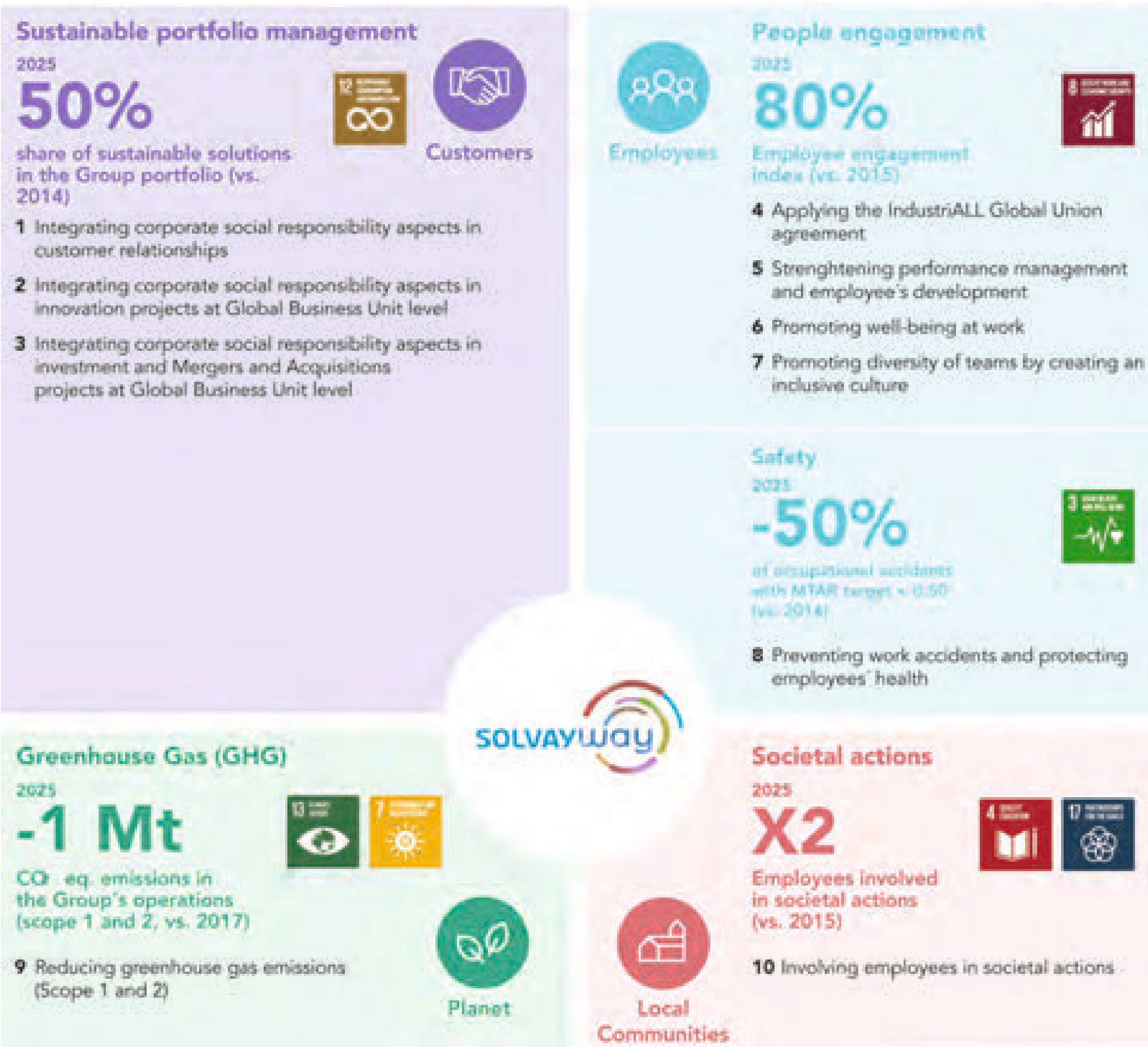
Solvay Way illustrates how the Company integrates social, societal, environmental, and economic factors into its management, strategy, decision-making, and operating practices, with the objective of creating value that stands the test of time.

Definition

Solvay Way is Solvay's sustainable development reference framework. It translates the Group's corporate social responsibility ambitions and commitments into concrete actions and clear responsibilities throughout the entire organization. Through Solvay Way, stakeholders' expectations are integrated into day-to-day activities and decision-making processes at every level of the organization.

Based on the materiality analysis, the Solvay Way team has developed a set of 37 practices which promote the interests of the Group's six stakeholders (Customers, Suppliers, Employees, Local Communities, the Planet, and Investors).

Solvay Way: ten practices linked with Solvay's five priority targets for 2025



Management approach

Solvay Way is deployed throughout the Group by the leadership of all its Global Business Units and Functions, and is supported by a network of more than 200 "Champions" and "Correspondents". The Solvay Way Champions ensure proper management at the business level and are supported locally at the sites by a team of Solvay Way Correspondents. Together, they play a key role in deploying the Solvay Way practices and sharing best practices and experiences. Global Business Unit presidents are accountable for managing Solvay Way effectively across their businesses.

This network is supported by Solvay's Sustainable Development and Energy (SDE) function, which promotes experience sharing and learning across entities. The SDE function is also responsible for making improvements by implementing the findings and conclusions reached through dialog with stakeholders. The key assessment results and outcomes are presented each year to the Executive Committee and the Board of Directors.

Indicators and objectives

In 2019, 34% of Solvay employees took part in projects related to Solvay Way action plans. This strong involvement demonstrates that employees are committed to Solvay's sustainable development ambitions.

34%

of employees involved

25%

of improvement in CSR practices

In 2019, all GBUs and corporate functions carried out self-assessments involving 127 industrial sites and 9 R&I sites. The Solvay Way spider chart below shows the results of these self-assessments.

Solvay Way process and results are reviewed by the Internal Audit based on a risk-based approach consistent with Group strategy, sustainability materiality and priorities.

For sites included in the 2019 Audit Plan, a review of Solvay Way self-assessment mandatory practices linked to the Group five sustainability targets (safety, greenhouse gas emissions, people engagement, sustainable business solutions and societal actions) and sampling review of additional practices selected by the GBUs have been performed.

Internal Audit Results

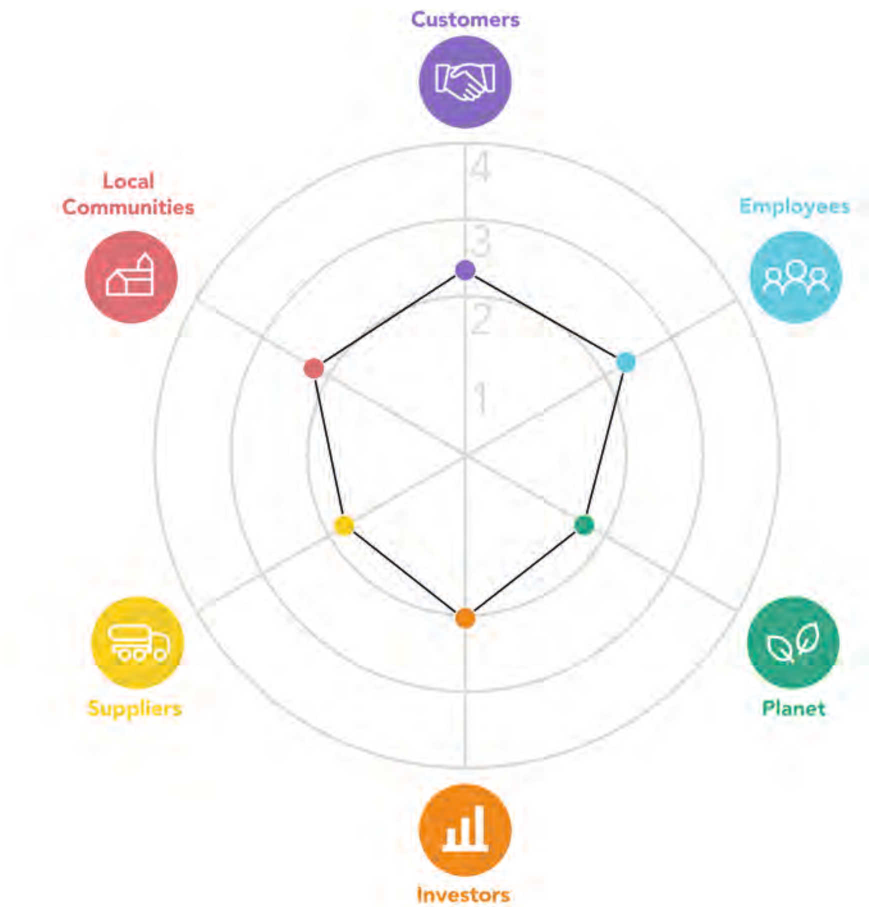
Internal Audits have reviewed Solvay Way on 121 sites in 2019, with 94% Solvay Way self-assessment accurate.

- 94% of practices correctly self-assessed (vs 84% in 2018),
- 6% of practice with a gap identified (vs 11% in 2018).

2020 action plan

We noticed that 6% of the self-assessment were not accurate. The correct assessments have been taken into account. A review of the gaps will be done with the sites to ensure a proper progress and assessment by 2020.

2019 Solvay Way Group profile



Solvay Way gives each Group entity the tools it needs to assess and improve its CSR practices using a ranking system with four performance levels. Each entity has to position its level on a scale from 0 to 4 based on its implementation of Solvay Way practices. Individual practices may apply to the site level (Research and Innovation, Industrial Campus, and Headquarters), to a Global Business Unit, or to the Group level (Corporate Function), depending on the topic. Some practices apply to all levels.

Ten mandatory practices are directly related to the Group's five sustainability targets and apply to all Group entities. Each Global Business Unit can select additional practices relating to its materiality analyses and priorities. Selected practices are validated by the leadership of the Global Business Units and reviewed by the Corporate Sustainability and Energy Team. On average, Global Business Units have performed a self-assessment on 16 practices.

2019 Key achievements

Inaugural Solvay Way Awards

This was the first year Solvay honored the outstanding performance of teams in the realm of sustainable development with the Solvay Way Awards. In 2019, the Group recognized six winners for their sustainability commitment, great performance, and concrete achievements.

Planet

Livorno site in Italy recognized for its resources efficiency management

The site reduced its use of fresh water by 8% by improving its water treatment and recovery processes. It also reduced the plant's steam use by 7% by reorganizing the heat exchange system and improved its waste resources.

Employees

Vadodara Research Center in India reaches 92% employee engagement

The Vadodara Research Center is leading the way in spreading social responsibility and safety awareness. With the successful implementation of the HSE tool dubbed "Behaviors Based Safety program", R&I recognized improvement in the way employees handle their own safety and the safety of their colleagues. All employees, contractors, and visitors are trained, empowered, and encouraged through an awareness and promotion program to make at least one observation per month: that means everyone is part of a continuous effort to end unsafe behaviors and promote safer ones!

Customers

Specialty Polymers GBU makes a 15-year commitment for more renewable energy

The Specialty Polymers GBU launched several projects in 2018 to promote sustainable mobility that answers society's unmet needs. The GBU is working to improve the sustainability profile of its products and provide safer, long-lasting solutions, while also working to enhance performance. Furthermore, the business has made a 15-year commitment with a solar farm in the US to provide products manufactured using renewable energy.

Suppliers

Supplier partnership of Coatis GBU

Cavalinho is a Brazilian road transport company and a core supplier of Coatis for the transport of their raw material and finished goods. Using the REDD mechanism (REDD = reducing emissions from deforestation and forest degradation), Cavalinho has acquired 16,500 hectares of forests in the Amazon region in order to ensure preservation and replanting. These green areas are capturing all the CO_2 emitted by the Cavalinho company, allowing its compensation for the next 20 years. Thanks to its partnership with Cavalinho, Solvay offset 17 ktons of CO_2 from transportation in 2019.

Local Communities

4 QUALITY EDUCATION

17 PARTNERSHIPS FOR THE GOALS

Education in action program in Paulinia

As part of its social action outreach to the local community, the Paulinia site in Brazil focused on enhancing youth employability, education, and solidarity, impacting more than 3,000 people in local communities. The site implemented the 'EducAção: Education in action' program and supported an NGO founded by the employees in 2003.

Raising awareness on Biodiversity locally

In 2019, a new practice related to biodiversity has been added to the Solvay Way. The new practice focuses on Solvay's manufacturing processes as part of its value chain. The objective is to ensure that sites identify the ways they impact local biodiversity and manage those impacts properly. The first step is to identify if there is a protected area or areas with high biodiversity value nearby the site's and then to monitor closely all potential pressures on it.

4
GBUs

25
sites

2.2. Circular economy

Definition

The circular economy refers to an economic model whose objective is to produce goods and services in a sustainable manner, limiting the consumption and wastage of resources (raw materials, water, energy), and the production of waste. The aim is to break with the linear economy model (extract, manufacture, consume, throw away), replacing it with a "circular" economic model. The linear economic model currently in place in our societies has reached its limits, as it strongly contributes to climate change and to the destruction of our environment. Immediate action and efforts are required in order to preserve the planet and its limited resources. Industries have a big role to play, and one way to do so is by incorporating circular economy principles into their activity on a global scale.

To limit the consumption and wastage of resources as well as the production of waste, innovation is required in order to optimize resource use. Recycling, reusing, reducing, renewing, recovering: these are all ways to create a circular economy and get rid of waste for good. Circular loops can keep the resources recirculating for as long as possible - ideally, forever, with no need to extract more of them.

According to the Energy Transitions Commission, a more circular economy could reduce CO_2 emissions from the plastics, steel, aluminium, and cement industries by 40% globally, and by 56% in developed economies like Europe by 2050.

Underpinned by a transition to renewables, the circular economy builds economic, natural, and social capital. It is based on three principles that Solvay will follow:

1. Design out waste and pollution;
2. Keep products and materials in use;
3. Regenerate natural systems.

Management approach

Responsibility for the Circular Economy is assigned to the Head of Circular Economy in the Sustainable Development and Energy (SDE) Corporate function.

The mission of the Head of Circular Economy is to accompany and lead the transition of Solvay's activity and its systemic approach, by creating circular loops not only with customers but also with the major brand owners in the industries where Solvay is present. By meticulously analysing the internal and external opportunities to make better use of products at every stage of their lifespan (and trying to find a new life for them through recycling or reuse), the Head of Circular Economy and the SDE function are constantly pushing new projects for Solvay and other partners to reduce waste, thus improving the environmental impact of the industry and contributing to a Global circular economy.

Chemistry, as a science and an industry, is a tremendously relevant and powerful enabler in material transformation and re-use. Using the large and diversified technology portfolio of the Group, from specialty chemicals to advanced materials, we can act as an enabler and co-construct new solutions to close loops.

Resource-efficient circular economy solutions

The transformation of Solvay into a circular economy driver is embedded in the Group's G.R.O.W. strategy.

Solvay is taking steps and working with customers, suppliers, and partners to identify opportunities where the Group can leverage its capabilities, in particular by doing the following:

1. Redesign products and processes by reducing the use of critical resources, resulting in recyclable products;
2. Develop new market value propositions to improve the customers' circularity;
3. Help extend the lifetime of customers' products;
4. Help customers reuse scarce resources;
5. Develop renewable energy solutions for customers.

Partnership with the Ellen MacArthur Foundation

In January 2018, Solvay and the Ellen MacArthur Foundation (EMF) signed a three-year Global Partner agreement that gives the Group an opportunity to make a difference in accelerating the transition to a circular economy in the chemical sector.

The Foundation was launched in 2010 and aims at helping businesses reach a circular approach in their business models. We share the EMF's belief that innovation is at the heart of any transition to the circular economy. Solvay has been chosen as the only chemical company and will work with ten other Global Partners (BlackRock, Danone, Google, H&M, Intesa Sanpaolo, DS Smith, Philips, Renault, SC Johnson, and Unilever) in innovating toward more sustainable and circular products.

Solvay is developing projects alongside other major actors and enabling a vital transition to better ways of producing, using, recycling, and reusing our products in the industry and beyond.

We are determined to build a sustainable future, and we believe that working with the Ellen MacArthur Foundation helps us accelerate our transition to resource economies.

Our commitments

As a strategic partner of the Ellen MacArthur Foundation, we are engaged in a journey to re-think and develop circular business with customers and brand owners to preserve the resources of the planet. We can contribute value to the circularity in three priority areas:

- Bring new functionalities: transform waste from Solvay's strategic markets into added-value raw materials;
- Enhanced technology: create value by increasing the quality of recycled materials through improved processes;
- Eco-design: develop new products to be circular by design.

Solvay is engaged in cross-industry organizations:

- WEF platform for developing low carbon emitting technologies (mixed plastics recycling, biomass utilization for low CO_2 emission, and new chemistries and processes using CO_2 as feedstock);
- WBCSD Factor 10;
- Circular Plastic Alliance CEFIC.

2019 Key achievements

In 2019, Solvay embedded circular and bio-based innovation into sourcing, new business development projects, and its portfolio.

Manufacturing biobased vanillin is one example. Produced from a natural raw material, ferulic acid obtained from non-GMO rice bran oil and through a fermentation process, Solvay RHOVANIL Natural CW is the only industrially produced vanillin.

A new solution to reduce metals extraction and waste

As demand for Electric Vehicle Lithium-ion batteries grows, so too will the need for a consistent source of critical metals such as cobalt. Solvay is helping to accelerate Electric Vehicle battery metal recycling and develop a sustainable, closed loop value chain facilitated by new recycling processes.

Leveraging its capabilities and partnerships, Solvay has an active role in improving productivity and efficiency across the entire battery metals value chain by offering superior Li, Co & Ni extraction efficiency for processors, delivering technologies to purify and convert those metals into feed stock for cathode manufacturing high-purity battery raw materials.

2.6. Sustainable Portfolio Management

Sustainable value creation is measured by Solvay's Sustainable Portfolio Management tool. It enables Solvay to make strategic decisions that steer its portfolio, support progress toward its sustainability objectives, and factor sustainability into operating decisions.

2009
SPM created

1,700+
Product-Application Combinations assessed

600+
experts involved

87%
of the portfolio analyzed

53%
of revenues in sustainable solutions*

* Scope: consistent with financial reporting.

Definition

Solvay's Sustainable Portfolio Management (SPM) focuses on sustainable business solutions. The SPM methodology is designed to boost Solvay's business performance and deliver higher growth by letting decision-makers know how Solvay's products contribute to sustainability, considering two factors:

1. the environmental footprint related to their production, and associated risks and opportunities,
2. how their applications create benefits or challenges from a market perspective, based on a qualitative assessment.

With SPM, decision-makers can detect sustainability risks and opportunities along the entire value chain (cradle-to-grave), develop action plans, and deliver innovative solutions that balance economic, social, and environmental values. SPM assessments are performed every year in order to capture the most recent signals from the market in a dynamic perspective covering more than 80% group revenue .

Management approach

Since its implementation in 2009, the Sustainable Portfolio Management tool has been widely adopted by Solvay Global Business Units and Functions to integrate sustainability into their key processes:

- The Sustainable Portfolio Management profile is an integral part of strategic discussions between Global Business Units and the Executive Committee;
- Solvay uses the Sustainable Portfolio Management tool to evaluate mergers and acquisition projects to see if the investment is feasible in the light of Sustainable Portfolio targets;
- Investment decisions (capital expenditure above €10 million and acquisitions) made by the Executive Committee or the Board of Directors include a sustainability aspect that involves an exhaustive Sustainable Portfolio Management analysis of the potential investment;
- All Research and Innovation projects are evaluated using Sustainable Portfolio Management;
- In Marketing and Sales, Sustainable Portfolio Management allows Solvay to engage customers on fact-based sustainability topics – such as climate change action, renewable energy, recycling, and air quality – with the goal of differentiating and creating value for Solvay and the customer.

Portfolio Sustainability Assessment at the World Business Council for Sustainable Development

Benchmarking and sharing best practices among peers and customers makes the Sustainable Portfolio Management methodology more robust and leads to better decision-making. Solvay is a key contributor to the World Business Council for Sustainable Development's Portfolio Sustainability Assessment. The initiative sets a high standard and gives industries a common framework for its implementation, detailing a specific methodology for the chemical industry.

3. Basis of preparation

Main reporting frameworks used to prepare this Annual Integrated Report

- **Global Reporting Initiative (GRI):** the GRI standards are the main reference for Solvay's sustainability reporting;
- **United Nations Global Compact:** the information provided serves as a progress report on implementation of the United Nations Global Compact's ten principles;
- **International Integrated Reporting Council (IIRC):** Solvay adheres to the principles and content elements of Integrated Reporting, as described in the "International Framework" published by the IIRC;
- **2014/95/EU:** Solvay uses the GRI Standards to comply with Directive 2014/95/EU of the European Parliament and of the Council of 22 October 2014 amending Directive 2013/34/EU as regards disclosure of non-financial and diversity information. The Directive was transposed into Belgian law in September 2017;
- **Sustainability Accounting Standards Board (SASB):** Solvay aligns its materiality analysis with the SASB approach to prepare the SASB Materiality Map™. For more details, see the Materiality Analysis section of this chapter.
- **World Business Council for Sustainable Development (WBCSD):** Solvay's report aligns with the WBCSD ESG Disclosure Handbook guidance in terms of process and content selection.

3.1. Task Force on Climate-related Financial Disclosure

The Financial Stability Board Task Force on Climate-related Financial Disclosures (TCFD) developed voluntary, consistent, climate-related financial risk disclosures for use by companies in providing information to investors, lenders, insurers, and other stakeholders.

The task force structured its recommendations around four themes that represent key aspects of how organizations operate: governance, strategy, risk management, and metrics and targets.

This section addresses the disclosures, with links to the relevant sections of the Annual Integrated Report, and provides a self-assessment of Solvay's level of alignment with the TCFD recommendations.

Governance

- The Charter of Corporate Governance describes how the Board of Directors manages sustainability-related aspects and is available on the Solvay Website. The Board thus devotes at least one meeting per year to an update on trends in global sustainable development issues, including climate change risks and opportunities;
- A Climate Risks Officer has been appointed at the Executive Committee level. He is in charge of ensuring that climate-related aspects are adequately considered in the Group's strategy and operations.

Strategy

- Long-term horizon assumptions are presented in the description of megatrends. See in particular the description of the "Resource constraints and demand for sustainability" megatrend. Medium-term assumptions (in the coming five years) are explained in the description of Solvay's main markets. Short-term assumptions (one year) are presented in the Group's outlook;
- Climate related risks and opportunities were fully reviewed in 2019 and are described in the "Risk Management" chapter. Four main risk categories were analyzed:
  - Product-related transition risks (using the Sustainable Portfolio Management methodology)
  - Scenario analysis using as reference the International Energy Agency "Sustainable Development" scenario
  - Acute physical risks linked to droughts, hurricanes and earthquakes,
  - Chronic physical risks linked to water scarcity.
- A scenario analysis was made in 2019, using as reference the International Energy Agency "Sustainable Development" scenario. Impacts on energy and CO_2 costs (including impact on raw material costs) and impacts on main markets have been assessed. Four Executive committee members were directly involved in the exercise. According to this exercise, the order of magnitude of favorable impacts on markets outweighs the negative impact on energy and CO_2 costs.
- The presentation of the Group's main risks does not include a differentiation between short-, medium-, and long-term horizons. Quantification of impacts is not disclosed.

Risk management

- The risk management process, the main risks, and the process used to rank them are described in the "Risk Management" chapter;
- Analysis of sustainability-related risks and opportunities is done through the Sustainable Portfolio Management methodology, for each product in each application or market, including the climate change transition risk;
- "Greenhouse gas emissions" (GHG) have been identified as a priority aspect in the Group's materiality analysis. "Climate transition risks" have been identified as part of the Group's main risks. Links between main risks and high materiality issues are part of the materiality analysis process. "Climate-related physical risks" have been ranked up to now as "moderate materiality aspects";

- The Sustainable Portfolio Management tool is a requirement in key Group processes and in particular in the assessment of capital expenditures projects, Research and Innovation projects, and acquisition and divestiture projects.

Metrics and targets

- The strategic objectives used to drive sustainable value creation are described in the Solvay scorecard;
- Greenhouse gas emissions, energy consumption, and Sustainable Portfolio Management metrics and targets are reported in the "Extra-financial statements" chapter. Solvay has pledged to reduce Scope 1 and 2 greenhouse gas emissions by 1 million tons by 2025, compared to 2017, by improving its energy efficiency and energy mix and by investing in clean technologies. The greenhouse gas emissions reduction target is used as a criteria in a "positive incentive loan" signed with a consortium of banks;
- Greenhouse gas Scope 1, Scope 2 and Scope 3 emissions are fully reported and audited. The scope of emissions reporting is consistent with financial reporting.

3.2. United Nations Sustainable Development Goals

In 2015, the United Nations established a set of goals to end poverty, protect the planet, and ensure prosperity for all. Each of these 17 Sustainable Development Goals (SDGs) includes specific targets to be achieved by 2030. Achieving the SDGs requires efforts by governments, the private sector, civil society, communities, and individuals.

Nine leading chemical companies, including Solvay, and two industry associations formed a dedicated working group, convened by the World Business Council for Sustainable Development (WBCSD). The group took a leadership role in piloting and refining the three-step framework described in WBCSD's SDG Sector Roadmap Guidelines.

In the context of this exercise, Solvay identified nine SDGs where the Group can have a material impact, positive or negative. The Group then integrated these seven SDGs into its materiality analysis as the official agenda of the "Planet" (Governments and NGOs) stakeholder group.

This preliminary list was reviewed in 2019, within the context of the work to define the Group's purpose, with an increasing focus on the impacts of products and operations. Solvay's main impacts can be grouped into three categories: climate, resources, and quality of life. The corresponding list of SDGs on which Solvay can have the most impact, positive or negative, through its operations and the products it sells, is the following:

- **Climate**, through the Group's energy consumption and greenhouse gas emissions, but also through products that impact customers' energy consumption or greenhouse gas emissions.

- **Resources**, through the Group's raw materials consumption, water consumption, effluents, emissions, and waste generation, but also through products' life cycles and end-of-life management.

- **Better Life**, through the Group's management of hazardous materials, people, process and product safety, through social dialogue initiatives, and through its product portfolio.

3.3. Reporting practices

Unless stated differently, the environmental and social reporting scope and boundaries are aligned to the financial reporting scope and boundaries, to allow consistency of data and ratios.

Greenhouse gas emissions

Solvay uses the following references:

- the "Guidance for Accounting & Reporting Corporate Greenhouse Gas Emissions (GHG) in the Chemical Sector Value Chain" published by the World Business Council for Sustainable Development;
- the **Greenhouse Gas Protocol Corporate Accounting and Reporting Standard**;
- the **Greenhouse Gas Protocol Corporate Value Chain (Scope 3) Standard**.

By extension, other emissions are reported according to the same guidelines.

To better reflect its sustainability policy, Solvay decided to apply the market-based method to calculate CO_2 emissions associated with purchased electricity. To fully comply with Global Reporting Initiative requirements, the following criteria (in decreasing order of priority) are applied when selecting the CO_2 emission factor of each electricity supply contract:

- **Energy attribute certificates** – emission factors resulting from specific instruments such as green energy certificates;
- **Contract based** – the emission factor obtained from contract agreements on specific sources for which there is no emission of specific attributes;
- **Supplier / utility emission rates** – the emission factor that is disclosed as a result of the supplier's retail mix;
- **Residual mix** – if a residual mix is unavailable, grid-average emission factors are used as a proxy;
- **Location-based** – if none of the above factors is available, it is the national emission factor published by national authorities or the International Energy Agency. Based on a World Resources Institute (WRI) recommendation, Emissions and Generation Resource Integrated Database (eGRID) emission factors published by the United States Environmental Protection Agency are used for the USA, instead of the state emission factor. Grid emission factors , published by the Ministry of Ecology and Environment are used for China, instead of the state emission factors.

Energy

Energy consumption components are converted into primary energy, according to the following conventions:

- Fuels, using the net calorific values;
- Steam purchased, taking into account the reference value of boiler efficiency related to the fuel used for its generation (e.g. 90% efficiency based on the net calorific value for natural gas);
- Electricity purchased, assuming an average efficiency of 39.5% for all types of power production except for nuclear power (33%), hydro (100%), solar (100%) and wind (100%) based on net calorific value (source: International Energy Agency (IEA)).

Environment

Environmental data are collected yearly at all Solvay industrial sites (production sites and Research and Innovation centers) and for each business separately in the case of multi-business sites. The data collection comprises substance emissions to air and water, waste generation and disposal, parameters related to the site's water balance, production volumes and finally, some indicators dealing with general environmental management.

After a thorough validation process, these data are consolidated at Group level in a manner consistent with financial reporting. In addition, the consolidated data are verified by an external auditor.

Safety

Safety performance is measured in all entities under Solvay operational control, i.e. on sites where Solvay policies and procedures apply. Accidents are reported to a central database and classified according to time lost and severity of injuries.

Frequency rates are calculated monthly at the Global Business Unit level and Group level. Performances and accident typologies are analyzed quarterly. Reports are provided to the Executive Committee and Global Business Units.

The Medical Treatment Accident Rate (MTAR), Lost Time Accident Rate (LTAR), and Process Safety Rate are calculated based on million hours worked.

Social

Headcount is provided for two scopes:

1. Solvay Continuous Operations includes continuous operations only and matches the financial accounts presentation;
2. Solvay Total Headcount also considers discontinued operations.

Apprentices, trainees, and students are excluded from the numbers. Headcount refers to employees that have a contract with Solvay and are classified as active, as they have a position in the organizational chart. Full Time Equivalent (FTE) corresponds to active employees times capacity utilization.

3.4. Materiality analysis

Solvay bases its sustainability priorities on a materiality analysis. This approach identifies critical economic, environmental, and social aspects with potential to significantly impact Solvay's performance and/or substantially influence stakeholders' decisions. The analysis is performed and updated each year using the Sustainability Accounting Standards Board (SASB) materiality approach.

5	8	15
Priority aspects	High materiality aspects	Moderate materiality aspects

Materiality analysis

Category	Moderate materiality	High materiality
Environment	Ecological impacts	✪ Greenhouse gas emissions Air quality Energy Water and wastewater Waste and hazardous materials
Social capital	Access and affordability Data security Customer privacy Selling practices and product labeling Product quality and safety	Customer welfare ✪ Societal actions
Human capital	Compensation and benefits Recruitment, development and retention	✪ Employee health and safety Diversity and inclusion ✪ Employee engagement and well-being
Business model and innovation	Business model resilience Product packaging Supply chain management Materials sourcing and efficiency Physical impacts of climate change	✪ Sustainable business solutions
Leadership and governance	Systemic risk management Regulatory capture and political influence	Critical incident risk management Management of the legal, ethics and regulatory framework

✪ Priorities

Materiality analysis process

Solvay's Sustainable Development and Energy Function coordinates the analysis with an internal network of the Solvay Way Champions in the Global Business Units and Functions. Experts in each Corporate Function have reviewed the analysis of each aspect, paying particular attention to consistency with the Group's risk analysis.

Materiality analysis process

Stakeholder inclusiveness | Sustainability context

Indirectly taken into account through:

- The exhaustive list of aspects of the SASB's "Materiality Map™";
- The "evidence of interest criteria" which includes the analysis of documents published by each stakeholder Group.

Report
Reporting on the 8 high materiality aspects and the 15 moderate materiality aspects.

1 Use of the SASB's Materiality Map™

SASB's Materiality Map™ identifies likely material sustainability aspects on an industry-by-industry basis.

2 SASB's Materiality Map™ is based on tests designed to prioritize aspects. To determine which sustainability topics were likely to be material to particular industries, SASB ran the following tests: evidence of interest, evidence of financial impact, forward looking adjustment.

The network of "the Solvay Way Champions" and internal experts for each highly material aspect were involved in the process.

3 Review the analysis by the Executive Committee and the Global Business Units and Corporate Functions leaders, give a special importance to ensure consistency with the analysis of the Group's main risks and also compare with the result of the analysis of the SASB for the chemical sector.

4 Annual review led by the Sustainable Development and Energy function

A review takes place after the report has been published, and the organization is preparing for the next reporting cycle. The findings inform and contribute to the Identification Step for the next reporting cycle.

2019 Updates

As in previous years, the vocabulary used for material aspects has been kept consistent with the SASB Materiality Map™, except in cases where the Group's Executive Committee has decided to do otherwise during the validation step in order to broaden the scope of some material aspects.

This is the case for the following high materiality aspects:

- "Societal actions" includes "Community relations" from the 2018 SASB Materiality Map™;
- "Employee engagement and well-being" includes "Labor practices" and "Employee engagement" from the SASB Materiality Map™;
- "Sustainable business solutions" includes "Product design and Lifecycle Management" from the SASB Materiality Map™;
- "Management of the legal, ethics and regulatory framework" includes "Business ethics", "Competitive behavior", and "Human Rights" from the SASB Materiality Map™;
- As last year, Solvay has kept "Compensation and benefits", "Recruitment, development and retention", and "Diversity and inclusion" as three aspects, mainly because of the extent of reporting on these issues in this report.

The work done during 2019 on Solvay's purpose, and the work done on the new sustainability approach, Solvay One Planet, have confirmed the high materiality aspects already selected.

Correspondence between the materiality analysis and the risk analysis of the Group

As described in the "Risks Management" chapter of this Annual Integrated Report, the risk analysis of Solvay is a specific process and is used as input for the materiality analysis.

All the main risks of the Group relate to high materiality aspects, except "Security" and "Cyber risks", which relate to moderate materiality aspects because the impact on daily operations is limited and is material only in the event of a malicious act.

Notes to Business model and innovation

This section addresses the impact that environmental and social factors have on innovation and business models. It examines the way environmental and social factors are integrated into the Group's value creation processes. Those processes include resource efficiency and other innovations in the production process, product innovation, and finding ways to design, use, and manage the end-of-life treatment of products efficiently and responsibly.

NOTE S1
Sustainable business solutions

Priority

Definition

A sustainable solution is defined by Solvay's Sustainable Portfolio Management tool as a product in a given application which makes a greater social and environmental contribution to the customer's performance and at the same time demonstrates a lower environmental impact in its production phase.

Indicators and objectives

Within Solvay, the Global Business Units are accountable for delivering sustainable business performance and contributing to the Group target of generating 50% of revenue from sustainable solutions by 2025.

Revenue breakdown by Sustainable Portfolio Management heat map categories

% of turnover	**2019**	2018	2017
Solutions	53	50	49
Neutral	27	30	31
Challenges	7	7	8
Not evaluated	13	13	12

Solutions: to be considered as part of the "solutions", products must serve in an application that demonstrates a direct, significant, and measurable benefit (social or environmental) to society at large. They must not exhibit sustainability concerns and must have a low monetized environment manufacturing footprint compared to the value they bring to society.

Neutral: no sustainability impact, positive or negative, identified.

Challenges: a sustainability roadblock is identified, or the environmental manufacturing footprint is too high.

By the end of 2019, 53% of sales in the assessed portfolio of Product-Application Combinations qualified as "solutions", a slight improvement compared with the previous year.

Most of the progress made over the last five years has been achieved through changes to Solvay's portfolio and the natural adoption of sustainable solutions as market standards (neutral), as a result of the market dynamic on sustainable topics. Today, the integration of sustainability in the business processes creates a positive dynamic to deliver more revenue in business solutions category. Therefore the Global Business Units have raised their ambition that will contribute to reach 65% in solutions by 2030.

Sustainable Portfolio Management's comprehensive, systematic approach reveals an increasing number of new market signals on sustainability that require discussion between the business and its customers to better understand their potential business impact.

The Sustainable Portfolio Management systematic portfolio assessment is aligned with the Group's financial scope. Changes in scope during the year, as outlined in the financial report, are reflected in the Sustainable Portfolio Management scope. The portfolio assessment is based on the 2019 revenue.

Correlation between Sustainable Portfolio Management analysis and sales growth

Sustainable Portfolio Management is designed to identify business accelerators or obstacles with respect to sustainability in order to help Solvay's business deliver higher growth and superior sustainable value. Over the last three years, Solvay's products have experienced significantly stronger annual revenue growth rates in cases where customers and consumers are looking for products to match their social or environmental needs.

Annual volume growth rate per Sustainable Portfolio Management category:

- Solutions: +4%;
- Challenges: -5%.

(based on 2016-2018 sales with the same product, same application, and same Sustainable Portfolio Management ranking over the last three years, representing 43% of Group sales).

2019 Key achievements

World Alliance for efficient technologies

Solvay joined the World Alliance for Efficient Solutions, created by Solar Impulse founder Bertrand Piccard, to promote efficient technologies, processes, and systems that help improve the quality of life on earth. Alliance members include start-ups, companies, institutions, and organizations. They assess the solutions submitted by their Members, with the help of independent technical and financial Experts, and select 1000 of the most promising ones. They will be labelled as Efficient Solutions and presented to governments, businesses and institutions to encourage them to adopt more ambitious environmental targets and energy policies.

In 2019, 7 Solvay products have been labeled as Solutions:

- AgRHO® S-BoostTM increases root development: the plant gets stronger quicker because it favors nutrients and water uptake, so less pesticides and fertilizers are required, and irrigation requirements are lower.
- SOLVAir®: It's a solution for treating exhaust gases from factories incineration (like Nox, SO2, HCI,...) plants and ships hence contributing to cleaner cities by using innovative Dry Sorbent Injection (DSI) process.
- Solef® PVDF: Applied in batteries, this fluorinated polymer improves the performance and durability of electric vehicles. It's a solution without any additives, it has the intrinsic stability inherent to fluoropolymers even when exposed to harsh environments, providing the user with a unique combination of properties resulting in longer equipment life.
- Capterall®: mineral formulations treat polluted water to reach lower discharge concentrations and manage fluctuations in pollutants in order to be compliant with strict regulations.
- Alve-One®: foaming solutions are an innovative generation of high-performance and cost-effective chemical blowing agents based on 100% safe raw materials helping fulfil the plastic industry's needs of moving towards a circular economy.
- MAX® HT: This solution enables all of our customers to enjoy increased heat transfer coefficients and evaporator steam economies that result in reduced energy consumption, caustic losses and maintenance costs (acid and labor).
- Paramove® : An approved veterinary medicine used in salmon farming to control sea lice and promote salmon welfare.

Notes to Environment

This chapter covers the impact of the company's operations on the environment, such as air emissions, water and wastewater, greenhouse gas emissions, and hazardous waste and substances introduced in the value chains.

How Solvay sites control their environmental footprint, in a nutshell

Environmental impacts of operations are managed through the processes and requirements embedded in the Health, Safety and Environment management systems deployed by sites in line with Solvay requirements, while hazardous substances in sold products are managed through the processes and requirements of Global Business Units' product Safety Management Systems.

While every industrial site is different, the Group's commitments remain the same:

- Reduce greenhouse gas emissions;
- Reduce air and water emission intensity;
- Perform regulatory compliance audits at all sites;
- Prevent incidents with environmental non-compliance;
- Follow up more effectively on waste and water intakes.

NOTE S2
Greenhouse gas emissions

Priority

12 Mt CO_2 eq.

Total greenhouse gas emissions – Scopes 1 and 2 (Kyoto Protocol)

Definition

The greenhouse gas emissions reported by Solvay correspond to the scope of the Kyoto Protocol and comprise the following compounds or compound families: CO_2, N_2O, CH_4, SF_6, HFCs, PFCs, and NF_3. To calculate their impact on climate change, greenhouse gas emissions are converted from metric tons to the CO_2 equivalent using the Global Warming Potential of each gas based on a 100-year timeframe, as published by the Intergovernmental Panel on Climate Change in its fifth assessment report.

The indicator takes into account:

- Direct emissions for each greenhouse gas released from Solvay's industrial activities (Scope 1 of Kyoto Protocol). For CO_2, the reporting of direct emissions includes emissions from the combustion of all fossil fuels as well as process emissions (e.g. thermal decomposition of carbonated products and chemical reduction of metal ores);
- Indirect CO_2 emissions related to the steam and electricity purchased from third parties and consumed internally (Scope 2 of Kyoto Protocol). For electricity purchased, indirect emissions are calculated by applying market-based methods. In 2019, electricity supply contracts were analyzed in order to determine the most appropriate CO_2 emissions factor of each site.

Management approach

Solvay is committed to reducing greenhouse gas emissions by 1 million tons no later than in 2025 at constant scope, to decouple effectively its emissions from its growth, the Group intends to act on all levers: improving its energy efficiency and energy mix, and investing in clean technologies. To this end, the Group is developping a growing pipeline energy-climate transition opportunities in collaborations between a dedicated team of experts in energy transition and operational at the industrial sites. Energy conversion actions are being developed in collaborations between a dedicated team of experts in energy transition and operational teams at the industrial sites. Opportunities to reduce energy consumption identified in the Solwatt energy efficiency program active since 2012 continue to be developed in parallel. For greenhouse gas emissions not related to energy, specific taskforces have been set up with strong technical inputs in order to develop the clean technologies required.

In July 2019, Solvay increased the internal carbon price applied to greenhouse gas emissions from €25 to €50 per metric ton CO_2, to take into account climate challenges in its investment decisions.

An externally verified and structured greenhouse gas emission reporting system and responses to rating agencies such as the Carbon Disclosure Project help the Group align its efforts with the magnitude of its greenhouse gas challenges.

Indicators and objectives

Solvay's priority objective

2025

-1 million tons

of greenhouse gas emissions (Scope 1 and 2) in comparison with 2017

+0.45

Mt CO_2 eq.
Variation due to changes in reporting scope (structural changes)

-0.11

Mt CO_2 eq.
Variation due to changes in calculation methodology or improvements in data accuracy

-0.61

Mt CO_2 eq.
Emissions increase or reduction at constant scope

Mt CO_2 eq.	**2019**	2018	2017
Total greenhouse gases emissions (scopes 1 and 2)	12.0	12.3	12.3

Scope: consistent with financial reporting.

Greenhouse gas emissions – 2019 achievement

Mt CO_2 eq.	
Total greenhouse gas emissions (scopes 1 and 2) in 2019	12.0
Total greenhouse gas emissions (scopes 1 and 2) in 2018	12.3
Variation due to changes in reporting scope (structural changes)	0.45
Variation due to changes in methodology or improvements in data accuracy	–0.11
Emissions increase or reduction at constant scope year on year	–0.61
Cumulated emissions increase or reduction since 2017 at constant scope	–0.58

Scope: consistent with financial reporting.

Variation due to changes in reporting scope attributable mainly to the integration of the cogeneration unit Rosen (Rosignano, Italy) in Solvay perimeter +0.5 million tons of CO_2.

Greenhouse gas emissions – intensity

kg CO_2eq. / € EBITDA	**2019**	2018	2017
Greenhouse gas intensity	5.17	5.51	5.53

Scope: consistent with financial reporting.

For a given year, greenhouse gas emissions intensity reflects the amount of scope 1 and 2 emissions covered by the Kyoto Protocol included in the financial scope expressed in kg CO_2 eq. per euro of EBITDA.

In 2019, greenhouse gas intensity decreased by 0.34 kg CO_2 eq. per euro of EBITDA.

Greenhouse gas emissions (Scope 1 & 2)

		2019	2018	2017
Direct and indirect CO_2 emissions (scopes 1 and 2)	Mt CO_2	10.0	9.8	10.0
Other greenhouse gases emissions according to Kyoto Protocol (scope 1)	Mt CO_2eq	2.0	2.4	2.3
Total greenhouse gases emissions according to Kyoto Protocol	Mt CO_2eq	12.0	12.3	12.3
Other greenhouse gases CO_2 emissions not according to Kyoto Protocol (scope 1)	Mt CO_2eq	0.1	0.1	0.1

Scope: consistent with financial reporting scope, including the manufacturing activities of the companies that are currently consolidated (fully or proportionately). The greenhouse gas emission of the companies in the financial scope represents 81% of the total greenhouse gas emissions of all companies in the operational scope.

Direct greenhouse gas emissions (Scope 1)

Mt CO_2 eq.	2019	2018	2017
Methane – CH_4	1.02	0.88	0.90
Nitrous oxide – N_2O	0.03	0.10	0.14
Sulfur hexafluoride – SF_6	0.07	0.04	0.06
Hydro fluoro carbons – HFCs	0.11	0.06	0.14
Perfluorocarbons – PFCs	0.78	1.36	1.07
Nitrogen trifluoride – NF_3	0.00	0.0	0.0
Total other Greenhouse gas emissions according to Kyoto Protocol	**2.01**	**2.44**	**2.31**
Carbon dioxide – CO_2	8.58	7.96	7.92
Total direct emissions	**10.59**	**10.35**	**10.2**

Scope: consistent with financial reporting.

In 2019, direct CO_2 emissions are slighlty higher than in 2018 mainly due to Rosen (Rosignano, Italy).

In 2019 direct other greenhouse gas emissions according to the Kyoto Protocol were 0.43 million tons CO_2 eq. lower than in 2018. This change is attributable mainly to an decrease of 0,56 million tons CO_2 eq. of CF_4 emissions in Spinetta (Italia) and an increase of 0.14 million tons CO_2 eq. of CH_4 emissions in Green River (US).

Total indirect CO_2 – Gross market-based (Scope 2)

Mt CO_2	2019	2018	2017
Electricity purchased for consumption	0.9	1.0	1.2
Steam purchased for consumption	0.5	0.9	0.9
Total	**1.4**	**1.9**	**2.1**

Scope: consistent with financial reporting.

Total indirect CO_2 – Gross location-based (Scope 2)

Mt CO_2	2019	2018	2017
Electricity purchased for consumption	1.0	1.1	1.2
Steam purchased for consumption	0.5	0.9	0.9
Total	**1.5**	**2.0**	**2.1**

Scope: consistent with financial reporting.

Since the implementation of the market-based method, a detailed review of emissions factors for purchased electricity covering all sites is done every year.

The decrease of 0.1 million tons of CO_2 for indirect CO_2 emissions linked to purchased electricity is explained by additional electricity purchases with lower carbon content.

Indirect CO_2 emissions linked to purchased steam decrease of 0.4 million tons of CO_2. This change is attributable mainly to the integration of the cogeneration unit Rosen (Rosignano, Italy) in Solvay perimeter.

Other indirect greenhouse gas emissions (Scope 3)

Mt CO_2 eq.	**2019**	2018	2017
Purchased goods and services	4.9	5.8	5.7
Capital goods	1.8	1.8	1.8
Fuel- and energy-related activities	1.0	0.7	0.7
Upstream transportation and distribution	Included in Purchased goods and services		
Waste generated in operations	Included in Purchased goods and services		
Business travel	0.01	0.02	0.02
Employee commuting	0.05	0.05	0.05
Downstream transportation and distribution	0.6	0.7	0.7
Processing of sold products	5.4	5.5	5.3
Use of sold products	9.5	10.9	11.1
End-of-life treatment of sold products	7.4	7.6	8.4
Downstream leased assets	0	0	0
Franchises	0	0	0
Investments(1)	1.1	1.1	2.0

(1) Investment scope was recalculated for 2017 and 2018 to comply with GHG protocol guidance.

Scope: consistent with financial reporting.

Due to Rosen integration, emission related to "Fuel and energy-related activities" increase of 0.3 million tons of CO_2 .

Downstream scope 3 emissions related to processing use and end-of-life of products have been identified as significant through the Sustainable Portfolio Management assessment.

2019 key achievements

At Solvay Spinetta site in Italy, an innovative clean technology developped in-house and comissioned in 2019 led to a decrease of 0.56 million tons CO_2 equivalent of CF_4 emissions in 2019.

In Paulinia, Brazil, a process excellence program avoided 0.08 million tons CO_2 equivalent of N_2O emissions in 2019.

Solvay continued to step up its involvement in renewable energy production in the area of sourcing in 2019.

- Works are ongoing to expand use of biomass energy beyond just the facilities in Brotas (Brazil), Dombasle (France), Rheinberg (Germany), Zhangjiagang (China), and Gunsan (South Korea), Panoli (India) and by constructing new facilities in Devnya (Bulgaria) and conversion of a coal boiler into biomass in Rheinberg (Germany)
- The Solvay Jasper County Solar Farm (United States) and in West Deptford (United States) are now fully operational and new Solar projects in Linne-Herten (Netherlands), Walcourt-les-Petons (Belgium), and West Deptford (US) are under study;
- A New Wind project is underway in Changshu (China);
- A Biogas contracts have been signed in Melle (France) and in St Fons (France).

NOTE S3
Energy

Highly material

Definition

Solvay's energy consumption is made up of four components:

1. Non-renewable primary fuels (coal, petcoke, natural gas, fuel oil, etc.), which are used for internal production of steam, electricity, and mechanical energy, and in manufacturing processes (coke and anthracite in lime kilns, gas in dryers, etc.);
2. Renewable primary fuels (biomass);
3. Purchased steam;
4. Purchased electricity.

To comply with Global Reporting Initiative requirements, steam and electricity generated from fuels and sold to a third party are deducted from the total. Energy that is purchased and sold afterwards to a third party without any transformation is not accounted for.

Management approach

In the field of energy supply, Solvay has consistently implemented programs to reduce its energy consumption. While Solvay has industrial activities such as synthetic Soda Ash plants and Peroxides – mainly in Europe – that consume large amounts of energy, it also operates a range of industrial activities whose energy content is relatively low as a percentage of the sales price, especially in the fluorinated Polymers business. The Group considers secure and competitive energy supplies to be particularly important and has taken the following strategic initiatives:

- Technological leadership in processes and high-performance industrial operations to minimize energy consumption;
- Diversification and flexible use of the different types and sources of primary energy;
- Upstream integration in steam and electricity generation (gas cogeneration, biomass or secondary fuels cogeneration, etc.);
- Periodic review of the condition of industrial sites' energy assets and connections;
- A strategy of supply coverage with long-term partnerships and medium- to long-term contracts, with price-hedging protection mechanisms when needed;
- Direct access to energy markets when possible (gas hubs, electrical grids, financial spot and futures exchanges);
- Regular forecast reports on energy and raw material price trends, which are sent to businesses to help them anticipate sales price realignments.

Solvay Energy Services optimizes energy purchasing and consumption for the Group and helps Global Business Units manage energy and greenhouse gas emissions.

Energy being a key factor for Solvay's activities, Solvay has stepped up its SOLWATT® energy efficiency program, which aims to continuously optimize the industrial processes involved in its energy production and supply.

SOLWATT® energy efficiency program

The Group has reduced its overall energy intensity by 8% since 2012. One of the key factors in this progress has been the SOLWATT® energy efficiency program. The improvement plan follows three approaches in parallel:

1. By developing the use of high-efficiency cogeneration plants, the Group is improving the generation efficiency of secondary energy such as steam and electricity. Two turbines were replaced with more efficient units in 2017: one in Spinetta and one in Rosignano. Electrical efficiency at those two cogeneration installations improved by 4%;
2. In 2016, the second phase of the SOLWATT® program was launched. By the end of 2019, the deployment of this second phase had covered most of the sites with significant energy consumption, representing 44% of Group energy consumption;
3. New and remodeled plants are optimized for energy consumption and generation.

In 2019, Solvay continued to disseminate technological breakthroughs to improve the overall energy efficiency of its operations.

Indicators and objectives

In 2012, Solvay undertook to reduce its energy consumption by 10% (1.3% per year on average) by 2020 at constant activity scope. Its energy intensity indicator covers both primary energy from fuels (coal, petcoke, coke, anthracite, fuel-oil, natural gas, biomass, etc.) and purchased steam and electricity.

Solvay's objective:

2020

-10%

of energy consumption at constant activity scope

Baseline 2012

Energy efficiency index – Baseline 100% in 2012

In %	**2019**	2018	2017
Energy efficiency index	92	93	94

Scope: energy index at constant activity scope reflects the change in energy consumption on a comparable basis after adjusting the historical scope to take into account scope changes and making adjustments for changes in production volumes from one year to the next.

Energy consumption

In petajoules low heating value (PJ)	**2019**	2018	2017
Primary energy consumption	123	127	130

Scope: this indicator shows the primary energy consumption over a given year related to the manufacturing activities of the companies that are currently consolidated (fully or proportionately). The primary energy consumption of the companies in the financial sphere represents 82% of the total primary energy consumption of all companies in the operational sphere.

In 2019, primary energy consumption was 3% lower than in 2018. This variation is linked to changes in reporting scope (-1.6% for Rosen, in Rosignano, Italy) modification of production (-1% in Denvya, in Bulgaria) and miscelleanous (-0.4%).

Fuel consumption from non-renewable sources

In petajoules low heating value (PJ)	**2019**	2018	2017
Solid fuels	43	46	46
of which the share of coal use to produce energy	24	25	27
Liquid fuels	0.4	0.5	0.4
Gaseous fuels	69	55	54
Total	**113**	**101**	**100**

Scope: consistent with financial reporting.

Fuel consumption from non-renewable sources increased in 2019. This variation is mainly attributable to Rosen (Rosignano , Italy) with an increase of 12.8 PJ of Natural Gas consumption . The solid fuels from non-renewable sources decrease by 2 PJ with the increase of the biomass consumption.

Fuel consumption from renewable sources

In petajoules low heating value (PJ)	2019	2018	2017
Renewable fuel consumption	5	4	3

Scope: consistent with financial reporting.

Biomass consumption increased of 1.1 PJ in 2019 with on top up the assets in Brotas (Brazil), Dombasle (France), Rheinberg (Germany), Zhangjiagang (China) and a new project in India.

Secondary energy purchased for consumption

In petajoules low heating value (PJ)	2019	2018	2017
Electricity	26	28	30
Heating	0	0	0
Cooling	0	0	0
Steam	12	18	20
Total secondary energy purchased	**38**	**45**	**49**

Scope: consistent with financial reporting.

In 2019 secondary energy purchased for consumption was 7 PJ lower than in 2018.

Energy sold

In petajoules low heating value (PJ)	2019	2018	2017
Electricity	19	11	11
Heating	0	0	0
Cooling	0	0	0
Steam	13	12	11
Total energy sold	**32**	**23**	**22**

Scope: consistent with financial reporting.

In 2019, the sale of self-generated secondary energy to third parties increased by 9 PJ. The evolution is mainly explained by an increase of sales of 9.1 PJ of Rosen (Rosignano, Italy).

2019 key achievements

Solvay has taken concrete steps in the form of large investments, such as the start-up of the mega hydrogen peroxide (HP) plant in Saudi Arabia and the recent replacement of two gas turbines with more efficient units, one in the Spinetta cogeneration unit (Italy) and one in the Rosignano cogeneration unit (Italy). In 2019 Solvay increased its biomass heat production beyond the facilities in Brotas (Brazil), Dombasle (France), Rheinberg (Germany), Zhangjiagang (China), and Gunsan (South Korea), and in Panoli (India), and in Devnya (Bulgaria) and conversion of coal boiler into biomass in Rheinberg (Germany).

NOTE S4
Air quality

⊕ Highly material

2,888
metric tons
Sulfur oxides

6,197
metric tons
Nitrogen oxides

4,109
metric tons
Non-methane volatile organic compounds

Definition

Nitrogen oxide and sulfur oxide emissions contribute to atmospheric and freshwater acidification. Non-methane volatile organic compounds (NMVOC) emissions contribute to the formation of tropospheric ozone and summer smog. Thus, these categories of substances are material because they directly impact air quality.

Nitrogen oxide emissions from Solvay's operations result mainly from the combustion of fossil fuels such as natural gas. They are expressed as the sum of nitrogen monoxide and nitrogen dioxide, excluding nitrous oxide (N_2O) that contributes to global warming but does not have any acidification impact.

Sulfur oxide emissions (SO_X) arise mainly from the combustion of anthracite or coal.

Non-methane volatile organic compounds are : volatile organic compounds (VOCs) with a standard boiling point below or equal to 250°C (EU Solvent Directive 1999/13/EC). NMVOCs are VOCs other than methane. Methane emissions from Solvay's mining activity at Green River (Wyoming, United States) are not included. Their impact is integrated into the greenhouse gas emission indicator.

Management approach

Air quality is managed through the Health, Safety and Environment management systems deployed by sites in line with their regulatory requirements and those from the Group.

Solvay is committed to improving air quality at local and regional levels, in close cooperation with local stakeholders. In the framework of its environmental plan, Solvay focuses on the following pollutants: nitrogen oxides (NO_X), sulfur oxides (SO_X), and non-methane volatile organic compounds (NMVOC).

Indicators and objectives

Solvay's objective:

⊕ **Solvay's objective:**

2020
-50%
of nitrogen oxides emissions intensity

2020
-50%
of sulfur oxide emissions intensity

2020
-40%
of non-methane volatile organic compound emissions intensity

Baseline 2015

Air emissions intensity

In kg per € EBITDA	**2019**	2018	2017
Nitrogen oxides – NO_x	0.0027	0.0035	0.0043
Sulfur oxides – SO_x	0.0012	0.0017	0.0021
Non-methane volatile organic compounds – NMVOC	0.0018	0.0019	0.0019

Scope: consistent with financial reporting. Past figures have been restated to reflect the impact of methodology improvements.

Since the start of the environmental plan in 2015, the emission intensities for nitrogen oxides, sulfur oxides, and NMVOC have dropped by 57%, 63% and 49% respectively. These performance already outweigh the 2020 targets Solvay has set in 2015.

Air emissions in absolute

In metric tons	**2019**	2018	2017
Nitrogen oxides – NO_x	6,197	7,704	9,485
Sulfur oxides – SO_x	2,888	3,750	4,573
Non-methane volatile organic compounds – NMVOC	4,109	4,252	4,142

Scope: consistent with financial reporting. Past figures have been restated to reflect the impact of methodology improvements.

Solvay's nitrogen oxide emissions went down significantly since 2018 (- 1,507 tons or - 20%), further closing the gap with its peers in the sector despite the energy intensive nature of the Soda Ash and Derivative Global Business Unit activity. This progress was mainly achieved at the sites of Torrelavega in Spain (- 686 metric tons or - 9.1% at Group level), Paulinia in Brazil (- 439 metric tons or - 5.7%) and Devnya in Bulgaria (- 367 metric tons or - 4.9%). At Paulinia, the lower NO_X emissions are the consequence of a fuel switch from oil to natural gas and improvements on the natural gas burners. These actions have been undertaken to satisfy the requirements of a new Brazilian law. The improvement at Torrelavega is due to two coal boilers, which have been retro-fitted with $DeNO_X$ systems in the spring and summer of 2019, respectively. The significant decrease of for NO_X in Devnya is due to the increased stream factor of the newest Circulating Fluidized Bed Boiler boilers. Since the start of the ongoing environmental plan (2015-2020), nitrogen oxide emissions decreased by 50% or about 13% per year. These changes have been achieved through investments in abatement technologies.

Solvay's sulfur oxide emissions have been cut by a further 862 metric tons since 2018, representing an additional 23% improvement. This progress was mainly achieved on the sites of Torrelavega in Spain (- 623 metric tons or - 16.6% at Group level), Atequiza Jalisc in Mexico (- 178 metric tons or - 4.8%) and Paulinia in Brazil (- 109 metric tons or - 2.9%). A small increase was observed at the plant of Rasal in India (+ 58 metric tons or +1.5%). The improvement on Torrelavega is due to the implementation of a new desulfurisation system (SolvAir®) on the coal boilers. The decrease at Atequiza is due to the lower production volume for one of the chemicals produced at that site. The contribution of Paulinia to the global decrease is due to the switch from oil to natural gas on one of their boilers. Since the start of the ongoing environmental plan (2015-2020), sulfur oxide emissions have decreased by 56% or about 14% per year. These changes have been achieved through investments in new boilers, new desulfurization units, and optimization of existing ones.

Compared to 2018, the NMVOC emissions from the Group have decreased slightly (- 143 metric tons or - 3.3%). This global change is the resultant effect of improvements, mainly at Green River (United States), Panoli (India) and Spinetta (Italy), and increases at Zhenjiang Songl (China), Greenville (United States) and Piedmont (United States). Green Rivers' NMVOC emissions have been reduced thanks to an enhanced recovery of mine gas in heated process equipment. The decrease at Panoli (India) is the consequence of a lower demand for PEEK/PES polymers. And at Spinetta (Italy), the NMVOC reduction is the fruit of the implementation of a new CF_4 abatement technology. Since the start of the ongoing environmental plan (2015-2020), NMVOC emissions have decreased by 40% or about 10% per year. It should be noted that the majority of this reduction is due to the divestement of the Performance Polyamides businesses.

2019 key achievements

The improvements in emissions to air for the substances on which we focus are mainly the consequence of investments in new abatement technologies and a switch to more environmental friendly combustibles.

NOTE S5
Water and wastewater

Highly material

435
million m³
Total water intake

330
million m³
Freshwater withdrawal

5,344
metric tons O_2
Chemical Oxygen Demand emissions

Definition

Water management encompasses the management of water flows and water quality, from abstraction from the natural environment to water flow restitution to the same or another environmental compartment.

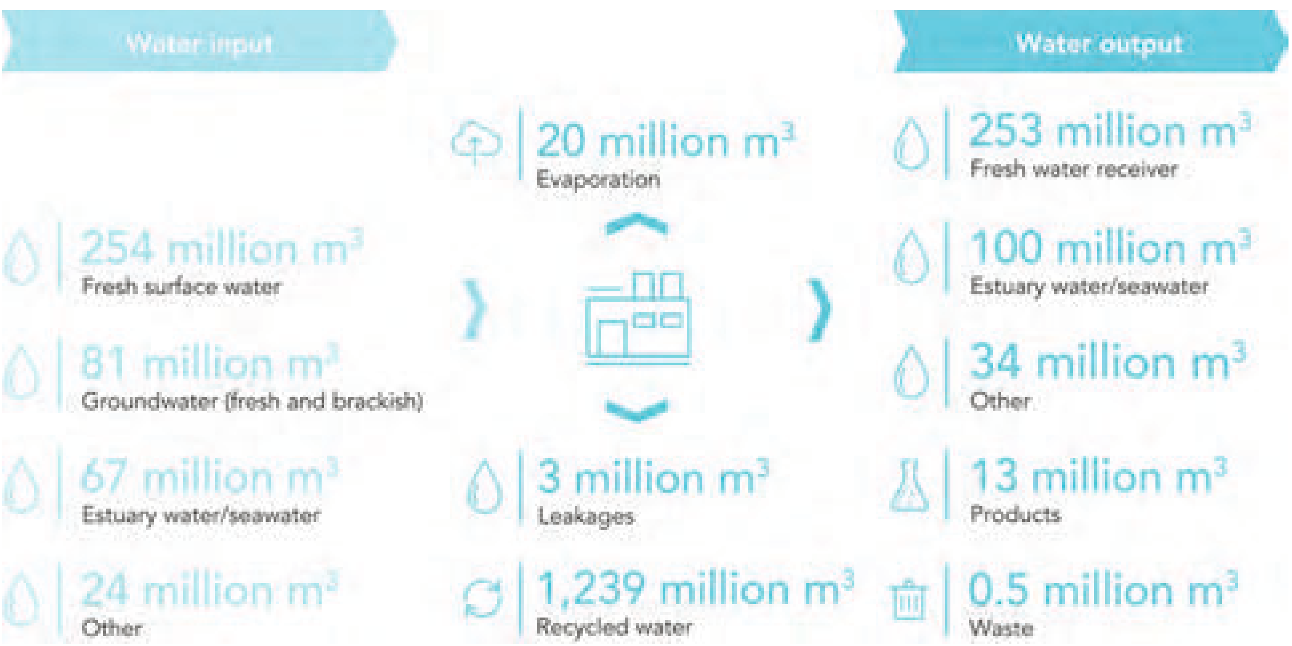
Freshwater withdrawal (in millions of m^3 per year) is the amount of incoming water from the public network (drinking water) and freshwater systems (rivers, lakes, etc.) as well as from groundwater sources (aquifers).

Chemical Oxygen Demand (COD) is the amount of oxygen reducing substances (mainly dissolved organic matter) discharged to aqueous receivers. COD is expressed as metric tons of oxygen per year. In addition to nitrogen and phosphorus species, Chemical Oxygen Demand also contributes to aquatic eutrophication.

Management approach

The Group has a company-wide water approach that includes a commitment to limit freshwater withdrawal and consumption, and to ensure that the quality status of the water bodies where effluents are discharged remains good, so that the impact on humans and natural biota is minimized. Solvay focuses on reducing two impacts: freshwater withdrawal and Chemical Oxygen Demand emissions.

Indicators and objectives



For 2019, the total water use of the Group is 1,350 Mm³, from which 1,236 Mm³ is used for cooling and 114 Mm³ for other process needs. Because around 70% of the cooling water is actually being recycled, the water we need to pump from natural resources is significantly less (426 Mm³). From this amount, 60% is coming from fresh surface water, 19% from ground water, 16% from sea water and the remainder from a variety of other sources. The total water discharged by the Group amounts to 387 Mm^3, from which 253 Mm^3 to freshwater receivers, 100 Mm^3 to the sea and to third parties (34 Mm^3), the remainder of the water being captured in products (13 Mm^3), waste (0.5 Mm^3) or lost by evaporation in cooling towers (20 Mm^3).

Solvay's objectives:

2020

-30%

of freshwater withdrawal intensity

Baseline 2015

2020

-30%

of Chemical Oxygen Demand emissions intensity

Freshwater withdrawal

	2019	2018	2017
Intensity (m^3 per € EBITDA)	0.142	0.148	0.147
Absolute (Mm^3)	330	330	326

Scope: consistent with financial reporting.

Past figures have been restated to reflect the impact of methodology improvements.

The freshwater withdrawal intensity has been reduced by 48% since the start of the environmental plan, meaning that Solvay has already exceeded the 2020 target. Similarly, the Chemical Oxygen Demand emission intensity was cut by 49%, again far better than our initial commitment. It should be noted that the majority of these reductions are due to the divestment of the Performance Polyamides business.

Since the start of the ongoing environmental plan (2015-2020), the freshwater withdrawal from the plants has decreased by 39% (or about 10% per year). The 2019 freshwater withdrawal at Group level did not change versus last year, although changes could be observed for some of our GBUs: Aroma Performance (+0.82 Mm^3), Soda Ash & Derivatives, + 1 Mm^3), GBU Coatis (-1.4 Mm^3), Novecare (-0.77 Mm^3). These changes can be attributed to market evolutions.

Chemical Oxygen Demand

	2019	2018	2017
Intensity (kg per € EBITDA)	0.0023	0.0027	0.0024
Absolute (metric tons O_2)	5,344	6,248	5,670

Scope: consistent with financial reporting.

Past figures have been restated to reflect the impact of methodology improvements.

The Chemical Oxygen Demand releases from the Group were 904 tons or 14% lower than in 2018. This global change is due to significant decreases at the sites of Spartanburg in the United States (- 293 tons), Vernon in the United States (-314 tons) and Paulinia in Brazil (- 168 tons) whilst higher emissions were noted at Tavaux in France (+ 87 tons). For Spartanburg, Chemical Oxygen Demand emissions could be reduced thanks to an improved nutrient enrichment to the Waste Water Treatment Plant (WWTP). The decrease at Vernon is the consequence of lower production rates compared to 2018, which was an exceptional year. Regarding Paulina, the reduction can be attributed to an improved control and performance of their WWTP and more stable inflows from the adipic acid plant.

It should be noted that around 22% of the Chemical Oxygen Demand emissions declared by Solvay (thus roughly 1,200 tons) are due to third parties (typically companies which formerly belonged to Solvay, from which we are treating the effluents through service level agreements. This way of reporting is compliant with the requirements of the GRI-101 standard.

Since the start of the ongoing environmental plan (2015-2020), the Chemical Oxygen Demand emissions have decreased by 39% (or about 10% per year). The biggest part of this reduction is due to the divestment of the polyamides business.

COD improvements in 2019 were the consequence of a better control and performance on some of our major waste water treatment plants.

NOTE S6
Waste and hazardous materials

Highly material

1,596
1,000 metric tons
non-hazardous industrial Waste

86.6
1,000 metric tons
hazardous industrial Waste

Definition

Two categories are material: hazardous industrial waste and hazardous materials put on the market.

Hazardous industrial wastes

Hazardous industrial waste originates from manufacturing and Research and Innovation activities, including packaging and maintenance waste. Solvay's Hazardous Industrial Wastes reduction efforts target Hazardous Industrial Wastes that is not treated in a sustainable manner, i.e. landfilled or incinerated without energy recovery.

Materials Placed on the Market

Solvay focuses on Substances of Very High Concern (SVHC). The Solvay reference list for SVHCs (S-SVHC and SRA Reference list) was established in 2015 with three categories (black, red, and yellow lists):

- Black list S-SVHCs: already undergoing a regulatory process of phasing out with a known deadline in at least one country or zone, or a restriction for Solvay relevant uses;
- Red list S-SVHCs: currently included in regulatory lists of substances that could enter into a process of special authorization or restriction in the medium term;
- Yellow list SRAs: substances requiring specific attention, i.e. substances under scrutiny by authorities, NGOs, scientists, and industries due to their current hazardous properties or potential effects.

Management approach

For industrial waste and particularly hazardous waste, the focus is on switching to more sustainable pathways that avoid landfilling or incineration without energy recovery, and promoting material or thermal recovery.

In terms of marketed products, Solvay strives to improve its knowledge of how its products are used and associated risks. The preparation of product Safety Data Sheets (SDS) for all products and REACH registrations reflects Solvay's commitment to ensuring the information on hazards associated with our products is readily available. For SVHCs, Solvay has a strategy to decrease their use in the value chain. Risk studies for red and black SVHCs (Substances of Very High Concern) placed on the market are underway, and substances are replaced with safer alternatives where possible.

Indicators and objectives

Waste

Solvay's objective:

2020

-30%

intensity of industrial hazardous waste not treated in a sustainable way

Baseline 2015

Waste intensity

In kg per € EBITDA	**2019**	2018	2017
Industrial hazardous waste not treated in a sustainable way	0.0117	0.0137	0.0185

Scope: consistent with financial reporting.

Past figures have been restated to reflect the impact of methodology improvements.

Since the start of the ongoing environmental plan (2015-2020), the intensity for hazardous industrial waste not treated in a sustainable way has decreased by 51%, meaning that the 2020 target has already be exceeded. It should be noted that the majority of this reduction is due to the divestment of the Performance Polyamides business. The amount of hazardous industrial waste not treated in a sustainable way for 2019 was 1.8 kt (- 6.2%) lower than in 2018. This significant reduction is the resultant effect of decreases and increases at individual sites: Ospiate in Italia (- 0.70 kt), La Rochelle in France (- 0.46 kt), Map Ta Phut in Thailand (+ 2.1 kt) and Paulinia in Brazil (+ 1.2 kt), … etc.

Waste production in absolute

In 1,000 metric tons	**2019**	2018	2017
Non-hazardous industrial waste	1,596	1,602	1,639
Hazardous industrial waste	86.6	93.1	100.7
Total industrial waste	1,682	1,696	1,740
Industrial hazardous waste not treated in a sustainable way	27.2	29.0	40.4
Industrial hazardous and non-hazardous waste not treated in a sustainable way	96.4	96.3	–

Scope: consistent with financial reporting.

Past figures have been restated to reflect the impact of methodology improvements.

Solvay's Hazardous Industrial Waste (HIW) represents only 5.4% of its total industrial waste. The hazardous industrial waste from the Group was 6.5 kt (- 7%) lower than in 2018. The biggest reductions were observed on the sites of Salindres in France (-1.52 kt), Panoli in India (-1.16 kt), Klundert in Netherlands (- 0.89 kt) and La Rochelle in France (-0.86 kt); whereas increases took place at the sites of Zhenjiagang Songl in China (+0.81 kt) and Augusta in the United States (+ 0.80 kt). The improvement on Salindres in France is due to the systematic revalorization of a fluoride containing sludge in a cement plant, changing the status from this material to a by-product instead of being a waste. In Panoli in India, the reduction can be explained by a lower demand. The increase at Zhenjiagang in China was mainly due to the release of a big amount of spent acid, stored on-site for several years. At Augusta in the United States, the rise can be explained by a higher stream factor of a cracking installation, leading to more spent acid.

Excluding perimeter changes, the magnitude of the observed year-to-year variations (+/-5%) for waste are not uncommon and linked to waste specific issues, often beyond the sphere of influence such as: turn-around operations, regulatory changes in waste classifications, problems with waste treatment companies, changes in market demand for by-products, … etc.

The Group has not set any target on the amount of Hazardous Industrial Waste in its environmental plan, although Solvay's ambition remains to decrease the volumes wherever possible through excellence programs and circular economy initiatives.

Solvay's non hazardous industrial waste accounts for 94.6% of its total industrial waste. The non hazardous industrial Waste for 2019 is only slightly lower than in 2018 (-6.5 kt, or -0.4%). The vast majority (83%) of this amount ends up in internal landfills which are very well controlled in order to minimize the environmental impact. Around 17% of the non hazardous industrial waste is currently being revalorized. The biggest changes were observed on the sites of Devnya in Bulgaria (-39.5 kt), Juarez in Mexico (-5.3 kt), Augusta in the United States (-4.3 kt) and Tavaux in France (-3.1 kt); whereas significant increases took place at the sites of Dombasle in France (+26.1 kt), GreenRiver in the United States (+14.1 kt).

The decrease at Devnya is in line with a lower production over 2019 whereas the waste produced by Juarez in Mexico was higher in 2018 because of a turn-around operation. At Augusta in the United States, Non hazardous industrial waste could be reduced thanks to an increased stream factor of a waste cracking unit and a waste heat boiler. At Tavaux in France, the gain was the consequence of a much lower coal consumption. In contrast with these reductions higher sludge amounts were produced in Dombasle in France due to an increase in the specific limestone production. At GreenRiver in the United States, the increase was due to an increase in tailings pond purge caused by a decrease in sodium bicarbonate production which utilizes tailings pond purge from the soda ash plant. Furthermore, there was an increase in coal usage which increases the amount of bottom and fly ash.

Since 2015, the Non Hazardous Industrial Waste at Group level increased by 136 kt (+9.3%), which is mainly linked to production volume increases from the GBU Soda Ash & Derivatives.

Safer alternatives for marketed products

Solvay's objective:

2020

100%

risk assessment and analysis of available safer alternatives for marketed products containing S-SVHCs

Solvay Substances of Very High Concern (SVHC) found in products sold

	2019	2018	2017
All SVHCs[1]	29	31	35
Percentage of completion of analysis of safer alternatives program for marketed products[2]	54% (63 out of 117 required assessments)	39% (50 out of 128 required assessments)	49% (28 out of 57 required assessments)
Of which effective replacement	30% (19/63)	32% (16/50)	32% (9/28)

(1) According to EU REACH Authorization list (annex XIV) and EU REACH Candidate list. SVHCs manufactured by or forming part of the composition of products sold by Solvay worldwide. REACH is a regulation of the European Union, adopted to improve the protection of human health and the environment from the risks that can be posed by chemicals.

(2) Analysis of Safer Alternatives for potential substitution for an SVHC. A substance may be present in more than one product.

Analysis of safer alternatives (ASA) are required and planned for a total of 117 combinations of products/applications.

Of the 63 "Analyses of safer alternatives" completed as of December 31, 2019, since the start of the program:

- 19 have led to effective replacement: SVHC substitution or reduction below required threshold, or production stopped;
- 21 are ongoing (alternative identified and discussed with customers to be implemented);
- 23 have resulted in no available alternatives (no substitute available or not allowed by regulations or not requested due to the application in the final product).

Notes to Human Capital

This section addresses the management of Solvay's human resources as a key asset for delivering long-term value. It includes factors that affect employee productivity, such as employee engagement and diversity, as well as the attraction and retention of employees. It also addresses labor relations management, and it covers the way the Group manages the health and safety of its employees.

NOTE S7
Employee health and safety

Employee health and safety management encompasses occupational safety, industrial hygiene, and occupational health management. Health and safety is managed in line with Solvay's Responsible Care Policy requirements.

0.44	0.66	0
MTAR*	LTAR**	Fatal accidents

Note: Contractors are included in occupational safety statistics.
* Medical Treatment Accident Rate (MTAR): number of work accidents leading to medical treatment other than first aid per million working hours.
** Lost Time Accident Rate (LTAR): number of work accidents with lost time (away from work) of more than one day per million working hours.

Definitions

Occupational health includes all the preventive actions to protect and promote physical and psychological health at work, both collectively and for each individual employee.

Industrial hygiene management encompasses the assessment, monitoring, and management of workers' potential exposures to ergonomic, chemical, and physical hazards.

Occupational safety is about preventing work-related injuries. Accidents were mostly linked to falls at the same level, human energy (pushing/pulling/striking an object), and exposure while opening a line or system.

Management approach

Occupational health

Occupational health activities at Solvay are managed through:

- performing risk-based medical surveillance,
- improving and adapting working conditions, and,
- promoting health.

The main occupational health key indicators are:

1. Occupational diseases (incidence rate and causes of disease): to define preventive and corrective actions;
2. Advanced risk-based medical surveillance rate: to assess that the medical surveillance is effective;
3. Human biomonitoring indicators: to assess chemical exposures (where applicable) and suggest preventive actions;
4. Stress / Well-being at work indicators: to identify main causal factors and launch action plans at the Site and Group levels.

Industrial hygiene

The systematic assessment and management of workers' potential exposures to ergonomic, chemical and physical hazards are key to Solvay's approach to protecting health. Global industrial hygiene procedures define minimum requirements for Solvay's industrial hygiene risk assessments and management strategies including hierarchy of controls. The Industrial hygiene program encompasses:

- Comprehensive chemicals inventories established and reviewed at the site level, with screening and priority ranking of substances with potential health impacts;
- Solvay Acceptable Exposure Limits (SAELs) developed internally for insufficient or outdated established Occupational Exposure Limits (OELs);
- Occupational Exposure Banding (OEB) when no established Occupational Exposure Limit (OEL) exists or there is limited toxicological data. Solvay's OEB approach provides a simple, quick, and easy-to-understand hazard ranking;
- Roll-out of a new global tool, SOCRATES to
  - give widespread, easy access to IH methods, tools and databases,
  - consistently perform and document IH risk assessments,
  - enhance traceability of an individual's potential exposures throughout their working life;
- Established key performance indicators to identify and track completion of site chemical and noise risk assessments.

Occupational safety

Several courses of action are being pursued to strengthen the Group's Safety Culture and prevent accidents:

- Consolidation of the application of Solvay's Life Saving Rules in all sites;
- Sharing of good practices and lessons drawn from accidents and near misses;
- Involvement of personnel in improvement actions and achievement of individual safety objectives;
- Promotion of the creating safety approach, which relies on a safety leadership style where managers act as mentors and demonstrate genuine care for all, with more focus on how we do things right.

Indicators and objectives

Occupational safety indicators

Fatal accidents

Headcount	**2019**	2018	2017
Solvay employees	0	0	0
Contractors	0	0	1

Scope: all sites under Solvay's operational control for which the Group manages and monitors safety performance. This represents 289 sites including manufacturing, research and innovation, administrative, and a series of closed sites with limited activities, and covers Solvay employees and contractors working on sites.

Solvay's priority objective:

2025

0.5

Halve the number of accidents involving medical treatment

Baseline 2014

Occupational accidents with medical treatment at Group sites (MTAR)

Accident per million hours worked	**2019**	2018	2017
Solvay employees and contractors	0.44	0.54	0.65
Solvay employees	0.44	0.58	0.63
Contractors	0.43	0.48	0.70

Scope: all sites under Solvay's operational control for which the Group manages and monitors safety performance. This represents 289 sites including manufacturing, research and innovation, administrative, and closed sites, covers Solvay employees and contractors working on sites.

Occupational accidents with lost time at Group sites (LTAR)

Accident per million hours worked	**2019**	2018	2017
Solvay employees and contractors	0.66	0.65	0.65
Solvay employees	0.73	0.71	0.70
Contractors	0.51	0.52	0.52

Scope: all sites under Solvay's operational control for which the Group manages and monitors safety performance. This represents 289 sites including manufacturing, research and innovation, administrative, and closed sites, covers Solvay employees and contractors working on sites.

Shifting from a mindset of preventing accidents to creating safety and creating a culture of caring has made a positive impact on Solvay's safety performance. Since embarking on this approach, more people have returned home unharmed year after year. In addition, our focus on creating a shared understanding of the risks and the mitigation measures for life critical activities, through our Solvay Life Saving Rules (SLSR), has contributed to a reduction in the number of fatalities in recent years. The number of Lost Time Accidents (LTA) remained stable compared to 2018. However, the number of LTAs associated with a medical treatment accident (MTA) decreased by 10% from 2018 to 2019. Note: In some cases, when a person is involved in an accident, they are prescribed time off by a medical professional even though the individual did not require any medical treatment. When this occurs, these incidents are classified as LTAs but not MTAs.

Nature of injuries

	2019	2018	2017
Trauma – fracture	15	19	23
Wound – cut	6	10	18
Burn – heat	5	4	3
Burn – chemical	2	4	3
Wound	1	2	1
Trauma	5	2	1
Multiple injuries	0	1	1
Total	**34**	**42**	**50**

Scope: all sites under Solvay's operational control for which the Group manages and monitors safety performance. This represents 289 sites including manufacturing, research and innovation, administrative, and closed sites, covers Solvay employees and contractors working on sites.

40% of the injuries that occurred involved hands or fingers. In 2018, Solvay focused on actions to prevent such injuries by sharing best practices and raising awareness through training. As a result, the number of such injuries was 20% lower in 2018 than in the previous two years.

Health indicators

Recognized occupational illnesses

	2019	2018	2017
Occupational illness frequency rate per million hours worked (OIFR)	0.54	0.33	0.28

This incidence rate concerns Solvay workers (active, retired or having left the company) and takes into account all the recognized occupational diseases (not only the short/mid latency ones which were reported in the previous years). To obtain the OSHA's OIFR, which is expressed per 200,000 hours worked, the figures must be divided by a factor of 5.

The OIFR increased in 2019 due to more asbestos-related benign diseases recognized in France and more musculoskeletal and skin diseases recognized in the US.

Recordable occupational illnesses by type

	2019	2018	2017
Hearing disorders	3	3	3
Musculoskeletal dis.	10	5	2
Other non-carcinogenic dis.	9	4	4
Asbestos-related dis. & cancers	39	25	18
Other cancers	4	8	4
Not specif./Unknown	1	1	1
Total	**66**	**46**	**32**

Scope: Recordable work-related illnesses in all sites under Solvay's operational control for which the Group manages and monitors safety and health performance for its employees, including manufacturing, research and innovation, administrative and closed sites. This represents 219 sites. The figures were consolidated on December 31, 2019. They differ from those published last year, as they now include work-related recordable diseases cases in accordance with the GRI 403 requirements (v.2018), meaning that they have been reported according to local regulations.

The number of recordable occupational illnesses increased in 2019 due to more asbestos-related diseases and cancers notified in France, and more musculoskeletal and skin diseases notified in EMEA and in the United States.

Advanced risk-based medical surveillance

A site is considered as performing advanced risk-based medical surveillance if ALL the following criteria are fulfilled:

- the chemical risk assessment completion rate is at least 30%;
- the site regularly communicates non-negligible risks to the Medical Service provider;
- at least 70% of the employees scheduled for risk-related medical surveillance during the year completed their assessment.

Advanced risk-based medical surveillance

In %	2019	2018
Manufacturing and Research & innovation sites with advanced risk-based medical surveillance	50	37

Scope: all sites under Solvay's operational control for which the Group has identified potential health hazards. For 2019, this represents 70 out of 139 manufacturing and R&I sites.

Human biomonitoring of exposure

35 sites are currently performing human biomonitoring of exposure (HBM), for 32 different chemicals (substances/group of substances).

Human biomonitoring of exposure involves measuring the concentration of a substance or its metabolites in human fluids (such as urine or blood). Human biomonitoring of exposure can be used to assess exposure to specific chemicals. Unlike monitoring that measures the atmospheric presence of certain contaminants in work spaces, human biomonitoring of exposure detects what has really been absorbed by the human body via all exposure pathways (inhalation, skin penetration, etc.) and under different working conditions (physical effort, etc.). Human biomonitoring of exposure helps to verify whether protective measures are effective. It is particularly useful for substances that penetrate the skin, have a systemic effect, or accumulate in the body.

Human biomonitoring of exposures (HBM)

Number of sites	**2019**	2018	2017
Sites performing HBM of exposure	35	35	35
Sites with at least one result above the Biological Limit Value (BLV)	3	4	3

For sites which had results above the biological limit values, action plans were put in place to reduce the exposure levels.

2019 Key achievements

Occupational health

- Consolidation of Occupational Health network: 14 Country/ Regional Medical Referents support Sites, GBUs, and local medical teams in Occupational Health and co-build Group recommendations;
- Global world-wide training of Sites (Medical teams, HSE, HR, Site Managers) on “Group requirements in Occupational Health” that will allow each Site to identify gaps and define a corrective action plan for full compliance by the end of 2020;
- Well-being at work (see specific chapter for more details): deployment of a worldwide burn-out observatory, training for managers, raising employee awareness by e-learning;
- The Travel Policy has been updated to include an obligation to undergo a pre-travel medical check for destinations classified as having a high sanitary risk. Employees traveling to risky destinations are informed as soon as they book a flight. This represents concrete progress and will ensure better prevention and protection of employees travelling for business reasons.

Occupational safety

Progress has been made on the “Creating Safety” journey, an innovative approach introduced in 2017 at the top management level. Twenty-five (25) sites have now carried out “Safety Climate” or similar assessments to understand the status of their safety culture. Sites have been training employees and contractors on risk awareness and safety leadership.

Several Global Business Unit and Function leadership teams have held training sessions with several recognized consultants. These types of sessions help create a common vision for what the company wants to achieve in terms of creating safety, as opposed to merely striving to prevent accidents.

Industrial hygiene

More than 75 percent of Solvay’s sites are now using SOCRATES, the new tool to manage industrial hygiene across the Group. The tool efficiently supports exposure assessment and sets clear priorities for risk management. Together with improved exposure documentation, SOCRATES will support industrial hygiene follow-up and advanced individualized medical surveillance. GBUs are to fully implement SOCRATES at all manufacturing and R&I sites by the end of 2021.

The development of SOCRATES was a collaborative effort with participation from the users. Today SOCRATES enables a site to easily and consistently perform and document risk assessments for all personnel who are potentially exposed to industrial hygiene agents such as chemicals, noise, ergonomics, and vibrations. Notifications from the system can inform people in charge about risk control measures. A useful feature allows shop-floor workers or researchers to access the tool and contribute to assessments of their own workplace.

SOCRATES makes it easier to trace an individual’s exposure to hazardous agents throughout their entire working life. It also supports the advanced medical monitoring of employees as promoted by the Group. Indeed, surveillance by medical teams is optimal if based on good knowledge and documentation of working conditions, especially regarding exposure to chemicals.

NOTE S8
Employee engagement and well-being

Priority

Solvay pursues comprehensive initiatives and processes to cultivate and assess the engagement and well-being of its employees, including personal development, rewards and recognition, an inclusive culture, and work-life balance. The Group also considers that engagement is fostered by freedom of association and collective bargaining.

Employee engagement

Definition

Employee engagement is the level of commitment, passion, and loyalty a worker has toward his/her work and the company. The Group believes that engagement increases performance through higher productivity and employee retention. Five factors have an impact on employee engagement: pride, quality of work environment, overall satisfaction, motivation, and attachment to the company. Solvay also considers that engagement is fostered by fair labor practices and well-being at work.

Management approach

Employee engagement is measured through a worldwide annual survey measuring the engagement of Solvay's employees and the factors leading to engagement. This enables the Group to identify strengths and areas where the working environment and employee experience can be improved. The survey results are assessed across various scopes – at the Group, Global Business Unit, Function, and site levels, as well as for each team manager with at least five respondents on his/her team. Across the Group, this represents a clear and intentional commitment by leaders and managers to improve engagement and support the well-being of their employees.

In 2019, Solvay decided to engage employees on the Purpose survey. The Solvay Employee Survey has not been launched this year. To define the Group's purpose, the largest listening exercise in Solvay's history took place. It involved 288 listening sessions convening 3,000 people, 75 hours of individual interviews, 13,000 completed surveys, 25 leadership dialogues, and 50% of survey responses from production sites.

Well-being at work

Definition

Solvay follows the well-being definition of the International Labor Organization and the World Health Organization: well-being at work is a holistic concept which relates to all aspects of the quality of working life that ensure workers are safe, physically and mentally healthy, satisfied, engaged and efficient. It contributes to a culture of recognition and support, to work-life balance, to employees' growth and development, and to good communication and collaboration.

In launching Purpose, Solvay stated well-being as one of its core beliefs, targeting a healthy organization.

The well-being indicator for Solvay's workforce is measured via the yearly "Solvay Engagement Survey". Four questions in the employee survey relate to perceived well-being at work. In 2019, Solvay did not conduct a "Solvay Engagement Survey" because it conducted another, related survey to collect employee's ideas, called the Solvay Purpose.

Management approach

Within Solvay, a multidisciplinary Committee on Well-Being At Work (WBAW) has existed since October 2016. It includes occupational physicians and psychologists, Human Resources, Health, Safety, and Environment experts, and sustainable development experts, representing all regions. The aim of this Committee is to define and promote a well-being at work program.

The WBAW program 2017-2020 has five pillars:

- executive Committee sponsorship: WBAW is a key priority for Solvay;
- include Mental health as part of the Safety communication to Executive Committee (burn-out observatory);
- provide toolboxes and initiate WBAW supportive network. On site, "Local support for WBAW" teams have been appointed (site HR, HSE, and medical professionals);
- develop Group deployment on WBAW training:
  - training of Executive Committee and Leadership Council (70 senior leaders),
  - training of managers: 898 managers trained through November 2019, with excellent feedback from participants who appreciated the concrete actionable examples,
  - training of "Local support for WBAW": few sessions held so far; needs to be promoted in 2020,
  - raise awareness of all Solvay employees via e-learning;
- support our sites to define and implement action plans.

A full section of the Solvay Way framework, which Solvay entities use to perform annual self-assessments and define improvement plans, is dedicated to well-being, while the yearly Solvay Engagement survey explores employee perceptions of well-being at work. This encourages sites to develop local well-being programs and assess stress risks. Well-being is one of the management aspects examined during the annual visits organized with IndustriAll Global Union.

In 2019, 140 sites assessed their performance in deploying the well-being at work mandatory practice: 81 of them reached the level where risk assessment of the stress causes has been performed, an action plan discussed and implemented, and well-being at work training deployed with managers.

2019 key achievements

Burn-out observatory deployment

The burnout observatory allows us to identify the main risk factors in order to define preventive actions. So far, the main risk factors identified are related to workload, quality of the management (recognition, support), and organizational changes.

Since 2016, the Burn-out observatory has been progressively deployed via the medical network in EMEA (Belgium, France, Germany, Italy, Spain, Portugal), North America (Mexico, some sites in the US), Latin America (Brazil, Chile), and APAC (China, India).

So far, it covers 77 Sites and 18,078 employees.

E-learning on WBAW for all employees

In June 2019, we posted an e-learning session on WBAW, available to all employees in 15 languages, in order to ensure a uniform understanding and provide guidance. 2,973 employees took the e-learning session. It will be promoted further in 2020.

China very active in WBAW-related actions

In 2019, China (with 2,600 employees) was very active in training on WBAW for managers (10 sessions) and employees, in stress assessments followed by actions at the team level, in building a network of "Local support on WBAW" (all Chinese sites), and in deploying a burn-out observatory (all Chinese sites).

Labor relations

100%

of employees covered by collective agreement*

* Due to the Solvay Care collective Agreement with the global employee representative body, the Solvay Global Forum, which covers all employees.

Solvay believes that a trusting, constructive relationship with employees and their representatives forms the basis for fair labor practices. This relationship is built on the Group's commitment to respect employees' fundamental human rights and guarantee their social rights.

Management approach

Labor relations are managed at four levels: site, country, Europe, and Group.

Solvay Global Forum

In 2015, Solvay created a global employee representative body, the Solvay Global Forum, composed of eight employee representatives from the eight main countries where Solvay operates (United States, France, China, Brazil, Germany, Italy, India, and South Korea). This Forum meets with the Executive Committee once a year, in Brussels, during a one-week session. Video conferences are held quarterly, bringing together the Solvay Global Forum and the Group's top management to comment on and discuss the quarterly results of the Group, and to keep everyone informed of the main new projects.

The main topics discussed in 2019 were the yearly negotiation of the Global Performance Sharing plan, which entitles each Group employee to a share of the Group's EBITDA, and which also includes sustainability criteria (progress on the Solvay Way annual self-assessment).

European Works Council

Solvay and its European Works Council (EWC) have been in permanent dialogue for more than 20 years. In 2019, the EWC met on two occasions in a plenary session. The sustainable development EWC commission met on two occasions and the EWC Secretariat met 11 times with senior Group management, allowing these representative bodies to be part of Solvay's evolution. Subject matters receiving particular attention were Mergers and Acquisitions (notably the divestment of the Polyamides activities); reorganization issues, including the simplification plan; developments in Group employment and working conditions; and strategy and sustainable development issues, such as the new strategy launched in November, a deeper dialog on the revision of the new code of business integrity, and the new sense of purpose. An agreement was signed to anticipate Brexit and maintain the UK's representation within the EWC.

The main topics discussed with the Sustainable Development Commission of the European Works Council in 2019 included sustainable development topics, the health and safety plan, and digital transformation projects.

The IndustriALL Global Union Framework Agreement

On December 17, 2013, Solvay signed a Corporate Social and Environmental Agreement for the whole Group with IndustriALL Global Union. This Agreement is based on International Labor Organization standards and the principles of the United Nations Global Compact. It is a tangible expression of Solvay's determination to ensure that basic labor rights and the Group's social standards in the areas of Health, Safety, and Environmental protection are respected at all of its sites.

In February 2017, Solvay took that collaboration one step further by renewing its Global Framework Agreement with IndustriALL Global Union, reinforcing its commitment by adding new social projects, such as societal actions and the protection of mental safety in the workplace.

Every year, IndustriALL Global Union representatives meet Solvay employees to check on compliance in the field, with two assessment missions taking place at two different sites. One mission measures the results of the Group's safety policy. The second examines the application of the agreement, which, in particular, formally covers the following health and safety aspects:

- Ensuring good working conditions;
- Managing risk as a daily concern;
- Defining demanding internal policies and their strict application;
- Improving safety performance and regular monitoring of both Solvay's and contractors' employees;
- Ensuring healthy working conditions for all, regardless of the job they perform and its associated risks.

In 2019, the two assessment missions took place in Mexico and India. In India, the visit created an opportunity to build a dialog plateforme at the national level between management and employee representatives. IndustriAll Global Union paid particular attention to Solvay's behavior-based employee safety approach and its potential limits.

To ensure all employees comply with the IndustriALL Global Union Agreement, it is integrated as an employee practice in the Solvay Way framework. In 2019, more than 99% of the sites have presented and explained to all employees the IndustriALL Agreement.

Solvay Cares: minimum social coverage standard for all employees worldwide.

In February 2017 Solvay signed a Global agreement on a minimum level of welfare and healthcare protection for all Solvay Group employees worldwide.

Solvay Cares was fully deployed in 2019 and aims to provide four major benefits:

1. Full income protection during parental leave, with 14 weeks for the mother and one week for the co-parent; and full income protection of one week during adoption;
2. A minimum coverage of 75% of medical fees in the event of hospitalization or severe illness;
3. Disability insurance in the event of lasting incapacity;
4. Life insurance with coverage for the family or partner.

What has Solvay Cares changed for employees?

By April 1, 2019, Solvay Cares was offering the agreed minimum level of benefits worldwide. The statutory benefits are considered part of the Solvay Cares provisions. This explains why benefits provided in different countries may vary and may differ from the minimum benefits.

Countries listed below were already at or above the minimum level of benefits and did not require any action: Brazil, Canada, Chile, Hong Kong, Taiwan, New Zealand, Vietnam, and other countries with smaller headcount.

Countries listed below needed an upgrade to their parental benefits only: Colombia, France, Germany, United Kingdom, United States, Argentina, and other countries with smaller headcount.

Minimum notice periods regarding operational changes

Some of the collective bargaining agreements specify notice periods for consultation and negotiation. The Global Framework Agreement concluded between Solvay and IndustriALL Global Union includes a provision that employees and unions (where applicable) must be informed in advance of any restructuring plans. In some of the collective bargaining agreements, a notice period and provisions for consultation and negotiation may be required.

Employee Representation Indicator

Trade unions are present at a majority of Solvay sites around the world. Union membership is estimated at 20% in Europe, 25% in South America, 30% in North America, and 70% in Asia.

NOTE S9
Diversity and inclusion

Highly material

24,155*	104	23%
Headcount	nationalities	women

* Scope: consistent with financial reporting.

Definition

Solvay defines diversity as all of the ways in which individuals are different, whether visible or not. Diversity includes more than gender, nationality, age, disability, ethnic origin, and sexual orientation. It includes thought and belief, culture, education, and background. In a business environment, it also includes corporate culture.

Inclusion means valuing and respecting difference, recognizing the unique contributions that many different types of individuals can make, and creating a working environment that maximizes every employee's potential. The Group sees this approach as a way to enhance its performance in its role as employer. It is convinced that its approach will ultimately improve the overall performance of its workforce, and has therefore made diversity and inclusion a performance lever and a growth enabler.

Management approach

Commitments and policy

Solvay commits itself to equal opportunities and encourages diversity and inclusion at every level of employment in the company. This commitment is grounded in Solvay's principles of ethical behavior, respect for people, customer focus, empowerment, and teamwork.

Diversity and inclusion are championed at the highest level in the organization by the Board of Directors, the Executive Committee, and the Leadership Council. Each Global Business Unit and Function entity management team is responsible for putting this commitment into practice. To reflect business objectives and cultural context, business, regional, and local leaders set specific and relevant objectives within the Group diversity and inclusion framework. Strategies and action plans have to be locally owned and driven by entity, region, and country to take into consideration local laws, customs, and priorities.

At the Group level, four areas of focus in terms of diversity receive specific attention and monitoring to ensure consistent improvement across the organization:

1. Improving the gender mix at all levels of the organization;
2. Leveraging the generational mix to optimize learning, knowledge, and experience;
3. Developing national and cultural talent that mirrors growth opportunities;
4. Enriching the team mix by leveraging experiences and backgrounds.

Diversity of the Board of Directors

The composition of the Board of Directors fulfills the duties imposed on it by Article 518 of the Companies Code.

7 of 15

Board members are women

Indicators and objectives

Since 2017, Solvay's actions have aimed to:

- Ensure leadership commitment and accountability;
- Foster diversity and inclusion awareness;
- Issue guidance in human resources processes such as recruiting, retention, and advancement.

A review of human resources processes focused on talent acquisition by offering guidance on candidate sourcing and selection.

Training and development programs have been focusing on initiatives such as raising awareness about inclusive behaviors and targeted development programs for female managers and for Asian talents, among others.

We also foster country-specific actions crafted in response to the local context, thanks to the Solvay Way network and best practices.

Solvay's objective:

2020

20%

of senior executive positions held by women

Gender diversity by employee category

Percentage of headcount	**2019**	2018
Women in senior management	14%	15%
Women in middle management	26%	25%
Women in junior management	33%	33%
Women in non-managerial positions	20%	20%
Total	**23%**	**23%**

Scope: consistent with financial reporting.

Age Group by employee category

Percentage of headcount	2019	2018
Senior management	**369**	**401**
Percentage under 30 years old	0%	0%
Percentage between 30–49 years old	29%	28%
Percentage 50 years old and older	71%	72%
Middle management	**2,895**	**2,915**
Percentage under 30 years old	0%	0%
Percentage between 30–49 years old	49%	49%
Percentage 50 years old and older	51%	51%
Junior management	**5,246**	**5,213**
Percentage under 30 years old	10%	10%
Percentage between 30–49 years old	64%	64%
Percentage 50 years old and older	26%	26%
Non-managerial	**15,645**	**15,972**
Percentage under 30 years old	14%	14%
Percentage between 30–49 years old	55%	55%
Percentage 50 years old and older	32%	31%

Scope: consistent with financial reporting.

Solvay's workforce by age

	2019	2018
Under 30 years old	2,649	2,800
Between 30–49 years old	13,422	13,605
50 years old and older	8,084	8,096
Total headcount	**24,155**	**24,501**

Scope: consistent with financial reporting.

According to the above table, the age structure is currently:

- 33% older than 50;
- 55% between the ages of 30 and 49;
- 12% younger than 30.

2019 Key achievements

Solvay is #9 out of over 10,000 European companies in the Financial Times' inaugural "Diversity Leaders" ranking.

The local deployment of the group policy, thanks to the Solvay Way network, was assessed in 2019 on 140 sites: 71 reached the level where an action plan to foster inclusion & diversity has been defined, approved by their referent Global Business Unit, and communicated to their employees.

More than 200 managers from all regions were trained this year on the six inclusive leadership behaviors: Listening to understand, Seeking multiple points of view, Giving & receiving feedback, Enhancing inclusion, Setting Processes & policies that foster Trust & Respect, and Cultivating self-awareness.

Our key International Management Seminar (IMS) happened in 2019: a six-month learning journey for 60 identified young talents from all regions and entities of the group, this program leads to inclusion and inclusive behaviors. The "IMS community" is an active group of 250 managers who have participated in the program since its start.

"WomenLeaders@Solvay", a group of more than 100 executive leaders worldwide, has been working on "how to promote diversity at Solvay". The group is sponsored by the top female leaders at Solvay. It is studying three specific themes and aims to make them more of a reality going forward.

Mentoring programs are tailored to female talents in some of our GBUs. The Soda Ash & Derivatives GBU, for instance, launched a three-year program this year.

Inclusion of disabled workers in France.

Support to disabled people and employees is key at Solvay. As an example, France was very active this year by renewing the social agreement in favor of disabled employees for the period 2019-2022 with stronger commitments to the 280 disabled workers in Solvay France (close to 7% of French employees). Solvay France has also promoted the following:

- "Talents Handicap", an online recruiting forum where candidates can search for jobs without travelling;
- "Handicap Ambassadors", an active network of disabled Solvay colleagues and "helpers" (on a volunteer basis);
- "Hand'e-passport", an e-learning course to help employees understand the different kinds of disabilities and how to manage relationships with each other, consisting of 11 sessions of 15 minutes each;
- Participation in the national "DuoDay" event in May 2019, a day of sharing one-on-one the difficulties of a disabled colleague at work;
- "Solvay Handi Trophies", four prizes recognizing four associations in November 2019.

93% of Solvay France's disabled employees recommend working for Solvay as a declared disabled person.

Notes to Social Capital

This chapter on social capital discusses Solvay's perceived role in society, i.e. expectations of what Solvay will contribute to society in return for its social license to operate. It addresses the management of relationships with key outside stakeholders, such as customers, local communities, the public, and the government.

NOTE S10
Customer welfare

Highly material

33%

Net Promoter Score®

Definition

The Net Promoter Score is the indicator used to measure customer loyalty for each Global Business Unit. The metric was developed by (and is a registered trademark of) Fred Reichfeld, Bain & Company and Satmetrix. GBU scores are consolidated at the Group level through a revenue-based weighted average.

The Net Promoter Score is calculated based on customer responses to a single question: How likely is it that you would recommend our company to a friend or colleague? Answers can range from 0 to 10. Those who respond 9 or 10 are called Promoters and considered likely to exhibit value-creating behaviors, making positive referrals to other potential customers. Those who respond with a score from 0 to 6 are labeled Detractors and are not supportive. Responses of 7 or 8 are labeled Passives. The Net Promoter Score is calculated by subtracting the percentage Detractors from the percentage of Promoters.

The Net Promoter System is the methodology Solvay uses to boost customer loyalty by promoting a culture of customer feedback and by developing active listening skills at every single touchpoint along the customer journey. The objective is to go far beyond "just a score" towards a deep transformation of the Group by fostering a much more customer-centric culture.

The Net Promoter System is structured around two pillars to systematically gather insights at both the strategic and operational levels. The objective of the first and more strategic stage is to identify and further reinforce the areas where the Group truly stands out against the competition in order to raise customer loyalty and accelerate growth.

The second and more operational stage captures how the customers perceive our offer from a day-to-day perspective. Those key insights trigger tangible action plans – both account specific and at the business unit level – to bring Solvay closer to its customers and better serve them by delivering more suitable and efficient services.

Management approach

Since 2014, each Global Business Unit has run a customer satisfaction survey at least once every two years to check their strategic alignment with the trends in their business environment. The aim is to identify and select the right areas for the Global Business Unit to focus on, so as to foster differentiation and accelerate growth.

The Net Promoter Score has been selected as the key indicator of customer loyalty for the Group. It is measured at the Global Business Unit level, consolidated at the Group level, and published annually.

In 2018, Solvay decided to take this "voice of the customer" approach to the next level by launching a new initiative (the "Net Promoter System") to transform the work practices of the entire frontline population across all business units and geographies, embedding customer feedback culture in our DNA.

The insights gathered from our customers systematically trigger action plans so that we continuously adapt our value proposition to better serve them and increase our share of wallet.

Indicator and objective

The Group Net Promoter Score increased from 14% in 2014 up to 33% in 2019.

In 2019, building on the experience gathered in 2018, Solvay further deployed the Net Promoter System across the Group based on a much broader survey scope, leveraging digital tools embedded in our customer relationship management (CRM).

This year, we registered a reduction in the Group Net Promoter Score which reached 33% in 2019 vs 42% in 2018 primarily driven by the change of scope as well as the very challenging business environment.

2019 is to be considered as a transition year during which the new system has been implemented across several GBU's. 2020 will become the new reference, the new baseline for the future as all GBUs will then be completely covered by the new Net Promoter System.

In %	**2019**	2018	2017
Solvay's Net Promoter Score (NPS)	33	42	36

Legend: Net Promoter Score is a customer loyalty metric developed by (and registered trademark of) Fred Reichheld, Bain & Company, and Satmetrix.

NOTE S11
Societal actions

Priority

Today, value creation is a collaborative effort both within the company and between the company and its stakeholders. The Group aims to strengthen its commitment by facilitating employee involvement in projects that serve society and by offering Solvay's expertise to regions where the Group operates. Disclosure of Solvay's indirect economic impact is provided in this section.

47%
of employees involved in local societal actions

€ 3.609 million
Solvay Group donations, sponsorships and own projects

Local societal actions

Definition

A local societal action is a volunteer activity developed by a site in collaboration with associations, governmental initiatives, or NGOs, with the aim of improving the human condition and contributing to local communities. It should address one of the four domains identified by Solvay:

1. Science;
2. Education and youth employability;
3. Environment;
4. Solidarity and philanthropy.

Responsibilities and resources

Each site is invited to design its own local societal action plan in accordance with the principles of the Solvay Way framework and the needs of surrounding communities. Guidelines are provided to the sites, inviting them to start by designating a working group to update the site's plans annually in pursuit of continuous improvement.

- The site manager is accountable for implementation, developing the societal action plan, and securing funding;
- The site Human Resources manager offers support, by proposing actions with stakeholders, providing documentation, and counting the employees involved;
- The industrial relations officer is a promoter who provides advice on aligning societal actions with stakeholder needs and Group guidelines, coordinates national initiatives, and communicates information among sites;
- The Solvay Way Correspondent acts as a reporter, ensuring compliance with Group rules, proposing actions, making site-level assessments, and recording and relaying information;
- Employee representatives are volunteer ambassadors. They actively contribute to and participate in the working groups and propose actions.

Indicators and objectives

Solvay's priority objective:

2025

40%

of employees involved in societal actions

In % of headcount	2019	2018	2017
Employees involved in local societal actions	47	33	33

Number of employees that participated at least in one societal action in 2019 (even if they are no long present at the company on December 31, 2019) divided by the headcount on December 31, 2019.

Citizen Day - 168 Solvay sites joining international calls for climate action

From September 17-27, on the occasion of international climate strikes and the UN's Climate Action Summit, Solvay organized its first World Citizen Day for environmental preservation.

Solvay sites around the globe organized their own Citizen Day initiatives, offering every employee and their families the opportunity to act on behalf of the environment within their communities. Official activities ranged from tree planting in India and Bulgaria to clean-up campaigns in China and Thailand, educational sessions on solar power and water conservation in Brazil and the United States, and efforts to reduce plastic and paper use in Europe and Asia.

During the two-week event, 169 sites participated, representing more than 94% of Group employees across the globe. The Citizen Day contributed to Solvay's sustainability targets, which include doubling the number of employees involved in local societal actions by 2025.

From now on, every year we will set aside one day to celebrate the impact groups of employees can have on the world when they all come together as Citizens of Solvay.

Corporate citizenship and philanthropy

Management approach

350

Requests for financial support

90

Funded projects

Solvay aims to connect its philanthropic efforts with the Group's areas of expertise and support causes where its products or activities can deliver added value.

In 1923, Solvay created the Ernest Solvay Fund to honor the founder of the Company, who died the year before. Today, the majority of Solvay's corporate philanthropy goes through the Ernest Solvay Fund, managed by the independent King Baudouin Foundation.

Solvay concentrates its philanthropic and funding efforts at the corporate level on promoting science, education, and youth employability, and in some circumstances it supports humanitarian initiatives in response to certain disasters and/or situations where its products or services are particularly valuable.

Major projects

The International Solvay Institutes for Physics and Chemistry

The Solvay Institutes were founded by Ernest Solvay in 1912 to support and develop curiosity-driven research in physics, chemistry, and associated fields with the purpose of "enlarging and deepening the understanding of natural phenomena".

The central activity of the Institutes is the periodic organization of the celebrated Solvay Conferences on Physics and Chemistry ("Conseils de Physique Solvay" and "Conseils de Chimie Solvay"). To complement this support for fundamental science, the Group organizes open workshops on specific selected topics, international chairs, colloquia, and an international doctoral school.

In addition to these activities, the Solvay Institutes promote the popularization of science by organizing the annual Solvay public lectures devoted to today's biggest scientific challenges.

The XperiLAB.be project exists to make young people aware of science. To achieve that, nothing beats a personal, hands-on approach. Doing is understanding! XperiLAB.be is also an opportunity to give pupils and teaching staff the tools that they often lack in class. It is designed for children in the last two years of primary school and the first two years of secondary school. Every year about 10,000 pupils attend sessions in the XperiLab.

Examples of Group science educational and social projects

- **CERN (CH):** Solvay supports the Non-Member State Summer Student Program, giving hundreds of students the chance to get hands-on experience in the sciences each year. The eight-week Summer Student Program gives undergraduate students in physics, computing, and engineering a unique opportunity to join in the day-to-day work of research teams and become familiar with the processes and technologies used on site;
- **1,001 inventions:** 1,001 Inventions is a British based, award-winning science and cultural heritage organisation. Through its educational programmes, books, blockbuster exhibitions, live shows, films, and learning products, 1,001 inventions showcases the contributions of inspirational men and women of different faiths and cultures in a civilisation that spread from Spain to China. 1,001 Inventions has produced a world-class range of exciting and engaging educational experiences, exhibitions, and productions.
- **The IUPAC-SOLVAY International Award for Young Chemists** is intended to encourage outstanding young research scientists at the beginning of their careers. The awards are given for the most outstanding Ph.D. theses in the general area of the chemical sciences, as described in a 1,000-word essay. The award is sponsored by Solvay.

Group strategic partnerships

Ellen MacArthur Foundation

In January 2018, Solvay and the Ellen MacArthur Foundation signed a three-year Global Partner agreement that gives the Group an opportunity to make a difference in accelerating the transition to a circular economy in the chemicals sector.

World Alliance for efficient technologies

Solvay joined the World Alliance for Efficient Solutions, created by Solar Impulse founder Bertrand Piccard, to promote efficient technologies, processes, and systems that help improve the quality of life on earth. Alliance members include start-ups, companies, institutions, and organizations.

The World Alliance for Efficient Solutions brings together the main actors involved in developing, financing or promoting products, services, processes and technologies that protect the environment in a profitable way. To this end, they assess the solutions submitted by their Members, with the help of independent technical and financial Experts, and select 1000 of the most promising ones. They will be labelled as Efficient Solutions and presented to governments, businesses and institutions to encourage them to adopt more ambitious environmental targets and energy policies.

In 2019, 7 Solvay products have been labeled as Solutions by the Alliance:

- AgRHO® S-BoostTM : This label confirms the product's value in terms of sustainability. Indeed, it increase root development: the plant gets stronger quicker because it favors nutrients and water uptake, so less pesticides and fertilizers are required, and irrigation requirements are lower.
- SOLVAir® : Its a solution for treating exhaust gases from factories incineration (like Nox, SO2, HCI,...) plants and ships hence contributing to cleaner cities by using innovative Dry Sorbent Injection (DSI) process.
- Solef® PVDF : It's a solution without any additives, it has the intrinsic stability inherent to fluoropolymers even when exposed to harsh environments, providing the user with a unique combination of properties resulting in longer equipment life.
- Paramove® : An approved veterinary medicine used in salmon farming to control sea lice and promote salmon welfare.
- Capterall® : mineral formulations treat polluted water to reach lower discharge concentrations and manage fluctuations in pollutants in order to be compliant with strict regulations.
- Alve-One®: foaming solutions are an innovative generation of high-performance and cost-effective chemical blowing agents based on 100% safe raw materials helping fulfil the plastic industry's needs of moving towards a circular economy
- MAX® HT : This solution enables all of our customers to enjoy increased heat transfer coefficients and evaporator steam economies that result in reduced energy consumption, caustic losses and maintenance costs (acid and labor).

Business programs for social needs

Sustainable Guar Initiative, or how we do inclusive business

7,300+
farmers registered in the program

1,529
women impacted by the program

971
kitchen gardens planted

60,000+
trees planted

Solvay is the world's leading producer of guar derivatives. Since 2015, Solvay has been spearheading a large-scale development initiative to make guar cultivation more sustainable while boosting the incomes of the farmers who produce it. Guar is a drought-resistant legume grown in semi-arid areas, predominantly in India. Rajasthan accounts for approximately 70% of the country's production.

In collaboration with L'Oreal and Henkel, two strategic customers active in Personal Care, and with the support of the NGO TechnoServe, more than 7,000 farmers in Bikaner were trained over four years, and more than 971 kitchen gardens were developed in 36 villages.

The initiative's primary objective is to encourage sustainable and climate-smart agriculture, thereby increasing farmers' revenues through good guar cultivation practices for seed selection, seed treatment, sowing, and pest management.

The initiative also empowers women through specific training on hygiene, health, and nutrition:

- Fostering better nutritional practices by growing vegetables in kitchen gardens in a region where the traditional diet is very limited;
- Improving health and hygiene practices for themselves and their children.

Lastly, the initiative focuses on agroforestry, with more than 60,000 trees planted to fight sand movement and soil erosion in the fields. The outcome means guar farmers can earn a better living, global buyers can obtain higher quality guar, and the market can benefit from improved supply security.

Notes to Leadership and Governance

This chapter covers regulatory compliance, risk management, safety management, conflicts of interest, anticompetitive behavior, corruption, bribery, and business complicity with human rights violations.

NOTE S12
Management of the legal, ethics, and regulatory framework

Highly material

Management of the legal, ethics, and regulatory framework encompasses business ethics – human rights, anti-corruption, and non-discrimination – and anti-competitive behavior.

Commitments and policies

Solvay's Code of Business Integrity

Solvay's Code of Business Integrity and the policies and procedures adopted to enhance good governance apply to all employees wherever they are located. In addition:

- Third parties are expected to act within the framework of the Code of Business Integrity;
- All critical suppliers must confirm that they adhere to the principles set out in the Solvay Supplier code;
- Majority-owned joint ventures are held to the Solvay Code of Business Integrity or to a separate code adopted based on similar principles.

Gifts, Entertainment and Anti-Bribery policy

Solvay's Code of Business Integrity expressly states that the Group prohibits bribery in any form. Solvay and its employees do not use gifts or entertainment to gain competitive advantage. Facilitation payments are not permitted by Solvay. Disguising gifts or entertainment as charitable donations is equally a violation of the Code of Business Integrity. The Code is supported by a more detailed policy on gifts, entertainment, and anti-bribery. Solvay is a member of Transparency International Belgium.

The Group employs an internal tracking system to record gifts and entertainment that exceed the acceptable reasonable value applicable in each region and requires manager approval for accepting or giving them. The use of the Gift and Entertainment Tracking System ("GETS") is part of Solvay's Internal Audit review process.

Human rights in business policy

Solvay's Human Rights in Business Policy, published on Solvay's website, sets forth Solvay's commitment to respecting human rights and acting with due diligence to avoid any infringement of human rights or any adverse impact on or abuses of such rights. The policy emphasizes Solvay's commitments to its stakeholders (its employees, its business partners, the communities and environment in which it operates, and children).

Solvay has a Global Human Rights Committee (GHRC) to oversee implementation of the policy, ensure compliance, and monitor the Group's performance in meeting its commitments. Members of the Global Human Rights Committee include the heads of the following Solvay business service activities and/or their delegates: Legal and Compliance, Human Resources, Purchasing and Supply Chain Excellence, Industrial, Internal Audit and Risk Management, and Sustainable Development. The GHRC is chaired by the Group General Counsel, who is the head of Legal and Compliance. Members of Solvay's Global Business Units and other business service activities contribute to the work of the GHRC on an ad hoc basis, as necessary.

The GHRC provides an annual written summary of its activities (including key performance indicator results) to the Executive Committee before the Group's annual report is issued, and it also validates the human rights reporting made in conjunction with the issuance of that report. Upon request, the Chair of the GHRC may be called upon to provide an Annual Integrated Report to the Audit Committee.

Solvay is also a pilot participant in the Belgium Commission for Children's Rights and Business Principles.

Competition Law policy

Solvay's goal is to conduct business ethically and not to enter into any business arrangements that eliminate or distort competition. Solvay is committed to developing and maintaining a culture of compliance to keep Solvay and its people on the right side of the law. Solvay has a formal Competition Law policy that stresses the importance of strict adherence to all competition laws. This formal Competition Law policy was approved by Solvay's Executive Committee and is published on the intranet, to which all Solvay's employees have access. Any violation of this policy may result in disciplinary action, subject to and in conformity with applicable laws.

Resources and responsibilities

A Compliance organization under the leadership of the Chief People Officer enhances a Group-wide culture based on ethics and compliance.

Regional Compliance Officers serve in all four zones where the Group operates. Every Solvay Global Business Unit and Function appoints Compliance Liaisons to enhance adherence to compliance objectives and to instill a commitment to compliance throughout Solvay.

As for competition law, Solvay has dedicated resources within the Legal Function responsible for the implementation of the Competition Law Compliance Program. They are in charge of providing competition law advice and guidance, as well as deploying effective and regular communication and training on competition law-related subjects.

Implementation of the competition law policy

Solvay has put in place a Competition Compliance Program that propagates a zero tolerance approach towards competition law infringements. As part of its Competition Compliance Program, Solvay provides a competition law tool kit on its intranet that includes up-to-date guidelines on specific areas of competition law, including guidance on dealing with competitors, an information exchange on Mergers and Acquisitions transactions, swaps, price announcements, vertical relationships, and so on.

To minimize cartel risks, Solvay has put in place a computer-based system that tracks all contacts that relevant employees have with competitors through a managerial approval procedure.

Grievance mechanisms

Employees are encouraged to report suspected violations or concerns through various internal avenues, including management, Human Resources, Legal & Compliance, and Internal Audit.

A Group-wide Speak Up program is in place and overseen by the Audit Committee of the Board of Directors. An external third-party helpline active 24 hours a day, 365 days a year allows employees to ask questions, raise concerns, or file reports.

The following chart shows the types of claims from January 2019 until December 2019 through Solvay's Speak Up program:

Solvay's Speak Up program

Number of claims	**2019**	2018	2017
Misconduct or inappropriate behavior	48	30	26
Discrimination including harassment and retaliation	34	20	15
Conflict of interest	14	10	7
Computer, email, internet	1	3	1
Environmental, health or safety law	5	2	6
Accounting or auditing	4	1	2
Anti-bribery	0	0	2
Confidentiality/misappropriation	4	1	2
International trade compliance	0	0	0
Substance abuse	3	1	1
Theft	3	4	3
Violence or threat	0	5	2
Other	24	11	16
Total	**140**	**88**	**83**

Through the Speak Up program, any concern regarding a breach is investigated by the Ethics and Compliance Function. In keeping with its commitment to transparency, the Speak Up tool is used to report progress on the investigations and is used to communicate the results of investigations directly to the reporters upon conclusion. Posters and an online brochure are available to employees and advertise the web address and toll-free numbers to access this tool in their regions. The Board's Audit Committee oversees the running of Speak Up.

140	127	46	63
Total claims made	Total claims closed*	Substantiated claims among resolved cases	Unsubstantiated claims among resolved cases

* Includes cases for which there was insufficient information or cases that were misdirected or referred.

Resolved Cases	No Action	Policy Review	Training	Discipline	Termination	Resignation
Substantiated	3	14	6	6	12	5
Unsubstantiated	49	8	3	1	1	1

Communication and training

Solvay's Code of Business Integrity

Code of Business Integrity training (live training and web-based training) is organized to ensure understanding and to address behavioral risks such as anti-trust, anti-bribery and corruption, and human rights abuses. Specific anti-corruption training is tailored to management and other personnel in sensitive positions (sales, procurement, industrial development, etc.). Special campaigns to maintain and/or enhance the level of awareness within the Group are identified and adopted annually.

Antitrust

Solvay has a concrete Competition Law Compliance Action Plan designed to mitigate the specific risks the Group has identified in this field of law. It has been in force since 2003 and is updated yearly. In 2019, this action plan covered

i. the roll-out of a new "General Antitrust Training" session which was successfully completed by 4,828 relevant employees,

ii. Contacts with Competitors Tracking System (CCTS) training sessions for 230 individuals as well as

iii. additional tailored face-to-face training sessions for 133 high-risk individuals.

Annual Internal Audits check to make sure the above mentioned Action Plan is effectively being implemented.

Anti-Corruption

The Anti-Bribery and Anti-Corruption training is now done on a two-year cycle for the pre-identified sensitive population. For the 2018-2019 cycle, 6,175 employees in sensitive business populations received the training, either through online, web-based training or live, in-person training. Additionally, the Code of Business Integrity that is mandatory for all employees to read and receive training on covers anti-corruption as a topic.

Human Rights

In 2018, the Group continued to develop its Human Rights in Business Policy plan. As part of this initiative, a Human Rights video was introduced to the Leadership Council to provide an overview of Solvay's actions and human rights strategy going forward. Throughout the year, the Group conducted human rights training for plant managers globally by connecting with them at their annual regional meetings.

NOTE S13
Critical incident risk management

Highly material

Definition

Process accident and safety focuses on preventing and controlling incidents in industrial processes, especially scenarios involving potentially catastrophic consequences for people or the environment. Solvay's process safety management is risk-based. Process safety programs continue to ensure the integrity of operations and incorporate good design principles alongside best engineering and operating practices. Indicators used to monitor Process Incidents (PSI) are aligned with International Council of Chemical Associations (ICCA) standards. Reported process incidents with environmental consequences are monitored and their severity (medium, high, and catastrophic) is classified according to defined criteria including quantity of spilled material, consequences on site or off site, and damage to the immediate vicinity. The overall management of historical soil contamination is monitored through environmental provisions.

Management approach

Process safety

Solvay's approach for preventing process incidents is based on the 14 elements of Process Safety Management, with special attention paid to Process Hazard Risk Analysis (Risk Analysis). Risk analysis forms the backbone of risk control. This quantified risk analysis covers existing, new, or modified installations. The use of a unique risk matrix enables Solvay to quantify the risk level of each accident scenario, combining severity and probability factors. The Process Safety Incident rate (PSI rate) is monitored and benchmarked with peers. Each incident is analyzed and ranked according to ICCA (International Council of Chemical Associations) and CEFIC (European Chemical Industry Council) globally harmonized Process Safety metrics. Preventive and corrective actions are implemented, with a focus on incidents generating an operating permit exceedance.

Soil rehabilitation

The corporate "Environmental Rehabilitation" department is dedicated to overseeing the management of closed sites and addressing environmental liabilities resulting from historical soil contamination. An Enterprise Risk Management approach is applied, backed by clear governance that combines a local approach (team management) with a global team (through initiatives). The aim is to have a clear understanding of Solvay's current and potential environmental liabilities and to effectively address these liabilities.

Indicators

Process safety incidents

Solvay's target is to avoid any high severity incident and to reduce the incident rate for medium severity incidents. Solvay's incident rate (PSI rate) is consistent with the method proposed by the International Council of Chemical Associations (ICCA).

	2019			
	S1	**S2**	2018	2017
Process safety incident rate	0.9	0.9	1	0.9

Legend: Number of process Incidents per 100 full time employees (employees and contractors, assuming 2,000 hours of work/worker/year): Solvay's process incident rate (PSI rate) is consistent with the method proposed by ICCA and CEFIC.

	2019		
	S1	**S2**	2018
Medium-severity process incidents with environmental consequences	20	14	47
... with operating permit exceedance	9	7	12
... without permit exceedance	11	7	35

Scope: The consolidated data for process safety incidents covers 139 sites out of a total of about 142 operational sites, including research and innovation centers with significant chemical process risks but excluding mines, careers, and laboratories with lower risks.

Two sets of indicators are presented for 2019, because the criteria to assess the severity of the process incidents has been changed in July 2019 to adapt to the ICCA (International Council of Chemical Associations) and CEFIC (European Chemical Industry Council) globally harmonized Process Safety metric.

Process incidents with environmental consequences are monitored and their severity (medium, high, and catastrophic) is classified according to defined criteria: quantity of spilled material, consequences on site or off site, damage to the immediate vicinity, fish kills.

No high or catastrophic severity incidents with environmental consequences were reported for 2019, meaning there was no significant off-site environmental impact. Solvay's target is to avoid any high severity incidents and to reduce the Process safety incident rate. In 2019, 34 Medium-severity incidents with environmental consequences were reported and, among those, 16 have generated reportable exceedances of an operating permit limit. The Group has followed up on each incident to ensure adequate actions are taken to avoid recurrence.

2019 key achievements

An extensive Process Hazard Analysis (PHA) training program has been developed into a flexible online training program. In total, 83 modules are now available as e-learning units on Solvay's YouGrow platform. The e-Learning platform enables process safety training to be more widely accessible throughout Solvay. The 83 modules in the Process Hazard Analysis training contain a total of 46 hours of lessons covering a range of subjects in Process Safety. The modules cover the full range of all pre-training required for a Process Risk Analysis (PRA) Leader related to risk analysis approaches, methods, and tools.

6

Financial statements

Financial statements

1. Consolidated financial statements

Solvay (the "Company") is a public limited liability company governed by Belgian law and quoted on Euronext Brussels and Euronext Paris. The principal activities of the Company, its subsidiaries, joint operations, joint ventures and associates (jointly the "Group") are described in note F1 *Revenue and segment information*.

On February 25, 2020, the Board of Directors authorized the consolidated financial statements for issuance. They have been prepared in accordance with IFRS accounting policies as endorsed by the European Union, as disclosed hereafter.

Main events and changes in consolidation scope during the year

On January 18, 2019, the European Commission cleared the divestment of Solvay's Polyamides activities to BASF, a key milestone in the completion of Solvay's transformation into an advanced materials and specialty chemicals company. One of the remaining closing conditions included the divestment of a remedy package to a third-party buyer to address the European Commission's competition concerns. BASF has offered remedies involving part of the assets originally in the scope of the acquisition. These entail among others the manufacturing assets of Solvay's polyamide intermediates, technical fibers, and engineering plastics business as well as its innovation capabilities in Europe. On August 14, 2019 Solvay and BASF have reached an agreement with Domo Chemicals whereby Domo Chemicals is to acquire the Solvay Polyamides assets that needed to be divested to a third party as part of the European Commission's merger control clearance process. Domo is a fully integrated nylon 6 specialist, providing specialized engineering materials solutions to its customers in the automotive, electrical, construction, industrial applications and consumer goods industries. The assets acquired by Domo involve Solvay's Performance Polyamides facilities at Belle-Etoile and Valence, as well as a stake in a newly created joint venture between BASF and Domo in Chalampé (France). They also involve sites in Gorzow (Poland), Blanes (Spain) and commercial activities in Germany and Italy. BASF acquired all the activities that were not included in the remedy package and that were part of the original agreement between Solvay and BASF signed at the end of 2017. The entire transaction, which is based on an aggregate purchase price of € 1.6 billion on a debt free and cash free basis, was completed on January 31, 2020.

On May 12, 2019, Solvay Finance SA (subsidiary of Solvay) exercised its first call option on its € 700 million hybrid bond (ISIN XS0992293570 / Common Code 099229357). This perpetual deeply subordinated bond, bearing an annual interest rate of 4.199%, was treated as equity under IFRS rules. Its repayment was due on May 12, 2019 at the end of the first 5.5 years. As a result, the overall quantum of hybrid bonds in Solvay's balance sheet decreased from € 2.5 billion at the end of 2018 to € 1.8 billion at the end of 2019.

On August 30, 2019, Solvay announced that Solvay SA placed senior fixed rate bonds for an aggregate nominal amount of € 600 million paying a coupon of 0.5% and having its maturity date on September 6, 2029. The notes are listed and admitted to trading on the regulated market of the Luxembourg Stock Exchange with ISIN BE6315847804. Meanwhile, Solvay Finance (America), LLC redeemed its outstanding US$ 800 million 3.400% notes due 2020 (CUSIP No. US8344PAA7 (Regulation S Notes) and 834423AA3 (Rule 144A Notes) / ISIN USU8344PAA76 (Regulation S Notes) and US834423AA33 (Rule 144A Notes)) on 30 September 2019.

On September 30, 2019 Solvay and Aquatiq concluded a joint venture agreement regarding Aqua Pharma company, under which Solvay acquired 50% of the shares for an amount of € 21 million. This strengthens their long-term collaboration to serve aquaculture customers. With this alliance, Solvay and Aqua Pharma aim to become a key aquaculture player by offering a wide range of sustainable and efficient solutions for sea lice and Amoebic Gill Disease (AGD) to the salmon industry.

After a strategic review performed in Q3 in the context of deteriorating profitability of the Oil & Gas business, the synergies between this business and the rest of Novecare appear to be too small and future growth opportunities too modest to support the Oil & Gas business being considered as part of one Novecare Cash Generating Unit. As a result, an impairment test was performed at the Oil & Gas business level rather than at Novecare level, which was carried out on September 30, 2019. Taking into account the carrying amount of the assets of the Oil & Gas business as of September 30, 2019 and the present value of future cash flows, an impairment of € 825 million pre-tax and € 658 million post-tax has been recognized.

On October 3, 2019 management decided to adapt the projects unveiled in June and September 2018, which focused on the footprint of its Research and Innovation sites in Lyon and Aubervilliers, the future of its Paris office and the transformation of its headquarters in Brussels. The initial objectives of these projects remain unchanged, namely:

- accelerate growth through innovation for its customers;
- strengthen collaboration between employees, customers, and partners;
- simplify the footprint of Solvay's administrative and Research & Innovation activities.

Adaption was needed because of the sharp increase in the projects' cost and the evolution of the economic context. Moreover, the number of employees willing to move to Brussels or Lyon has been considered too low. This could have hampered the continuity of activities at the service of our customers. As a consequence, the planned transfers of the teams based in Paris to Lyon and Brussels have been discontinued and the provision for indemnities resulting from expected refusals to relocate has been reversed (€ 48 million).

Main events and changes in consolidation scope in prior year

On November 15, 2017, Solvay agreed to sell its US facility in Charleston, South Carolina, and the phosphorus derivatives-based products made at the plant to German specialty chemicals company Lanxess. The products at the site were used primarily as intermediates in plastic additives, flame retardants and agricultural applications. The business represented sales of approximately € 65 million. The transaction was completed on February 8, 2018 for US$ 68 million, leading to a net capital gain before tax of € 22 million. Employees at the site were transferred.

On March 15, 2018, Solvay announced it had agreed to sell its Porto Marghera plant, which produces hydrofluoric acid, to Alkeemia, part of the Italian Fluorsid Group. The hydrofluoric acid is utilized by Solvay as a base chemical for the production of selected specialty polymers. This divestment is in line with Solvay Specialty Polymers' strategy to focus on specialties, where technology and innovation make the difference, to improve the sustainability of its productions. Fluorsid Group is one of the key players in the hydrofluoric acid and derivatives market at an international level. Alkeemia acquired Solvay Specialty Polymers' Porto Marghera branch of activities, and the employees at the site have been transferred. The sale closed on June 1, 2018. In connection with the disposal, an impairment loss of € 23 million was recognized in the first quarter of 2018.

On March 29, 2018, Solvay announced it was taking a new step in its transformation, putting its customers at the core of its organization to enhance its long-term growth as an advanced materials and specialty chemicals company. Solvay announced plans to simplify its organization that needs to be adapted to its portfolio, which is now strongly focused on high-performance materials and tailored solutions, as well as to its changing customer base. The Group launched the relevant information/consultation procedures with employee representatives. These procedures were completed at the end of June.

On November 27, 2018 Solvay successfully issued a perpetual hybrid bond for an aggregate nominal amount of € 300 million, to be used for general corporate purposes, including the possibility to refinance the existing € 700 million hybrid bond with a first call date in May 2019. The € 300 million hybrid bond has a first call date on March 4, 2024 and a coupon of 4.25% until this date, with a reset every 5 years thereafter. The hybrid bond ranks junior to all senior debt and is classified as equity (and accordingly, coupons will be deducted from equity in accordance with IFRS).

Consolidated income statement

In € million	Notes	2019	2018
Sales	(F1)	**11,227**	**11,299**
of which revenue from non-core activities	(F3)	983	1,042
of which net sales		10,244	10,257
Cost of goods sold		(8,244)	(8,264)
Gross margin		**2,983**	**3,035**
Commercial costs		(381)	(373)
Administrative costs		(950)	(1,006)
Research and development costs		(323)	(297)
Other operating gains and losses	(F4)	(131)	(123)
Earnings from associates and joint ventures	(F25)	95	44
Results from portfolio management and reassessments	(F5)	(914)	(208)
Results from legacy remediation and major litigations	(F5)	(61)	(86)
EBIT		**316**	**986**
Cost of borrowings	(F6)	(140)	(131)
Interest on loans and short term deposits	(F6)	15	13
Other gains and losses on net indebtedness	(F6)	(16)	(1)
Cost of discounting provisions	(F6)	(105)	(77)
Income from equity instruments measured at fair value through other comprehensive income		4	
Profit for the year before taxes		**74**	**791**
Income taxes	(F7)	(153)	(75)
Profit/(loss) for the year from continuing operations		**(79)**	**716**
Profit for the year from discontinued operations	(F8)	236	201
Profit for the year	(F9)	**157**	**917**
attributable to:			
Solvay share		118	877
non-controlling interests		38	39
Basic earnings per share from continuing operations (€)		(1.14)	6.55
Basic earnings per share from discontinued operations (€)		2,29	1.94
Basic earnings per share (€)	(F10)	1.15	8.49
Diluted earnings per share from continuing operations (€)		(1.14)	6.52
Diluted earnings per share from discontinued operations (€)		2,28	1.93
Diluted earnings per share (€)	(F10)	1.15	8.46

The comparative figures of income taxes have been restated (decrease of expense) for an amount of € 19 million, following amendments to IAS 12 Income Taxes as part of the annual improvements to IFRS standards 2015–2017 cycle – See section Basis of preparation.

Consolidated statement of comprehensive income

In € million	*Notes*	**2019**	2018
Profit for the year		**157**	**917**
Other comprehensive income			
Gains and losses on hedging instruments in a cash flow hedge	*(F11)*	5	(47)
Currency translation differences – Subsidiaries and joint operations	*(F11)*	140	255
Share of other comprehensive income of associates and joint ventures accounted for using equity method that will be reclassified to profit or loss	*(F11)*	24	(34)
Recyclable components		**169**	**173**
Gains and losses on equity instruments measured at fair value through other comprehensive income	*(F11)*	3	3
Remeasurements of the net defined benefit liability	*(F11)*	(163)	26
Share of comprehensive income of associates and joint ventures accounted for using equity method that will not be reclassified to profit or loss	*(F11)*	(2)	
Non recyclable components		**(162)**	**29**
Income tax relating to recyclable and non recyclable components	*(F11)*	48	1
Other comprehensive income, net of related tax effects	*(F11)*	**55**	**204**
Comprehensive income for the year		**211**	**1,120**
attributable to:			
Solvay share		174	1,077
non-controlling interests		37	43

Consolidated statement of cash flows

The amounts below include both continuing and discontinued operations.

In € million	Notes	2019	2018
Profit for the year		**157**	**917**
Adjustments to profit for the year			
Depreciation, amortization and impairments	*(F12)*	1,906	944
Earnings from associates and joint ventures	*(F25)*	(95)	(44)
Other non operating and non cash items	*(F13)*	24	(12)
Additions and reversals of provisions	*(F16)*	154	315
Net financial charges		245	198
Income tax expense/income	*(F14)*	262	156
Changes in working capital	*(F15)*	(86)	(148)
Use of provisions	*(F16)*	(399)	(395)
Use of provisions for additional voluntary contributions (pension plans)	*(F16)*	(114)	
Dividends received from associates and joint ventures	*(F25)*	25	25
Income taxes paid (including income taxes paid on sale of investments)	*(F14)*	(263)	(235)
Cash flow from operating activities		**1,815**	**1,720**
Acquisition (–) of subsidiaries	*(F17)*	(6)	(12)
Acquisition (–) of investments – Other	*(F17)*	(16)	(4)
Loans to associates and non-consolidated companies		10	(3)
Sale (+) of subsidiaries and investments	*(F17)*	(31)	26
Acquisition (–) of property, plant and equipment	*(F17)*	(751)	(691)
of which capital expenditures required by share sale agreement and excluded from Free Cash Flow		(59)	(38)
Acquisition (–) of intangible assets	*(F17)*	(106)	(142)
Sale (+) of property, plant and equipment and intangible assets	*(F17)*	18	42
of which cash flow related to the sale of real estate in the context of restructuring/dismantling/remediation			9
Dividends from equity instruments measured at fair value through other comprehensive income		4	
Changes in non-current financial assets		(1)	
Cash flow from investing activities		**(880)**	**(784)**
Proceeds from perpetual hybrid bonds issuance	*(F31)*		298
Redemption of perpetual hybrid bonds	*(F31)*	(701)	
Acquisition (–)/sale (+) of treasury shares	*(F33)*	23	(22)
Increase in borrowings	*(F36)*	3,044	2,444
Repayment of borrowings	*(F36)*	(2,776)	(2,993)
Changes in other current financial assets	*(F36)*	(32)	(25)
Payment of lease liabilities	*(F36)*	(110)	
Net interests paid		(118)	(114)
Coupons paid on perpetual hybrid bonds	*(F31)*	(115)	(111)
Dividends paid		(426)	(411)
Other	*(F18)*	(19)	123
Cash flow from financing activities		**(1,230)**	**(811)**
of which increase/decrease of borrowings related to environmental remediation		8	
Net change in cash and cash equivalents		**(295)**	**126**
Currency translation differences		1	(14)
Opening cash balance		1,103	992
Closing cash balance	*(F36)*	809	1,103

Consolidated cash flows from discontinued operations

In € million	Notes	2019	2018
Cash flow from operating activities		276	244
Cash flow from investing activities		(130)	(122)
Cash flow from financing activities		(5)	(1)
Net change in cash and cash equivalents	*(F19)*	**141**	**120**

Consolidated statement of financial position

In € million	Notes	2019	2018
ASSETS			
Intangible assets	*(F20)*	2,642	2,861
Goodwill	*(F21)*	4,468	5,173
Property, plant and equipment	*(F22)*	5,472	5,454
Right-of-use assets	*(F23)*	447	
Equity instruments measured at fair value through other comprehensive income	*(F35)*	56	51
Investments in associates and joint ventures	*(F25)*	555	441
Other investments	*(F26)*	38	41
Deferred tax assets	*(F7)*	1,069	1,123
Loans and other assets	*(F35)*	289	282
Non-current assets		**15,035**	**15,427**
Inventories	*(F28)*	1,587	1,685
Trade receivables	*(F35)*	1,414	1,434
Income tax receivables		129	97
Other financial instruments	*(F35)*	119	101
Other receivables	*(F29)*	628	719
Cash and cash equivalents	*(F36)*	809	1,103
Assets held for sale	*(F30)*	1,586	1,434
Current assets		**6,272**	**6,574**
Total assets		**21,307**	**22,000**
EQUITY & LIABILITIES			
Share capital	*(F31)*	1,588	1,588
Issue premiums		1,170	1,170
Other reserves		6,757	7,750
Non-controlling interests	*(F32)*	110	117
Total equity		**9,625**	**10,624**
Provisions for employee benefits	*(F34)*	2,694	2,672
Other provisions	*(F34)*	825	883
Deferred tax liabilities	*(F7)*	531	618
Financial debt	*(F36)*	3,382	3,180
Other liabilities		159	121
Non-current liabilities		**7,592**	**7,474**
Other provisions	*(F34)*	190	281
Financial debt	*(F36)*	1,132	630
Trade payables	*(F35)*	1,277	1,439
Income tax payables		102	114
Dividends payables		161	154
Other liabilities	*(F37)*	792	850
Liabilities associated with assets held for sale	*(F30)*	437	435
Current liabilities		**4,091**	**3,902**
Total equity and liabilities		**21,307**	**22,000**

Consolidated statement of changes in equity

		Equity attributable to equity holders of the parent				
In € million	*Notes*	Share capital	Share premiums	Treasury shares	Perpetual hybrid bonds	Retained earnings
Balance at December 31, 2017		**1,588**	**1,170**	**–281**	**2,188**	**6,454**
IFRS 9 adoption						–5
Balance at January 1, 2018		**1,588**	**1,170**	**–281**	**2,188**	**6,449**
Profit for the year						877
Items of other comprehensive income	*(F11)*					
Comprehensive income						***877***
Perpetual hybrid bonds issuance	*(F31)*				298	
Cost of stock options						9
Dividends						–378
Coupons of perpetual hybrid bonds						–111
Acquisition (–)/sale (+) of treasury shares				–18		–4
Other						–8
Balance at December 31, 2018		**1,588**	**1,170**	**–299**	**2,487**	**6,834**
IFRS 16 adoption						8
Balance at January 1, 2019		**1,588**	**1,170**	**–299**	**2,487**	**6,842**
Profit for the year						118
Items of other comprehensive income	*(F11)*					
Comprehensive income						***118***
Redemption of perpetual hybrid bonds	*(F31)*				–697	–3
Cost of stock options						11
Dividends						–394
Coupons of perpetual hybrid bonds						–115
Acquisition (–)/sale (+) of treasury shares				25		–2
Other						5
Balance at December 31, 2019		**1,588**	**1,170**	**–274**	**1,789**	**6,462**

	Revaluation reserve (fair value)					
Currency translation differences	Equity instruments measured at fair value through other comprehensive income	Cash flow hedges	Defined benefit pension plan	Total other reserves	Non-controlling interests	Total equity
–834	**5**	**16**	**–665**	**6,882**	**113**	**9,752**
				–5		–5
–834	**5**	**16**	**–665**	**6,876**	**113**	**9,747**
				877	39	917
217	4	–42	22	200	4	204
217	***4***	***–42***	***22***	***1,077***	***43***	***1,120***
				298		298
				9		9
				–378	–40	–418
				–111		–111
				–22		–22
			8		1	
–618	**9**	**–26**	**–636**	**7,750**	**117**	**10,624**
				8		8
–618	**9**	**–26**	**–636**	**7,758**	**117**	**10,632**
				118	38	157
164	1	5	–114	56	–1	55
164	***1***	***5***	***–114***	***174***	***37***	***211***
				–701		–701
				11		11
				–394	–39	–432
				–115		–115
				23		23
		1	–6		–5	–5
–454	**10**	**–21**	**–756**	**6,757**	**111**	**9,625**

2. Notes to the consolidated financial statements

IFRS general accounting policies

1. Basis of preparation

This information was prepared in accordance with European Regulation (EC) 1606/2002 on the application of international accounting standards dated July 19, 2002. The Group's consolidated financial statements for the year ended December 31, 2019 were prepared in accordance with IFRS (International Financial Reporting Standards) as published by the International Accounting Standards Board (IASB), and endorsed by the European Union.

The accounting standards applied in the consolidated financial statements for the year ended December 31, 2019 are consistent with those used to prepare the consolidated financial statements for the year ended December 31, 2018, except for the adoption of new Standards effective as of January 1, 2019, that are discussed hereafter. Aside from Interest Rate Benchmark Reform, the Group has not early adopted any other standard, interpretation or amendment that has been issued but is not yet effective.

Standards, interpretations and amendments applicable for the first time in 2019

As of January 1, 2019, the Group applied, for the first time, IFRS 16 Leases, the amendments to IAS 12 Income Taxes as part of the annual improvements to IFRS standards 2015–2017 cycle, and IFRIC 23 Uncertainty Over Income Tax Treatment. Several other amendments and interpretations apply for the first time in 2019 (including Interest Rate Benchmark Reform, which amends IFRS 9 Financial Instruments, IAS 39 Financial Instruments: Recognition and Measurement, and IFRS 7 Financial Instruments: Disclosures) but do not have a more than insignificant impact on the consolidated financial statements of the Group.

IFRS 16 *Leases*

As from January 1, 2019, the Group no longer applies IAS 17 Leases, IFRC 4 Determining whether an Arrangement contains a Lease, SIC-15 Operating Leases – Incentives and SIC-27 Evaluating the Substance of Transactions Involving a Legal Form of a Lease. IFRS 16 is applicable for annual periods beginning on or after January 1, 2019. IFRS 16 sets out the principles for the recognition, measurement, presentation, and disclosure of leases and requires lessees to account for all leases under a single on-balance sheet model, similar to the accounting for finance leases under IAS 17. At the commencement date of a lease, lessees recognize a lease liability (i.e. a liability to make lease payments), and a right-of-use asset (i.e. an asset representing the right to use the underlying asset over the lease term).

The Group's leased assets relate mainly to buildings, transportation equipment, and industrial equipment.

The right-of-use assets are presented separately in the consolidated statement of financial position, and the lease liabilities are presented as part of financial debt.

On January 1, 2019, the Group:

- adopted IFRS 16, using the modified retrospective approach and did not restate comparative information. The Group did publish pro forma comparative information outside its IFRS financial statements, that was included in the fourth quarter 2018 Financial Report;
- measured the lease liability for leases previously classified as operating leases at the present value of the remaining lease payments, discounted using the respective Group entity's incremental borrowing rate as of January 1, 2019. The lease liability amounted to € 433 million, as further detailed in the table below. The weighted average incremental borrowing rate was 3.73%;
- measured the right-of-use assets for leases previously classified as an operating lease at an amount equal to the lease liability, adjusted by the amount of any prepaid or accrued lease payments relating to that lease recognized in the consolidated statement of financial position at December 31, 2018. The right-of-use assets amounted to € 428 million;
- used the practical expedient available on transition to IFRS 16 related to onerous contracts, adjusting the right-of-use assets at January 1, 2019 by the amount of any provision for onerous leases recognized in the consolidated statement of financial position immediately before January 1, 2019. Such positively impacted the retained earnings as of January 1, 2019 by € 8 million.

This table summarizes the impacts of the application of IFRS 16 on the consolidated statement of financial position at transition date:

Consolidated statement of financial position In € million	December 31, 2018	IFRS 16	January 1, 2019
Right-of-use assets		428	428
Loans and other assets	282	(10)	272
Other receivables	719	(1)	718
Assets held for sale	1,434	19	1,453
Total assets	**22,000**	**436**	**22,436**
Total equity	10,624	8	10,632
Other provisions	883	(16)	867
Financial debt – Non-current	3,180	340	3,520
Financial debt – Current	630	93	723
Trade payables	1,439	(8)	1,431
Liabilities associated with assets held for sale	435	19	454
Total equity and liabilities	**22,000**	**436**	**22,436**

Right-of-use assets and lease liabilities amounted to € 425 million before the following reclassifications:

- prepaid lease payments, previously included in "Loans & other assets" (€ 10 million) and "Other receivables" (€ 1 million), increased "Right-of-use assets" by € 11 million ;
- provisions for onerous leases, previously recognized in "Other provisions", decreased "Right-of-use assets" by € (8) million (€ (16) million in "Other provisions" and € 8 million in "Total equity");
- accrued lease payments, previously included in "Trade payables", increased financial debt by € 8 million.

These amounts are the opening balances as of January 1, 2019.

On January 1, 2019, following the adoption of IFRS 16, both "Assets held for sale", and "Liabilities associated with assets held for sale" increased by € 19 million for the right-of use assets and lease liabilities related to Polyamides.

The following reconciliation to the opening balance for the lease liabilities as at January 1, 2019 is based on the operating lease obligations as at December 31, 2018:

In € million	January 1, 2019
Total of future minimum lease payments under non-cancellable operating leases (undiscounted) at December 31, 2018	491
Minimum lease payments of finance leases (undiscounted) at December 31,2018	90
Other	24
Lease liabilities (undiscounted) at January 1, 2019	**606**
Discounting (including finance leases as at December 31, 2018)	(137)
Present value of minimum lease payments of finance leases at December 31, 2018	(36)
Additional lease liabilities as a result of the initial application of IFRS 16 as at January 1, 2019	**433**

“Other” mainly includes onerous lease contracts, previously recognized in “Other provisions” for € 16 million, and accrued lease payments, previously included in “Trade payables” for € 8 million.

As a result of the adoption of IFRS 16, for the financial year 2019, depreciation and finance expense increased by € 113 million and € 23 million, respectively, and operating expenses decreased by € (133) million. In addition, the operating cash flows increased by € 133 million, against a decrease of financing cash flows.

Amendments to IAS 12 *Income Taxes* as part of the annual improvements to IFRS standards 2015–2017 cycle

As from January 1, 2019, the Group applies the amendments to IAS 12, that apply to the income tax consequences of dividends recognized on or after the beginning of the earliest comparative period, i.e. January 1, 2018.

In 2018, the income tax consequences of the coupons on perpetual hybrid bonds classified as equity were recognized in equity. As a result of the adoption of the amendment, those income tax consequences will be recognized in profit or loss.

In € million		2018
Profit for the period, IFRS as published	**a**	**898**
Tax on hybrids in equity	b	19
Profit for the period, IFRS restated	**c = a + b**	**917**
Profit for the period attributable to non-controlling interests, IFRS restated	d	39
Profit for the period attributable to Solvay shareholders, IFRS restated	**e = c – d**	**877**
Weighted average of number of outstanding shares, basic	f	103,276,632
Basic earnings per share (in €), IFRS restated	**g = e / f**	**8.49**

In the consolidated statement of cash flows, increase in “Profit for the year” is offset by lower “Income tax expenses”.

In the consolidated statement of changes in equity, increase in “Profit for the year” is offset by lower “Other” changes in “Retained Earnings”.

IFRIC 23 *Uncertainty over Income Tax Treatment*

The interpretation addresses the financial reporting of the impacts of uncertainties surrounding income taxes in the scope of IAS 12 Income Taxes and does not apply to taxes or levies outside the scope of IAS 12, nor does it specifically include requirements related to interest and penalties associated with uncertain tax treatments. The interpretation specifically clarifies the following:

- whether an entity considers uncertain tax treatments separately or together with one or more other uncertain tax treatments is based on what approach better predicts the resolution of the uncertainty;
- an entity is to assume that a taxation authority with the right to examine any amounts reported to it will examine those amounts and will have full knowledge of all relevant information when doing so;
- an entity determines taxable profit (tax loss), tax bases, unused tax losses, unused tax credits and tax rates considering whether it is probable that the relevant authority will accept each tax treatment, or group of tax treatments, that it used or it plans to use in its income tax filing; and
- an entity reassess its judgments and estimates if facts and circumstances change.

The interpretation is effective for annual reporting periods beginning on or after January 1, 2019, but certain transition reliefs are available. The Group applies the interpretation since its effective date, yet did not identify a more than insignificant measurement impact on its consolidated financial statements. Uncertain tax liabilities in the amount of € 40 million, formerly included under provisions, have been reclassified to other non-current liabilities.

Other standards, interpretations and amendments applicable for the first time in 2019 do not have a material impact on the Group’s consolidated financial statements.

Standards, interpretations and amendments applicable for the first time in 2020

Standards, interpretations and amendments applicable for the first time in 2020 are not expected to have a more than insignificant impact on the Group’s consolidated financial statements.

Standards, interpretations and amendments applicable for the first time after 2020

Standards, interpretations and amendments applicable for the first time after 2020 are not expected to have a more than insignificant impact on the Group’s consolidated financial statements.

2. Basis of measurement and presentation

The consolidated financial statements are presented in millions of euros, which is also the functional currency of the parent company.

The preparation of the financial statements requires the use of estimates and assumptions that have an impact on the application of accounting policies and the measurement of amounts recognized in the financial statements. The areas for which the estimates and assumptions are material with respect to the consolidated financial statements are presented in the section *Critical accounting judgments and key sources of estimation uncertainty*.

3. Principles of consolidation

3.1. Consolidation scope

3.1.1. General

The consolidated financial statements incorporate the financial statements of the Company, and:

- entities controlled by the Company (including through its subsidiaries) and that hence qualify as subsidiaries (see 3.1.2. below);
- arrangements over which the Company (including through its subsidiaries) exercises joint control, and that qualify as joint operations (see 3.1.3. below);
- arrangements over which the Company (including through its subsidiaries) exercises joint control, and that qualify as joint ventures (see 3.1.4. below);
- entities over which the Company (including through its subsidiaries) has significant influence and that hence qualify as associates (see 3.1.4. below).

Where necessary, adjustments are made to the financial statements of the investees so as to align their accounting policies with those of the Group.

In accordance with the principle of materiality, certain companies which are not of a significant size have not been included in the consolidation scope. Companies are deemed not to be significant when, during two consecutive years, they do not exceed any of the three following thresholds in terms of their contribution to the Group's accounts:

- sales of € 30 million;
- total assets of € 15 million;
- headcount of 150 persons.

Companies that do not meet these criteria are, nevertheless, consolidated where the Group believes that they have a potential for rapid development, or where they hold shares in other companies that are consolidated based on the above criteria.

In the aggregate, the non-consolidated companies have an immaterial impact on the consolidated financial statements of the Group.

The full list of companies can be obtained at the Company's head office.

3.1.2. Investments in subsidiaries

A subsidiary is an entity over which the Group has control. Control is achieved when the Group has (a) power over an investee, (b) exposure, or rights, to variable returns from its involvement with the investee, and (c) the ability to use its power over the investee to affect the amount of the investor's returns. To assess whether the Group has control, potential voting rights are taken into account. Subsidiaries are fully consolidated. The results of subsidiaries acquired or disposed of during the year are included in the consolidated income statement from the effective date of acquisition and up to the effective date of disposal.

Intra-group transactions, balances, income and expenses are eliminated on consolidation.

Non-controlling interests in subsidiaries are presented separately from the Group's equity. Non-controlling interests are initially measured, either at fair value (full goodwill method), or at the non-controlling interests' proportionate share in the recognized amounts of the acquiree's identifiable net assets (proportionate goodwill method). The choice of measurement is made on an acquisition-by-acquisition basis. Subsequent to the acquisition, the carrying amount of non-controlling interests is the amount of those interests at initial recognition plus the non-controlling interests' share of subsequent changes in equity. Total comprehensive income is attributed to non-controlling interests even if this results in the non-controlling interests having a deficit balance.

Changes in the Group's equity interest in a subsidiary that do not result in a loss of control are accounted for as equity transactions. The carrying amounts of the Group's interests and the non-controlling interests are adjusted to reflect the changes in their relative interests in the subsidiary. Any difference between the amount by which the non-controlling interests are adjusted and the fair value of the consideration paid or received is recognized directly in equity.

When the Group loses control of a subsidiary, the profit or loss on disposal is calculated as the difference between (i) the aggregate of the fair value of the consideration received and the fair value of any retained interest, and (ii) the previous carrying amount of the assets (including goodwill) and liabilities of the subsidiary and any non-controlling interests. Amounts previously recognized in other comprehensive income in relation to the subsidiary are accounted for (i.e. reclassified to profit or loss or transferred directly to retained earnings) in the same manner as would be required if the relevant assets or liabilities were disposed of. The fair value of any investment retained in the former subsidiary at the date when control is lost is considered to be the fair value on initial recognition for subsequent accounting in accordance with IFRS 9 Financial

Instruments or, when applicable, the cost on initial recognition of an investment in an associate or joint venture in accordance with IAS 28 Investments in Associates and Joint Ventures.

3.1.3. Investments in joint operations

A joint operation is a joint arrangement whereby the parties that have joint control of the arrangement have rights to the assets, and obligations for the liabilities, relating to the arrangement. Joint control is the contractually agreed sharing of control of an arrangement, which exists only when decisions about relevant activities require the unanimous consent of the parties sharing control. In its consolidated financial statements, the Group recognizes its share of the joint operations' assets, liabilities, revenue and expenses, based on its ownership interest in the joint operations.

3.1.4. Investments in associates and joint ventures

An associate is an entity over which the Group has significant influence and that is neither a subsidiary, nor an interest in a joint arrangement. Significant influence is the power to participate in the financial and operating policy decisions of the investee but is not control or joint control over those policies.

A joint venture is a joint arrangement whereby the parties that have joint control of the arrangement have rights to the net assets of the arrangement. Joint control is the contractually agreed sharing of control of an arrangement, which exists only when decisions about relevant activities require the unanimous consent of the parties sharing control.

The results, assets and liabilities of associates and joint ventures are incorporated in the consolidated financial statements using the equity method of accounting, except when the investment is classified as held for sale, in which case it is accounted for in accordance with IFRS 5 Non-current Assets Held for Sale and Discontinued Operations. Under the equity method, on initial recognition, investments in associates and joint ventures are recognized in the consolidated statement of financial position at cost, and the carrying amount is adjusted for post-acquisition changes in the Group's share of the net assets of the associate or joint venture, less any impairment of the value of individual investments. Losses of an associate or joint venture in excess of the Group's interest in that associate or joint venture (which includes any long-term interests that, in substance, form part of the Group's net investment in the associate or joint venture) are recognized only to the extent that the Group has incurred legal or constructive obligations or made payments on behalf of the associate or joint venture.

Any excess of the cost of acquisition over the Group's share of the net fair value of the identifiable assets and (contingent) liabilities of the associate or joint venture recognized at the date of acquisition is goodwill. The goodwill is included within the carrying amount of the investment and is assessed for impairment as part of that investment.

Where a Group entity transacts with an associate or joint venture of the Group, profits and losses are eliminated to the extent of the Group's interest in the relevant associate or joint venture.

4. Foreign currencies

The individual financial statements of each Group entity are prepared in the currency of the primary economic environment in which the entity operates (its functional currency). For the purpose of the consolidated financial statements, the results and financial position of each Group entity are expressed in euros (EUR), which is the presentation currency of the Group's consolidated financial statements.

In preparing the financial statements of the individual entities, transactions in currencies other than the entities' functional currency are recognized at the exchange rates prevailing at the dates of the transactions. At the end of each reporting period, monetary items denominated in foreign currencies are translated at the closing rate. Non-monetary items carried at fair value that are denominated in foreign currencies are translated at the rate when the fair value was measured. Non-monetary items that are measured in terms of historical cost in a foreign currency are not translated at the closing rate.

Exchange differences are recognized in profit or loss in the period in which they arise except for:

- exchange differences on monetary items receivable from or payable to a foreign operation for which settlement is neither planned nor likely to occur in the foreseeable future (therefore forming part of the net investment in the foreign operation), which are recognized initially in other comprehensive income under "currency translation differences"; and
- exchange differences on transactions entered into in order to hedge certain foreign currency risks (see note F35 *Financial instruments and financial risk management* for hedge accounting policies).

The main exchange rates used are:

		Year-end rate		Average rate	
		2019	2018	**2019**	2018
1 Euro =					
Brazilian Real	BRL	4.5177	4.4399	4.4132	4.3073
Yuan Renminbi	CNY	7.8229	7.8650	7.7341	7.8064
Pound Sterling	GBP	0.8513	0.8949	0.8777	0.8847
Indian Rupee	INR	80.1612	79.9766	78.8293	80.7322
Japanese Yen	JPY	121.8678	125.8730	122.0180	130.3953
Korean Won	KRW	1,298.7512	1,278.2047	1,305.3086	1,298.8877
Mexican Peso	MXN	21.2226	22.5201	21.5572	22.7042
Russian Ruble	RUB	69.9450	79.7633	72.4580	74.0579
US Dollar	USD	1.12305	1.1456	1.1195	1.1809

5. Government grants

Government grants are not recognized until there is reasonable assurance that the Group will comply with the conditions attaching to them and that the grants will be received.

Government grants relating to the purchase of property, plant and equipment are deducted from the cost of those assets. They are recognized in the consolidated statement of financial position at their expected value at the moment of initial recognition. The grant is recognized in profit or loss over the depreciation period of the underlying assets as a reduction of depreciation expense.

Other government grants are recognized as income on a systematic basis over the periods in which the related costs, which they are intended to compensate, are recognized. Government grants that are receivable as compensation for expenses or losses already incurred or for the purpose of giving immediate financial support to the Group with no future related costs are recognized in profit or loss in the period in which they become receivable.

Critical accounting judgments and key sources of estimation uncertainty

1. Critical accounting judgments

No critical accounting judgments have been identified for the year ended December 31, 2019.

2. Key sources of estimation uncertainty

Impairment

The Group performs annual impairment tests on (groups of) CGUs to which goodwill has been allocated, and each time there are indicators that their carrying amount might be higher than their recoverable amount. This analysis requires management to estimate the future cash flows expected to be generated by the CGUs and a suitable discount rate in order to calculate present value. The recoverable amount is highly sensitive to discount and growth rates.

Further details are provided in note F21 *Goodwill and business combinations* and F27 *Impairment of property, plant and equipment, intangible assets, right-of-use assets, and equity method investees*.

Income taxes

Deferred tax assets

The carrying amount of the deferred tax assets is reviewed at each reporting date. The carrying amount of a deferred tax asset is reduced to the extent that it is no longer probable that the Group will earn sufficient taxable profits against which the deductions can be utilized. Any such reduction is reversed to the extent that it becomes probable that sufficient taxable profits will be available.

Deferred tax assets other than tax loss carryforwards are analyzed on a case by case basis, taking into account all relevant facts and circumstances. For example, a zero taxable profit, after deducting the amounts paid to retirees under a defined benefit plan and for which a deductible temporary difference existed, can justify the recognition of the underlying deferred tax assets.

Recognition of deferred tax assets for tax loss carryforwards requires a positive taxable profit during the year that enables the utilization of tax losses that originated in the past. Because of uncertainties inherent to predicting such positive taxable profit, recognition of deferred tax assets from tax loss carryforwards is based on a case by case analysis, which is usually based on five-year profit forecasts, except with respect to any financial company for which ten-year financial profit forecasts are considered highly predictable and are consequently used.

The corporate tax reporting team, which monitors the Group's deferred tax positions, is involved in assessing deferred tax assets.

Further details are provided in note F7.B. *Deferred taxes in the consolidation statement of financial position*.

Tax reform in the United States

New guidance issued by the Internal Revenue Service ("IRS") related to the US tax reform could be issued in 2020 and trigger a review, if applicable to the Group, of some estimates at year-end 2019.

Further details are provided in note F7.B. *Deferred taxes in the consolidation statement of financial position*.

Provisions

Restructuring provision for the Group's simplification and transformation program

On March 29, 2018, Solvay announced it is taking a new step in its transformation, putting its customers at the core of its organization to enhance its long-term growth as an advanced materials and specialty chemicals company. The estimate of the provision is based on the number and the cost of redundancy and relocation packages that the Group expects to pay. It is inherently subject to uncertainty and is monitored by the Human Resources department, in close cooperation with the Finance department. On October 3, 2019 management decided to stop the planned transfers of the teams based in Paris to Lyon and Brussels, which was part of the simplification and transformation program announced in 2018. This decision was announced internally on October 23. At the end of 2019, the provision amounts to € 85 million.

Defined benefit obligations - General

The actuarial assumptions used in determining the defined benefit obligations at December 31 as well as the annual cost can be found in note F34 *Provisions*. All main employee benefits plans are assessed annually by independent actuaries. Discount rates and inflation rates are defined centrally by management. The other assumptions (such as future salary increases and expected rates of medical care cost increases) are defined at a local level. All plans are supervised by the Group's central Human Resources department with the help of a central actuary to check the reasonableness of the results and ensure consistency in reporting.

Further details are provided in note F34.A. *Provisions for employee benefits*.

Environmental provisions

Environmental provisions are managed and coordinated jointly by the Environmental Rehabilitation department and the Finance department. In case of environmental impacts stemming from historical production activities, generally, no provision is recognized for remediation works beyond the 20 years due to the inherent high level of uncertainty as to whether there will be any obligation after the lapse of this period.

The forecasts of expenses are discounted to their present value. The discount rates fixed by geographical area correspond to the average risk-free rate on 10-year government bonds or the inflation rate if higher. These rates are set annually by the Finance Department and can be revised based on the evolution of economic parameters of the country involved. To reflect the passage of time, the provisions are increased each year at the discount rates described above.

Further details are provided in note F34.B. *Provisions other than for employee benefits*.

Provisions for litigations

Any significant litigations (tax and other, including threat of litigation) are reviewed by Solvay's in-house lawyers with the support, when appropriate, of external counsels at least every quarter. This review includes an assessment of the need to recognize provisions and/or remeasure existing provisions together with the Finance department and the Insurance department.

Further details are provided in note F34.B. *Provisions other than for employee benefits*.

Leases – Assessment of lease term

Determining the lease term requires judgment. Elements that are considered include assessing the probability that early termination options or extension options will be exercised. All facts and circumstances relevant to the assessment are considered, and the main ones have been described in note F23 *Right-of-use assets and lease obligations*. Lease terms are determined with the support of the departments that have the relevant knowledge, and that mainly include the Purchasing department, and the Facility department.

Non-IFRS (Underlying) metrics

Besides IFRS accounts, the Group also presents underlying income statement performance indicators. The objective is to generate a measure that avoids distortion and facilitates the appreciation of performance and comparability of results over time.

See Glossary for definitions of adjustments (IFRS vs Underlying metrics) and Business Review for more information and reconciliation with IFRS figures.

Notes to the consolidated income statement

Preliminary comment: consistent with the presentation in the consolidated income statement, the notes to the consolidated income statement as presented hereafter do not include the consolidated income statement impacts from discontinued operations that are presented on a separate line. Those are disclosed in note F8 *Discontinued operations*.

NOTE F1
Revenue and segment information

Accounting policy

IFRS 15 establishes a five-step model to account for revenue arising from contracts with customers:

- identify the contract;
- identify the performance obligations;
- determine the transaction price;
- allocate the transaction price to the performance obligations in the contract; and
- recognize revenue when or as the Group satisfies a performance obligation.

Under IFRS 15, revenue is recognized at an amount that reflects the consideration to which the Group expects to be entitled in exchange for transferring goods or services to a customer.

Sale of goods: Contracts can be short term (including based only on a purchase order) or long term, some have minimum off-take requirements. As the Group is in the business of selling chemicals, contracts with customers generally concern the sale of goods. As a result, revenue recognition generally occurs at a point in time when control of the chemicals is transferred to the customer, generally on delivery of the goods.

Distinct elements: a good or service that is promised to a customer is distinct if both of the following criteria are met: (a) the customer can benefit from the good or service either on its own or together with other resources that are readily available to the customer (i.e. the good or service is capable of being distinct); and (b) the Group's promise to transfer the good or service to the customer is separately identifiable from other promises in the contract (i.e. the promise to transfer the good or service is distinct within the context of the contract).

The revenue of the Group consists mainly of sales of chemicals, which qualify as separate performance obligations. Value-added services – mainly customer assistance services – corresponding to Solvay's know-how are rendered predominantly over the period that the corresponding goods are sold to the customer.

Variable consideration: some contracts with customers provide trade discounts or volume rebates. Trade discounts and volume rebates give rise to variable consideration under IFRS 15, and are required to be estimated at contract inception and subsequently at each reporting date. IFRS 15 requires the estimated variable consideration to be constrained to prevent overstatement of revenue.

Moment of recognition of revenue: revenue is recognized when (or as) the Group satisfies a performance obligation by transferring a promised good or service (ie an asset) to a customer. An asset is transferred when (or as) the customer obtains control of that asset. Substantially all revenue stems from performance obligations satisfied at a point in time, i.e. the sale of goods. Revenue recognition for those takes into account the following:

- the Group has a present right to payment for the asset;
- the customer has legal title to the asset;
- the Group has transferred physical possession of the asset;
- the customer has the significant risks and rewards of ownership of the asset (in this respect, incoterms are considered); and
- the customer has accepted the asset.

The Group sells its chemicals to its customers, (a) directly, (b) through distributors, and (c) with the assistance of agents. When the Group delivers a product to distributors for sale to end customers, the Group evaluates whether that distributor has obtained control of the product at that point in time. No revenue is recognized upon delivery of a product to a customer or distributor if the delivered product is held on consignment. Indicators of consignment inventory include:

- the product is controlled by the Group until a specified event occurs, such as the sale of the product to a customer of the distributor or until a specified period expires;
- the Group is able to require the return of the product or transfer the product to a third party (such as another distributor); and
- the distributor does not have an unconditional obligation to pay for the product (although he might be required to pay a deposit).

Agents facilitate sales and do not purchase and resell the goods to the end customer.

Products sold to customers generally cannot be returned, other than for performance deficiencies. Customer acceptance clauses are in many cases a formality that would not affect the Group's determination of when the customer has obtained control of the goods.

Revenue from services is recognized in the period those services have been rendered.

Warranties: warranties provide a customer with assurance that the related product will function as the parties intended because it complies with agreed-upon specifications. Substantially all warranties do not provide the customer with a service in addition to the assurance that the product complies with agreed-upon specifications, and are hence accounted for in accordance with IAS 37 Provisions, Contingent Liabilities and Contingent Assets.

An **Operating Segment** is a component of the Group that engages in business activities from which it may earn revenues and incur expenses, whose operating results are regularly reviewed by the entity's chief operating decision maker and for which discrete financial information is available. The Solvay Group's chief operating decision maker is the Chief Executive Officer.

General

Solvay is organized into four Operating Segments:

- Advanced Materials offers high-performance materials for multiple applications primarily in the automotive, aerospace, electronics, and health markets. It particularly provides sustainable mobility solutions, reducing weight and improving CO_2 and energy efficiency.
- Advanced Formulations primarily serves the consumer goods, agro and food, as well as energy markets. It offers customized specialty formulations that impact surface chemistry and alter liquid behavior, to optimize efficiency and yield, while minimizing the environmental impact.
- Performance Chemicals operates in mature and resilient markets and has leading positions in chemical intermediates. Success is based on economies of scale and state-of-the-art production technology. It mainly serves the consumer goods and food markets.
- Corporate & Business Services includes corporate and other business services, such as the Research & Innovation Center, and energy services.

We refer to the Business Review for more information on Operating Segments, GBUs figures, and new definition of Operating Segments (effective as from 2020).

External net sales by cluster

In € million	**2019**	2018
Advanced Materials	**4,512**	**4,385**
Specialty Polymers	1,927	2,009
Composite Materials	1,272	1,082
Silica	449	442
Special Chem	864	852
Advanced Formulations	**2,846**	**3,057**
Novecare	1,789	2,000
Technology Solutions	632	643
Aroma Performance	425	414
Performance Chemicals	**2,879**	**2,808**
Soda Ash & Derivatives	1,661	1,562
Peroxides	683	654
Coatis	455	509
Functional Polymers	80	82
Corporate & Business Services	**6**	**7**
CBS and NBD	6	7
Total	**10,244**	**10,257**

Sales by market

Sales by market are presented in the Business Review, see note B1.

Net sales by country and region

The sales disclosed below are allocated based on the customers' location.

In € million	**2019**	**%**	2018	%
Belgium	138	1%	153	1%
Germany	711	7%	727	7%
Italy	438	4%	444	4%
France	397	4%	402	4%
Netherlands	99	1%	105	1%
United Kingdom	287	3%	279	3%
Spain	177	2%	191	2%
European Union – Other	519	5%	501	5%
European Union	**2,765**	**27%**	**2,802**	**27%**
Europe – Other	**94**	**1%**	**103**	**1%**
United States	2,896	28%	3,001	29%
Canada	165	2%	160	2%
North America	**3,061**	**30%**	**3,161**	**31%**
Brazil	693	7%	681	7%
Mexico	222	2%	193	2%
Latin America – Other	254	2%	234	2%
Latin America	**1,169**	**11%**	**1,108**	**11%**
Australia	100	1%	100	1%
China	962	9%	942	9%
Hong Kong	50	0%	77	1%
India	198	2%	191	2%
Indonesia	97	1%	105	1%
Japan	360	4%	357	3%
Russia	55	1%	62	1%
Saudi Arabia	122	1%	110	1%
South Korea	297	3%	279	3%
Thailand	188	2%	177	2%
Turkey	74	1%	73	1%
Other	650	6%	610	6%
Asia and rest of the world	**3,153**	**31%**	**3,083**	**30%**
Total	**10,244**	**100%**	**10,257**	**100%**

Information per segment

2019 In € million Income statement items	Advanced Materials	Advanced Formulations	Performance Chemicals	Corporate & Business Services	Group Total
Net sales (including inter-segment sales)	4,513	2,849	2,905	6	10,273
Inter-segment sales		(3)	(26)		(30)
Net sales	4,512	2,846	2,879	6	10,244
Revenue from non-core activities	43	17	280	643	983
Gross margin	1,440	728	794	21	2,983
Depreciation and amortization	464	1,105	228	109	1,906
Earnings from associates and joint ventures	8	9	77	1	95
Underlying EBITDA[1]	*1,143*	*490*	*852*	*(163)*	*2,322*
EBIT					**316**
Net financial charges					(242)
Income taxes					(153)
Profit for the year from discontinued operations					236
Profit for the year					**157**

(1) Underlying EBITDA is a key performance indicator followed by management and includes other elements than those presented above (see Business Review section – Reconciliation of underlying with IFRS figures).

2019 In € million Statement of financial position and other items	Advanced Materials	Advanced Formulations	Performance Chemicals	Corporate & Business Services	Group Total
Capital expenditures (continuing operations)	375	155	177	119	826
Capital expenditures (discontinued operations)			141		141
Investments (continuing operations)	4	2	11	6	23
Working capital					
Inventories	839	379	359	9	1,587
Trade receivables	555	349	452	58	1,414
Trade payables	397	288	363	229	1,277

Capital expenditures are related to property, plant and equipment, right-of-use assets, and intangible assets.

Investments include acquisitions of subsidiaries and other investments (joint operations, joint ventures and associates).

2018 In € million Income statement items	Advanced Materials	Advanced Formulations	Performance Chemicals	Corporate & Business Services	Group Total
Net sales (including inter-segment sales)	4,386	3,060	2,831	7	10,283
Inter-segment sales		(3)	(23)		(26)
Net sales	4,385	3,057	2,808	7	10,257
Revenue from non-core activities	33	19	312	678	1,042
Gross margin	1,474	787	737	37	3,035
Depreciation and amortization	435	264	198	47	944
Earnings from associates and joint ventures	10	5	27	1	44
Underlying EBITDA(1)	*1,197*	*521*	*729*	*(218)*	*2,230*
EBIT					**986**
Net financial charges					(195)
Income taxes					(75)
Profit for the year from discontinued operations					201
Profit for the year					**917**

(1) Underlying EBITDA is a key performance indicator followed by management and includes other elements than those presented above (see Business Review section – Reconciliation of underlying with IFRS figures).

2018 In € million Statement of financial position and other items	Advanced Materials	Advanced Formulations	Performance Chemicals	Corporate & Business Services	Group Total
Capital expenditures (continuing operations)	355	148	149	58	711
Capital expenditures (discontinued operations)			122		122
Investments (continuing operations)	12			4	16
Working capital					
Inventories	900	446	326	13	1,685
Trade receivables	535	396	482	21	1,434
Trade payables	437	345	381	275	1,439

Capital expenditures are related to property, plant and equipment and intangible assets.

Investments include acquisitions of subsidiaries and other investments (joint operations, joint ventures and associates).

Non-current assets, capital expenditures and investments by country and region (continuing operations)

	Non-current assets				Capital expenditures and investments			
In € million	**2019**	**%**	2018	%	**2019**	**%**	2018	%
Belgium	253	2%	304	2%	(96)	11%	(51)	7%
Germany	438	3%	402	3%	(45)	5%	(33)	5%
Italy	635	5%	581	4%	(85)	10%	(74)	10%
France	2,883	21%	2,906	21%	(116)	14%	(111)	15%
United Kingdom	221	2%	207	1%	(19)	2%	(28)	4%
Spain	144	1%	140	1%	(19)	2%	(15)	2%
European Union – Other	327	2%	304	2%	(25)	3%	(20)	3%
European Union	**4,900**	**36%**	**4,844**	**35%**	**(405)**	**48%**	**(332)**	**46%**
Europe – Other		**0%**		**0%**	**(18)**	**2%**	**1**	**0%**
United States	6,710	49%	7,239	52%	(290)	34%	(249)	34%
Canada	185	1%	176	1%	(11)	1%	(11)	2%
North America	**6,896**	**50%**	**7,415**	**53%**	**(301)**	**35%**	**(261)**	**36%**
Brazil	266	2%	256	2%	(26)	3%	(30)	4%
Latin America – Other	40	0%	36	0%	(3)	0%	(8)	1%
Latin America	**306**	**2%**	**292**	**2%**	**(29)**	**3%**	**(38)**	**5%**
Russia	245	2%	168	1%		0%		0%
Thailand	135	1%	123	1%	(5)	1%	(6)	1%
China	563	4%	579	4%	(47)	6%	(41)	6%
South Korea	123	1%	123	1%	(11)	1%	(8)	1%
India	264	2%	234	2%	(23)	3%	(35)	5%
Singapore	50	0%	42	0%	(3)	0%	(1)	0%
Japan	22	0%	18	0%	(3)	0%	(2)	0%
Other	175	1%	184	1%	(2)	0%	(3)	0%
Asia and rest of the world	**1,576**	**12%**	**1,470**	**10%**	**(95)**	**11%**	**(96)**	**13%**
Total	**13,677**	**100%**	**14,022**	**100%**	**(848)**	**100%**	**(727)**	**100%**

Non-current assets are those other than deferred tax assets, loans and other assets. Capital expenditures and investments include acquisitions of property, plant and equipment, right-of-use assets (2019 only), intangible assets and investments in subsidiaries and other investments (joint operations, joint ventures and associates). Both exclude discontinued operations.

NOTE F2
Consolidated income statement by nature

In € million	Notes	2019	2018
Net sales	(F1)	10,244	10,257
Revenue from non-core activities	(F3)	983	1,042
Raw materials, utilities and consumables used		(4,825)	(5,344)
Changes in inventories		(151)	165
Personnel expenses		(2,308)	(2,229)
Wages and direct social benefits		*(1,672)*	*(1,634)*
Employer's contribution for social insurance		*(304)*	*(307)*
Pensions and insurance benefits		*(155)*	*(105)*
Other personnel expenses		*(175)*	*(182)*
Amortization, depreciation and impairment	(F12)	(1,906)	(944)
Other variable logistics expenses		(716)	(716)
Other fixed expenses		(1,037)	(923)
Addition and reversal of provisions (excluding employee benefit provisions)	(F31)	(50)	(263)
Operating lease expenses			(101)
M&A costs and gains and losses on disposals	(F5)	(13)	(3)
Earnings from associates and joint ventures	(F25)	95	44
EBIT		**316**	**986**
Cost of borrowings	(F6)	(140)	(131)
Interest on loans and short term deposits	(F6)	15	13
Other gains and losses on net indebtedness	(F6)	(16)	(1)
Cost of discounting provisions	(F6)	(105)	(77)
Income from equity instruments measured at fair value through other comprehensive income		4	
Profit for the year before taxes		**74**	**791**
Income taxes	(F7)	(153)	(75)
Profit/(loss) for the year from continuing operations		**(79)**	**716**
Profit for the year from discontinued operations	(F8)	236	201
Profit for the year	(F9)	**157**	**917**
attributable to:			
Solvay share		118	877
non-controlling interests		38	39

NOTE F3
Revenue from non-core activities

This revenue primarily comprises commodity and utility trading transactions and other revenue, considered to not correspond to Solvay's know-how and core business. The decrease in 2019 is mainly related to lower gas and electricity prices in 2019 compared to 2018.

NOTE F4
Other operating gains and losses

In € million	2019	2018
Start-up and preliminary study costs	(15)	(11)
Capital gains/losses on sales of property, plant and equipment and intangible assets	11	22
Net foreign exchange gains and losses		(4)
Amortization of intangible assets resulting from PPA	(182)	(197)
Cytec post-retirement medical obligations reduction		24
Other	55	43
Other operating gains and losses	**(131)**	**(123)**

NOTE F5
Results from portfolio management and reassessments, legacy remediation and major litigations

Accounting policy

Results from portfolio management and reassessments include:

- gains and losses on the sale of subsidiaries, joint operations, joint ventures, and associates that do not qualify as discontinued operations;
- acquisition costs of new businesses;
- gains and losses on the sale of real estate not directly linked to an operating activity;
- restructuring charges driven by portfolio management and reassessment, including impairment losses resulting from the shutdown of an activity or a plant; and
- impairment losses resulting from testing of CGUs.

Results from legacy remediation and major litigations include:

- the remediation costs not generated by on-going production facilities (shut-down of sites, discontinued productions, previous years' pollution); and
- the impact of significant litigations.

Results from portfolio management and reassessments

In € million	**2019**	2018
Restructuring costs and impairment	(901)	(205)
M&A costs and gains and losses on disposals	(13)	(3)
Results from portfolio management and reassessments	**(914)**	**(208)**

Results from legacy remediation and major litigations

In € million	**2019**	2018
Major litigations		(25)
Remediation costs and other costs related to non-ongoing activities	(62)	(60)
Results from legacy remediation and major litigations	**(61)**	**(86)**

In 2019:

- restructuring costs and impairment primarily relate to:
  - impairment related to Novecare Oil & Gas business (€ (825) million);
  - impairment on other non-performing assets (€ (26) million), mainly due to the impairment of previously capitalized items related to the adaptation of the Group's simplification and transformation program;
- M&A costs and gains and losses on disposals concern mainly the impairment of the receivable related to the earn-out for the disposal in 2017 of the Formulated Resins business (€ (8) million).

In 2018:

- restructuring costs and impairment primarily related to:
  - the Group simplification and transformation program (€ (185) million);
  - impairments related to the Porto Marghera divestment (€ (23) million) and to other non performing assets (€ (16) million);
  - reversal of impairment related to a cogeneration asset in Brazil (€ 22 million);
- M&A costs and gains and losses on disposals mainly relate to:
  - the capital gain on the disposal of the phosphorus derivatives business (€ 22 million);
  - the estimated expense related to the Guaranteed Minimum Pensions equalization (€ (14) million) between 1990 and 1997 for Rhodia and Cytec legacies, prior to their acquisition;
  - the capital loss on the disposal of the Soda Ash business in Egypt (€ (7) million).

NOTE F6
Net financial charges

Accounting policy

Interest on borrowings is recognized in costs of borrowings as incurred, with the exception of borrowing costs directly attributable to the acquisition, construction and production of qualifying assets (see note F22 *Property, Plant and Equipment*).

Net foreign exchange gains or losses on financial items and changes in fair value of derivative financial instruments related to net indebtedness are presented in "Other gains and losses on net indebtedness", with the exception of changes in fair value of derivative financial instruments that are hedging instruments in a cash flow hedge relationship, and which are recognized on the same line as the hedged item, when the latter affects profit or loss.

In € million	**2019**	2018
Cost of borrowings	(117)	(131)
Interest expense on lease liabilities	(23)	
Interest on loans and short term deposits	15	13
Other gains and losses on net indebtedness	(16)	(1)
Net cost of borrowings	**(141)**	**(118)**
Cost of discounting provisions	(85)	(74)
Impact of change of discount rate on provisions	(20)	(3)
Dividends from equity instruments measured at fair value through other comprehensive income	4	
Net financial charges	**(242)**	**(194)**

Details are included in note F36 *Net indebtedness*.

The increase of the net cost of borrowings is mainly explained by:

- the lower cost of borrowings, following (a) the repayment at maturity (June 2018) of the EMTN bond (€ 382 million balance with a coupon of 4.625%), and (b) the early repayment in 2019 of the US$ 800 million Senior US$ bonds of Solvay Finance America LLC, initially maturing in 2020 with a 3.4% yearly coupon together with the issuance of a 10-year Senior bond (€ 600 million) with a 0.5% yearly coupon;
- the interest expense on lease liabilities following the application of IFRS 16 in 2019, resulting in the recognition of interest expense for € (23) million;
- the increase in other gains and losses on net indebtedness from € (1) million for 2018 to € (16) million for 2019, mainly explained by one-off costs for € (12) million related to the early repayment of the US$ 800 million Senior US$ bonds of Solvay Finance America LLC.

The increase of cost of discounting provisions relates to post-employment benefits (€ (14) million) and to environmental provisions (€ 3 million) and is mainly explained by the evolution of the applicable discount rates (see also note F34 *Provisions*).

NOTE F7
Income taxes

Accounting policy

Current taxes

The current tax payable is based on taxable profit of the year. Taxable profit differs from profit as reported in the consolidated income statement because of items of income or expense that are taxable or deductible in other years and items that are never taxable or deductible. The Group's liability for current tax is calculated using tax rates that have been enacted or substantively enacted by the end of the reporting period.

Deferred taxes

Deferred taxes are recognized for temporary differences between the carrying amounts of assets and liabilities in the consolidated financial statements and their corresponding tax bases used in the computation of taxable profit.

Deferred tax assets are generally recognized for all deductible temporary differences to the extent that it is probable that taxable profits will be available against which those deductible temporary differences can be utilized.

Deferred tax liabilities are generally recognized for all taxable temporary differences.

No deferred tax liabilities are recognized following the initial recognition of goodwill. In addition, no deferred tax assets or liabilities are recognized with respect to the initial recognition of an asset or liability in a transaction which is not a business combination and affects neither accounting profit nor taxable profit.

Deferred tax liabilities are recognized for taxable temporary differences associated with investments in subsidiaries, joint operations, joint ventures, and associates, except where the Group is able to control the timing of the reversal of the temporary difference and it is probable that the temporary difference will not reverse in the foreseeable future.

The carrying amount of the deferred tax assets is reviewed at each reporting date. The carrying amount of a deferred tax asset is reduced to the extent that it is no longer probable that the Group will earn sufficient taxable profits against which the deductions can be utilized. Any such reduction is reversed to the extent that it becomes probable that sufficient taxable profits will be available.

Deferred tax assets other than tax loss carryforwards are analyzed on a case by case basis, taking into account all relevant facts and circumstances. For example, a zero taxable profit, after deducting the amounts paid to retirees under a defined benefit plan and for which a deductible temporary difference existed, can justify the recognition of the underlying deferred tax assets. Recognition of deferred tax assets for tax loss carryforwards requires a positive taxable profit during the year that enables the utilization of tax losses that originated in the past. Because of uncertainties inherent to predicting such positive taxable profit, recognition of deferred tax assets from tax loss carryforwards is based on a case by case analysis, which is usually based on five-year profit forecasts, except with respect to any financial company for which ten-year financial profit forecasts are considered highly predictable and are consequently used.

The corporate tax reporting team, which monitors the Group deferred tax positions, is involved in assessing deferred tax assets.

Further details are provided in note F7.B.

Deferred tax assets and liabilities are measured at the tax rates that are expected to apply in the period in which the liability is settled or the asset is realized, based on tax rates (and tax laws) that have been enacted or substantively enacted by the end of the reporting period. The measurement of deferred tax liabilities and assets reflects the tax consequences that would follow from the manner in which the Group expects, at the end of the reporting period, to recover or settle the carrying amount of its assets and liabilities.

Current tax assets and liabilities are offset when there is a legally enforceable right to set off the recognized amounts and when the Group intends to settle its current tax assets and liabilities on a net basis.

Deferred tax assets and liabilities are offset when there is a legally enforceable right to set off current tax assets against current tax liabilities and when they relate to income taxes levied by the same taxation authority and the Group intends to settle its current tax assets and liabilities on a net basis.

Current and deferred taxes for the period

Current and deferred taxes for the period are recognized as an expense or income in profit or loss, except when they relate to items that are recognized outside profit or loss (whether in other comprehensive income or directly in equity), in which case the tax is also recognized outside profit or loss, or when they arise from the initial accounting for a business combination. In the case of a business combination, the tax effect is taken into account in the accounting for the business combination.

F7.A. Income taxes

The income taxes (net expense) recognized in the consolidated income statement increased by € (77) million in 2019 compared to 2018. The income taxes (net income) recognized in other comprehensive income increased by € 47 million in 2019 compared to 2018, mainly due to the decrease of discount rates on post-retirement benefits.

In € million	2019	2018	
Current taxes related to current year[1]	(147)	(158)	a)
Provisions for tax litigations[*]	1	4	
Other current taxes related to prior years[*]	3	30	b)
Current taxes	**(143)**	**(124)**	
Changes in unrecognized deferred tax assets[2]	(110)	88	c)
Deferred tax income on amortization of PPA step-ups[*]	45	50	
Deferred tax impact of changes in the nominal tax rates[*]	15	(2)	d)
Deferred taxes related to prior years[*]	7	2	
Reversal of deferred taxes related to Oil & Gas impairment[*]	167		e)
Other deferred taxes	(134)	(89)	f)
Deferred taxes	**(11)**	**49**	
Income taxes recognized in the consolidated income statement	**(153)**	**(75)**	
Income taxes on items recognized in other comprehensive income	**48**	**1**	

(1) Of which € 11 million in Adjustments in 2019

(2) Of which € (98) million in Adjustments in 2019

(*) Adjustments

Note: the Underlying tax expense in the Business Review includes the IFRS income taxes excluding the Adjustments.

Main comments regarding the current taxes

a) The current taxes related to current year decreased slightly by € 11 million.

b) The other current taxes related to prior years were mainly impacted in 2018 by the reversal of the 2017 accrual for the one-time tax on unremitted earnings resulting from the US tax reform enacted at year-end 2017 (€ 31 million), following the application of new Internal Revenue Service guidance in 2018.

Main comments regarding the deferred taxes

(see column "Recognized in income statement" in the table in section F7.C. for changes in deferred taxes by nature)

c) Changes in unrecognized deferred tax assets:

- In 2018, this change amounted to € 88 million resulting mainly from the statutory reorganization in Brazil (€ 38 million) and from the expected capital gain on the Polyamides divestment in 2019 (€ 67 million);
- in 2019, this change amounts to € (110) million resulting mainly from a revision of the forecasts of utilization of tax losses carried forward in the holding companies (€ (58) million) and from the reversal of deferred taxes (mainly on capital allowances deemed not to be utilized within the next five years) in the United Kingdom (€ (56) million).

d) The deferred tax impact of changes in the nominal rates:

- In 2019, the income of € 15 million resulted mainly from the update in the expected rate applicable related to the timing of the reversal of temporary differences in France.

e) The deferred tax impact of the impairment of the Oil & Gas assets:

- In 2019, the impairment of Oil & Gas assets (see note F5 *Results from portfolio management and reassessments, legacy remediation and major litigations* for pre-tax net expense) has generated a deferred tax income of € 167 million in the United States resulting mainly from the impairment of the deductible goodwill for Oil & Gas in the US tax unit.

f) Other deferred taxes:

- In 2018, the other deferred taxes (€ (89) million) included:
  - the utilization of tax losses carried forward for € (99) million;
  - the recognition of deferred tax assets on temporary disallowed interests in the United States for € 22 million;
  - the retroactive restatement for € 19 million resulting from IAS 12 Income Taxes amendment related to hybrid coupons that are recognized in P&L (prior to the change, recognition in equity);
  - other net increase and reversal of other temporary differences for € (31) million.
- In 2019, the other deferred taxes (€ (134) million) included:
  - the main utilization of tax losses carried forward for € (92) million, mainly in the United States and in holding companies;
  - the recognition of deferred tax assets on temporary disallowed interests in the United States for € 17 million;
  - other net increase and reversal of other temporary differences for € (59) million.

F7.B. Reconciliation of the income tax expense

The effective income tax expense has been reconciled with the theoretical tax expense obtained by applying to the pre-tax profit of each Group entity the nominal tax rate prevailing in the country in which it operates.

In € million	**2019**	2018
Profit for the year before taxes	74	791
Earnings from associates and joint ventures	95	43
Profit for the year before taxes excluding earnings from associates and joint ventures	**(21)**	**748**
Reconciliation of the tax charge		
Total tax charge of the Group entitites computed on the basis of the respective local nominal tax rates	(77)	(201)
Weighted average nominal rate	Not relevant	27%
Tax effect of changes in nominal tax rates	15	(2)
Changes in unrecognized deferred tax assets	(110)	88
Tax effect of permanent differences	37	28
Gains and losses with no tax expense and income	(3)	7
US taxes disconnected from profit for the year before taxes	(17)	(21)
Provisions for tax litigations	1	4
Other tax effect of current and deferred tax adjustments related to prior years	12	32
Tax effect on distribution of dividends	(11)	(11)
Effective tax charge	**(153)**	**(75)**
Effective tax rate	**207%**	**10%**

The weighted average nominal rate of 2019 is not relevant as the profit before taxes and equity earnings is negative after the impairment of Oil & Gas assets amounting to € (825) million. After excluding this impairment, the weighted average nominal rate of 2019 was 30% and could be compared to the rate of 2018 of 27%. This increase is mainly due to an unfavorable mix effect resulting notably from a lower profit before tax in the United States.

The effective tax rate was 10% in 2018 (restated, see comments on item f in previous table for amendment of IAS 12). The effective rate in 2019 is not relevant either (207%). After excluding the impairment Oil & Gas, the effective rate would have been 36%. This increase of 26% is mainly due to the change in unrecognized deferred tax assets: € (110) million in 2019 versus € 88 million that contributes to increase significantly the effective tax rate (see comments on item c in previous table).

F7.C. Deferred taxes in the consolidated statement of financial position

2019 In € million	Opening balance	Recognized in income statement	Recognized in other compre-hensive income	Exchange rate effect	Transfer to asset held for sale	Other	Closing balance
Temporary differences							
Employee benefits obligations	549	(35)	48	3	(2)		563
Provisions other than employee benefits	252	(8)		1	(1)		243
Property, plant and equipment	(249)			(5)	28		(229)
Intangible assets	(499)	78		(11)		1	(432)
Right-of-use assets and lease liabilities							(1)
Goodwill	(38)	128					91
Other temporary differences	101	(60)		1	12	(1)	55
Tax losses	359	(146)		1			214
Tax credits	32	2					34
Assets held for sale		30				(30)	
Total (net amount)	**505**	**(11)**	**48**	**(10)**	**36**	**(30)**	**538**

The net deferred tax assets at year-end 2019 amount to € 538 million.

2018 In € million	Opening balance	Recognized in income statement	Recognized in other compre-hensive income	Exchange rate effect	IFRS 9	Transfer to asset held for sale	Other	Closing balance
Temporary differences								
Employee benefits obligations	599	(41)	(1)	1		(7)	(1)	549
Provisions other than employee benefits	188	63		1				252
Property, plant and equipment and intangible assets	(769)	26		(29)		24		(749)
Goodwill(1)	(26)	(12)						(38)
Other(2)(3)	(20)	115	2		2	4	(3)	101
Tax losses	346	10		1			2	359
Tax credits(4)	159	(126)						32
Assets held for sale		13					(13)	
Total (net amount)	**476**	**49**	**1**	**(26)**	**2**	**20**	**4**	**505**
(1) Of which amortization of Oil & Gas goodwill in the United States	(41)	(11)						(52)
(2) Of which reversal of US one-time tax	(123)	123						
(3) Including the restatement related to the perpetual hybrid bonds coupons		19					(19)	
(4) Of which reversal of US foreign tax credits due to reversal of one-time tax	123	(123)						

The net deferred tax assets at year-end 2018 amounted to € 505 million.

The significant components of the deferred tax assets and deferred tax liabilities at the end of 2019 and 2018 are as follows:

2019 In € million	Deferred tax assets	Deferred tax liabilities	Net deferred taxes before impairment	Impairment	Net deferred taxes
Employee benefits obligations	609	(10)	599	(35)	563
Provisions other than employee benefits	272	(4)	267	(24)	243
Property, plant and equipment	(1)	(198)	(198)	(31)	(229)
Intangible assets	66	(498)	(432)		(432)
Right-of-use assets and lease liabilities	80	(81)	(1)		(1)
Goodwill	91		91		91
Other	114	(49)	65	(10)	55
Temporary differences	**1,230**	**(840)**	**391**	**(100)**	**290**
Operational losses	1,590		1,590	(1,419)	171
Non-operational losses	339		339	(297)	42
Tax losses	**1,929**		**1,929**	**(1,716)**	**213**
Tax credits carried forward	**78**		**77**	**(43)**	**34**
Netting deferred taxes	(658)	658			
Deferred taxes	**2,579**	**(182)**	**2,397**	**(1,859)**	**538**

2018 In € million	Deferred tax assets	Deferred tax liabilities	Net deferred taxes before impairment	Impairment	Net deferred taxes
Employee benefits obligations	563	(10)	553	(4)	549
Provisions other than employee benefits	297	(3)	294	(42)	252
Property, plant and equipment		(259)	(259)	10	(249)
Intangible assets	47	(546)	(499)		(499)
Goodwill	15	(52)	(38)		(38)
Other	163	(39)	123	(22)	101
Temporary differences	**1,084**	**(911)**	**174**	**(58)**	**116**
Operational losses	1,723		1,723	(1,418)	304
Non-operational losses	364		364	(310)	54
Tax losses	**2,087**		**2,087**	**(1,729)**	**359**
Tax credits carried forward	**78**		**78**	**(46)**	**32**
Netting deferred taxes	(555)	555			
Deferred taxes	**2,694**	**(355)**	**2,339**	**(1,833)**	**505**

The total net deferred tax assets at € 538 million at year-end 2019 are € 33 million higher than in 2018. The main changes in 2019 are related to the following items:

- deferred tax assets on employee benefits obligations: € 563 million at year-end 2019, € 14 million higher than in 2018. The change was mainly impacted by reversal of temporary differences in income statement and by the taxes on the remeasurement in Other Comprehensive Income of employee benefits obligations (see note F34.A. *Provisions* for employee benefits);
- deferred tax liabilities on intangible assets for € (432) million at year-end 2019, € 67 million lower than in 2018. The decrease in these liabilities in 2019 mainly reflects the tax impact of € 45 million of amortization in the consolidated income statement of the step-up of intangible assets resulting from Purchase Price Allocation;
- deferred taxes on goodwill: € 91 million at year-end 2019, € 127 million higher than in 2018 mainly due to the reversal of deferred tax liability and recognition of deferred tax assets in the United States resulting from the impairment of the deductible goodwill for Oil & Gas in the US tax unit, i.e. € 139 million out of a total for all temporary differences of € 167 million;
- deferred taxes on tax losses: € 214 million at year-end 2019, € (145) million lower than in 2018 mainly due to the utilization of main tax losses carried forward for € (92) million and the change in unrecognized deferred tax assets on losses in the holding companies for € (58) million;
- deferred tax assets on other temporary differences: € 55 million at year-end 2019, € (46) million lower than in 2018. This decrease is related to:
  - additional temporary disallowed interests in the United States for € 17 million;
  - additional deferred tax liabilities on unremitted earnings for € (13) million, mainly for US subsidiaries;
  - inventories for € (8) million;
  - adjustments related to discontinued operations for € (30) million;
  - other various impacts for € (12) million.

Only € (44) million for deferred tax liabilities on unremitted earnings were recognized. An amount of € 20 million was not recognized because the Group controls the timing of the reversal of the temporary differences and it is probable that they will not reverse in the foreseeable future.

Recognized deferred tax assets for which utilization depends on future taxable profits in excess of the profit arising from the reversal of existing taxable temporary differences within entities that have suffered a tax loss in either current or preceding year in the related tax jurisdiction, amount to € 601 million. This recognition is justified by favorable expectations as to future taxable profits.

F7.D. Other information

For the majority of the Group's tax loss carryforwards, no deferred tax assets have been recognized. The unrecognized tax losses are mainly located in countries where they can be carried forward indefinitely. The tax losses carried forward generating deferred tax assets are given below by expiration date.

In € million	**2019**	2018
Within 1 year	12	19
Within 2 years	19	18
Within 3 years	15	6
Within 4 years	24	18
Within 5 or more years	38	202
No time limit	713	1,037
Total of tax losses carried forward which have generated recognized deferred tax assets	**822**	**1,302**
Tax losses carried forward for which no deferred tax assets were recognized	6,803	6,916
Total of tax losses carried forward	**7,625**	**8,217**

The tax losses carried forward (€ 822 million) have generated deferred tax assets for € 214 million. In 2018, the tax loss carried forward (€ 1,302 million) had generated deferred tax assets for € 359 million. The decrease of tax losses carried forward which have generated recognized deferred tax assets is mainly due to the utilization of tax losses in the United States.

NOTE F8
Discontinued operations

Accounting policy

A discontinued operation is a component of the Group which the Group has disposed of or which is classified as held for sale (see note F30 *Assets held for sale*), and which:

- represents a separate major line of business or geographical area of operations;
- is part of a single coordinated plan to dispose of a separate major line of business or geographical area of operations; or
- is a subsidiary acquired exclusively with a view to resale.

A component of the Group consists of operations and cash flows, which can be clearly distinguished operationally and for financial reporting purposes, from the rest of the Group.

In the consolidated statement of comprehensive income, the consolidated statement of cash flows, and disclosures, discontinued operations are re-presented for prior periods presented.

2019 In € million	Polyamides	Other	Total
Net sales	1,463		1,463
EBIT	332	14	347
Financial result	(3)	1	(2)
Tax	(109)		(109)
Profit from discontinued operations	**221**	**15**	**236**
attributable to Solvay share	221	15	236

Polyamides EBIT includes M&A costs for € (16) million.

The € 15 million in the column "Other" mainly results from post-closing warranties related to the disposal of the Pharma business and an adjustment for the Indupa purchase price.

2018 In € million	Polyamides	Other	Total
Net sales	1,563		1,563
EBIT	288	(4)	284
Financial result	(3)		(3)
Tax	(80)		(80)
Profit (loss) from discontinued operations	**205**	**(5)**	**201**
attributable to Solvay share	205	(5)	201

Polyamides EBIT includes M&A costs for € (18) million.

The € (5) million in the column "Other" referred to post-closing adjustments related to the disposal of Acetow.

NOTE F9
Profit for the year

Profit for the year amounts to € 157 million compared to € 917 million in prior year. See previous notes for explanations on the main variations.

NOTE F10
Earnings per share

Accounting policy

The basic earnings per share are obtained by dividing profit for the year by the weighted average number of ordinary shares outstanding during the reporting period. The weighted average number of ordinary shares excludes the treasury shares held by the Group over the reporting period.

The diluted earnings per share are obtained by dividing profit for the year, adjusted for the effects of dilutive potential ordinary shares, by the weighted average number of ordinary shares, also adjusted by the number of dilutive potential ordinary shares attached to the issuance of share options.

The number of dilutive potential ordinary shares is calculated for the weighted average number of share options outstanding during the reporting period as the difference between the average market price of ordinary shares during the reporting period and the exercise price of the share option. Share options have a dilutive effect only when the average market price is above the exercise price (share options are "in the money").

For the purpose of calculating diluted earnings per share, there were no adjusting elements to the profit for the year (Solvay share).

Basic and diluted amounts per share for discontinued operations are presented in the consolidated income statement.

Number of shares (in thousands)	**2019**	2018
Weighted average number of ordinary shares (basic)	103,177	103,277
Dilution effect	227	459
Weighted average number of ordinary shares (diluted)	103,403	103,735

	2019		2018	
	Basic	**Diluted**	Basic	Diluted
Profit for the year (Solvay share) including discontinued operations (in € thousands)	118,415	118,415	877,219	877,219
Profit/(loss) for the year (Solvay share) excluding discontinued operations (in € thousands)	(117,582)	(117,582)	676,565	676,565
Earnings per share (including discontinued operations) (in €)	1.15	1.15	8.49	8.46
Earnings per share (excluding discontinued operations) (in €)	(1.14)	(1.14)	6.55	6.52

Full data per share, including dividend per share, can be found in the Business Review section.

The average market price during 2019 was € 96.74 per share (2018: € 110.21 per share). The following share options were out of the money, and therefore antidilutive for the period presented, but could potentially dilute basic earnings per share in the future (see note F33 *Share-based payments)*:

Antidilutive share options	Date granted	Exercise price (in €)	Number of share options granted	Number of share options outstanding
Share option plan 2013	25/03/2013	104.33	427,943	367,171
Share option plan 2014	01/01/2014	101.14	380,151	351,482
Share option plan 2015	25/02/2015	114.51	346,617	346,617
Share option plan 2017	23/02/2017	111.27	316,935	316,935
Share option plan 2018–1	27/02/2018	113.11	400,704	400,704
Share option plan 2018–2	30/07/2018	108.38	72,078	72,078
Share option plan 2019	27/02/2019	97.05	438,107	438,107
Total			**2,382,535**	**2,293,094**

Notes to the consolidated statement of comprehensive income

NOTE F11
Consolidated statement of comprehensive income

Accounting policy

In accordance with IAS 1 Presentation of Financial Statements, the Group elected to present two statements, i.e. a consolidated income statement immediately followed by a consolidated statement of comprehensive income.

The components of other comprehensive income (OCI) are presented before related tax effects with one amount shown for the aggregate amount of income tax relating to those components. Tax impacts are further disclosed in this note.

Presentation of the tax effect relating to each item of other comprehensive income

Note: the below table presents the total other comprehensive income items for the aggregate of the shares of Solvay and the non-controlling interests.

	2019			2018		
In € million	**Before-tax amount**	**Tax expense(–) / income (+)**	**Net-of-tax amount**	Before-tax amount	Tax expense (–)/ income (+)	Net-of-tax amount
Effective portion of gains and losses on hedging instruments in a cash flow hedge	*(53)*	*1*	*(52)*	*(61)*	*5*	*(57)*
Recycling to the income statement	*58*		*58*	*14*		*14*
Gains and losses on hedging instruments in a cash flow hedge (see note F35)	5	1	6	(47)	5	(42)
Currency translation differences arising during the year	*141*		*141*	*241*		*241*
Recycling of currency translations differences relating to foreign operations disposed of in the year	*(1)*		*(1)*	*13*		*13*
Currency translation differences – Subsidiaries and joint operations	140		140	255		255
Share of other comprehensive income of associates and joint ventures accounted for using equity method that will be reclassified to profit or loss	24		24	(34)		(34)
Recyclable components	**169**	**1**	**170**	**173**	**5**	**179**
Gains and losses on equity instruments measured at fair value through other comprehensive income	3	(2)	1	3		4
Remeasurements of the net defined benefit liability (see note F34)	(163)	49	(113)	26	(4)	22
Share of comprehensive income of associates and joint ventures accounted for using equity method that will not be reclassified to profit or loss	(2)		(2)			
Non recyclable components	**(162)**	**47**	**(115)**	**29**	**(4)**	**26**
Other comprehensive income	**7**	**48**	**55**	**203**	**1**	**204**

Currency translation differences

Accounting policy

For the purpose of presenting consolidated financial statements at the end of each reporting period, the assets and liabilities of the Group's foreign operations are expressed in euros using closing rates. Income and expense items are translated at the average exchange rates for the period except when the impact of applying the average rate is materially different from applying the spot rate at the respective transactions' dates, in which case the latter is applied. Exchange differences arising, if any, are recognized in other comprehensive income as "currency translation differences".

Currency translation differences are reclassified from equity to profit or loss, on:

- a disposal of the Group's entire interest in a foreign operation, or a partial disposal involving loss of control over a subsidiary that includes a foreign operation. In this case, all of the accumulated exchange differences in respect of that operation attributable to the Group are reclassified to profit or loss. Any exchange differences that have previously been attributed to non-controlling interests are derecognized, but they are not reclassified to profit or loss;
- a partial disposal of an interest in a joint arrangement or an associate that includes a foreign operation, when the retained interest is a financial asset. In this case, all of the accumulated exchange differences in respect of that operation attributable to the Group are reclassified to profit or loss;
- a partial disposal of an interest in a joint venture or an associate that includes a foreign operation and that continues to be accounted for as a joint venture or an associate. In this case, a proportionate share of the accumulated exchange differences is reclassified to profit or loss.

In case of a partial disposal of a subsidiary (i.e. no loss of control) that includes a foreign operation, the proportionate share of accumulated exchange differences is reattributed to non-controlling interests and is not recognized in profit or loss.

In case of (a) a capital decrease of a subsidiary without loss of control, or (b) a capital decrease of an equity method investee or a joint operation without modification of the share of equity interest held in that investee, then no accumulated exchange differences are reclassified from equity to profit or loss.

Goodwill and fair value adjustments arising on the acquisition of a foreign operation are treated as assets and liabilities of the foreign operation and translated into the Group's presentation currency at the closing rate.

The total currency translation gains amount to € 164 million in 2019, and only relate to the Group's share. They are linked to the revaluation of the US dollar (€ 115 million), the Russian ruble (€ 26 million), the Mexican peso (€ 12 million), and to the devaluation of the British pound (€ (15) million), compared to the euro.

The total currency translation gains amounted to € 220 million in 2018, and included:

- € 207 million currency translation gain, of which € 202 million for the Group's share; and
- the recycling of € 13 million currency translation loss mainly related to the sale of Soda Ash business in Egypt, of which € 15 million for the Group's share.

The € 207 million currency translation gains were linked to the revaluation of the US dollar (€ 289 million) and to the devaluation of the Brazilian real (€ (30) million), the Chinese renminbi (€ (24) million) and the Russian ruble (€ (25) million), compared to the euro.

Notes to the consolidated statement of cash flows (continuing and discontinued operations)

NOTE F12
Depreciation, amortization and impairments

In 2019 total depreciation, amortization and impairment losses amount to € 1,906 million, of which:

- straight-line depreciation and amortization of € 1,032 million for continuing operations including:
  - cost of goods sold (€ 641 million);
  - administrative costs (€ 110 million);
  - research and development costs (€ 83 million);
  - other (€ 198 million), including € 182 million for PPA amortization (see note F4 *Other operating gains and losses*);
- net impairment loss of € 873 million for continuing operations, due to the impairment on Novecare Oil & Gas business (€ (825) million), and on other non-performing assets (€ (26) million), mainly due to the impairment of previously capitalized items related to the Group's simplification and transformation program (see note F5 *Results from portfolio management and reassessments, legacy remediation and major litigations*).

The increase in the straight-line depreciation and amortization in 2019 compared to 2018 is mainly related to the adoption of IFRS 16 Leases.

In 2018 total depreciation, amortization and impairment losses amount to € 944 million, of which:

- straight-line depreciation and amortization of € 921 million for continuing operations including:
  - cost of goods sold (€ 548 million);
  - administrative costs (€ 97 million);
  - research and development costs (€ 59 million);
  - other (€ 217 million), including € 197 million for PPA amortization (see note F4 *Other operating gains and losses*);
- net impairment loss of € 23 million for continuing operations (see note F5 *Results from portfolio management and reassessments, legacy remediation and major litigations*).

NOTE F13
Other non operating and non cash items

The other non operating and non cash items for 2019 (€ 24 million) mainly include M&A expenses related to the disposal of the Polyamides business (€ 16 million).

The other non operating and non cash items for 2018 (€ (12) million) mainly include the results related to the disposal of the phosphorus-derivatives business (€ (22) million) and of the Soda Ash business in Egypt (€ 7 million).

NOTE F14
Income taxes

In 2019

Income tax expense amounts to € 262 million, of which € 153 million for continuing operations.

Income tax paid amounts to € 263 million, of which € 240 million for continuing operations.

In 2018

Income tax expense amounted to € 156 million, of which € 76 million for continuing operations.

Income tax paid amounted to € 235 million, of which € 211 million for continuing operations.

Income taxes are discussed in note F7 *Income taxes*.

NOTE F15
Changes in working capital

In € million	2019	2018
Inventories	164	(239)
Trade receivables	21	60
Trade payables	(217)	98
Other receivables/payables	(54)	(68)
Changes in working capital	**(86)**	**(148)**
Of which discontinued operations	(64)	(39)

See comments in the Business Review section.

NOTE F16
Additions, reversals and use of provisions

In 2019:

- additions and reversals on provisions amount to € 154 million and concern mainly employee benefits (€ 93 million) and environment (€ 49 million);
- use of provisions amounts to € (399) million, of which € (10) million for discontinued operations, and concerns mainly employee benefits (€ (223) million), environment (€ (78) million) and restructuring (€ (61) million);
- use of provisions for additional voluntary contributions in pensions plans in the United Kingdom amounts to € (114) million.

In 2018:

- additions and reversals on provisions amounted to € 315 million and included the provision related to the Group's simplification and transformation program (€ 177 million);
- use of provisions amounted to € (395) million, of which € (5) million for discontinued operations.

See note F34 *Provisions* for more information.

NOTE F17
Cash flows from investing activities – acquisition/disposal of assets and investments

2019 In € million	Acquisitions	Disposals	Total
Subsidiaries	(6)	(31)	**(37)**
Other	(16)		**(16)**
Total investments	(23)	(31)	**(53)**
Property, plant and equipment/Intangible assets	(857)	18	**(839)**
Total	**(880)**	**(13)**	**(892)**

2018 In € million	Acquisitions	Disposals	Total
Subsidiaries	(12)	26	14
Other	(4)		(4)
Total investments	(16)	26	10
Property, plant and equipment/Intangible assets	(833)	42	(791)
Total	**(849)**	**69**	**(781)**

In 2019

The acquisition of subsidiaries (€ (6) million) mainly relates to post-acquisition payments of Cytec.

Other acquisitions mainly relate to the investment in Aqua Pharma Group.

The disposal of subsidiaries (€ (31) million) mainly relates to M&A costs for Polyamides divestment for € (16) million, amounts paid for Pharma and Indupa disposals without impact on the 2019 income statement (€ (19) million), net of the reimbursement of loans related to the disposal of the Cross Linkable Compounds business for € 7 million.

The acquisition of property, plant and equipment and intangible assets (€ (857) million) relates to various projects:

- Composite Materials: new manufacturing line of high performance particles for pre-impregnated carbon fiber in Willow Island (United States);
- Corporate: investment in Material Science Application Center in Brussels (Belgium);
- Specialty Polymers: new production unit dedicated to Polyethersulfone (PESU) in Panoli (India);
- Specialty Polymers: Polyvinylidene Fluoride (PVDF) capacity increase in Tavaux (France);
- Specialty Polymers: Diofan PVDC latex capacity increase in Tavaux (France);
- Technology Solutions: doubling of production capacity of hindered amine light stabilizers (HALS) in Willow Island (United States).

In 2018

The acquisition of subsidiaries (€ (12) million) related to post-acquisition payments of Cytec.

The disposal of subsidiaries (€ 26 million) was mainly related to the phosphorus derivative business for € 54 million, the Soda Ash business in Egypt for € 10 million, M&A costs for Polyamides divestment for € (20) million. The balance is composed of amounts paid or received for prior years disposals without impact on the 2018 consolidated income statement (deferred payment for purchase of BASF shares in Solvin for € (22) million and Cross Linkable Compound for € 4 million).

The acquisition of property, plant and equipment and intangible assets (€ (833) million) related to various projects:

- Corporate: investment in Material Science Application Center in Brussels (Belgium);
- Soda Ash & Derivatives: refurbishment of a cogeneration unit in Bernburg (Germany);
- Special Chem: new eH2O2 plant in Rosignano (Italy) and in Zhengiang (China);
- Specialty Polymers: new production unit dedicated to Polyethersulfone (PESU) in Panoli (India);
- Specialty Polymers: Polyvinylidene Fluoride (PVDF) capacity increase in Tavaux (France);
- Technology Solutions: doubling of production capacity of hindered amine light stabilizers (HALS) in Willow Island (United States).

In 2018 the cash in from disposal of property, plant and equipment related to sale of real estate (€ 27 million), mainly following restructuring initiatives or changes in portfolio and cash in from disposal of intangible assets related to sale of customer lists (€ 15 million).

NOTE F18
Other cash flows from financing activities

The other cash flows from financing activities (€ (19) million in 2019, € 123 million in 2018) mainly relate to margin calls on hedging instruments as part of Energy Services' activities.

For trading in futures of different commodities (CO_2, power, gas, coal), Energy Services uses brokers. These deals are subject to margin calls. To cover the credit risk of the counterparty, brokers pay a margin call to Solvay in case the instrument is in the money for Solvay. Vice-versa if the instrument is out of the money for Solvay, Solvay pays a margin call to the brokers. The margin calls are presented as part of financial debt (see note F36 *Net indebtedness*). Cash flows from margin calls are recognized as financing cash flows that fluctuate with the fair value of the instrument. The actual settlement of these commodity derivatives is net of margin calls and the gross amount (including margin calls that are reclassified from financing cash flows) is recognized in operating cash flows.

NOTE F19
Cash flows from discontinued operations

The 2019 cash flows from discontinued operations amounts to € 141 million (€ 120 million in 2018) and relates to Polyamides.

Notes to the consolidated statement of financial position

NOTE F20
Intangible assets

Accounting policy

General

An intangible asset is an identifiable non-monetary asset without physical substance. It is identifiable when it is separable, i.e. is capable of being separated or divided from the Group, or when it arises from contractual or other legal rights. An intangible asset shall be recognized if, and only if:

a. it is probable that the expected future economic benefits that are attributable to the asset will flow to the Group; and

b. the cost of the asset can be measured reliably.

Intangible assets acquired or developed internally are initially measured at cost. The cost of an acquired intangible asset comprises its purchase price, import duties and non-refundable purchase taxes, after deducting trade discounts and rebates, and any directly attributable cost of preparing the asset for its intended use. Subsequent expenditure on intangible assets is capitalized only if it is probable that it will increase the future economic benefits associated with the specific asset. Other expenditure is expensed as incurred.

After initial recognition, intangible assets are measured at cost less accumulated amortization and impairment losses, if any.

Intangible assets are amortized on a straight-line basis over their estimated useful lives, which do not exceed the contractual period, if any. The estimated useful lives, residual values and amortization methods are reviewed at each year-end, and any changes in estimates are accounted for prospectively.

Patents and trademarks	2–20 years
Software	3–5 years
Development expenditures	2–5 years
Customer relationships	5–29 years
Other intangible assets – Technologies	5–20 years

Amortization expense is included in the consolidated income statement within cost of goods sold, administrative costs, research and development costs and other operating gains and losses.

The asset is tested for impairment if (a) there is a trigger for impairment, and (b) annually for projects under development (see note F27 *Impairment of property, plant and equipment, intangible assets, right-of-use assets, and equity method investees*).

Intangible assets are derecognized from the consolidated statement of financial position on disposal or when no future economic benefits are expected from their use or disposal. The gain or loss arising from the derecognition of an intangible asset is recognized in profit or loss at the moment of derecognition.

Research and development costs

Research costs are expensed in the period in which they are incurred.

Development costs are capitalized if, and only if, all the following conditions are fulfilled:

- the cost of the asset can be reliably measured;
- the technical feasibility of the product has been demonstrated;
- the product or process will be placed on the market or used internally;
- the assets will generate future economic benefits (a potential market exists for the product or, where it is to be used internally, its future utility has been demonstrated);
- the technical, financial and other resources required to complete the project are available.

Development costs comprise employee expenses, the cost of materials and services directly attributable to the projects, and an appropriate share of directly attributable fixed costs including, and where applicable, borrowing costs. The intangible assets are amortized as from the moment they are available for use, i.e. when they are in the location and condition necessary for them to be capable of operating in the manner intended by management. Development costs which do not satisfy the above conditions are expensed as incurred.

Patents, trademarks and customer relationships

Those intangible assets have mainly been acquired through business combinations. Customer relationships consist of customer lists.

Other intangible assets

Other intangible assets mainly include technology acquired separately or in a business combination.

In € million	Development costs	Patents and trademarks	Customer relationships	Other intangible assets	Total
Gross carrying amount					
At December 31, 2017	**285**	**1,588**	**1,888**	**717**	**4,479**
Additions	88	19		35	142
Disposals and closures	(6)	(5)		(5)	(16)
Increase through business combinations				5	5
Currency translation differences	2	34	68	18	122
Other	2	25		(28)	(1)
Transfer to assets held for sale	1			1	2
At December 31, 2018	**372**	**1,661**	**1,956**	**743**	**4,731**
Additions	77	5		24	106
Disposals and closures	(9)	(39)		(2)	(50)
Increase through business combinations		2			2
Currency translation differences	2	18	30	12	62
Other	(6)	24		(17)	1
Transfer to assets held for sale	(3)	2		1	(1)
At December 31, 2019	**433**	**1,673**	**1,986**	**760**	**4,851**
Accumulated amortization					
At December 31, 2017	**(74)**	**(680)**	**(492)**	**(293)**	**(1.539)**
Amortization	(36)	(110)	(135)	(49)	(330)
Impairment	(2)				(3)
Disposals and closures	6	5		5	16
Currency translation differences		(5)	(10)	(8)	(23)
Other		2	(4)	14	12
Transfer to assets held for sale		(1)		(3)	(4)
At December 31, 2018	**(105)**	**(790)**	**(640)**	**(335)**	**(1.871)**
Amortization	(48)	(105)	(116)	(55)	(323)
Impairment				(53)	(53)
Disposals and closures	9	39		2	50
Currency translation differences		(4)	(5)	(5)	(14)
Other		(1)	1		
Transfer to assets held for sale	3	(4)		3	2
At December 31, 2019	**(141)**	**(865)**	**(760)**	**(443)**	**(2.209)**
Net carrying amount					
At December 31, 2017	211	908	1,396	424	2,940
At December 31, 2018	266	872	1,315	408	2,861
At December 31, 2019	**291**	**807**	**1,226**	**318**	**2,642**

Intangibles mainly relate to the intangibles acquired through the acquisitions of Rhodia and Cytec. The average remaining useful life of Rhodia's assets is 3 years, and the one of Cytec's assets is 13 years. The impairment recognized in 2019 relates to the Novecare Oil & Gas business.

NOTE F21
Goodwill and business combinations

Accounting policy

General

Acquisitions of subsidiaries are accounted for using the acquisition method. The consideration for each acquisition is measured at the aggregate of the fair values (at the date of acquisition) of assets transferred and liabilities incurred or assumed, and equity instruments issued by the Group in exchange for control of the acquiree. Acquisition-related costs are recognized in profit or loss as incurred.

Where applicable, the consideration for the acquisition includes any asset or liability resulting from a contingent consideration arrangement, measured at its acquisition-date fair value. Subsequent changes in such fair values are adjusted against the cost of acquisition where they qualify as measurement period adjustments (see below). All other subsequent changes in the fair value of contingent consideration classified as an asset or liability are accounted for in accordance with relevant IFRSs, generally through profit or loss.

Where a business combination is achieved in stages, the Group's previously held interests in the acquired entity are remeasured to fair value at the acquisition date (i.e. the date the Group obtains control) and the resulting gain or loss, if any, is recognized in profit or loss. Amounts arising from interests in the acquiree prior to the acquisition date that have previously been recognized in other comprehensive income are reclassified to profit or loss, where such treatment would be appropriate if that interest were disposed of.

The acquiree's identifiable assets, liabilities and contingent liabilities that meet the conditions for recognition under IFRS 3 Business Combinations are recognized and measured at their fair value at the acquisition date, except that:

- deferred tax assets or liabilities, and liabilities or assets related to employee benefit arrangements are recognized and measured in accordance with IAS 12 Income Taxes, and IAS 19 Employee Benefits, respectively;
- liabilities or equity instruments related to the replacement by the Group of an acquiree's share-based payment awards are measured in accordance with IFRS 2 Share-based Payment; and
- assets (or disposal groups) that are classified as held for sale in accordance with IFRS 5 Non-current Assets Held for Sale and Discontinued Operations are measured in accordance with that Standard.

If the initial accounting for a business combination is incomplete by the end of the reporting period in which the combination occurs, the Group reports provisional amounts for the items for which the accounting is incomplete. Those provisional amounts are adjusted during the measurement period (see paragraph below), or additional assets or liabilities are recognized, to reflect new information obtained about facts and circumstances that existed as of the acquisition date that, if known, would have affected the amounts recognized as of that date.

The measurement period is the period from the date of acquisition to the date the Group obtains complete information about facts and circumstances that existed as of the acquisition date, and does not exceed twelve months.

Goodwill

Goodwill arising in a business combination is recognized as an asset at the date that control is obtained (the acquisition date). Goodwill is measured as the excess of the sum of:

a. the consideration transferred;

b. the amount of any non-controlling interests in the acquiree; and

c. in a business combination achieved in stages, the acquisition date fair value of the previously held equity interest in the acquiree,

over the share acquired by the Group in the fair value of the entity's identifiable net assets at the acquisition date.

Goodwill is not amortized but is tested for impairment on an annual basis, and more frequently if there are any impairment triggers identified.

For the purpose of impairment testing, goodwill is allocated to each of the Group's cash-generating units (or groups of cash-generating units) in accordance with IAS 36 Impairment of Assets.

A cash-generating unit (CGU) is the smallest identifiable group of assets that generates cash inflows that are largely independent of the cash inflows from other group(s) of assets.

These tests consist of comparing the carrying amount of the assets or (groups of) CGUs with their recoverable amount. The recoverable amount of an asset or a (group of) CGU(s) is the higher of its fair value less costs to sell and its value in use. If the recoverable amount of the CGU is less than its carrying amount, the impairment loss is allocated first to reduce the carrying amount of any goodwill allocated to the unit and then to the other assets of the unit pro-rata on the basis of the carrying amount of each asset in the unit. An impairment loss recognized on goodwill shall not be reversed in a subsequent period.

Assets held for sale include their related goodwill.

On disposal of an operation within a CGU to which goodwill has been allocated, the goodwill associated with the operation disposed of is included in the determination of the profit or loss on disposal. It is measured on the basis of the relative values of the operation disposed of and the portion of the CGU retained, unless another method better reflects the goodwill associated with the operation disposed of.

Goodwill – overview

In € million	Total
Net carrying amount	
At December 31, 2017	**5,042**
Currency translation differences	139
Other	(8)
At December 31, 2018	**5,173**
Currency translation differences	66
Impairment	(771)
At December 31, 2019	**4,468**

In 2019 the impairment mainly relates to the Novecare Oil & Gas business. In 2019 and 2018 the currency translation differences mainly related to goodwill expressed in US dollars.

Goodwill by (groups of) CGU(s)

Goodwill acquired in a business combination is allocated to the CGUs or groups of CGUs that are expected to benefit from that business combination.

	2018				**2019**			
In € million	At beginning of the period	Adjustments	Currency translation differences	At the end of the period	**Transfer**	**Impair-ment**	**Currency translation differences**	**At the end of the period**
Operating segments – Groups of CGUs								
Advanced Materials	493			493				493
Advanced Formulations	194			194	(46)			148
Performance Chemicals	86			86				86
(Groups of) CGUs								
Composite Materials	1,266	(8)	61	1,319		(13)	27	1,334
Novecare	1,231		33	1,264	(698)		3	569
Novecare Oil & Gas					744	(758)	15	
Technology Solutions	903		43	946			19	966
Special Chem	225			225				226
Specialty Polymers	178		1	179			1	180
Soda Ash and Derivatives	162			162				162
Coatis	82			82				82
Silica	72			72				72
Aroma Performance	49			49				49
Energy Services	50			50				50
Hydrogen Peroxide Europe	21			21				21
Hydrogen Peroxide Mercosul	14			14				14
Hydrogen Peroxide Nafta	7			7				7
Hydrogen Peroxide Asia	11			11			1	11
Total goodwill	**5,042**	**(8)**	**139**	**5,173**		**(771)**	**66**	**4,468**

The split from Novecare of Novecare Oil & Gas that is now considered to be a separate CGU has been explained in Main events and changes in consolidation scope during the year, and in note F27 *Impairment of property, plant and equipment, intangible assets, right-of-use assets, and equity method investees*. The goodwill of Novecare Oil & Gas has been fully impaired (€ (758) million).

NOTE F22
Property, plant and equipment

Accounting policy

General

Property, plant and equipment are tangible items that:

- are held for use in the production or supply of goods or services, for rental to others, or for administrative purposes; and
- are expected to be used during more than one period.

The items of property, plant and equipment owned by the Group are recognized as property, plant and equipment when the following conditions are satisfied:

- it is probable that the future economic benefits associated with the asset will flow to the Group;
- the cost of the asset can be measured reliably.

Items of property, plant and equipment are initially measured at cost. The cost of an item of property, plant and equipment comprises its purchase price and any costs directly attributable to bringing the asset to the location and condition necessary for it to be capable of operating in the manner intended by management. If applicable, the cost comprises borrowing costs during the construction period.

After initial recognition, items of property, plant and equipment are measured at cost less accumulated depreciation and impairment losses, if any.

Items of property, plant and equipment are depreciated on a straight-line basis over their estimated useful lives. The components of an item of property, plant and equipment with different useful lives are depreciated separately. Land is not depreciated. The estimated useful lives, residual values and depreciation methods are reviewed at each year-end, and any changes in estimates are accounted for prospectively.

Buildings	30–40 years
IT equipment	3–5 years
Machinery and equipment	10–20 years
Transportation equipment	5–20 years

Depreciation expense is included in the consolidated income statement within cost of goods sold, administrative costs, and research and development costs.

The asset is tested for impairment if there is trigger for impairment (see note F27 *Impairment of property, plant and equipment, intangible assets, right-of-use assets, and equity method investees*).

Items of property, plant and equipment are derecognized from the consolidated statement of financial position on disposal or when no future economic benefits are expected from their use or disposal. The gain or loss arising from the derecognition of an item of property, plant and equipment is recognized in profit or loss at the moment of derecognition.

Subsequent expenditure

Subsequent expenditure related to items of property, plant and equipment is capitalized only if it is probable that it will increase the future economic benefits associated with the specific asset. Other expenditure is expensed as incurred. Subsequent expenditure incurred for the replacement of a component of an item of property, plant and equipment is only recognized as an asset when it satisfies the recognition criteria mentioned above. The carrying amount of replaced items is derecognized.

Repair and maintenance costs are recognized in the consolidated income statement as incurred.

Regarding its industrial activity, Solvay incurs expenditure for major repairs over several years for most of its sites. The purpose of this expenditure is to maintain the proper working order of certain installations without altering their useful life. This expenditure is considered as a specific component of the item of property, plant and equipment and is depreciated over the period during which the economic benefits are expected to be obtained, i.e. the major repairs' intervals.

Dismantling and restoration costs

Dismantling and restoration costs are included in the cost of an item of property, plant and equipment if the Group has a legal or constructive obligation to dismantle or restore. They are depreciated over the useful life of the items to which they pertain.

Generally, Solvay's obligation to dismantle and/or restore its operating sites is only likely to arise upon the discontinuation of a site's activities. A provision for dismantling of discontinued sites or installations is recognized when there is a legal obligation (due to a request or injunction from the relevant authorities), or when there is no technical alternative than to dismantle, so to ensure the safety compliance of the discontinued sites or installations.

Borrowing costs

Borrowing costs directly attributable to the acquisition, construction or production of qualifying assets, which are assets that necessarily take a substantial period of time to get ready for their intended use or sale, are added to the cost of those assets, until such time as the assets are substantially ready for their intended use or sale.

Investment income earned on the temporary investment of specific borrowings pending their expenditure on qualifying assets is deducted from the borrowing costs eligible for capitalization.

All other borrowing costs are recognized in profit or loss in the period in which they are incurred.

In € million	Land and buildings	Fixtures and equipment	Other tangible assets	Property, plant and equipment under construction	Total
Gross carrying amount					
At December 31, 2017	**2,844**	**9,362**	**380**	**585**	**13,171**
Additions	15	123	12	547	697
Disposals and closures	(29)	(216)	(14)		(259)
Increase through business combinations	1				1
Currency translation differences	19	78	1	4	102
Other	43	255	26	(429)	(106)
Transfer to assets held for sale	(2)	(31)	1	(53)	(86)
At December 31, 2018	**2,889**	**9,571**	**405**	**654**	**13,519**
Additions	36	124	10	615	784
Disposals and closures	(30)	(200)	(15)		(245)
Increase through business combinations	1				2
Currency translation differences	27	93	3	6	129
Other	96	359	24	(506)	(27)
Transfer to assets held for sale	(6)	(8)	(1)	(91)	(106)
At December 31, 2019	**3,013**	**9,939**	**425**	**678**	**14,056**
Accumulated depreciation					
At December 31, 2017	**(1,359)**	**(6,101)**	**(278)**		**(7,737)**
Depreciation	(96)	(462)	(35)		(592)
Impairment	(10)	(31)	(1)		(41)
Reversal of impairment		22			22
Disposals and closures	26	211	14		250
Currency translation differences	(6)	(34)			(41)
Other	33	67			101
Transfer to assets held for sale	8	(34)	(1)		(27)
At December 31, 2018	**(1,404)**	**(6,361)**	**(301)**		**(8,065)**
Depreciation	(93)	(464)	(39)		(596)
Impairment	(20)	(30)	(1)		(51)
Reversal of impairment	1				1
Disposals and closures	29	199	15		243
Currency translation differences	(8)	(49)	(1)		(58)
Other	3	(12)			(9)
Transfer to assets held for sale	5	(53)			(49)
At December 31, 2019	**(1,487)**	**(6,770)**	**(327)**		**(8,584)**
Net carrying amount					
At December 31, 2017	1,485	3,261	102	585	5,433
At December 31, 2018	1,486	3,210	104	654	5,454
At December 31, 2019	**1,527**	**3,169**	**98**	**678**	**5,472**

The line “Other” mainly includes changes following portfolio transactions and reclassification of property, plant and equipment under construction to the appropriate categories when they are ready for intended use.

Cash flows related to major investments are disclosed in note F17 *Cash flows from investing activities - acquisition/disposal of assets and investments.*

NOTE F23
Right-of-use assets and lease liabilities

Accounting policy

As explained in the basis of preparation, the Group adopted IFRS 16 on January 1, 2019 using the modified retrospective approach. Hereinafter are disclosed the accounting policies applied in 2019 (IFRS 16 Leases). For accounting policies applied in 2018 (IAS 17 Leases), reference is made to the 2018 Annual Report. Transition impacts have been discussed in the basis of preparation.

Definition of a lease

At inception of a contract, which generally coincides with the date the contract is signed, the Group assesses whether a contract is, or contains, a lease. A contract is, or contains, a lease if the contract conveys the right to control the use of an identified asset for a period of time in exchange for consideration.

An asset is typically identified by being explicitly specified in a contract. However, an asset can also be identified by being implicitly specified at the time that the asset is made available for use by the customer. If the supplier has a substantive substitution right, then the asset is not identified. A substantive substitution right means that (a) the supplier has the practical ability to substitute the asset throughout the period of use, and (b) would economically benefit from doing so.

To assess whether a contract conveys the right to control the use of an identified asset, the Group assesses whether, throughout the period of use, it has:

- the right to obtain substantially all of the economic benefits from use of the identified asset; and
- the right to direct the use of the identified asset. This is generally the case when the Group has the decision-making rights regarding how and for what purpose the asset is used.

Lease term

The Group determines the lease term as the non-cancellable period of a lease, together with both:

- periods covered by an option to extend the lease if the Group is reasonably certain to exercise that option; and
- periods covered by an option to terminate the lease if the Group is reasonably certain not to exercise that option.

In its assessment, the Group considers the impact of the following factors (non-exhaustive):

- contractual terms and conditions for the optional periods, compared with market rates;
- significant leasehold improvements undertaken (or expected to be undertaken) over the term of the contract;
- costs relating to the termination of the lease, including relocation costs, costs of identifying another underlying asset suitable for the Group's needs, costs of integrating a new asset into the Group's operations, and termination penalties;
- the importance of that underlying asset to the Group's operations, including the availability of suitable alternatives;
- conditionality associated with exercising the option (i.e. when the option can be exercised only if one or more conditions are met), and the likelihood that those conditions will exist; and
- past practice.

Right-of-use asset and lease liability

The Group recognizes a right-of-use asset and a lease liability at the lease commencement date, which is the date that the lessor makes the asset available for use by the Group.

Right-of-use asset

The right-of-use asset is initially measured at cost, which comprises:

- the amount of the initial measurement of the lease liability;
- any lease payments made at or before the commencement date, less any lease incentive received; and
- any initial direct costs incurred by the Group.

After the commencement date, the right-of-use asset is measured at cost less any accumulated depreciation and any accumulated impairment losses. Right-of-use assets are depreciated using the straight-line depreciation method, from the commencement date to (a) the end of the useful life of the underlying asset, in case the lease transfers ownership of the underlying asset to the Group by the end of the lease term, or the lease contains a purchase option that the Group is reasonably certain to exercise, or (b) the earlier of the end of the useful life and the end of the lease term, in all other cases.

Lease liability

The lease liability is initially measured at the present value of the lease payments that are not paid at the commencement date, discounted using the interest rate implicit in the lease or, if that rate cannot be readily determined, the respective Group entity's incremental borrowing rate. Lease payments included in the measurement of the lease liability comprise the following:

- fixed payments, less any lease incentives receivable;
- variable lease payments that depend on an index or a rate, initially measured using the index or rate as at the commencement date;
- amounts expected to be payable by the Group under residual value guarantees;
- the exercise price of a purchase option if the Group is reasonably certain to exercise that option; and
- payments of penalties for early terminating the lease, if the Group is reasonably certain to exercise an option to early terminate the lease.

Service components (e.g. utilities, maintenance, insurance, …) are excluded from the measurement of the lease liability.

After the commencement date, the lease liability is measured by:

- increasing the carrying amount to reflect interest on the lease liability;
- reducing the carrying amount to reflect the lease payments made; and
- remeasuring the carrying amount to reflect any reassessment or lease modifications, or to reflect the impact from a revised index or rate.

In € million	Land	Buildings	Trans-portation equipment	Industrial equipment	Other tangible assets	Total
Gross carrying amount						
At December 31, 2018	**0**	**0**	**0**	**0**	**0**	**0**
Adoption IFRS 16	18	170	140	93	8	428
Transfer from property, plant and equipment (finance leases under IAS 17)		6		44	(4)	46
Additions	1	45	54	16	2	118
Currency translation differences	1	2	2			5
Other	(2)	(8)	(6)		1	(15)
Transfer to assets held for sale		(5)	(6)	(1)		(11)
At December 31, 2019	**18**	**209**	**185**	**153**	**7**	**571**
Accumulated depreciation						
At December 31, 2018	**0**	**0**	**0**	**0**	**0**	**0**
Transfer from property, plant and equipment (finance leases under IAS 17)		(4)		(8)		(12)
Depreciation	(1)	(49)	(50)	(9)	(3)	(113)
Transfer to assets held for sale		6	5	(11)		
At December 31, 2019	**(1)**	**(47)**	**(45)**	**(28)**	**(3)**	**(124)**
Net carrying amount						
At December 31, 2018	0	0	0	0	0	0
At December 31, 2019	**16**	**162**	**139**	**125**	**4**	**447**

The Group primarily leases buildings, that include office buildings, and warehouses. Those leases are generally long-term leases and may include extension options.

Next, the Group leases transportation equipment, that mainly consists of railcars and containers to transport the Group's products.

Industrial equipment mainly relates to utility assets.

Lease contracts generally are negotiated by the local teams, and contain a wide range of different terms and conditions. Many lease contracts contain extension options and/or early termination options to provide the Group with operational flexibility. Such options are taken into account when determining the lease term and the lease liability when it is reasonably certain that they will be exercised.

If the Group exercised its extension options not currently included in the lease liability, the present value of additional payments would amount to € 96 million at December 31, 2019.

Lease contracts signed not yet commenced amount to € 123 million and mainly relate to a cogeneration asset in Germany, a building in Lyon and industrial equipment in the United States.

Total cash outflows for leases amount to € 133 million, of which € 110 million related to payment of lease liabilities and € 23 million of interest expenses. Information on the corresponding lease liabilities (€ 470 million) can be found in the note F36 *Net indebtedness*. Information on the finance expense related to lease liabilities can be found in note F6 *Net financial charges*.

NOTE F24
Joint operations

The list of joint operations is available in the note F43 *List of companies included in the consolidation scope*.

- Soda Ash & Derivatives operations/interests in Devnya (Bulgaria), 75% held by Solvay and comprising the following legal entities:
  - Solvay Sodi AD;
  - Solvay Sisecam Holding AG.
- Hydrogen Peroxide Propylene Oxide (HPPO) operations/interests in Zandvliet (Belgium), Map Ta Phut (Thailand) and the HPPO plant in the Kingdom of Saudi Arabia, all 50% held by Solvay and comprising the following legal entities:
  - BASF Interox H_2O_2 Production NV;
  - MTP HP JV C.V.;
  - MTP HP JV Management B.V.;
  - MTP HP JV (Thailand) Ltd.;
  - Saudi Hydrogen Peroxide Co.
- Interests in Butachimie (France), 50% held by Solvay, included in Polyamides discontinued operations.

NOTE F25
Investments in associates and joint ventures

The list of associates and joint ventures is available in the note F43 *List of companies included in the consolidation scope.*

The associates and joint ventures not classified as held for sale/discontinued operations are accounted for under the equity method of accounting.

	2019			2018		
In € million	**Associates**	**Joint ventures**	**Total**	Associates	Joint ventures	Total
Investments in associates and joint ventures	17	538	555	15	426	441
Earnings from associates and joint ventures	2	93	95	3	41	44

Investments in associates

In € million	**2019**	2018
Carrying amount at January 1	**15**	**23**
Profit for the year	2	3
Dividends received	(1)	(1)
Impairment		(9)
Carrying amount at December 31	**17**	**15**

The tables below present the summary of the statement of financial position and income statement of the associates as if they were proportionately consolidated.

In € million	**2019**	2018
Statement of financial position		
Non-current assets	**12**	**16**
Current assets	**13**	**18**
Cash and cash equivalents	2	6
Non-current liabilities	**1**	**3**
Non-current financial debt	1	2
Current liabilities	**8**	**16**
Current financial debt	2	4
Investments in associates	**17**	**15**
Income statement		
Sales	32	36
Depreciation and amortization	(1)	(1)
Interest on loans and short term deposits	1	1
Profit for the year from continuing operations	**2**	**2**
Profit for the year	**2**	**2**
Total comprehensive income	**2**	**2**
Dividends received	**1**	**1**

Investments in joint ventures

In € million	2019	2018
Carrying amount at January 1	**426**	**443**
Additions	11	
Capital increase	10	
Profit for the year	93	41
Dividends received	(25)	(24)
Currency translation differences	24	(34)
Other	(1)	
Carrying amount at December 31	**538**	**426**

In 2019 the additions and the capital increase relate to the investment in Aqua Pharma Group.

In 2019, the currency translation differences mainly relate to the evolution of the Russian ruble compared to the euro. In 2018, the currency translation differences mainly relate to the evolution of the Russian ruble, of the Brazilian real and of the Indian rupee compared to the euro.

The tables below present the summary of the statement of financial position and income statement of the material joint ventures as if they were proportionately consolidated.

2019 In € million	Rusvinyl OOO	Peroxidos do Brasil Ltda	Solvay & CPC Barium Strontium	Shandong Huatai Interox Chemical Co. Ltd	Hindustan Gum & Chemicals Ltd	Aqua Pharma Group	EECO Holding and subsidiaries	Cogen-eration Rosignano
Ownership interest	50.0%	69.4%	75.0%	50.0%	50.0%	50.0%	33.3%	25.4%
Operating Segment	Perfor-mance Chemicals	Perfor-mance Chemicals	Advanced Materials	Perfor-mance Chemicals	Advanced Formulations	Perfor-mance Chemicals	Corporate & Business Services	Corporate & Business Services
Statement of financial position								
Non-current assets	**371**	**54**	**11**	**6**	**5**	**19**	**16**	**9**
Current assets	**66**	**56**	**46**	**7**	**155**	**11**	**23**	**1**
Cash and cash equivalents	33	23	9	5	133	6	2	
Non-current liabilities	**135**	**4**	**14**		**3**	**3**	**16**	**5**
Non-current financial debt	104	1				2	16	5
Current liabilities	**59**	**25**	**19**	**4**	**8**	**5**	**18**	**1**
Current financial debt	39	5	7				17	1
Investments in joint ventures	**243**	**82**	**24**	**9**	**149**	**21**	**5**	**3**
Income statement								
Sales	202	82	73	18	28		3	
Depreciation and amortization	(25)	(5)	(2)	(1)	(1)		(2)	(1)
Cost of borrowings	(15)						(1)	
Interest on loans and short-term deposits	1	1			12		1	
Income taxes	(13)	(10)	(3)	(1)	(2)			
Profit for the year from continuing operations	**51**	**23**	**8**	**2**	**8**		**1**	
Profit for the year	**51**	**23**	**8**	**2**	**8**		**1**	
Other comprehensive income	25	(1)	(1)		(1)			
Total comprehensive income	**77**	**21**	**7**	**2**	**7**			
Dividends received		**7**	**13**	**2**	**3**			

Other comprehensive income mainly comprises the currency translation differences.

2018 In € million	Rusvinyl OOO	Peroxidos do Brasil Ltda	Solvay & CPC Barium Strontium	Hindustan Gum & Chemicals Ltd	Shandong Huatai Interox Chemical Co. Ltd	EECO Holding and subsidiaries	Cogeneration Rosignano
Ownership interest	50.0%	69.4%	75.0%	50.0%	50.0%	33.3%	25.4%
Operating Segment	Performance Chemicals	Performance Chemicals	Advanced Materials	Advanced Formulations	Performance Chemicals	Corporate & Business Services	Corporate & Business Services
Statement of financial position							
Non-current assets	**352**	**47**	**11**	**6**	**7**	**17**	**9**
Current assets	**53**	**43**	**45**	**152**	**5**	**28**	**4**
Cash and cash equivalents	23	19	9	125	3	2	1
Non-current liabilities	**189**	**4**	**12**	**4**	**–**	**8**	
Non-current financial debt	160	2				8	
Current liabilities	**50**	**18**	**15**	**9**	**3**	**33**	**9**
Current financial debt	36	4				33	8
Investments in joint ventures	**167**	**67**	**30**	**145**	**9**	**4**	**4**
Income statement							
Sales	183	73	80	40	20	6	3
Depreciation and amortization	(22)	(4)	(1)	(1)	(1)	(2)	(1)
Cost of borrowings	(17)					(2)	
Interest on loans and short-term deposits		1		7		1	
Income taxes	(1)	(6)	(3)	(2)	(1)		
Profit for the year from continuing operations	**5**	**19**	**9**	**5**	**3**	**1**	
Profit for the year	**5**	**19**	**9**	**5**	**3**	**1**	
Other comprehensive income	(25)	(4)	1	(7)			
Total comprehensive income	**(19)**	**14**	**10**	**(2)**	**3**		
Dividends received		**13**	**8**	**2**	**2**		

Other comprehensive income mainly comprises the currency translation differences.

NOTE F26
Other investments

Accounting Policy

In accordance with the concept of materiality, certain companies which are insignificant have not been included in the consolidation scope. They are measured at cost and tested for impairment on an annual basis, which is considered a good proxy of their fair value. For more information, refer to *Principles of consolidation*.

In € million	2019	2018
Carrying amount at January 1	**41**	**47**
Additions		(2)
Disposals	(5)	(2)
Capital increase	2	1
Changes of consolidation method	(1)	(2)
Impairments/reversal of impairments	3	(3)
Other	(2)	
Carrying amount at December 31	**38**	**41**

The line "Changes in consolidation method" includes entities that are no longer below materiality thresholds and that start being accounted for as subsidiaries, joint operations, joint ventures or associates.

NOTE F27
Impairment of property, plant and equipment, intangible assets, right-of-use assets, and equity method investees

Accounting policy

General

At the end of each reporting period, the Group reviews whether there is any indication that those assets have suffered an impairment loss. If any such indication exists, the recoverable amount of the asset is estimated in order to determine the extent of the impairment loss (if any). Where it is not possible to estimate the recoverable amount of an individual asset, the Group estimates the recoverable amount of the CGU to which the asset belongs. Where a reasonable and consistent basis of allocation can be identified, corporate assets are allocated to individual CGUs, or otherwise they are allocated to the smallest group of CGUs for which a reasonable and consistent allocation basis can be identified.

The recoverable amount is the higher of fair value less costs of disposal and value in use. In assessing value in use, the estimated future cash flows are discounted to their present value using a pre-tax discount rate. Future cash flows are adjusted for risks not incorporated into the discount rate.

If the recoverable amount of an asset (or CGU) is estimated to be less than its carrying amount, the carrying amount of the asset (or CGU) is reduced to its recoverable amount. An impairment loss is recognized immediately in profit or loss.

When an impairment loss subsequently reverses, the carrying amount of the asset (or CGU) is increased to the revised estimate of its recoverable amount, but so that the increased carrying amount does not exceed the carrying amount that would have been determined (net of amortization or depreciation) had no impairment loss been recognized for the asset (or CGU) in prior years. A reversal of an impairment loss is recognized immediately in profit or loss.

Assets other than non-current assets held for sale

In accordance with IAS 36 Impairment of Assets, the recoverable amount of property, plant and equipment, intangible assets, right-of-use assets, CGUs or groups of CGUs, including goodwill, and equity method investees corresponds to the higher of their fair value less costs of disposal, and their value in use. The latter equals the present value of the future cash flows expected to be derived from each asset, CGU or group of CGUs, and equity method investees and is determined using the following inputs:

- business plan approved by management based on growth and profitability assumptions, taking into account past performances, forecast changes in the economic environment and expected market developments, including opportunity and risks resulting from climate change and environmental regulations such as products phasing out. For further details, refer to the Risk Management Section. Such business plan generally covers five years, unless management is confident that projections over a longer period are reliable;
- consideration of a terminal value determined based on the cash flows obtained by extrapolating the cash flows of the last years of the business plan referred to above, affected by a long-term growth rate deemed appropriate for the activity and the location of the assets;
- discounting of expected cash flows at a rate determined using the weighted average cost of capital formula.

Discount rate

The discount rate is estimated based on an extensive benchmarking with peers, so as to reflect the return investors would require if they were to choose an investment in the underlying assets. The weighted average cost of capital used to discount future cash flows was set at 6.7% in 2019 (6.2% in 2018). The discount rate increase in 2019 results from the increase of the country risk premium in some countries (Italy, Belgium, Brazil, Russia, India, France) and to the increase of the adjusted levered beta.

Long-term growth rates

In 2019 a comprehensive review of the entire business portfolio was performed resulting in the definition of the G.R.O.W Strategy and each CGU was assigned to one of three agile business segments that become effective as from 2020: Materials, Chemicals and Solutions, with different growth opportunities, consistent with the long term growth rates of the market they serve and the Group competitive position in those markets. The long-term growth rate was set at 2% for the CGUs in the Segment Materials, 0% in the Segment Chemicals, except for Soda Ash and Peroxides, for which a 1% rate was set, and 1% in the Segment Solutions (excluding Oil & Gas).

In 2018 the long-term growth rate was set at 2%, except for Aroma Performance, for which a 1% rate was set.

Other key assumptions are specific to each CGU (utility price, volumes, margin, etc.).

Impairment tests 2019

Impact of IFRS 16 Leases adoption

The adoption of IFRS 16 Leases had a limited impact on the assets to which IAS 36 Impairment of Assets applies. As of January 1, 2019, those assets increased from € 15.2 billion to € 15.6 billion or by 3% adding the right-of-use assets. In light of the limited impacts of the adoption of IFRS 16, its consequences for the impairment testing were insignificant.

Novecare Oil & Gas business

Most of Novecare Oil & Gas business is linked to the unconventional oil & gas in North America, and in particular the "fracking" stage of the process. Novecare serves other oil & gas applications and other process stages, such as cementing and production, but they represent only a small portion of the total sales.

In the context of difficult and uncertain global oil & gas markets, the fracking chemicals business has proved to be highly volatile and over the last two years the value pool for fracking chemicals has significantly decreased and both volumes and prices have come under pressure, as changes in the competitive environment are commoditizing the market. Solvay's oil & gas position, which comprise the Chemlogics and the Rhodia Oil & Gas businesses, have also been impacted by two further developments that have accelerated and became particularly impactful in 2019:

- The first is a marked decline in more sustainable and efficient, but also more expensive, natural guar-based formulations as customers have continued to opt for lower cost friction reducers rather than Solvay's solutions, and recent innovations have thus far failed to reverse that trend.
- The second is increased pricing pressure and loss of market share as competitors entered the important "last-mile" delivery and service space, which was previously a source of differentiation, as well as the more general pressure on the whole value chain caused by lower oil and natural gas prices.

As a result of these developments, in 2019 the profitability of the Oil & Gas business has deteriorated significantly. Action has been taken in terms of changing management, adapting cost structures as well as developing plans that are expected to help recover to a level of profitability that better reflects the competitive landscape.

Further, the strategic review that was undertaken also evidenced that the former Chemlogics business has been relatively more resilient than the former Rhodia guar based business.

As a result the synergies between the Oil & Gas business and the rest of Novecare are now too small and future growth opportunities too modest to support the Oil & Gas business being considered as part of Novecare, which was previously the position. This conclusion required, in compliance with IAS 36 Impairment of assets, for the Oil & Gas activities to be isolated in a separate CGU and the impairment test to be conducted at an Oil & Gas business level rather than at Novecare level.

Taking into account the carrying amount of the assets related to the Oil & Gas business and the present value of future cash flows based on the recovery plan, an impairment of € 825 million pre-tax and € 658 million post-tax has been recognized. The magnitude of the impairment is exacerbated both by the evolution of foreign currency exchange rates since the acquisition of Chemlogics in 2013, and by an expectation of persistently low oil prices. The latter dampens demand for premium solutions and thereby the recoverable amount of the asset (cash-generating unit), which is its value in use, calculated with a WACC of 6.7%.

The impairment loss of € 825 million has been recognized by class of assets in the Segment Advanced Formulations as follows: € 758 million for goodwill, € 53 million for intangible assets, € 9 million for property, plant and equipment, and € 5 million for inventories.

Sensitivities for Composite Materials

Composite Materials was part of the Cytec acquisition at year-end 2015 (Operating Segment: Advanced Materials). It had a carrying amount of € 3.4 billion, including goodwill of € 1.3 billion (see note F21 *Goodwill and business combinations*). The headroom for Composite Materials (being the difference between the value in use based on discounted cash flows and the carrying amount) was close to € 0.8 billion, or close to 24% of the carrying amount.

The headroom of Composite Materials is sensitive to change in assumptions related to discount rate and long term growth rate. Under the sensitivities below, this headroom remained positive, although below 10% of the carrying amount if the long term growth rate decreases by 1%.

in € billion	2019		2018	
Assumptions: Discount rate = 6.7% Long term growth rate = 2%	Impact on recoverable amount	Revised headroom	Impact on recoverable amount	Revised headroom
Sensitivity to discount rate –0,5%	0.5	1.3	0.6	1.3
Sensitivity to discount rate +0,5%	(0.4)	0.4	(0.4)	0.3
Sensitivity to long term growth rate –1%	(0.7)	0.1	(0.6)	0.1
Sensitivity to long term growth rate +1%	1.0	1.8	1.0	1.8

The table below shows the break-even analysis for the headroom of Composite Materials:

	Discount rate		Long term growth rate	
	Base rate	Break-even rate	Base rate	Break-even rate
2019	6.7%	7.8%	2.0%	0.8%
2018	6.2%	7.1%	2.0%	0.8%

Sensitivities for Technology Solutions

Technology Solutions was equally part of the Cytec acquisition at year-end 2015 (Operating Segment: Advanced Formulations). It had a carrying amount of € 2.0 billion, including goodwill of € 1.0 billion (see note F21 *Goodwill and business combinations*). The headroom for Technology Solutions (being the difference between the value in use based on discounted cash flows and the carrying amount) was close to € 0.4 billion, or close to 20% of the carrying amount.

In light of the strategic review performed in 2019, the long term growth assumption for Technology Solutions has been revised (from 2% in 2018 to 1% in 2019). As this change in assumption has a significant impact on the recoverable amount of Technology Solutions, a sensitivity analysis has been performed.

Under the sensitivities below, this headroom remained positive, although below 10% of the carrying amount if the long term growth rate decreases by 1%.

in € billion	2019	
Assumptions: Discount rate = 6.7% Long term growth rate = 1%	Impact on recoverable amount	Revised headroom
Sensitivity to discount rate –0,5%	0.2	0.6
Sensitivity to discount rate +0,5%	(0.2)	0.2
Sensitivity to long term growth rate –1%	(0.3)	0.1
Sensitivity to long term growth rate +1%	0.5	0.8

The table below shows the break-even analysis for the headroom of Technology Solutions:

Discount rate		Long term growth rate	
Base rate	Break-even rate	Base rate	Break-even rate
6.7%	7.8%	1.0%	(0.2%)

Impairment tests 2018

No impairment loss for fully consolidated CGUs

The impairment tests performed at CGU level at December 31, 2018 did not lead to any impairment of assets, as the recoverable amounts of the (groups of) CGUs were higher than their carrying amounts. More specifically, the difference between the (groups of) CGUs' value in use and their carrying amount (headroom) represented in all cases more than 10% of their carrying amount. As such, for those (groups of) CGUs, a reasonable change in a key assumption on which the recoverable amount of the (groups of) CGUs is based, would not result in an impairment loss for the related (groups of) CGUs.

Reversal of impairment for a cogeneration asset in Brazil

In 2018 following improved market conditions, the impairment loss related to the Brazilian electricity cogeneration asset that was recognized in 2016 had been reversed (€ 22 million – Operating Segment: Corporate and Business Services) – also see note F5 *Results from portfolio management and reassessments, legacy remediation and major litigations*.

Results of impairment tests for CGUs under joint control

RusVinyl is a Russian joint venture in chlorovinyls (Operating Segment: Performance Chemicals) in which Solvay holds a 50% equity interest, together with Sibur who holds the remaining 50% equity interest.

The recoverable amount of the investment has been estimated based on a dividend discount model taking into account the latest business plan. It is highly sensitive to the RUB/€ exchange rate. This rate impacts the carrying amount of the investment, the foreign currency losses on the euro denominated debt, and consequently the distributable earnings potential. The impairment test confirms that the value-in-use (based on dividend discount model) is in line with the carrying amount.

NOTE F28
Inventories

Accounting policy

Cost of inventories includes the purchase, conversion and other costs incurred in bringing the inventories to their present location and condition. The cost of inventories is determined by using the weighted average cost or first-in, first-out (FIFO) method. Inventories having a similar nature and use are measured using the same cost formula.

Inventories are measured at the lower of purchasing cost (raw materials and merchandise) or production cost (work in progress and finished goods) and net realizable value. Net realizable value represents the estimated selling price, less all estimated costs of completion and the estimated costs necessary to make the sale.

CO_2 emission rights

With respect to the mechanism set up by the European Union to encourage manufacturers to reduce their greenhouse gas emissions, carbon dioxide (CO_2) emission rights are granted to the Group for free. The Group is also involved in Clean Development Mechanism (CDM) under the Kyoto protocol. Under these projects, the Group has deployed facilities in order to reduce greenhouse gas emissions at the relevant sites in return for Certified Emission Reductions (CER).

In the absence of any IFRS regulating the accounting treatment of CO_2 emission rights, the Group applies the Trade/Production model, according to which CO_2 emission rights are presented as inventories if they will be consumed in the production process or as derivatives if they are held for trading. Energy Services is involved in CO_2 emission rights' trading, arbitrage and hedging activities. The net income or expense from these activities is recognized in "other operating gains and losses" (a) for the industrial component, where Energy Services sells the excess CO_2 emission rights generated by Solvay or where a Group deficit is recognized, as well as (b) for the trading component, where Energy Services acts as a trader/broker with respect to those CO_2 emission rights.

In light of its centralized CO_2 emission rights' portfolio management, for emission rights that are substitutable between subsidiaries, the Group's financial statements reflect the Group's net position. If this net position is negative, a provision is recognized, measured based on the market price of the CO_2 emission rights at reporting date.

Energy savings certificates (ESCs)

Energy savings certificates are presented as inventory items. They are measured at weighted average cost. As their cost is not separately identifiable, and as they are a by-product, they are measured at their net realizable value upon initial recognition.

In € million	**2019**	2018
Finished goods	973	1,083
Raw materials and supplies	672	654
Work in progress	22	22
Total	**1,667**	**1,759**
Write-downs	(80)	(74)
Net total	**1,587**	**1,685**

NOTE F29
Other receivables (current)

In € million	**2019**	2018
VAT and other taxes	271	351
Advances to suppliers	66	81
Financial instruments – operational	167	162
Insurance premiums	30	30
Loan receivables	24	14
Receivables on assets disposal		3
Other	69	77
Other current receivables	**628**	**719**

Financial instruments – operational include held for trading and cash flow hedge derivatives (see note F35.A. *Overview of financial instruments*).

NOTE F30
Assets held for sale

Accounting policy

A disposal group is a group of assets to be disposed of, by sale or otherwise, together as a group in a single transaction, and liabilities directly associated with those assets that will be transferred in the transaction. The group includes goodwill acquired in a business combination if the group is a cash-generating unit to which goodwill has been allocated, or if it is an operation within such a cash-generating unit.

Non-current assets and disposal groups are classified as held for sale if their carrying amount will be recovered principally through a sale transaction rather than through continuing use. This condition is regarded as met only when the sale is highly probable and the asset (or disposal group) is available for immediate sale in its present condition. For a sale to be highly probable, management should be committed to a plan to sell the asset (or disposal group), an active program to locate a buyer and complete the plan should be initiated, the asset (or disposal group) should be actively marketed at a price which is reasonable in relation to its current fair value, the sale should be expected to be completed within one year from the date of classification, and actions required to complete the plan should indicate that it is unlikely that significant changes to the plan will be made or that the plan will be withdrawn.

When the Group is committed to a sale plan involving loss of control of a subsidiary, all of the assets and liabilities of that subsidiary are classified as held for sale when the criteria described above are met, regardless of whether the Group will retain a non-controlling interest in its former subsidiary after the sale.

Non-current assets (and disposal groups) classified as held for sale are measured at the lower of their previous carrying amount and fair value less costs to sell. Any excess of the carrying amount over the fair value less costs to sell is recognized as an impairment loss. Depreciation of such assets is discontinued as from their classification as held for sale. Prior period consolidated statements of financial position are not restated to reflect the new classification of a non-current asset (or disposal group) as held for sale.

In € million	**2019** **Polyamides**	2018 Polyamides
Operating Segment	**Performance Chemicals**	**Performance Chemicals**
Property, plant and equipment	817	670
Goodwill	173	173
Intangible assets	69	71
Right-of-use assets	35	
Investments	1	1
Deferred tax assets	34	32
Inventories	236	249
Trade receivables	186	200
Other assets	33	39
Assets held for sale	***1,586***	***1,434***
Provisions	81	75
Deferred tax liabilities	110	72
Other non-current liabilities	21	10
Trade payables	147	217
Income tax payables	14	12
Other liabilities	63	48
Liabilities associated with assets held for sale	***437***	***435***
Net carrying amount of the disposal group	**1,149**	**999**
Included in other comprehensive income		
Currency translation differences	19	21
Defined benefit plans	(5)	(3)
Other comprehensive income	**14**	**17**

Property, plant and equipment increased as a result of continued capital expenditures. Since the classification of Polyamides as held for sale (2017), no depreciations have been recognized.

NOTE F31
Equity

Accounting policy

Share capital

Ordinary shares are classified as equity.

Incremental costs directly attributable to the issuance of new share capital are directly recognized in equity as a deduction, net of tax, from the equity issuance proceeds.

Reserves

The reserves include:

- treasury shares;
- perpetual hybrid bonds that qualify as equity absent any unavoidable contractual obligation to repay the principal and interest of the perpetual hybrid bonds (no maturity, interest is payable annually but can be deferred indefinitely at the issuer's discretion);
- retained earnings;
- currency translation differences from the consolidation process relating to the translation of the financial statements of foreign operations prepared in a non-euro functional currency to the euro presentation currency;
- the impacts of the fair value remeasurement of equity instruments measured at fair value through other comprehensive income;
- the impacts of the fair value remeasurement of financial instruments documented as hedging instruments in cash flow hedges;
- actuarial gains and losses related to defined benefit plans.

Non-controlling interests

Those represent the share of non-controlling interests in the net assets and comprehensive income of subsidiaries of the Group, and corresponds to the interests in subsidiaries that are not held by the Company or its subsidiaries.

Perpetual hybrid bonds

To strengthen its capital structure, Solvay issued undated deeply subordinated perpetual bonds ("perpetual hybrid bonds") of respectively € 1.2 billion (€ 1,194 million net of issuance costs) in 2013 following the acquisition of Chemlogics, € 1.0 billion (€ 994 million net of issuance costs) in 2015 for the financing of the acquisition of Cytec, and € 300 million (€ 298 million net of issuance costs) in November 2018. In May 2019, Solvay has repaid € 700 million of hybrid bonds (NC5.5 at 4.199%) issued in 2013, further to the exercise of its first call option.

All perpetual hybrid bonds are classified as equity absent any unavoidable contractual obligation to repay the principal and interest of the perpetual hybrid bonds, specifically:

- no maturity, yet the issuer has a call option at every reset date to redeem the instrument;
- at the option of the issuer, interest payments can be deferred indefinitely.

The coupons related to the perpetual hybrid bonds are recognized as equity transactions and are deducted from equity upon declaration (see consolidated statement of changes in equity):

- amounting to € 57 million in 2019 (€ 57 million in 2018) for the 2013 € 1.2 billion issuance (€ 700 million NC5.5 at 4.199% - repaid in May 2019 – and outstanding € 500 million NC10 at 5.425%);
- amounting to € 55 million in 2019 (€ 55 million in 2018) for the 2015 € 1.0 billion issuance (€ 500 million NC5.5 at 5.118% and € 500 million NC8.5 at 5.869%);
- amounting to € 3 million in 2019 (corresponding to a quarter) for the 2018 € 300 million issuance (NC5.25); the coupon expected to be declared in 2020 is expected to amount to € 13 million (4.25% yearly coupon).

Should Solvay have elected not to pay any interests to the perpetual hybrid bond holders, then any payment of dividends to the ordinary shareholders or repayment of ordinary shares would trigger a contractual obligation to pay previously unpaid interests to the perpetual hybrid bond holders.

Tax impacts related to the perpetual hybrid bonds are recognized in profit or loss (also see section *Basis of Preparation*).

Number of shares (in thousands)

	2019	2018
Shares issued and fully paid at January 1	105,876	105,876
Shares issued and fully paid at December 31	105,876	105,876
Treasury shares held at December 31	2,466	2,723

NOTE F32
Non-controlling interests

The amounts disclosed below are fully consolidated amounts and do not reflect the impacts from elimination of intragroup transactions.

At the end of 2019 the following three subsidiaries have non-controlling interests totaling € 89 million (out of a total of € 111 million).

2019 In € million	Zhejiang Lansol	Solvay Special Chem Japan	Solvay Soda Ash
Non-controlling ownership interest	45%	33%	20%
Statement of financial position			
Non-current assets	27	19	300
Current assets	32	22	27
Non-current liabilities	1	1	18
Current liabilities	15	4	24
Income statement			
Sales	63	65	346
Profit for the year	5	3	148
Other comprehensive income		1	(13)
Total comprehensive income	**5**	**4**	**135**
Dividends paid to non-controlling interests		1	31
Share of non-controlling interest in the profit for the year	2	1	30
Accumulated non-controlling interests	19	12	58

At the end of 2018 the following three subsidiaries have non-controlling interests totaling € 89 million (out of a total of € 117 million).

2018 In € million	Zhejiang Lansol	Solvay Special Chem Japan	Solvay Soda Ash
Non-controlling ownership interest	45%	33%	20%
Statement of financial position			
Non-current assets	23	18	304
Current assets	42	21	28
Non-current liabilities	3	1	13
Current liabilities	23	2	23
Income statement			
Sales	62	67	321
Profit for the year	11	5	142
Other comprehensive income	(1)	2	1
Total comprehensive income	**10**	**7**	**143**
Dividends paid to non-controlling interests		2	32
Share of non-controlling interest in the profit for the year	5	2	28
Accumulated non-controlling interests	17	12	60

NOTE F33
Share-based payments

Accounting policy

Solvay has set up compensation plans, including equity-settled and cash-settled share-based compensation plans.

In its equity-settled plans, the Group receives services as consideration for its own equity instruments (namely through the issuance of share options). The fair value of services rendered by employees in consideration for the granting of equity-instruments represents an expense. This expense is recognized on a straight-line basis in the consolidated income statement over the vesting periods relating to these equity-instruments with the recognition of a corresponding adjustment in equity. The fair value of services rendered is measured based on the fair value of the equity-instruments on the grant date. It is not subsequently remeasured. At each reporting date, the Group re-estimates the number of share options likely to vest. The impact of the revised estimates is recognized in profit or loss against a corresponding adjustment in equity.

In its cash-settled plans, the Group acquires services by incurring a liability to transfer to its employees rendering those services amounts that are based on the price (or value) of equity instruments (including shares or share options) of the Group (namely through the issuance of performance share units). The fair value of services rendered by employees in consideration for the granting of share-based payments represents an expense. This expense is recognized on a straight-line basis in the consolidated income statement over the vesting periods relating to these share-based payments with the recognition of a corresponding adjustment in liabilities. At each reporting date, the Group re-estimates the number of options likely to vest, with the impact of the revised estimates recognized in profit or loss. The Group measures the services acquired and the liability incurred at the fair value of the liability. Until the liability is settled, the Group remeasures the fair value of the liability at the end of each reporting period and at the date of settlement, with any changes in fair value recognized in profit or loss for the period.

Stock Option Plan

As every year since 1999, in 2019, the Board of Directors renewed the share option plan offered to executive staff (51 beneficiaries) with a view to involving them more closely in the long-term development of the Group. The plan is an equity-settled share-based plan. The majority of the managers involved subscribed to the options offered to them in 2019 with an exercise price of € 97.05 representing the average stock market price of the share for the 30 days prior to the offer.

At the end of December 2019, the Group held 2,465,766 treasury shares, which have been deducted from consolidated shareholders' equity.

Share options	**2019**	2018 – 2	2018 – 1	2017	2016	2015
Number of share options granted and still outstanding at December 31, 2018		72,078	400,704	316,935	759,023	346,617
Granted share options	438,107					
Forfeitures of rights and expiries						
Share options exercised						
Number of share options at December 31, 2019	438,107	72,078	400,704	316,935	759,023	346,617
Share options exercisable at December 31, 2019						346,617
Exercise price (in €)	97.05	108.38	113.11	111.27	75.98	114.51
Fair value of options at measurement date (in €)	17.77	20.81	19.10	23.57	17.07	24.52

Share options	2014	2013	2012	2011	2007	2006
Number of share options granted and still outstanding at December 31, 2018	360,354	367,171	404,959	62,481	68,058	64,721
Granted share options						
Forfeitures of rights and expiries				(3,257)		(17,882)
Share options exercised	(8,872)		(198,815)	(59,224)	(15,570)	(46,839)
Number of share options at December 31, 2019	351,482	367,171	206,144		52,488	
Share options exercisable at December 31, 2019	351,482	367,171	206,144		52,488	
Exercise price (in €)	101.14	104.33	83.37	61.76	90.97	102.53
Fair value of options at measurement date (in €)	22.79	20.04	21.17	12.73	17.56	19.92

	2019		2018	
	Number of share options	**Weighted average exercise price**	Number of share options	Weighted average exercise price
At January 1	3,223,101	101.32	2,986,850	97.90
Granted during the year	438,107	97.05	472,782	112.39
Forfeitures of rights and expiries during the year	(21,139)	96.25	(34,368)	90.24
Exercised during the year	(329,320)	83.05	(202,164)	78.58
At December 31	3,310,749	102.60	3,223,101	101.32
Exercisable at December 31	1,323,902		1,674,361	

In 2019, the share options resulted in an expense of € 11 million, which was calculated by third parties according to the Black-Scholes model, and recognized in the consolidated income statement as part of administrative costs.

The valuation of the stock option plan of 2019 is based on:

- the price of the underlying asset (Solvay share): € 100.05 at February 27, 2019;
- the time outstanding until the option maturity: exercisable from January 1, 2023, until February 27, 2027, taking into account the fact that some of them will be exercised before the option maturity;
- the option exercise price: € 97.05;
- the risk-free return: 0.39% (on average);
- the volatility of the underlying yield, estimated based on the option price: 23.00%;
- a dividend yield of 3.03%.

Weighted average remaining contractual life:

In years	**2019**	2018
Share option plan 2006	–	1.0
Share option plan 2007	1.0	2.0
Share option plan 2011	–	1.0
Share option plan 2012	0.1	1.1
Share option plan 2013	1.2	2.2
Share option plan 2014	2.2	3.2
Share option plan 2015	3.2	4.2
Share option plan 2016	4.2	5.2
Share option plan 2017	5.2	6.2
Share option plan 2018 – 1	6.2	7.2
Share option plan 2018 – 2	6.6	7.6
Share option plan 2019	7.2	–

Performance Share Units Plan (PSU)

Since 2013, the Board of Directors renewed a yearly Performance Share Unit Plan, offered to executive staff with the objective of involving them more closely in the development of the Group, making this part of the long term incentive policy. All the managers involved subscribed the PSU offered to them in 2019 with a grant price of € 97.05. The Performance Share Units is a cash-settled share-based plan through which beneficiaries will obtain a cash benefit based on the Solvay share price, as well as performance conditions and accrued dividends.

Each plan has a 3-year vesting period, after which a cash settlement will take place, if vesting conditions will have been met.

Performance share units	**Plan 2019**	Plan 2018
Number of PSUs	239,556	215,567
Grant date	26/02/2019	27/02/2018
Acquisition date	01/01/2022	01/01/2021
Vesting period	31/03/2019 to 31/12/2021	31/03/2018 to 31/12/2020
Performance conditions	40% of the initial granted PSUs are subject to the Underlying EBITDA YoY growth % over 3 years (2019, 2020, 2021)	40% of the initial granted PSUs are subject to the Underlying EBITDA YoY growth % over 3 years (2018, 2019, 2020)
	40% of the initial granted PSUs are subject to the CFROI YoY % variation over 3 years (2019, 2020, 2021)	40% of the initial granted PSUs are subject to the CFROI YoY % variation over 3 years (2018, 2019, 2020)
	20% of the initial granted PSUs are subject to the GHG Intensity reduction target at the end of the accounting period ending December 31, 2021	20% of the initial granted PSUs are subject to the GHG Intensity reduction target at the end of the accounting period ending December 31, 2020
Validation of performance conditions	By the Board of Directors	By the Board of Directors

In 2019 the impact on the consolidated income statement regarding PSU (net of hedging) amounts to € 17 million, compared to € 15 million in 2018. The carrying amount of the PSU liability at the end of 2019 amounts to € 40 million, compared to € 44 million at the end of 2018.

NOTE F34
Provisions

In € million	Employee benefits	Restructuring	Environment	Litigation	Other	Total
At December 31, 2018	**2,671**	**185**	**691**	**121**	**168**	**3,836**
Additions	106	41	58	23	52	280
Reversals of unused amounts	(13)	(65)	(8)	(13)	(27)	(126)
Uses	(337)	(62)	(81)	(9)	(24)	(513)
Increase through discounting	69		40	(2)		107
Remeasurements	182					182
Currency translation differences	23	1	5		1	29
Transfer to liabilities associated with assets held for sale	(9)		(2)		3	(8)
Other	3	(2)		(40)	(39)	(78)
At December 31, 2019	**2,694**	**99**	**703**	**80**	**135**	**3,710**
Of which current provisions		33	79	5	73	190

The use (cash-out) of € 513 million includes € 503 million for continuing operations, of which € 337 million for employee benefits (including € 114 million for voluntary contributions), € 62 million for restructuring plans and € 81 million for environmental items. The reversal of unused amounts includes the reversal of provisions for indemnities for expected refusals to relocate following the decision to stop the planned transfers of the teams based in Paris to Lyon and Brussels (€ (48) million). The line “increase through discounting” includes € 87 million for increase at constant discount rate, and € 20 million related to change of discount rate. The line “Other” corresponds mainly to a reclassification of € 40 million in other non-current liabilities following the adoption of IFRIC 23 Uncertainty over Income Tax Treatments, and € 16 million in lease liabilities related to onerous contracts following the adoption of IFRS 16 Leases.

The deleveraging corresponds to the net difference between:

- cash out (use for € (513) million) on the one hand; and
- the sum of the net accruals for new liabilities (€ 154 million, being additions less reversals of unused amounts) and the increase through discounting (€ 87 million) at constant discount rate on the other hand.

The deleveraging of provisions amounts to € 272 million. This amount is higher than in previous years mainly due to a voluntary contribution in pensions plans of United Kingdom for € 114 million in addition to the mandatory pensions contributions. The effect of this voluntary contribution will be a partial de-risking of the pension plans and a reduction of recurring pension contributions in the mid-term.

Management expects provisions (other than employee benefits) to be used (cash outlays) as follows:

In € million	Up to 5 years	Between 5 and 10 years	Beyond 10 years	Total
Provisions for environment	312	115	275	702
Provisions for litigation	74	6		80
Provisions for restructuring and other	207	22	5	233
At December 31, 2019	**593**	**143**	**280**	**1,015**

F34.A. Provisions for employee benefits

Accounting policy

General

The Group's employees are offered various post-employment benefits, other long-term employee benefits, and termination benefits as a result of legislation applicable in certain countries, and contractual agreements entered into by the Group with its employees or constructive obligations.

The post-employment benefits are classified as defined contribution or defined benefit plans.

Defined contribution plans

Defined contribution plans involve the payment of fixed contributions to a separate entity, and release the employer from any subsequent obligation, as this separate entity is solely responsible for paying the amounts due to the employee. The expense is recognized when an employee has rendered services to the Group during the period.

Defined benefit plans

Defined benefit plans concern all plans other than defined contribution plans, and include:

- post-employment benefits: pension plans, other post-employment obligations and supplemental benefits such as post-employment medical plans;
- other long-term employee benefits: long-service benefits granted to employees according to their seniority in the Group;
- termination benefits such as early pension plans.

Taking into account projected final salaries on an individual basis, post-employment benefits are measured by applying a method (projected unit credit method) using assumptions involving discount rate, life expectancy, turnover, wages, annuity revaluation and medical cost inflation. The assumptions specific to each plan take into account the local economic and demographic contexts.

The discount rates are interest rates of high-quality corporate bonds that are denominated in the currency in which the benefits will be paid, and that have terms to maturity approximating the terms of the related pension obligation.

The amount recognized under post-employment obligations corresponds to the difference between the present value of future obligations and the fair value of the plan assets funding the plan, if any. If this calculation gives rise to a deficit, an obligation is recognized in liabilities. Otherwise, a net asset limited to the lower of the surplus in the defined benefit plan and the present value of any future plan refunds or any reduction in future contributions to the plan is recognized.

The defined benefit cost consists of service cost and net interest expense (based on discount rate) on the net liability or asset, both recognized in profit or loss, and remeasurements of the net liability or asset, recognized in other comprehensive income.

Service cost consists of current service cost, past service cost resulting from plan amendments or curtailments and settlement gains or losses.

The interest expenses arising from the reverse discounting of the benefit obligations, the financial income on plan assets (determined by multiplying the fair value of the plan assets by the discount rate) as well as interest on the effect of the asset ceiling are recognized on a net basis in the net financial charges (cost of discounting of provisions).

Remeasurements of the net liability or asset consist of:

- actuarial gains and losses on the benefit obligations arising from experience adjustments and/or changes in actuarial assumptions (including the effect of changes in the discount rate) recognized in other comprehensive income;
- changes as a consequence of plan amendments, recognized in profit or loss;
- the return on plan assets (excluding amounts in net interest) and changes in the limitation of the net asset recognized.

Other long-term and termination benefits are accounted for in the same way as post-employment benefits but remeasurements are fully recognized in the net financial charges during the period in which they occur.

The actuarial calculations of the main post-employment obligations and other long-term benefits are performed by independent actuaries.

Overview

In € million	2019	2018
Post-employment benefits	2,498	2,490
Other long-term benefits	145	132
Termination benefits	52	50
Total employee benefits	**2,694**	**2,671**

Post-employment benefits

A. Defined contribution plans

For defined contribution plans, Solvay pays contributions to publicly or privately administered pension funds or insurance companies. For 2019, the expense amounts to € 62 million compared to € 58 million for 2018.

B. Defined benefit plans

Defined benefit plans can be either funded via outside pension funds or insurance companies ("funded plans") or financed within the Group ("unfunded plans"). Unfunded plans have no plan assets dedicated to them.

The net liability results from the net of the provisions and the asset plan surplus.

In € million	2019	2018
Provisions	2,498	2,490
Asset plan surplus	(23)	(5)
Net liability	**2,475**	**2,485**
Operational expense	56	31
Finance expense	57	51

The operating expense includes current service cost for € 44 million (€ 47 million in 2018).

B.1. Management of risks

Over recent years, the Group has reduced its exposure to defined benefit plan obligations stemming from future services by converting existing plans into pension plans with a lower risk profile (hybrid plans, cash balance plans and defined contribution plans) or by closing them to new entrants.

Solvay continuously monitors its risk exposure, focusing on the following risks:

Asset volatility

Equity instruments, even though expected to outperform corporate bonds in the long-term, create volatility and risk in the short-term. To mitigate this risk, the allocation to equity instruments is monitored using Assets and Liabilities Management techniques, to ensure it remains appropriate given the respective schemes' and Group's long term objectives.

Changes in bond yields

A decrease in corporate bond yields will increase the carrying amount of the plans' liabilities. For funded schemes this impact will be partially offset by an increase in the fair value of the plan assets.

Inflation risk

The defined benefit obligations are linked to inflation, and higher inflation will lead to higher liabilities (although, in most cases, caps on the level of inflationary increases are in place to protect against extreme inflation). A limited part of the assets are either unaffected by or only loosely correlated with inflation, meaning that an increase in inflation will also increase the plans' net liabilities.

Life expectancy

The majority of the schemes' obligations are to provide benefits for the life of the member. Increases in life expectancy will therefore increase the plans' liabilities.

Regulatory risk

Especially with respect to funded plans, the Group is exposed to the risk of external funding following regulatory constraints. This should not impact the defined benefit obligation but could expose the Group to a potential significant cash outlay.

For more information about Solvay Group risk management, please refer to the "Management of risks" section of the present document.

B.2 Description of obligations

The provisions have been set up to cover post-employment benefits granted by most Group companies in line, either with local rules and /or with established practices which generate constructive obligations.

The largest post-employment plans in 2019 are in the United Kingdom, the United States, France, Germany and Belgium. These five countries represent 94% of the total defined benefit obligations.

2019 In € million	Defined benefit obligations	In %	Recognized plan assets	Net liability	In %	Ratio plan assets on defined benefit obligations
United Kingdom	1,680	30%	1,423	256	10%	85%
United States	1,406	26%	1,134	272	11%	81%
France	1,113	20%		1,113	45%	0%
Germany	576	11%		576	23%	0%
Belgium	400	7%	274	126	5%	68%
Other countries	336	6%	204	132	5%	61%
Total	**5,511**	**100%**	**3,035**	**2,475**	**100%**	**55%**

2018 In € million	Defined benefit obligations	In %	Recognized plan assets	Net liability	In %	Ratio plan assets on defined benefit obligations
United Kingdom	1,530	31%	1,124	406	16%	73%
United States	1,271	25%	981	290	12%	77%
France	1,021	20%	1	1,020	41%	0%
Germany	520	10%		520	21%	0%
Belgium	385	8%	242	143	6%	63%
Other countries	294	6%	188	106	4%	64%
Total	**5,022**	**100%**	**2,536**	**2,485**	**100%**	**51%**

It is worth highlighting that unfunded plans are mainly in Germany and France that account for 68% of 2019 net liability. See comments by countries below.

United Kingdom

Solvay sponsors a few defined benefit plans in the United Kingdom; the largest one is the Rhodia Pension Fund. This is a final salary funded pension plan, with entitlement to accrue a percentage of salary per year of service. It was closed to new entrants in 2003 and replaced by a defined contribution plan.

Broadly, about 8% of the liabilities are attributable to current employees, 27% to former employees and 65% to current pensioners.

The Fund functions and complies with UK legislation under a large regulatory framework. The Pensions Regulator has a risk based approach to regulation and a code of practice which provides practical guidance to trustees and employers of defined benefit schemes on how to comply with the scheme funding requirements. In accordance with UK legislation, the Fund is subject to Scheme Specific Funding which requires that pension plans are funded prudently.

The UK Rhodia Pension Fund is governed by a Board of Trustees. They manage the Fund with prudent and fair judgment. The Trustees determine the liabilities used for Statutory Funding Objectives based on prudent actuarial and economic assumptions. Any shortfall or deficit once these liabilities have been deducted from the Fund's assets must be reduced by additional contributions and in a time frame determined in accordance with the employer's ability to pay and the strength of covenant or contingent security being offered by the employer.

The Rhodia Pension Fund is subject to a triennial valuation cycle for funding purposes. This valuation is performed by the scheme actuary in line with UK regulations and is discussed between the Trustees and the sponsoring employer to agree the valuation assumptions and a funding plan. The last completed valuation was as at January 1, 2018 which established a fixed contribution rate of pensionable pay for active members plus a deficit recovery plan which aims to fund the scheme's technical provisions over a period of time. Recovery contributions have been increased so that the plan is expected to be fully funded by the end of 2027 in accordance with local regulations. At the end of 2019 a voluntary contribution has been paid (€ 114 million), which corresponds to the expected annual contributions for the next four years.

The guarantee provided by Solvay (£ 550 million) is based on local regulations and exceeds the recognized liability (€ 216 million) – See note F39 *Contingent liabilities and financial guarantees* for more information.

France

Solvay sponsors different defined benefit plans in France. The largest plans are the French compulsory retirement indemnity plan and three closed top hat plans. Indeed, as required by the

"Loi Pacte", the open top hat plan (so called "ARS") has been closed at the end of 2019 and replaced by a defined contribution plan.

The main plan is for all former Rhodia current and retired employees who contributed to the plan prior to its closure in the 1970s. It offers a full benefit guarantee based on the end-of-career salary. This plan is unfunded and broadly, about 99% of the liabilities are attributable to current pensioners.

In accordance with French legislation, adequate guarantees have been provided.

United States

As of year-end 2019 Solvay sponsored five different defined benefit pension plans in the United States (two qualified plans and three non-qualified plans). A qualified plan is an employer-sponsored retirement plan that qualifies for special tax treatment under Section 401(a) of the Internal Revenue Code. At this moment all defined benefit plans are closed to new entrants where newly hired employees are eligible to participate in a defined contribution plan. Note that both qualified defined benefit pension plans are funded while the three non-qualified defined benefit pension plans are unfunded. The qualified plans make up the vast majority of the pension liabilities as of December 31, 2019.

Solvay's plans are in compliance with local laws regarding audited financial statements, governmental filings, and Pension Benefit Guaranty Corporation insurance premiums where applicable. The plans are reviewed and monitored locally by fiduciary committees for purposes of plan investments and administrative matters.

For the US qualified plans, Solvay's contributions take into account minimum (tax-deductible) funding requirements as well as maximum tax deductible contributions, both regulated by the tax authorities.

Certain eligible participants may elect to receive their pension in a single lump sum payment instead of a monthly payment.

Broadly, about 27% of the liabilities are attributable to current employees, 9% to former employees for whom benefit payments have not yet commenced and 64% to current pensioners.

In 2019, in the United States Solvay contributed to two multiemployer pension plans under collective bargaining agreements that cover certain of its union-represented employees. Each of the multiemployer plans is a defined benefit pension plan. None of the multiemployer plans provide an allocation of its assets, liabilities, or costs among contributing employers. None of the multiemployer plans provides sufficient information to permit Solvay, or other contributing employers, to account for the multiemployer plan as a defined benefit plan. Accordingly, the company accounts for its participation in each of the multiemployer plans as if they were a defined contribution plan. For multiemployer plans, during 2019 and 2018, the annual contributions paid are less than € 1 million.

Germany

Solvay sponsors various defined benefit plans in Germany. The largest plans are a closed final-pay plan and an open cash balance plan. As is common in Germany, all plans are unfunded. Broadly, about 64% of the liabilities are attributable to current pensioners.

Belgium

Solvay sponsors two defined benefit plans in Belgium. These are funded pension plans. The plan for executives has been closed since end of 2006, and the plan for the White and Blue collars has been closed since 2004. The past service benefits provided under these plans continues to be adapted each year considering annual salary increase and inflation ("Dynamic management"). In accordance with market practice in Belgium, because of favorable retirement lump sum taxation, most benefits are paid as lump sum.

Furthermore, Solvay sponsors two open defined contribution plans, classified as defined benefit plans for accounting purposes due to the minimum guarantees explained hereafter. These are funded pension plans which are open since the beginning of 2007 for the one in favor of the executives and since beginning of 2005 for the one in favor of the White and Blue collars. Participants may choose to invest their contributions amongst four different investment funds (from "Prudent" to "Dynamic"). However, regardless of their choices, the Belgian law foresees that the employer must guarantee a return on employer contribution and on personal contribution, creating that way a potential liability for the Group. Since 2016 the return has been fixed at 1.75% for both types of contributions, at the minimum of the range provided by law since January 1, 2016 (1.75% to 3.75%). At the end of 2019 net liability recognized in the consolidated statement of financial position concerning these plans is not material.

Solvay's plans are administered through the Solvay Pension Fund that operates in compliance with local laws regarding minimum funding, investments principles, audited financial statements, governmental filings, and governance principles. The Pension Fund is managed through a General Assembly and a Board of Directors delegating day-to-day activities to an operational Committee.

Solvay sponsors a few other smaller pension plans. All these plans are insured.

Other Plans

The majority of the obligations relate to pension plans. In some countries (mainly the United States), there are also post-employment medical plans, which represent 6% of the total defined benefit obligation.

B.3 Financial impacts

Changes in net liability

In € million	2019	2018
Net amount recognized at beginning of period	**2,485**	**2,622**
Net expense recognized in P&L – Defined benefit plans	113	82
Actual employer contributions/direct actual benefits paid	(308)	(196)
Acquisitions and disposals		(8)
Remeasurements before impact of asset ceiling	167	(25)
Change in the effect of the asset ceiling limit on remeasurements	(1)	(1)
Reclassifications	1	4
Currency translation differences	22	7
Transfer to (liabilities associated with) assets held for sale	(4)	
Net amount recognized at end of period	**2,475**	**2,485**

Remeasurements before impact of asset ceiling (€ 167 million) comprise:

- the favorable investment return on plan assets (excluding interests reported in the consolidated income statement) for € (327) million;
- decrease in discount rates (€ 584 million) mainly in the United States, United Kingdom and Eurozone;
- decrease in inflation rate (€ (38) million) for United Kingdom;
- other remeasurements due to changes in the other financial assumptions, demographic and experience effects (€ (52) million).

Net expense

In € million	2019	2018
Current service costs	44	47
Past service costs (including curtailments)	8	(26)
Service costs	**52**	**20**
Interest cost	144	135
Interest income	(87)	(84)
Net interest	**57**	**51**
Administrative expenses paid	**4**	**11**
Net expense recognized in P&L – Defined benefit plans	**113**	**82**
Remeasurements recognized in other comprehensive income	**166**	**(26)**

The service costs and administrative expenses of these benefit plans are recognized within cost of sales, administrative costs, research & development costs or operating gains and losses and results from legacy remediation, and the net interest is recognized as a finance expense.

In 2019 the Group's current service costs amount to € 44 million, of which € 29 million related to funded plans and € 15 million related to unfunded plans.

In 2018 the Group's current service costs amounted to € 47 million, of which € 31 million related to funded plans and € 16 million related to unfunded plans. Past service costs include mainly favorable impacts reflecting the amendment of post-retirement healthcare and death benefit plan in the United States (€ 24 million), a curtailment effect (€ 15 million) mainly in France and in Belgium, compensated by an unfavorable impact of the UK guarantee minimum pension for € 16 million.

Net liability

In € million	2019	2018
Defined benefit obligations – Funded plans	3,500	3,200
Fair value of plan assets at end of period	(3,040)	(2,542)
Deficit for funded plans	**460**	**658**
Defined benefit obligations – Unfunded plans	2,011	1,822
Deficit/Surplus (–)	**2,471**	**2,481**
Amounts not recognized as asset due to asset ceiling (recognized in other comprehensive income)	4	5
Net liability (asset)	**2,475**	**2,485**
Provision recognized	2,498	2,490
Asset recognized	(23)	(5)

Changes in defined benefit obligations

In € million	2019	2018
Defined benefit obligation at beginning of period	**5,022**	**5,349**
Current service costs	44	47
Past service costs (including curtailments)	8	(26)
Interest cost	144	135
Employee contributions	5	4
Settlements		(8)
Acquisitions and disposals (–)		(8)
Remeasurements in other comprehensive income	494	(209)
Actuarial gains and losses due to changes in demographic assumptions	*(20)*	*(45)*
Actuarial gains and losses due to changes in financial assumptions	*511*	*(139)*
Actuarial gains and losses due to experience	*2*	*(26)*
Actual benefits paid	(308)	(296)
Currency translation differences	105	29
Reclassification and other movements	3	4
Transfer from/to (liabilities associated with) assets held for sale	(5)	2
Defined benefit obligation at end of period	**5,511**	**5,022**
Defined benefit obligations – Funded plans	3,500	3,200
Defined benefit obligations – Unfunded plans	2,011	1,822

Changes in the fair value of plan assets

In € million	2019	2018
Fair value of plan assets at beginning of period	**2,542**	**2,733**
Interest income	87	84
Remeasurements in other comprehensive income	327	(185)
Employer contributions	308	196
Employee contributions	5	4
Administrative expenses paid	(4)	(11)
Settlements		(8)
Actual benefits paid	(308)	(296)
Currency translation differences	83	23
Reclassification and other movements	2	
Transfer from/to (liabilities associated with) assets held for sale	(1)	1
Fair value of plan assets at end of period	**3,040**	**2,542**
Actual return on plan assets	414	(101)

In 2019 the total return on plan assets, i.e. including interest income, amounts to € 414 million against € (101) million in 2018.

In 2019, the Group's cash contributions amount to € 308 million, of which € 107 million of mandatory contributions to funds, € 114 million of voluntary cash contributions, and € 87 million of direct benefits payments. The voluntary cash contributions were made to improve the funding levels of the Rhodia Pension Fund in the United Kingdom.

The Group's cash contributions for 2018 amounted to € 196 million, of which € 95 million of mandatory contributions to funds and € 101 million of direct benefits payments.

Except for any significant change in the regulatory environment (see "regulatory risk" above), the Group's mandatory cash contributions in 2020 are expected to decrease to approximate € 129 million, and the voluntary cash contributions are expected to approximate € 435 million (€ 380 million in France and € 55 million in the United States). The decrease of the mandatory contributions expected in 2020 is due to the action plans undertaken by the Group on the management of pension funding.

Categories of plan assets

	2019	2018
Equities	37%	36%
Bonds	49%	57%
Properties	0%	1%
Cash and cash equivalents	4%	2%
Derivatives	6%	0%
Others	4%	3%
Total	**100%**	**100%**

With respect to the invested assets, it should be noted that these assets do not contain any direct investment in Solvay Group shares or in property or other assets occupied or used by Solvay. This does not exclude Solvay shares being included in mutual investment fund type investments.

Changes in asset ceiling

In € million	**2019**	2018
Effect of the asset ceiling limit at beginning of period	**5**	**6**
Change in the effect of the asset ceiling limit on remeasurements	(1)	(1)
Effect of the asset ceiling limit at end of period	**4**	**5**

Actuarial assumptions used in determining the liability

Some of the retirement plans that Solvay has in place provide annuity payments that are adjusted on a regular basis to mitigate the effects for cost of living increases.

The salary growth assumption is used to determine what will be the salary at the end of the career of the individuals, as the defined benefit plans take into account the last salary of the individuals. This assumption includes impacts of both inflation and merit increases.

The pension growth assumption defines the expected future adjustments for these annuity payments. The plan defines how these annuity payments will be adjusted, and might be linked to inflation. Pension growth assumptions mainly apply for the defined benefit retirement plans in the United Kingdom, France and Germany.

Inflation assumption is presented separately as salary growth and pension growth assumptions encompass more variables than inflation.

	Eurozone		United Kingdom		United States	
In %	**2019**	2018	**2019**	2018	**2019**	2018
Discount rates	0.75	1.75	2.00	2.75	3.00	4.00
Expected rates of future salary increases	1.75 – 3.75	1.75 – 4.00	1.90 – 3.00	2.15 – 3.25	3.00 – 3.75	3.00 – 3.75
Inflation	1.75	1.75 – 2.00	3.00	3.25	2.25	2.25
Expected rates of pension growth	0.00 – 1.75	0.00 – 2.00	2.85	3.10	NA	NA

Actuarial assumptions used in determining the annual cost

	Eurozone		United Kingdom		United States	
In %	**2019**	2018	**2019**	2018	**2019**	2018
Discount rates	1.75	1.50	2.75	2.50	4.00	3.50
Expected rates of future salary increases	1.75 – 4.00	1.75 – 4.00	2.15 – 3.25	2.15 – 3.25	3.00 – 3.75	3.00 – 3.75
Inflation	1.75 – 2.00	1.50 – 1.75	3.25	3.25	2.25	2.25
Expected rates of pension growth	0.00 – 2.00	0.00 – 1.75	3.10	3.10	NA	NA

Actuarial assumptions regarding future mortality are based on recent country specific mortality tables. These assumptions translate at January 1, 2019 into an average remaining life expectancy in years for a pensioner retiring at age 65:

In years	Belgium	France	Germany	United Kingdom	United States
Retiring at the end of the reporting period					
Male	18	24	20	20	20
Female	21	28	24	23	22
Retiring 20 years after the end of the reporting period					
Male	18	27	23	21	21
Female	21	31	26	24	23

For most countries the mortality assumptions reflect actual scheme experience and/or Solvay's expectations in terms of future mortality improvements.

The actuarial assumptions used in determining the employee benefits obligation at December 31 are based on the following employee benefits liabilities durations:

	Eurozone	United Kingdom	United States
Duration in years	11.8	15.0	9.7

Sensitivities on the defined benefits obligation for the post-employment benefits

Each sensitivity amount is calculated assuming that all other assumptions are held constant. It should be noted that economic factors and conditions often affect multiple assumptions simultaneously.

Sensitivity to a change of percentage in the discount rates:

In € million	0.25% increase	0.25% decrease
Eurozone	(61)	63
United Kingdom	(60)	63
United States	(33)	34
Others	(6)	6
Total	**(160)**	**166**

Sensitivity to a change of percentage in the inflation rates:

In € million	0.25% increase	0.25% decrease
Eurozone	54	(53)
United Kingdom	46	(45)
United States		
Others	5	(4)
Total	**105**	**(102)**

Sensitivity to a change of percentage in salary growth rates:

In € million	0.25% increase	0.25% decrease
Eurozone	13	(12)
United Kingdom	3	(3)
United States	1	(1)
Others	1	(1)
Total	**18**	**(17)**

Sensitivity to a change of one year on mortality tables - The table shows impacts when the age of all beneficiaries increases or decreases by one year:

In € million	Age correction +1 year	Age correction –1 year
Eurozone	(85)	87
United Kingdom	(68)	69
United States	(32)	33
Others	(9)	9
Total	**(194)**	**198**

F34.B. Provisions other than for employee benefits

Accounting policy

General

Provisions are recognized when (a) the Group has a present obligation (legal or constructive) as a result of a past event, (b) it is probable that the Group will be required to settle the obligation, and (c) a reliable estimate can be made of the amount of the obligation.

The amount recognized as a provision is the best estimate of the consideration required to settle the present obligation at the end of the reporting period, taking into account the risks and uncertainties surrounding the obligation. Where the effect of the time value of money is material, the amount is the present value of expenditures required to settle the obligation. Impacts of changes in discount rates are generally recognized in the financial result.

When some or all of the economic benefits required to settle a provision are expected to be recovered from a third party, a receivable is recognized as an asset if it is virtually certain that reimbursement will be received when the Group settles the obligation.

Onerous contracts

An onerous contract is a contract in which the unavoidable costs of meeting the obligations under the contract exceed the economic benefits expected to be received under it. Present obligations arising from onerous contracts are recognized and measured as provisions.

Restructurings

A restructuring provision is recognized when the Group has developed a detailed formal plan for the restructuring and has raised a valid expectation in those affected that it will carry out the restructuring by starting to implement the plan or announcing its main features to those affected by it. The measurement of a restructuring provision includes only the direct expenditures arising from the restructuring, which are those amounts that are both necessarily entailed by the restructuring and not associated with the ongoing activities of the entity.

Environmental liabilities

Twice a year Solvay analyzes all its environmental risks and the corresponding provisions. Solvay measures these provisions to the best of its knowledge of applicable regulations, the nature and extent of the pollution, clean-up techniques and other available information. The assessment of all environmental risks, including those related to PFAS (per- and polyfluoroalkyl substances), are based on management's knowledge and compliant with applicable Standards. Based on its best knowledge, the Group believes that its provisions for all environmental risks are adequate. Provisions have been set in accordance with applicable IFRS accounting standards. This is also consistent with the Group's past practice and significant experience history with other environmental matters.

Restructuring provisions

These provisions amount to € 99 million, compared with € 185 million at the end of 2018.

The provisions at the end of 2019 mainly relate to the Group's simplification and transformation program (€ 85 million).

Environmental provisions

These provisions amount to € 703 million at the end of 2019, compared with € 691 million at the end of 2018, and pertain to:

- mines and drilling operations to the extent that legislation and/or operating permits in relation to quarries, mines and drilling operations contain requirements to pay compensation to third parties. Most of these provisions, based on local expert advice, can be expected to be used over a 1-20 year horizon and amount to € 149 million;
- the dismantling of the last mercury electrolysis activities, that was completed in 2019. The remaining provisions related to those activities will be used for the management of contamination of soils and groundwater, mostly over the next 20 years.
- lime dikes (settling ponds related mainly to soda ash plant) , dump at sites and third party dump sites (linked to several industrial activities). These provisions have a horizon of 1 to 20 years;
- various types of pollution (organic, inorganic) coming from miscellaneous chemical productions; these provisions mainly cover discontinued activities or closed plants. Most of these provisions have a horizon of 1 to 20 years.

The estimated amounts are discounted based on the probable date of settlement, and are periodically adjusted to reflect the passage of time.

The breakdown of the environmental provisions for the main Countries/Regions is reported here below:

In € million	2019	%	2018	%
France	133	19%	137	20%
Germany	128	18%	126	18%
Rest of Europe	178	25%	176	25%
North America	154	22%	150	22%
Rest of the world	110	16%	101	15%
Total	**703**	**100%**	**691**	**100%**

Provisions for litigation

Provisions for litigation refer to indirect tax and legal exposures. They amount to € 80 million at the end of 2019 compared with € 121 million at the end of 2018. The balance at the end of 2019 relates to indirect tax risks (€ 13 million) and legal claims (€ 67 million).

In the framework of adopting IFRIC 23 Uncertainty over Income Tax Treatments, an amount of € 40 million has been reclassified from provisions to other non-current liabilities.

Other provisions

Other provisions relate to the shutdown or disposal of activities and amount to € 135 million, compared with € 168 million at the end of 2018.

NOTE F35
Financial instruments and financial risk management

Accounting policy

General

Financial assets and liabilities are recognized when, and only when Solvay becomes a party to the contractual provisions of the instrument.

Amortized cost is the amount at which the financial asset or financial liability is measured at initial recognition minus the principal repayments, plus or minus the cumulative amortization using the effective interest method of any difference between that initial amount and the maturity amount and, for financial assets, adjusted for any loss allowance. The effective interest rate is the rate that exactly discounts estimated future cash payments or receipts through the expected life of the financial asset or financial liability to the gross carrying amount of a financial asset or to the amortized cost of a financial liability. When calculating the effective interest rate, the Group estimates the expected cash flows by considering all the contractual terms of the financial instrument (for example, prepayment, extension, call and similar options) but does not consider the expected credit losses. The calculation includes all fees and points paid or received between parties to the contract that are an integral part of the effective interest rate, transaction costs, and all other premiums or discounts.

Financial assets

Trade receivables are initially measured at their transaction price, if they do not contain a significant financing component, which is the case for substantially all trade receivables. Other financial assets are initially measured at fair value plus, in the case of a financial asset not at fair value through profit or loss, transaction costs that are directly attributable to the acquisition of the financial asset.

A financial asset is classified as current when the cash flows expected to flow from the instrument mature within one year.

All recognized financial assets will subsequently be measured at either amortized cost or fair value under IFRS 9 Financial Instruments. Specifically:

- a debt instrument that (i) is held within a business model whose objective is to collect the contractual cash flows and (ii) has contractual cash flows that are solely payments of principal and interest on the principal amount outstanding is measured at amortized cost (net of any write down for impairment), unless the asset is designated at fair value through profit or loss (FVTPL) under the fair value option;
- a debt instrument that (i) is held within a business model whose objective is achieved both by collecting contractual cash flows and selling financial assets and (ii) has contractual terms that give rise on specified dates to cash flows that are solely payments of principal and interest on the principal amount outstanding, is measured at fair value through other comprehensive income (FVTOCI), unless the asset is designated at FVTPL under the fair value option. Upon derecognition, the cumulative gains and losses previously recognized in other comprehensive income are reclassified to profit or loss;
- all other debt instruments are measured at FVTPL;
- all equity investments are measured in the consolidated statement of financial position at fair value, with gains and losses recognized in profit or loss except that if an equity investment is not held for trading, nor contingent consideration recognized by an acquirer in a business combination, an irrevocable election can be made at initial recognition to measure the investment at FVTOCI, with dividend income recognized in profit or loss. This classification is determined on an instrument-by-instrument basis. Upon derecognition, the cumulative gains or losses previously recognized in other comprehensive income are reclassified to retained earnings.

For instruments quoted in an active market, the fair value corresponds to a market price (level 1). For instruments that are not quoted in an active market, the fair value is determined using valuation techniques including reference to recent arm's length market transactions or transactions involving instruments which are substantially the same (level 2), or discounted cash flow analysis including, to the greatest possible extent, assumptions consistent with observable market data (level 3). However, in limited circumstances, cost of equity instruments may be an appropriate estimate of their fair value. That may be the case if insufficient more recent information is available to measure fair value, or if there is a wide range of possible fair value measurements and cost represents the best estimate of fair value within that range.

Impairment of financial assets

The impairment loss of a financial asset measured at amortized cost is calculated based on the expected loss model, representing the weighted average of credit losses with the respective risks of a default occurring as the weights. Expected credit losses are based on the difference between the contractual cash flows due in accordance with the contract and all the cash flows that the Group expects to receive, discounted at an approximation of the original effective interest rate.

For trade receivables that do not contain a significant financing component (i.e. substantially all trade receivables), the loss allowance is measured at an amount equal to lifetime expected credit losses. Those are the expected credit losses that result from all possible default events over the expected life of those trade receivables, using a provision matrix that takes into account historical information on defaults adjusted for the forward looking information per customer. The Group considers a financial asset in default when contractual payments are 60 days past due. However, in certain cases, the Group may also consider a financial asset to be in default when internal or external information indicates that the Group is unlikely to receive the outstanding contractual amounts in full before taking into account any credit enhancements held by the Group. A financial asset is fully impaired when there is no reasonable expectation of recovering the contractual cash flows.

Impairment losses are recognized in the consolidated income statement, except for debt instruments measured at fair value through other comprehensive income. In this case, the allowance is recognized in other comprehensive income.

Financial liabilities

Financial liabilities are initially measured at fair value minus, in the case of a financial liability not at fair value through profit or loss, transaction costs that are directly attributable to the issue of the financial liability. Subsequently, they are measured at amortized cost, except for:

- financial liabilities at fair value through profit or loss. Such liabilities, including derivatives that are liabilities, are subsequently measured at fair value;
- financial guarantee contracts. After initial recognition, guarantees are subsequently measured at the higher of the expected losses and the amount initially recognized.

Derivative financial instruments

A derivative financial instrument is a financial instrument or other contract within the scope of IFRS 9 Financial Instruments with all three of the following characteristics:

- its value changes in response to the change in a specified interest rate, financial instrument price, commodity price, foreign exchange rate, index of prices or rates, credit rating or credit index, or other variable, provided in the case of a non-financial variable that the variable is not specific to a party to the contract (sometimes called the 'underlying');
- it requires no initial net investment or an initial net investment that is smaller than would be required for other types of contracts that would be expected to have a similar response to changes in market factors;
- it is settled at a future date.

The Group enters into a variety of derivative financial instruments (forward, future, option, collars and swap contracts) to manage its exposure to interest rate risk, foreign exchange rate risk, and commodity risk (mainly utility and CO_2 emission rights price risks).

As explained above, derivatives are initially recognized at fair value at the date a derivative contract is entered into and are subsequently remeasured to their fair value at the end of each reporting period. The resulting gain or loss is recognized in income or expense, unless the derivative is designated and effective as a hedging instrument. The Group designates certain derivatives as hedging instruments of the exposure to variability in cash flows with respect to a recognized asset or liability or a highly probable forecast transaction that could affect profit or loss (cash flow hedges).

A derivative with a positive fair value is recognized as a financial asset whereas a derivative with a negative fair value is recognized as a financial liability. Derivative instruments (or portions of them) are presented as non-current assets or non-current liabilities if the remaining maturity of the underlying settlements is more than twelve months after the reporting period. Other derivative instruments (or portions of them) are presented as current assets or current liabilities.

Hedge accounting

The Group designates certain derivatives and embedded derivatives, in respect of interest rate risk, foreign exchange rate risk, Solvay share price risk, and commodity risk (mainly utility and CO_2 emission rights price risks), as hedging instruments in a cash flow hedge relationship.

At the inception of the hedge relationship, there is a formal designation and documentation of the hedging relationship and the Group's risk management objective and strategy for undertaking the hedge. So to apply hedge accounting: (a) there is an economic relationship between the hedged item and the hedging instrument, (b) the effect of credit risk does not dominate the value changes that result from that economic relationship, and (c) the hedge ratio of the hedging relationship is the same as that resulting from the quantity of the hedged item that the Group actually hedges and the quantity of the hedging instrument that the Group actually uses to hedge that quantity of hedged item.

The requirement under (a) above that an economic relationship exists means that there is an expectation that the value of the hedging instrument and the value of the hedged item will systematically change in the opposite direction in response to movements in either the same underlying (or underlyings that are economically related in such a way that they respond in a similar way to the risk that is being hedged).

Cash flow hedges

The effective portion of changes in the fair value of hedging instruments that are designated in a cash flow hedge is recognized in other comprehensive income.

The gain or loss relating to the ineffective portion is recognized immediately in profit or loss.

As long as cash flow hedge qualifies, the hedging relationship is accounted for as follows:

a. the separate component of equity associated with the hedged item (cash flow hedge reserve) is adjusted to the lower of the following (in absolute amounts):
   i) the cumulative gain or loss on the hedging instrument from inception of the hedge; and
   ii) the cumulative change in fair value (present value) of the hedged item (i.e. the present value of the cumulative change in the hedged expected future cash flows) from inception of the hedge.
b. the portion of the gain or loss on the hedging instrument that is determined to be an effective hedge (i.e. the portion that is offset by the change in the cash flow hedge reserve calculated in accordance with (a)) is recognized in other comprehensive income.
c. any remaining gain or loss on the hedging instrument (or any gain or loss required to balance the change in the cash flow hedge reserve calculated in accordance with (a)) is hedge ineffectiveness that is recognized in profit or loss.
d. the amount that has been accumulated in the cash flow hedge reserve in accordance with (a) is accounted for as follows:
   i) if a hedged forecast transaction subsequently results in the recognition of a non-financial asset or a non-financial liability, the Group removes that amount from the cash flow hedge reserve and includes it directly in the initial cost or other carrying amount of the asset or the liability. This is not a reclassification adjustment and hence it does not affect other comprehensive income.
   ii) for cash flow hedges other than those covered by i), that amount is reclassified from the cash flow hedge reserve to profit or loss as a reclassification adjustment in the same period or periods during which the hedged expected future cash flows affect profit or loss (for example, in the periods that interest income or interest expense is recognized or when a forecast sale occurs).
   iii) however, if that amount is a loss and the Group expects that all or a portion of that loss will not be recovered in one or more future periods, it immediately reclassifies the amount that is not expected to be recovered into profit or loss as a reclassification adjustment.

Most hedged items are transaction related. The time value of options, forward elements of forward contracts, and foreign currency basis spreads of financial instruments that are hedging the items affect profit or loss at the same time as those hedged items.

Hedge accounting is discontinued prospectively when the hedging relationship (or a part of a hedging relationship) ceases to meet the qualifying criteria (after taking into account any rebalancing of the hedging relationship, if applicable). This includes instances when the hedging instrument expires or is sold, terminated or exercised.

When the Group discontinues hedge accounting for a cash flow hedge it accounts for the amount that has been accumulated in the cash flow hedge reserve as follows:

- if the hedged future cash flows are still expected to occur, that amount remains in the cash flow hedge reserve until the future cash flows occur. However, if that amount is a loss and the Group expects that all or a portion of that loss will not be recovered in one or more future periods, it immediately reclassifies the amount that is not expected to be recovered into profit or loss as a reclassification adjustment.
- if the hedged future cash flows are no longer expected to occur, that amount is immediately reclassified from the cash flow hedge reserve to profit or loss as a reclassification adjustment. A hedged future cash flow that is no longer highly probable to occur may still be expected to occur.

The following table presents the financial instruments by category, split by current and non-current assets and liabilities.

In € million	Classification	2019 Carrying amount	2018 Carrying amount
Non-current assets – Financial instruments		**322**	**328**
Equity instruments measured at fair value through other comprehensive income	Financial assets measured at fair value through other comprehensive income	56	51
Loans and other non-current assets (excluding pension fund surpluses)	Financial assets measured at amortized cost	266	277
Current assets – Financial instruments		**2,509**	**2,801**
Trade receivables	Financial assets measured at amortized cost	1,414	1,434
Other financial instruments		119	101
Other marketable securities >3 months	Financial assets measured at amortized cost	44	68
Currency swaps	Held for trading	3	1
Other current financial assets	Financial assets measured at amortized cost	72	32
Financial instruments – Operational		167	162
Held for trading	Held for trading	142	151
Derivative financial instruments designated in a cash flow hedge relationship	Cash-flow hedge	25	12
Cash and cash equivalents	Financial assets measured at amortized cost	809	1,103
Total assets – Financial instruments		**2,830**	**3,128**
Non-current liabilities – Financial instruments		**3,541**	**3,301**
Financial debt		3,382	3,180
Bonds	Financial liabilities measured at amortized cost	2,859	2,937
Other non-current debts	Financial liabilities measured at amortized cost	155	208
Finance lease liabilities IAS 17 – Non-current portion	Finance lease liabilities measured at amortized cost		35
Lease liabilities IFRS 16 – Non-current portion	Lease liabilities measured at amortized cost	368	
Other liabilities	Financial liabilities measured at amortized cost	159	121
Current liabilities - Financial instruments		**2,756**	**2,416**
Financial debt		1,132	630
Short-term financial debt (excluding finance lease liabilities IAS 17)	Financial liabilities measured at amortized cost	1,022	616
Currency swaps	Held for trading	8	12
Finance lease liabilities IAS 17 – Current portion	Finance lease liabilities measured at amortized cost		1
Lease liabilities IFRS 16 – Current portion	Lease liabilities measured at amortized cost	102	
Trade payables	Financial liabilities measured at amortized cost	1,277	1,439
Financial instruments – Operational		187	194
Held for trading	Held for trading	135	151
Derivative financial instruments designated in a cash flow hedge relationship	Cash-flow hedge	52	43
Dividends payables	Financial liabilities measured at amortized cost	161	154
Total liabilities – Financial instruments		**6,297**	**5,717**

F35.A. Overview of financial instruments

The following table gives an overview of the carrying amount of all financial instruments by category as defined by IFRS 9 Financial Instruments.

In € million	**2019** **Carrying amount**	2018 Carrying amount
Fair value through profit or loss		
Held for trading (financial instruments – operational – see note F29)	142	151
Derivative financial instruments designated in a cash flow hedge relationship (see note F29)	**25**	**12**
Financial assets measured at amortized cost		
Financial assets measured at amortized cost (including cash and cash equivalents, trade receivables, loans and other current/non-current assets except pension fund surpluses)	2,605	2,914
Financial assets measured at fair value through other comprehensive income		
Equity instruments measured at fair value through other comprehensive income	56	51
Total financial assets	**2,830**	**3,128**
Fair value through profit or loss		
Held for trading (financial instruments – operational – see note F37)	(135)	(151)
Held for trading (financial debt – see note F36, table Changes in financial debt)	(8)	(12)
Derivative financial instruments designated in a cash flow hedge relationship (see note F37)	**(52)**	**(43)**
Financial liabilities measured at amortized cost		
Financial liabilities measured at amortized cost (excluding dividends payable)	(5,469)	(5,321)
Dividends payable	(161)	(154)
Lease liabilities measured at amortized cost		
Lease liabilities IFRS 16 measured at amortized cost	(470)	
Finance lease liabilities IAS 17 (see note F36, section Changes in financial debt)		(36)
Total financial and lease liabilities	**(6,296)**	**(5,717)**

The category "Held for trading" only contains derivative financial instruments that are used for management of foreign currency risk, interest rate risk, utility and CO_2 emission rights price risks, index and Solvay share price. Contracts which have been documented as hedging instruments (hedge accounting under IFRS 9 Financial Instruments) or which meet the exemption criteria for own use are not included in the category "Held for trading". Equity instruments measured at fair value through OCI pertain to Solvay's New Business Development (NBD) activity: the Group has built a Corporate Venturing portfolio which is made of direct investments in start-up companies and of investments in venture capital funds. If the Group does not have significant influence or joint control, the investments are measured at fair value according to the valuation guidelines published by the European Private Equity and Venture Capital Association, and impacts are recognized in other comprehensive income.

F35.B. Fair value of financial instruments

Valuation techniques and assumptions used for measuring fair value

Accounting policy

Quoted market prices are available for financial assets and financial liabilities with standard terms and conditions that are traded on active markets. The fair values of derivative financial instruments are equal to their quoted prices, if available. In case such quoted prices are not available, the fair value of the financial instruments is determined based on a discounted cash flow analysis using the applicable yield curve derived from quoted interest rates matching maturities of the contracts for non-optional derivatives. Optional derivatives are fair valued based on option pricing models, taking into account the present value of probability weighted expected future payoffs, using market reference formulas.

The fair values of other financial assets and financial liabilities are determined in accordance with generally accepted pricing models based on discounted cash flow analysis.

Fair value of financial instruments measured at amortized cost

	2019		2018		
In € million	**Carrying amount**	**Fair value**	Carrying amount	Fair value	Fair value level
Non-current assets – Financial instruments	**266**	**266**	**277**	**277**	
Loans and other non-current assets (except pension fund surpluses)	266	266	277	277	2
Non-current liabilities – Financial instruments	**(3,173)**	**(3,364)**	**(3,301)**	**(3,396)**	
Bonds	(2,859)	(3,050)	(2,937)	(3,032)	1
Other non-current debts	(155)	(155)	(208)	(208)	2
Other liabilities	(159)	(159)	(121)	(121)	2
Finance lease liabilities IAS 17 – Non-current portion			(35)	(35)	2

The carrying amounts of current financial assets and liabilities are estimated to reasonably approximate their fair values, such in light of short terms to maturity.

Financial instruments measured at fair value in the consolidated statement of financial position

The table “Financial instruments measured at fair value in the consolidated statement of financial position” provides an analysis of financial instruments that, subsequent to their initial recognition, are measured at fair value, grouped into Levels 1 to 3 based on the degree to which the fair value is observable. Financial instruments, classified as held for trading and as hedging instruments in cash flow hedges are mainly grouped into Levels 1 and 2. They are fair valued based on forward pricing and swap models using present value calculations. The models incorporate various inputs including foreign exchange spot and interests rates of the respective currencies, currency basis spreads between the respective currencies, interest rate curves and forward rate curves of the underlying commodity. The equity instrument measured at fair value through OCI fall within Level 3, and are measured based on a discounted cash flow approach.

In accordance with the Group internal rules, the responsibility for measuring the fair value level resides with (a) the Treasury department for the non-utility derivative financial instruments, and the non-derivative financial liabilities, (b) the Sustainable Development and Energy department for the utility derivative financial instruments and (c) the Finance department for non-derivative financial assets.

Financial instruments measured at fair value in the consolidated statement of financial position

	2019			
In € million	Level 1	Level 2	Level 3	Total
Held for trading	**77**	**67**		**145**
Foreign currency risk		6		6
Utility risk	76	59		135
CO_2 risk	2			2
Solvay share price		2		2
Index		1		1
Cash flow hedges		**25**		**25**
Foreign currency risk		7		7
Utility risk		18		18
Equity instruments measured at fair value through other comprehensive income			**56**	**56**
New Business Development			56	56
Total (assets)	**77**	**92**	**56**	**225**
Held for trading	**(72)**	**(72)**		**(144)**
Foreign currency risk		(7)		(7)
Interest rate risk		(3)		(3)
Utility risk	(71)	(56)		(127)
CO_2 risk		(1)		(2)
Solvay share price		(4)		(4)
Index		(1)		(1)
Cash flow hedges		**(51)**		**(51)**
Foreign currency risk		(6)		(6)
Utility risk		(46)		(46)
Total (liabilities)	**(72)**	**(124)**		**(195)**

	2018			
In € million	Level 1	Level 2	Level 3	Total
Held for trading	**63**	**89**		**152**
Foreign currency risk		3		3
Utility risk	39	82		121
CO_2 risk	24			24
Solvay share price		1		1
Index		3		3
Cash flow hedges		**12**		**12**
Foreign currency risk		5		5
Utility risk		6		6
CO_2 risk		1		1
Solvay share price				
Equity instruments measured at fair value through other comprehensive income			**51**	**51**
New Business Development			51	51
Other current receivables – financial instruments (Money Market Funds)				
Cash and cash equivalents				
Marketable securities				
Total (assets)	**63**	**100**	**51**	**215**
Held for trading	**(70)**	**(93)**		**(163)**
Foreign currency risk		(11)		(11)
Interest rate risk		(4)		(4)
Utility risk	(47)	(67)		(114)
CO_2 risk	(23)	(3)		(26)
Solvay share price		(6)		(6)
Index		(3)		(3)
Cash flow hedges		**(43)**		**(43)**
Foreign currency risk		(15)		(15)
Utility risk		(18)		(18)
CO_2 risk		(2)		(2)
Solvay share price		(7)		(7)
Total (liabilities)	**(70)**	**(136)**		**(206)**

Movements of the period

Reconciliation of level 3 fair value measurements of financial assets and liabilities

	2019		
	At fair value through profit or loss	**At fair value through other compre-hensive income**	
In € million	**Derivatives**	**Equity instruments**	**Total**
Opening balance at January 1		**51**	**51**
Total gains or losses			
Recognized in other comprehensive income		3	3
Acquisitions		5	5
Capital decreases		(4)	(4)
Closing balance at December 31		**56**	**56**

	2018		
	At fair value through profit or loss	At fair value through other comprehensive income	
In € million	Derivatives	Equity instruments	Total
Opening balance at January 1		**44**	**44**
Total gains or losses			
Recognized in other comprehensive income		3	3
Acquisitions		9	9
Capital decreases		(5)	(5)
Closing balance at December 31		**51**	**51**

Income and expenses of financial instruments recognized in the consolidated income statement and in other comprehensive income

In € million	2019	2018
Recognized in the consolidated income statement		
Recycling from OCI of derivative financial instruments designated in a cash flow hedge relationship		
Foreign currency risk	(28)	(12)
Utility risk	(31)	(3)
CO_2 risk		1
Changes in the fair value of financial instruments held for trading		
Utility risk	(14)	20
CO_2 risk	11	5
Recognized in the gross margin	**(61)**	**11**
Changes in the fair value of financial instruments held for trading		
Solvay share price	5	(13)
Gains and losses (time value) on derivative financial instruments designated in a cash flow hedge relationship		
Foreign currency risk	1	3
Foreign operating exchange gains and losses		(4)
Recognized in other operating gains and losses	**7**	**(14)**
Net interest expense	(102)	(117)
Interest expense on lease liabilities	(23)	
Other gains and losses on net indebtedness (excluding gains and losses on items not related to financial instruments)		
Foreign currency risk	(9)	(2)
Interest element of swaps	12	5
Others	(14)	1
Recognized in charges on net indebtedness	**(135)**	**(114)**
Dividends from equity instruments measured at fair value through other comprehensive income	**4**	
Total recognized in the consolidated income statement	**(187)**	**(117)**

The loss on highly probable sales in foreign currency recognized in gross margin for € (28) million and on utility instruments for € (31) million, mainly related to gas procurement, is the result of the recycling of gains and losses of derivative financial instruments designated in a cash flow hedge relationship.

The change in fair value of financial instruments held for trading resulting in a loss of € (14) million and recognized in gross margin is mainly due to the price decrease of gas and electricity in 2019. The gain of € 5 million recognized in other operating gains and losses is the result of the change in fair value of equity swaps for long-term incentives.

The increase in other gains and losses on net indebtedness from € (1) million for 2018 to € (14) million for 2019 is mainly explained by one-off costs for € (12) million related to the early repayment of the US$ 800 million Senior US$ bonds of Solvay Finance America LLC.

Income and expenses on financial instruments recognized in other comprehensive income include the following:

	Foreign currency risk		Interest rate risk		Commodity risk		Risk on Solvay share price		Total	
In € million	**2019**	2018	**2019**	2018	**2019**	2018	**2019**	2018	**2019**	2018
Balance at January 1	**(12)**	**15**		**(1)**	**(13)**	**(2)**	**(7)**	**3**	**(32)**	**15**
Recycling from other comprehensive income of derivative financial instruments designated in a cash flow hedge relationship	28	12			31	2			59	14
Effective portion of changes in fair value of cash flow hedge	(15)	(38)		1	(45)	(14)	7	(9)	(53)	(61)
Balance at December 31	**1**	**(12)**			**(28)**	**(13)**		**(7)**	**(27)**	**(32)**

F35.C. Capital management

See 2 *Capital, shares and shareholders* in respect of capital in the Corporate governance statement chapter of this report.

The Group manages its funding structure with the objective of safeguarding its ability to continue as a going concern, optimizing the return for shareholders, maintaining an investment-grade rating, and minimizing the cost of debt.

The capital structure of the Group consists of equity (including perpetual hybrid bonds (see note F31 *Equity*) and of net debt (see note F36 *Net indebtedness*). Perpetual hybrid bonds are nevertheless considered as debt in the Group's Underlying metrics.

Besides the statutory minimum equity funding requirements that apply to the Company's subsidiaries in the different countries, Solvay is not subject to any additional legal capital requirements.

The Treasury department reviews the capital structure on an ongoing basis under the authority and the supervision of the Chief Financial Officer. As appropriate, the Legal department is involved to ensure compliance with legal and contractual requirements.

F35.D. Financial risk management

The Group is exposed to market risks from movements in foreign exchange rates, interest rates and other market prices (utility prices, CO_2 emission rights prices and equity prices). The Group's senior management oversees the management of these risks and is supported by the Treasury department (non-commodity risks) and Solvay Sustainable Development and Energy department that advise on financial risks and the appropriate financial risk governance framework for the Group. Both departments provide assurance to the Group's senior management that the Group's financial risk activities are governed by appropriate policies and procedures and that financial risks are identified, measured and managed in accordance with the Group's policies and risk objectives. The Solvay Group uses derivative financial instruments to hedge clearly identified foreign exchange, interest rate, index, utility price and CO_2 emission rights price risks (hedging instruments). All derivative activities for risk management purposes are carried out by specialist teams that have the appropriate skills, experience and supervision. However, the required criteria to apply hedge accounting are not met in all cases.

Furthermore, the Group is also exposed to liquidity risks and credit risks.

The majority of derivative hedging instruments held by the Group mature in less than one year.

Foreign currency risks

The Group is a multi-specialty chemical company with operations worldwide, and hence undertakes transactions denominated in foreign currencies. As a consequence, the Group is exposed to exchange rate fluctuations. In 2019, the Group was mainly exposed to US dollar, Chinese yuan, Brazilian real, Mexican peso and Japanese yen.

To mitigate its foreign currency risk, the Group has defined a hedging policy that is essentially based on the principles of financing its activities in local currency and hedges the transactional exchange risk at the time of invoicing (risk which is certain). The Group constantly monitors its activities in foreign currencies and hedges, where appropriate, the exchange rate exposures on expected cash flows (risk which is highly probable).

Exchange rate exposures are managed within approved policy parameters utilizing forward foreign exchange contracts or, when appropriate, other derivatives like currency options.

In the course of 2019 the EUR/USD exchange rate moved from 1.1455 at the start of January to 1.1231 at the end of December. In the course of 2018 the EUR/USD exchange rate moved from 1.1995 at the start of January to 1.1455 at the end of December.

Based on the USD contribution to the Group's EBITDA, as of Dec 31st 2019, a fluctuation of (0.10) to the US$/€ exchange rate, would generate about € 125 million (€ 120 million for 2018) variation to the EBITDA. 2/3 of this variation is at conversion level and 1/3 at transaction level the latter being mostly hedged.

At the end of 2019, a strengthening of the US dollar vs EUR would increase the net debt by approximately € 100 million per 0.10 US$/€ fluctuation. Conversely, a weakening of the US dollar vs EUR would decrease the net debt by approximately € 84 million per 0.10 US$/€ fluctuation.

At the end of 2018, a strengthening of the US dollar vs EUR would increase the net debt by approximately € 129 million per 0.10 US$/€ fluctuation. Conversely, a weakening of the US dollar vs EUR would decrease the net debt by approximately € 108 million per 0.10 US$/€ fluctuation.

The Group's currency risk can be split into two categories: translation and transactional risk.

Translation risk

The translation exchange risk is the risk affecting the Group's consolidated financial statements related to investees operating in a currency other than the EUR (the Group's presentation currency).

During 2019 and 2018, the Group did not hedge the currency risk of foreign operations.

Transactional risk

The transactional risk is the exchange risk linked to a specific transaction, such as a Group entity buying or selling in a currency other than its functional currency.

To the largest extent possible, the Group manages the transactional risk on receivables and borrowings centrally and locally when centralization is not possible.

The choice of borrowing currency depends mainly on the opportunities offered by the various markets. This means that the selected currency is not necessarily that of the country in which the funds will be invested. Nonetheless, operating entities are financed essentially in their functional currencies.

In emerging countries it is not always possible to borrow in local currency, either because funds are not available in local financial markets, or because the financial conditions are too onerous. In such a situation the Group has to borrow in a different currency. Nonetheless the Group considers opportunities to refinance its borrowings in emerging countries with local currency debt.

Derivatives are initially recognized at fair value at the date a derivative contract is entered into and are classified into the two categories described below:

Held for trading

The transactional risk is managed either by spot or forward contracts. Unless documented as hedging instruments (see above), derivative financial instruments are classified as held for trading.

In 2019 the net notional amount is a short position of € (169) million compared to the long position of 2018. This evolution is mainly explained by a modification of the debt currency mix (see note F36 *Net Indebtedness*), an increased foreign exchange hedging activity in China and internal restructuring optimization activity.

The following table details the notional amounts of the Group's derivatives contracts outstanding at the end of the period:

	Notional amount(1)		Fair value assets		Fair value liabilites	
In € million	**2019**	2018	**2019**	2018	**2019**	2018
Held for trading	(169)	138	6	3	(7)	(11)
Total	**(169)**	**138**	**6**	**3**	**(7)**	**(11)**

(1) Long/(short) positions (if the foreign exchange transaction does not involve the functional currency, both notionals are considered)

Cash flow hedge

The Group uses derivatives to hedge identified foreign exchange rate risks. It documents those as hedging instruments unless it hedges a recognized financial asset or liability when generally no cash flow hedge relationship is documented. Most hedges are transaction related.

At the end of 2019 for future exposure, the Group had mainly hedged forecast sales (short position) in a nominal amount of US$ 713 million (€ 635 million) and JP¥ 9,206 million (€ 76 million). All cash flow hedges that exist at the end of December 2019 will be settled within the next 12 months, and will impact profit or loss during that period.

The following table details the notional amounts of Solvay's derivatives contracts outstanding at the end of the period:

Notional amounts net

2019	Notional amount of the instrument[1]	Notional amount of the hedged item[2]	Percentage of exposure hedged	Average hedge exchange rate per risk category	Cash flow hedge reserve	Fair value of the hedging instrument	
Cash flow hedges – Forecasted sales and purchases[4]					Equity	Assets	Liabilities
	In € million				In € million		
JPY/EUR	(46)	(98)	47%[3]	122.75			
JPY/USD	(30)	(58)	51%[3]	106.97			
USD/BRL	(143)	(266)	54%[3]	3.94	1	2	(1)
USD/CNY	(154)	(256)	60%	6.92	(1)	1	(2)
USD/EUR	(278)	(493)	56%[3]	1.15	(2)	1	(3)
USD/MXN	(46)	(84)	55%[3]	20.18	2	2	
USD/THB	(14)	(28)	49%[3]	30.52			
Total	**(710)**	**(1,284)**			**1**	**7**	**(6)**

(1) Long/(short) positions

(2) (Long)/short positions

(3) In compliance with Group Treasury Policy the percentage of hedged exposure will reach the progressive minimum compliance level of 60% in Q1 2020

(4) The hedging instruments are located in the lines Other Receivables and Other Liabilities in the consolidated statement of financial position

2018	Notional amount of the instrument[1]	Notional amount of the hedged item[2]	Percentage of exposure hedged	Average hedge exchange rate per risk category	Cash flow hedge reserve	Fair value of the hedging instrument	
Cash flow hedges – Forecasted sales and purchases[4]					Equity	Assets	Liabilities
	In € million				In € million		
JPY/EUR	(71)	(104)	68%	129.52	(2)		(2)
JPY/USD	(30)	(53)	57%[3]	109.32			
USD/BRL	(142)	(244)	58%[3]	3.94	(1)	3	(2)
USD/CNY	(128)	(283)	45%[3]	6.71	(3)		(3)
USD/EUR	(408)	(501)	81%	1.18	(8)		(8)
USD/MXN	(47)	(86)	55%[3]	20.78	1	1	
USD/THB	(19)	(35)	54%[3]	32.54			
Total	**(845)**	**(1,305)**			**(12)**	**5**	**(15)**

(1) Long/(short) positions

(2) (Long)/short positions

(3) In compliance with Group Treasury Policy the percentage of hedged exposure has reached the progressive minimum compliance level of 60% in Q1 2019

(4) The hedging instruments are located in the lines Other Receivables and Other Liabilities in the consolidated statement of financial position

Interest rate risks

See the Financial risk in the Management of risks section of this report for additional information on the interest rate risks management.

Interest rate risk is managed at Group level.

The Group is exposed to interest rate risk because entities in the Group borrow funds at both fixed and floating interest rates. Interest rate risk is managed at Group level by maintaining an appropriate mix between fixed and floating rate borrowings.

Interest rate exposure by currency is summarized below:

In € million	**At December 31, 2019**			At December 31, 2018		
Currency	**Fixed rate**	**Floating rate**	**Total**	Fixed rate	Floating rate	Total
Financial debt						
EUR	(2,874)	(87)	(2,960)	(1,709)	(60)	(1,769)
USD	(1,276)	(18)	(1,294)	(1,731)	(12)	(1,744)
SAR		(87)	(87)		(112)	(112)
INR	(32)	(16)	(48)	(13)	(2)	(15)
KRW	(3)	(24)	(27)		(30)	(30)
THB	(10)	(20)	(30)		(27)	(27)
BRL	(19)		(19)	(16)	(1)	(17)
Other	(51)	3	(48)	(95)	(1)	(95)
Total	**(4,264)**	**(249)**	**(4,513)**	**(3,564)**	**(246)**	**(3,810)**
Cash and cash equivalents						
EUR		249	249		391	391
USD		248	248		382	382
CAD		5	5		7	7
THB		35	35		17	17
SAR		4	4		4	4
BRL		60	60		67	67
CNY		35	35		77	77
KRW		26	26		32	32
JPY		34	34		38	38
Other		113	113		89	89
Total		**809**	**809**		**1,103**	**1,103**
Other financial instruments						
CNY		44	44		67	67
EUR		50	50		17	17
SAR		19	19		15	15
Other		6	6		3	3
Total		**119**	**119**		**101**	**101**
Total	**(4,264)**	**678**	**(3,586)**	**(3,564)**	**959**	**(2,605)**

At the end of 2019, around € 4.3 billion of the Group's gross debt was at fixed-rate, including mainly:

- Senior EUR Bonds for a total of € 1,850 million maturing in 2022, 2027 and 2029 (carrying amount of € 1,837 million);
- Remaining part (US$ 196 million) of the US$ Senior Bonds 2023 of US$ 400 million (carrying amount of € 169 million);
- Remaining part (US$ 163 million) of the US$ Senior Bonds 2025 of US$ 250 million (carrying amount of € 143 million);
- Senior US$ Bonds for a total of US$ 800 million (carrying amount of € 709 million);
- Belgian Treasury notes (commercial papers) for a total of € 700 million maturing within the year (carrying amount of € 700 million);
- IFRS 16 lease liability for a total of € 470 million (carrying amount of € 470 million).

The floating rate debts that are subject to interest rate swaps are discussed below.

The impact of interest rate volatility at the end of 2019 compared to 2018 is the following:

	Sensitivity to a +100 bp movement in EUR market interest rates		Sensitivity to a (100) bp movement in EUR market interest rates	
In € million	**2019**	2018	**2019**	2018
Profit or loss	(1)	(1)	1	1

The sensitivity to interest rates' volatility remains stable at the end of 2019 compared to 2018. The floating rate debt is very limited and part of it is hedged by interest rate swaps and cross-currency interest rate swaps reducing even more its volatility.

Interest rate risk hedged by instrument accounted for as held for trading

	Notional amount		Fair value assets		Fair value liabilites	
In € million	**2019**	2018	**2019**	2018	**2019**	2018
Held for trading	83	109			(3)	(4)
Total	**83**	**109**			**(3)**	**(4)**

The fair value of € (3) million reported under "held for trading" is mainly explained by a cross currency swap contracted in May 2017 to mitigate the volatility (forex and interest rate) of the external financing set up for our HPPO joint operation (Saudi Hydrogen Peroxide Company) 50/50 with Sadara in Saudi Arabia (notional amount € 83 million corresponding to 50%).

Interest rate risk hedged by instrument accounted for as a hedging instrument in a cash flow hedge

2019 In € million (except where indicated)	Notional amount of the instrument[1]	Notional amount of the hedged item[2]	Percentage of exposure hedged	Hedge interest rate per risk category	Cash flow hedge reserve	Fair value of the hedging instrument	
					Equity	Assets	Liabilities
Cash flow hedges – Floating rate debt	(10)	(20)	50%	Pay Fix 3.125% Receive THBFIX6M			
Total	**(10)**	**(20)**					

(1) The hedging instruments are located in the lines Other Receivables and Other Liabilities in the consolidated statement of financial position

(2) The hedging item is located in the lines Non-current and current financial debt in the consolidated statement of financial position

2018 In € million (except where indicated)	Notional amount of the instrument[1]	Notional amount of the hedged item[1]	Percentage of exposure hedged	Hedge interest rate per risk category	Cash flow hedge reserve	Fair value of the hedging instrument	
					Equity	Assets	Liabilities
Cash flow hedges – Floating rate debt	(13)	(27)	50%	Pay Fix 3.125% Receive THBFIX6M	(1)		(1)
Total	**(13)**	**(27)**			**(1)**		**(1)**

(1) The hedging instruments are located in the lines Other Receivables and Other Liabilities in the consolidated statement of financial position

(2) The hedging item is located in the lines Non-current and current financial debt in the consolidated statement of financial position

Other market risks

Utility and CO_2 price risks

The Group purchases a large portion of its coal, gas and electricity needs in Europe and the United States based on fluctuating liquid market indices. In order to reduce the cost volatility, the Group has developed a policy for exchanging variable price against fixed price through derivative financial instruments. Most of these hedging instruments can be documented as hedging instruments of the underlying purchase contracts. Utility purchase contracts at fixed price with a physical delivery for use in the Group's operations are qualified as own use contracts (not derivatives) and constitute a natural hedge. Those have not been included in this note.

Similarly the Group's exposure to CO_2 price is partially hedged by forward purchases of European Union Allowances (EUA). Forward purchases with physical delivery for use in the Group's operations are qualified as own use contracts (not derivatives).

Finally some exposure to gas-electricity or coal-electricity spreads may arise from the production of electricity on Solvay sites (mostly from cogeneration units in Europe), which can be hedged by means of forward purchases and forward sales or optional schemes. In this case, cash flow hedge accounting is applied.

Financial hedging of utility and CO_2 emission rights price risks is managed centrally by Energy Services on behalf of the Group entities.

Energy Services also carries out trading transactions with respect to utility and CO_2, for which the residual price exposure is maintained close to zero.

The following tables detail the notional principal amounts and fair values of utility and CO_2 derivative financial instruments outstanding at the end of the reporting period:

In € million (except where indicated)	Notional amount of the instrument[1]		Notional amount of the instrument (in units)			Fair value of the instrument – Asset		Fair value of the instrument – Liability	
Held for trading	**2019**	2018	**2019**	2018		**2019**	2018	**2019**	2018
Coal	8	15	126,008	120,000	Tons	1	2	(1)	(2)
Power	716	613	21,753,757	15,850,229	MWh	75	87	(67)	(85)
Standard Quality Gas	354	416	21,183,576	18,962,646	MWh	59	32	(55)	(27)
CO_2	26	45	723,320	5,594,159	Tons	2	24	(2)	(26)
Total	**1,104**	**1,089**				**137**	**145**	**(125)**	**(140)**

(1) The hedging instruments are located in the lines Other Receivables and Other Liabilities in the consolidated statement of financial position

The amounts presented in the tables hereafter include hedging needs of GBUs of the Group that sourced through Energy Services, and not the full Group utility hedging needs.

2019 In € million (except where indicated)	Notional amount of the instrument[1]	Notional amount of the instrument (in units)		Notional amount of the hedged item	Notional amount of the hedged item (in units)		Percentage of exposure hedged	Average hedge price per risk category		Cash flow hedge reserve	Fair value of the instrument – Asset	Fair value of the instrument – Liability
Cash flow hedge												
Benzene	5	6,991	Tons	40	61,353	Tons	11%	722	EUR/ ton			
Coal	48	780,984	Tons	97	1,769,600	Tons	44%	70	USD/ ton	(6)		(6)
Power	135	2,838,006	MWh	195	3,694,068	MWh	77%	56	EUR/ MWh			
Standard Quality Gas	218	22,798,066	MWh	474	27,481,119	MWh	83%	16	EUR/ MWh	(23)	17	(40)
CO_2			Tons			Tons				(2)		(2)
Total	**405**			**807**						**(31)**	**17**	**(48)**

(1) The hedging instruments are located in the lines Other Receivables and Other Liabilities in the consolidated statement of financial position

2018 In € million (except where indicated)	Notional amount of the instrument[1]	Notional amount of the instrument (in units)		Notional amount of the hedged item	Notional amount of the hedged item (in units)		Percentage of exposure hedged	Average hedge price per risk category		Cash flow hedge reserve	Fair value of the instrument – Asset	Fair value of the instrument – Liability
Cash flow hedge												
Benzene	7	9,088	Tons	43	50,000	Tons	18%	796	EUR/ ton			
Coal	17	252,000	Tons	54	624,800	Tons	40%	77	USD/ ton	2	2	
Power	104	1,765,121	MWh	104	1,765,000	MWh	100%	59	EUR/ MWh	(8)	2	(10)
Standard Quality Gas	129	6,904,347	MWh	210	13,938,999	MWh	50%	19	EUR/ MWh	(7)	3	(10)
CO_2			Tons			Tons						
Total	**257**			**411**						**(13)**	**7**	**(20)**

(1) The hedging instruments are located in the lines Other Receivables and Other Liabilities in the consolidated statement of financial position

Performance Share Units Plan (PSU) risk on Solvay share price

In order to neutralize the volatility of the Solvay share price which will impact the liability valuation relating to the PSUs (with related employer charges), the Group entered into equity swaps covering more than 90% of the risk. The liability of € 25 million recognized for 2018 and 2019 PSU plans corresponds to the best estimate of the amount due at maturity. Consequently, all hedge relationships exceeding this liability have been discontinued with an insignificant impact on the consolidated income statement.

Credit risk

See the Financial risk in the Management of risks section of this report for additional information on the credit risk management.

The Group continuously monitors the credit risk of important business partners.

The Group engages in transactions only with financial institutions with a good credit rating. The Group monitors and manages exposures to financial institutions within approved counterparty credit limits and credit risk parameters in order to mitigate the risk of default. For financial guarantees, see note F39 *Contingent liabilities and financial guarantees.*

The Group recognizes expected credit losses on all of its trade receivables: it applies the simplified approach and recognizes lifetime expected losses on all trade receivables, using a provision matrix in order to calculate the lifetime expected credit losses for trade receivables, using historical information on defaults adjusted for the forward looking information.

The Group classifies the customers and their related receivables in various rating classes, based on the risks' grading attributed to the customers and on the ageing balance of receivables. As such, for all receivables overdue below 6 months, the Group considers percentages within a range between 0.005% and 4.365%, depending on the rating class. For all receivables overdue in excess of 6 months, the Group considers a rate of 50% or of 100%, depending on the rating class. The customer's grading is reviewed annually for customers assessed as low risk profile, and every six months for customers assessed as higher risk profile.

There is no significant concentration of credit risk at Group level because the receivables' credit risk is spread over a large number of customers and markets.

The ageing of trade receivables, financial instruments - operational, loans and other non-current assets is as follows:

	Total	Credit-impaired	With expected loss allowance, not credit-impaired				
2019 In € million			not past due	less than 30 days past due	between 30 and 60 days past due	between 60 and 90 days past due	more than 90 days past due
Trade receivables	1,460	51	1,321	74	9	3	2
Trade receivables – allowance	(46)	(43)	(1)				(2)
Trade receivables – net	**1,414**	**8**	**1,320**	**74**	**9**	**3**	
Financial instruments – operational	**167**		**167**				
Loans and other non-current assets	352	136	215				
Loans and other non-current assets – allowance	(62)	(62)					
Loans and other non-current assets – net	**289**	**74**	**215**				
Total	**1,871**	**82**	**1,702**	**74**	**9**	**3**	

	Total	Credit-impaired	With expected loss allowance, not credit-impaired				
2018 In € million			not past due	less than 30 days past due	between 30 and 60 days past due	between 60 and 90 days past due	more than 90 days past due
Trade receivables	1,486	52	1,297	112	9	3	12
Trade receivables – allowance	(52)	(49)	(2)				(1)
Trade receivables – net	**1,434**	**3**	**1,296**	**112**	**9**	**3**	**11**
Financial instruments – operational	**162**		**162**				
Loans and other non-current assets	344	152	192				
Loans and other non-current assets – allowance	(62)	(62)					
Loans and other non-current assets – net	**282**	**89**	**192**				
Total	**1,878**	**92**	**1,650**	**112**	**9**	**3**	**11**

The table below presents the allowances on trade receivables:

In € million	2019	2018
Carrying amount at January 1, before IFRS 9 adoption	**(52)**	**(49)**
IFRS 9 adoption		(6)
Carrying amount at January 1, after IFRS 9 adoption	**(52)**	**(55)**
Additions	(4)	(12)
Uses	8	3
Reversal of impairments	3	10
Currency translation differences		2
Transfer to assets held for sale		(1)
Other		1
Carrying amount at December 31	**(46)**	**(52)**

Liquidity risk

See the Financial risk in the Management of risks section of this report for additional information on the liquidity risk management.

Liquidity risk relates to Solvay's ability to service and refinance its debt (including notes issued) and to fund its operations.

This depends on its ability to generate cash from operations and not to over-pay for acquisitions.

The Finance Committee gives its opinion on the appropriate liquidity risk management for the Group's short, medium and long term funding and liquidity management requirements.

The Group manages liquidity risk by maintaining adequate reserves, banking facilities and reserve borrowing facilities, by continuously monitoring forecast and actual cash flows, and by matching the maturity profiles of financial assets and liabilities.

The Group staggers the maturities of its financing sources over time in order to limit amounts to be refinanced each year.

The following tables detail the Group's remaining contractual maturity for its financial liabilities with contractual repayment periods.

The tables have been prepared using the discounted cash flows of financial liabilities, based on the earliest date on which the Group can be required to pay.

The following tables present discounted amounts (carrying amounts):

2019 In € million	Total	Within one year	In year two	In years three to five	Beyond five years
Outflows of cash:					
Trade liabilities	1,277	1,277			
Dividends payables	161	161			
Financial instruments – operational	187	187			
Other non-current liabilities	159		26	89	44
Financial debt	4,044	1,030	54	1,001	1,958
Lease liabilities	470	102	67	138	163
Total	**6,297**	**2,756**	**147**	**1,229**	**2,166**

2018 In € million	Total	Within one year	In year two	In years three to five	Beyond five years
Outflows of cash:					
Trade liabilities	1,439	1,439			
Dividends payables	154	154			
Financial instruments – operational	194	194			
Other non-current liabilities	121		37	85	
Financial debt	3,810	630	799	1,011	1,369
Total	**5,717**	**2,416**	**836**	**1,096**	**1,369**

The following tables present undiscounted amounts (nominal value):

2019 In € million	Total	Within one year	In year two	In years three to five	Beyond five years
Outflows of cash:					
Trade liabilities	1,277	1,277			
Dividends payables	161	161			
Financial instruments – operational	187	187			
Other non-current liabilities	159		26	89	44
Financial debt	4,067	1,029	54	1,011	1,973
Lease liabilities	470	102	67	138	163
Total	6,321	2,755	148	1,238	2,180
Interests on financial debt and lease liabilities	576	100	97	235	145
Total outflows of cash	**6,897**	**2,854**	**244**	**1,473**	**2,325**

2018 In € million	Total	Within one year	In year two	In years three to five	Beyond five years
Outflows of cash :					
Trade liabilities	1,439	1,439			
Dividends payables	154	154			
Financial instruments – operational	194	194			
Other non-current liabilities	121		37	85	
Financial debt	3,835	630	802	1,024	1,381
Total	5,743	2,416	838	1,108	1,381
Interests on financial debt	577	108	103	209	157
Total outflows of cash	**6,320**	**2,524**	**941**	**1,317**	**1,538**

The Group has access to the following instruments:

- An amount of € 700 million (compared to € 246 million at the end of 2018) was issued from the Belgian Treasury Bill program (out of € 1.5 billion available under the program). The US commercial paper program in an amount of US$ 500 million was unused at the end of 2019 as well as at the end of 2018. The two programs are covered by back-up credit lines;
- A € 2 billion syndicated credit facility maturing in 2024. Solvay has also secured bilateral credit lines (~ € 1,495 million). They were all unused at the end of 2019.

NOTE F36
Net indebtedness

The Group's net indebtedness is the balance between its financial debts and other financial instruments, and cash and cash equivalents.

In € million	**2019**	2018
Financial debt	4,513	3,810
Cash and cash equivalents	(809)	(1,103)
Other financial instruments	(119)	(101)
Net indebtedness	**3,586**	**2,605**

The increase in the net indebtedness is mainly due to (a) the increase of the financial debt, resulting from the recognition of additional lease liabilities following the adoption of IFRS 16 Leases and that amount to € 470 million at the end of 2019, and (b) the increase of short-term treasury notes. The repayment of the € 700 million hybrid bond (recognized in equity) in June 2019, using available cash (partially resulting from the € 300 million cash available after the issuance of an hybrid bond in September 2018), also impacted cash and cash equivalents.

Solvay Investment Grade rating is Baa2/P2 (stable outlook) with Moody's and BBB/A2 (stable outlook) with Standard & Poor's.

Financial debt: main borrowings

					2019		2018	
In € million (except where indicated)	Nominal amount	Coupon	Maturity	Secured	**Amount at amortized cost**	**Fair value**	Amount at amortized cost	Fair value
Senior US$ notes (144A;US$ 800 million)	712	3.40%	2020	No			697	697
Senior € notes	750	1.625%	2022	No	746	781	745	781
Senior US$ note Cytec Industries Inc (issuance US$ 400 million)	175	3.5%	2023	No	169	178	165	167
Senior US$ note Cytec Industries Inc (issuance US$ 250 million)	146	3.95%	2025	No	143	150	140	138
Senior US$ notes (144A;US$ 800 million)	712	4.45%	2025	No	709	775	695	706
Senior € notes	500	2.75%	2027	No	496	584	496	542
Senior € notes	600	0.500%	2029	No	595	582		
Total					**2,859**	**3,049**	**2,937**	**3,032**

In 2019 Solvay SA issued a 10-year Senior note (€ 600 million) with an 0.5% yearly coupon in parallel with the early repayment of the US$ 800 million Senior US$ notes of Solvay Finance America LLC, initially maturing in 2020.

There are no instances of default on the above-mentioned financial debts. There are no financial covenants, neither on Solvay SA, nor on any of the Group's holding companies.

Other financial instruments

In € million	**2019**	2018
Currency swaps	3	1
Other marketable securities > 3 months	44	68
Other current financial assets	72	32
Other financial instruments	**119**	**101**

The other marketable securities > 3 months include the bank drafts position.

The other current financial assets mainly include margin calls of Energy Services for instruments with a negative fair value, and represent collateral for the obligations.

Cash and cash equivalents

In € million	**2019**	2018
Cash	664	907
Term deposits	144	197
Cash and cash equivalents	**809**	**1,103**

By their nature, the carrying amount of cash and cash equivalents is equal to, or a very good proxy of, its fair value.

Changes in financial debt and in other financial instruments arising from financing activities

	2018	2019									
In € million	Total	**IFRS 16 adoption**	**Cash flows from increase of borrowings**	**Cash flows from repayment of borrowings**	**Cash flows from payment of lease liabilities**	**Changes in foreign exchange rates**	**Changes in other current financial assets**	**Other in financing cash flows**	**Transfer from non-current to current**	**Other**	**Total**
Bonds	2,937		597	(712)		36					2,859
Other non-current debts	208		48	(10)		3			(109)	16	156
Long-term finance lease obligations	35	(36)				1			(2)	1	
Lease liabilities – Long-term portion		376				5			(123)	111	368
Non-current financial debt	**3,180**	**340**	**645**	**(721)**		**45**			**(234)**	**128**	**3,382**
Short-term financial debt (excluding finance lease obligations)	616		2,399	(2,054)				(28)	109	(22)	1,020
Currency swaps	12									(4)	8
Short-term finance lease obligations	1								2	(2)	
Lease liabilities – Short-term portion		93			(110)				123	(5)	102
Current financial debt	**630**	**93**	**2,399**	**(2,054)**	**(110)**			**(28)**	**234**	**(33)**	**1,132**
Total financial debt	**3,810**	**433**	**3,044**	**(2,776)**	**(110)**	**46**		**(28)**		**95**	**4,513**
Currency swaps	(1)									(1)	(3)
Other marketable securities > 3 months	(67)					(1)	24				(44)
Other current financial assets	(32)						(57)	12		5	(73)
Other financial instruments	**(101)**					**(1)**	**(32)**	**12**		**3**	**(119)**
Total cash flows		**433**	**3,044**	**(2,776)**	**(110)**		**(32)**	**(16)**			

The financial debt increased from € 3,810 million at the end of 2018 to € 4,513 million at the end of 2019.

The non-current financial debt increases by € 202 million, mainly resulting from:

- the recognition of additional lease liabilities following the application of IFRS 16 Leases (€ 340 million at transition date, € 368 million at December 31, 2019);
- the issuance of Senior € notes for € 600 million;
- the early repayment of the US$ 800 million US$ Senior Bond;
- the transfer to current financial debt for € (234) million.

The current financial debt increases by € 503 million, mainly resulting from:

- the commercial papers outstanding at the end of the year (€ 700 million in 2019, against € 246 million in 2018);
- the transfer from non-current financial debt for € 234 million.

The amounts presented in the consolidated statement of cash flows under "increase in borrowings" and "repayment of borrowings" include the issuance of € 2,365 million and the repayment of € 1,911 million of commercial papers.

The € 111 million in "Other" mainly relates to leases that commenced during the year, as well as lease modifications.

NOTE F37
Other liabilities (current)

In € million	**2019**	2018
Wages and benefits debts	293	329
VAT and other taxes	112	131
Social security	61	68
Financial instruments – operational	187	194
Insurance premiums	15	15
Advances from customers	42	31
Other	82	81
Other current liabilities	**792**	**848**

Financial instruments – operational include held for trading and cash flow hedge derivatives (see note F35.A. *Overview of financial instruments*).

Miscellaneous Notes

NOTE F38
Commitments to acquire property, plant and equipment and intangible assets

In € million	**2019**	2018
Commitments to acquire property, plant and equipment and intangible assets	102	132

The amount mainly relates to commitments for the acquisition of property, plant and equipment.

NOTE F39
Contingent liabilities and financial guarantees

Accounting policy

A contingent liability is:

a. a possible obligation that arises from past events and whose existence will be confirmed only by the occurrence or non-occurrence of one or more uncertain future events not wholly within the control of the entity; or

b. a present obligation that arises from past events but is not recognized because:
(i) it is not probable that an outflow of resources embodying economic benefits will be required to settle the obligation; or
(ii) the amount of the obligation cannot be measured with sufficient reliability

Contingent liabilities are not recognized in the consolidated financial statements, except if they arise from a business combination. They are disclosed unless the possibility of an outflow of economic benefits is remote.

Financial guarantees are contracts that require the Group to make specified payments to reimburse the holder for a loss it incurs because a specified debtor fails to make payment when due in accordance with the original or modified terms of a debt instrument.

In order to avoid double counting, only financial guarantees in excess of liabilities recognized or disclosures made elsewhere in the Group's financial statements are disclosed in this note.

In € million	**2019**	2018
Financial guarantees RusVinyl	84	85
Financial guarantees pensions	456	279
Contingent liabilities	312	762
Total	**852**	**1,126**

During 2019, the Group undertook an in-depth review of its disclosures of contingent liabilities and financial guarantees in the amount of € 1,126 million as reported in its 2018 annual consolidated IFRS financial statements, clarifying the distinction between Financial guarantees (€ 364 million), and Contingent liabilities (€ 762 million).

Financial guarantees related to RusVinyl, the joint venture with SIBUR for the operation of a PVC plant in Russia, amount to € 84 million at December 31, 2019 (€ 85 million at the end of 2018). Those guarantees have been given on a several basis by both shareholders, SolVin/Solvay and Sibur, proportionate to their equity interest (50/50). In light of RusVinyl's demonstrated capacity to honor its debt obligations, the probability of the guarantees being called is considered to be highly remote.

The financial guarantees related to pensions are mainly related to the UK Rhodia Pension Fund (€ 430 million) – See note F34.B.2. *Description of obligations*. Such corresponds to the amount by which the guarantee exceeds the recognized pension liability. This guarantee applies to the pension liability measured based on a local UK regulatory basis (prudential basis) plus an allocation for market risk, which is higher when compared to the liability measured based on the methodology as prescribed by IAS 19 Employee Benefits. The increase of the excess when compared to the end of 2018 is mainly explained by the voluntary contribution (€ 114 million) that decreased the provision. The probability of the guarantees being called is considered to be highly remote.

The contingent liabilities decreased mainly following changed estimates as to probability of an outflow of economic benefits. Contingent liabilities primarily relate to environmental remediation matters.

NOTE F40
Related parties

Balances and transactions between Solvay SA and (a) its subsidiaries and (b) its joint operations for the Group's share of the respective joint operations, which are related parties of Solvay SA, have been eliminated in consolidation and are not disclosed in this note. Details of transactions between the Group and other related parties are disclosed below.

Sale and purchase transactions

	Sale of goods		Purchase of goods	
In € million	**2019**	2018	**2019**	2018
Associates	10	12	5	5
Joint ventures	41	55	23	23
Other related parties	30	27	70	49
Total	**81**	**95**	**99**	**77**

	Amounts owed by related parties		Amounts owed to related parties	
In € million	**2019**	2018	**2019**	2018
Associates	1	1		
Joint ventures	1	2	2	2
Other related parties	8	10	11	10
Total	**9**	**13**	**13**	**12**

Loans to related parties

In € million	**2019**	2018
Loans to joint ventures	9	25
Loans to other related parties	17	13
Total	**26**	**38**

Compensation of key management personnel

Key management personnel is composed of all members of the Board of Directors and members of the Executive Committee.
Amounts due in respect of the year (compensation) and obligations existing at the end of the year in the consolidated statement of financial position:

In € million	**2019**	2018
Wages, charges and short-term benefits	3	3
Non-compete fee		2
Long-term benefits	1	13
Cash-settled share-based payments liability	6	5
Total	**10**	**23**

The decrease of the long-term benefits is due to changes in the composition of the Executive Committee and the departure of the former Chief Executive Officer.

Expenses of the year:

In € million	**2019**	2018
Wages, charges and short-term benefits	8	9
Non-compete fee		2
Long-term benefits	2	2
Share-based payments expenses	9	3
Total	**19**	**15**

Excluding employer social charges and taxes

NOTE F41
Dividends proposed for distribution

The Board of Directors will propose to the "General Shareholders' Meeting" a gross dividend of € 3.75 per share.

Taking into account the dividend advance payment distributed in January 2020 of € 1.50 per share, the dividends proposed for distribution, but not yet recognized as a distribution to equity holders amount to € 238 million.

NOTE F42
Events after the reporting period

Accounting policy

Events after the reporting period which provide evidence of conditions that existed at the end of the reporting period (adjusting events) are recognized in the consolidated financial statements. Events indicative of conditions that arose after the reporting period are non-adjusting events and are disclosed in the notes if material.

On January 31, 2020, Solvay announced it had formally completed the divestment of its Performance Polyamides activities to BASF and Domo Chemicals. The transaction is based on an enterprise value of € 1.6 billion and the expected selling proceeds net of costs of disposals on the combined transaction are estimated to be around € 1.2 billion (selling proceeds of € 1.5 billion received on January 31, 2020). The expected capital gain after taxes, subject to customary post-closing purchase price adjustments, is around € 70 million.

Solvay has used a portion of the polyamides sale proceeds to prefund a part of the pension liabilities in France. This additional voluntary contribution amounts to approximately € 380 million.

NOTE F43
List of companies included in the consolidation scope

The Group consists of Solvay SA and a total of 339 investees.

Of these 339 investees, 183 are fully consolidated, 8 are proportionately consolidated and 27 are accounted for under the equity method, whilst the other 121 do not meet the criteria of significance.

List of companies entering or leaving the consolidation scope

Companies entering the consolidation scope

Country	Company	Comments
AUSTRALIA	Aqua Pharma Australia Pty Ltd, Armidale	New company
CANADA	Aqua Pharma Inc, Saint John	New company
CHILE	Aqua Pharma Chile Spa, Puerto Montt	New company
GERMANY	Polytechnyl Germany Gmbh, Hannover	New company
IRELAND	Aqua Pharma Ireland Ltd, Dublin	New company
NORWAY	Aqua Pharma Group A.S., Lillehammer	New company
	Aqua Pharma A.S., Lillehammer	New company
	Haugaland Shipping A.S., Haugesund	New company
UNITED KINGDOM	D Ferguson Welders Ltd, Inverness	New company
	Aqua Pharma Ltd, Inverness	New company
UNITED STATES	Aqua Pharma U.S. Inc, Kirkland	New company

Companies leaving the consolidation scope

Country	Company	Comments
EGYPT	Solvay Alexandria Trading LLC, Alexandria	No longer meets the consolidation criteria
UNITED STATES	Cytec Overseas Corp., New Jersey	Merged into Cytec Global Holdings Inc
	Cytec Carbon Fibers LLC, New Jersey	Merged into Cytec Engineered Materials Inc
	IMC Mining Chemicals LLC, New Jersey	Merged into Cytec Global Holdings Inc
URUGUAY	Alaver SA, Montevideo	No longer meets the consolidation criteria

List of subsidiaries

Indicating the percentage holding. The percentage of voting rights is very close to the percentage holding.

ARGENTINA	
Solvay Argentina SA, Buenos Aires	100
Solvay Quimica SA, Buenos Aires	100
AUSTRALIA	
Cytec Asia Pacific Holdings Pty Ltd, Baulkham Hills	100
Cytec Australia Holdings Pty Ltd, Baulkham Hills	100
Solvay Interox Pty Ltd, Banksmeadow	100
AUSTRIA	
Solvay Österreich GmbH, Wien	100
BELGIUM	
Carrières les Petons S.P.R.L., Walcourt	100
Solvay Chemicals International S.A., Brussels	100
Solvay Chimie S.A., Brussels	100
Solvay Participations Belgique S.A., Brussels	100
Solvay Pharmaceuticals S.A. – Management Services, Brussels	100
Solvay Specialty Polymers Belgium SA/NV, Brussels	100
Solvay Stock Option Management S.P.R.L., Brussels	100
BRAZIL	
Cogeracao de Energia Electricica Paraiso SA, Brotas	100
Techpolymers Industria E Comercio Ltda, Sao Paulo	100
Rhodia Brazil Ltda, Sao Paolo	100
Rhodia Poliamida Brasil Ltda, Sao Paolo	100
Rhodia Poliamida e Especialidades Ltda, Sao Paolo	100
Rhopart-Participacoes Servidos e Comercio Ltda, Sao Paolo	100
BULGARIA	
Solvay Bulgaria EAD, Devnya	100
CANADA	
Cytec Canada Inc, Niagara Falls Welland	100
Solvay Canada Inc, Toronto	100
CHINA	
Beijing Rhodia Eastern Chemical Co., Ltd, Beijing	60
Cytec Industries Co. Ltd, Shanghai	100
Cytec Engineered Materials Co. Ltd, Shanghai	100
Liyang Solvay Rare Earth New Material Co., Ltd, Liyang City	96.3
Rhodia Hong Kong Ltd, Hong Kong	100
Solvay (Beijing) Energy Technology Co., Ltd, Beijing	100
Solvay (Shanghai) Engineering Plastics Co., Ltd, Shanghai	100
Solvay (Shanghai) International Trading Co., Ltd, Shanghai	100
Solvay (Shanghai) Ltd, Shanghai	100
Solvay (Zhangjiagang) Specialty Chemicals Co. Ltd, Suzhou	100
Solvay (Zhenjiang) Chemicals Co., Ltd, Zhenjiang New area	100
Solvay Chemicals (Shanghai) Co. Ltd, Shanghai	100
Solvay China Co., Ltd, Shanghai	100
Solvay Fine Chemical Additives (Qingdao) Co., Ltd, Qingdao	100
Solvay Hengchang (Zhangjiagang) Specialty Chemical Co., Ltd, Zhangjiagang City	70
Solvay Lantian (Quzhou) Chemicals Co., Ltd, Zhejiang	55
Solvay Silica Qingdao Co., Ltd, Qingdao	100
Solvay Speciality Polymers (Changshu) Co. Ltd, Changshu	100
Suzhou Interox Sem Co. Ltd, Suzhou	100
Zhuhai Solvay Specialty Chemicals Co Ltd, Zhuhai City	100
CHILE	
Cytec Chile Ltda, Santiago	100

FINLAND	
Solvay Chemicals Finland Oy, Voikkaa	100
FRANCE	
Cogénération Tavaux SAS, Paris	33.3
Cytec Process Materials Sarl, Toulouse	100
RHOD V S.N.C., Courbevoie	100
RHOD W S.N.C., Courbevoie	100
Rhodia Chimie S.A.S., Aubervilliers	100
Rhodia Energy GHG S.A.S., Puteaux	100
Rhodia Laboratoire du Futur S.A.S., Pessac	100
Rhodia Operations S.A.S., Aubervilliers	100
Rhodia Participations S.N.C., Courbevoie	100
Rhodianyl S.A.S., Saint-Fons	100
Solvay – Opérations – France S.A.S., Paris	100
Solvay – Fluorés – France S.A.S., Paris	100
Solvay Energie France S.A.S., Paris	100
Solvay Energy Services S.A.S., Puteaux	100
Solvay Finance S.A., Paris	100
Solvay France S.A., Courbevoie	100
Solvay Speciality Polymers France S.A.S., Paris	100
Solvin France S.A., Paris	100
GERMANY	
Cavity GmbH, Hannover	100
Cytec Engineered Materials GmbH, Oestringen	100
European Carbon Fiber GmbH, Kelheim	100
Horizon Immobilien AG, Hannover	100
Performance Polyamides Gmbh, Hannover	100
Polytechnyl Germany Gmbh, Hannover	100
Salzgewinnungsgesellschaft Westfalen GmbH & Co KG, Hannover	65
German limited partnership, which makes use of the exemptions offered by Section 264(b) of the German Commercial Code, not to publish their annual financial statements.	
Solvay Chemicals GmbH, Hannover	100
Solvay Fluor GmbH, Hannover	100
Solvay Flux GmbH, Hannover	100
Solvay GmbH, Hannover	100
Solvay Infra Bad Hoenningen GmbH, Hannover	100
Solvay P&S GmbH, Freiburg	100
Solvay Specialty Polymers Germany GmbH, Hannover	100
Solvin GmbH & Co. KG – PVDC, Rheinberg	100
Solvin Holding GmbH, Hannover	100
INDIA	
Rhodia Polymers & Specialties India Private Limited, Mumbai	100
Solvay Specialities India Private Limited, Mumbai	100
Sunshield Chemicals Limited, Mumbai	62.4
INDONESIA	
PT. Cytec Indonesia, Jakarta	100
IRELAND	
Solvay Finance Ireland Unlimited, Dublin	100
ITALY	
Cytec Process Materials S.r.l., Mondovi	100
Performance Polyamide Italy Srl, Bollate	100
Solvay Chimica Italia S.p.A., Milano	100
Solvay Energy Services Italia S.r.l., Bollate	100
Solvay Solutions Italia S.p.A., Milano	100
Solvay Specialty Polymers Italy S.p.A., Milano	100

JAPAN	
Nippon Solvay KK, Tokyo	100
Solvay Japan K.K., Tokyo	100
Solvay Nicca Ltd, Tokyo	60
Solvay Special Chem Japan Ltd, Anan City	67
Solvay Specialty Polymers Japan KK, Minato Ku-Tokyo	100
LATVIA	
Solvay Business Services Latvia SIA, Riga	100
LUXEMBOURG	
Cytec Luxembourg International Holdings Sarl, Strassen	100
Solvay Chlorovinyls Holding S.a.r.l., Luxembourg	100
Solvay Finance (Luxembourg) SA, Luxembourg	100
Solvay Hortensia S.A., Luxembourg	100
Solvay Luxembourg S.a.r.l., Luxembourg	100
MEXICO	
Cytec de Mexico S.A. de C.V., Jalisco	100
Solvay Industrial S.de R.L. de C.V., Mexico	100
Solvay Fluor Mexico S.A. de C.V., Ciudad Juarez	100
Solvay Mexicana S. de R.L. de C.V., Monterrey	100
NETHERLANDS	
Cytec Industries B.V., Vlaardingen	100
Rhodia International Holdings B.V., Den Haag	100
Solvay Chemicals and Plastics Holding B.V., Linne-Herten	100
Solvay Chemie B.V., Linne-Herten	100
Solvay Solutions Nederland B.V., Klundert	100
Solvin Holding Nederland B.V., Linne-Herten	100
NEW ZEALAND	
Solvay New Zealand Ltd, Auckland	100
PERU	
Cytec Peru S.A.C., Lima	100
POLAND	
Solvay Engineering Plastics Poland Sp z.o.o., Gorzow Wielkopolski	100
Solvay Advanced Silicas Poland Sp. z o.o., Gorzow Wielkopolski	100
PORTUGAL	
Solvay Business Services Portugal Unipessoal Lda, Carnaxide	100
Solvay Portugal – Produtos Quimicos S.A., Povoa	100
RUSSIA	
Solvay Vostok OOO, Moscow	100
SINGAPORE	
Rhodia Amines Chemicals Pte Ltd, Singapore	100
Solvay Fluor Holding (Asia-Pacific) Pte. Ltd., Singapore	100
Solvay Specialty Chemicals Asia Pacific Pte. Ltd., Singapore	100
SOUTH KOREA	
Cytec Korea Inc, Seoul	100
Daehan Solvay Special Chemicals Co., Ltd, Seoul	100
Solvay Chemicals Korea Co. Ltd, Seoul	100
Solvay Chemical Services Korea Co. Ltd, Seoul	100
Solvay Energy Services Korea Co. Ltd, Seoul	100
Solvay Korea Co. Ltd, Seoul	100
Solvay Silica Korea Co. Ltd, Incheon	100
Solvay Specialty Polymers Korea Company Ltd, Seoul	100
SPAIN	
Solvay Quimica S.L., Barcelona	100
Solvay Solutions Espana S.L., Madrid	100

SWITZERLAND	
Solvay (Schweiz) AG, Bad Zurzach	100
Solvay Vinyls Holding AG, Bad Zurzach	100
THAILAND	
Solvay Asia Pacific Company Ltd, Bangkok	100
Solvay (Bangpoo) Specialty Chemicals Ltd, Bangkok	100
Solvay (Thailand) Ltd, Bangkok	100
Solvay Peroxythai Ltd, Bangkok	100
TURKEY	
Solvay Istanbul Kimya Limited Sirketi, Istanbul	100
UNITED KINGDOM	
Advanced Composites Group Investments Ltd, Heanor	100
Cytec Engineered Materials Ltd, Wrexham	100
Cytec Industrial Materials (Derby) Ltd, Heanor	100
Cytec Industrial Materials (Manchester) Ltd, Heanor	100
Cytec Industries UK Holdings Ltd, Wrexham	100
Cytec Med-Lab Ltd, Heanor	100
Cytec Process Materials (Keighley) Ltd, Keighley	100
McIntyre Group Ltd, Watford	100
Rhodia Holdings Ltd, Watford	100
Rhodia International Holdings Ltd, Oldbury	100
Rhodia Limited, Watford	100
Rhodia Organique Fine Ltd, Watford	100
Rhodia Overseas Ltd, Watford	100
Rhodia Pharma Solutions Holdings Ltd, Cramlington	100
Rhodia Pharma Solutions Ltd, Cramlington	100
Rhodia Reorganisation, Watford	100
Solvay Interox Ltd, Warrington	100
Solvay Solutions UK Ltd, Watford	100
Solvay UK Holding Company Ltd, Warrington	100
Umeco Composites Ltd, Heanor	100
Umeco Ltd, Heanor	100
UNITED STATES	
Ausimont Industries, Inc., Wilmington, Delaware	100
CEM Defense Materials LLC, Tempe Arizona	100
Cytec Aerospace Materials (ca) Inc., Sacramento California	100
Cytec Engineered Materials Inc., Princeton New Jersey	100
Cytec Global Holdings Inc., Princeton New Jersey	100
Cytec Industrial Materials (ok) Inc., Tulsa Oklahoma	100
Cytec Industries Inc, Princeton New Jersey	100
Cytec Korea Inc., Princeton New Jersey	100
Cytec Process Materials (ca) Inc., Santa Fe Springs California	100
Cytec Technology Corp., Princeton New Jersey	100
Garret Mountain Insurance Co., Burlington Vermont	100
Rocky Mountain Coal Company, LLC, Houston, Texas	100
Solvay America Holdings, Inc., Houston, Texas	100
Solvay America Inc., Houston, Texas	100
Solvay Chemicals, Inc., Houston, Texas	100
Solvay Finance (America) LLC, Houston, Texas	100
Solvay Financial Services INC., Wilmington, Delaware	100
Solvay Fluorides, LLC., Greenwich, Connecticut	100
Solvay Holding INC., Princeton, New Jersey	100
Solvay India Holding Inc., Princeton, New Jersey	100
Solvay Soda Ash Expansion JV, Houston, Texas	80
Solvay Soda Ash Joint Venture, Houston, Texas	80
Solvay Specialty Polymers USA, LLC, Alpharetta, Georgia	100
Solvay USA INC., Princeton, New Jersey	100
URUGUAY	
Zamin Company S/A, Montevideo	100

List of joint operations

Indicating the percentage holding.

AUSTRIA	
Solvay Sisecam Holding AG, Wien	75
BELGIUM	
BASF Interox H2O2 Production N.V., Brussels	50
BULGARIA	
Solvay Sodi AD, Devnya	73.5
FRANCE	
Butachimie S.N.C., Courbevoie	50
NETHERLANDS	
MTP HP JV C.V., Weesp	50
MTP HP JV Management bv, Weesp	50
SAUDI ARABIA	
Saudi Hydrogen Peroxide Co, Jubail	50
THAILAND	
MTP HP JV (Thailand) Ltd, Bangkok	50

List of companies consolidated by applying the equity method of accounting

Indicating the percentage holding.

Joint ventures

AUSTRALIA	
Aqua Pharma Australia Pty Ltd, Armidale	50
BELGIUM	
EECO Holding SA, Brussels	33.3
BRAZIL	
Peroxidos do Brasil Ltda, Sao Paulo	69.4
CANADA	
Aqua Pharma Inc, Saint John	50
CHILE	
Aqua Pharma Chile Spa, Puerto Montt	50
CHINA	
Shandong Huatai Interox Chemical Co. Ltd, Dongying	50
FRANCE	
Cogénération Belle Etoile SAS, Paris	33.3
GERMANY	
Solvay & CPC Barium Strontium GmbH & Co KG, Hannover	75
Solvay & CPC Barium Strontium International GmbH, Hannover	75
INDIA	
Hindustan Gum & Chemicals Ltd, New Delhi	50
IRELAND	
Aqua Pharma Ireland Ltd, Dublin	50
ITALY	
Cogeneration Rosignano S.r.l., Rosignano	25.4
Cogeneration Spinetta S.p.a., Bollate	33.3
MEXICO	
Solvay & CPC Barium Strontium Monterrey S. de R.L. de C.V., Monterrey	75
NORWAY	
Aqua Pharma Group A.S., Lillehammer	50
Aqua Pharma A.S., Lillehammer	50
Haugaland Shipping A.S., Haugesund	50
RUSSIA	
RusVinyl OOO, Moscow	50
UNITED KINGDOM	
D Ferguson Welders Ltd, Inverness	50
Aqua Pharma Ltd, Inverness	50
UNITED STATES	
Aqua Pharma U.S. Inc, Kirkland	50

Associates

CHINA	
Qingdao Hiwin Solvay Chemicals Co. Ltd, Qingdao	30
FRANCE	
GIE Chime Salindres, Salindres	50
INDONESIA	
Solvay Manyar P.T., Gresik	50
MEXICO	
Silicatos y Derivados S.A. DE C.V., Estado de Mexico	20
POLAND	
Zaklad Energoeloctryczny Energo-Stil Sp. z o.o., Gorzow Wielkopolski	25
UNITED KINGDOM	
Penso Holdings Ltd, Coventry	20

3. Summary of financial statements of Solvay SA

The annual financial statements of Solvay SA are presented in summary format below. In accordance with the Belgian Companies Code, the annual financial statements of Solvay SA, the management report and the statutory auditor's report will be filed with the National Bank of Belgium.

These documents are also available free of charge on the internet or upon request sent to:

Solvay SA
rue de Ransbeek 310
B – 1120 Brussels

The balance sheet of Solvay SA at the end of the year 2019 presented below is based on a dividend distribution of € 3.75 per share.

At the end of 2019, Solvay SA has still one Branch, Solvay S.A. Italia (Viale Lombardia 2, 20021 Bollate, Italy).

The accounts of Solvay SA are prepared in accordance with Belgian generally accepted accounting principles.

The main activities of Solvay SA consist of holding and managing a number of investments in Group companies and of financing the Group's activities from the bank and bond markets.Solvay SA also has a Group internal factoring activity without recourse. As a result, Solvay SA owns and manages Group's trade receivables from customers based in Europe and in Asia. It manages the research center at Neder-Over-Heembeek (Brussels, Belgium) and a very limited number of commercial activities not undertaken through subsidiaries.

Balance sheet of Solvay SA (summary)

In € million	2019	2018
ASSETS		
Fixed assets	**13,286**	**13,883**
Start-up expenses and intangible assets	164	172
Tangible assets	64	55
Financial assets	13,058	13,656
Current assets	**5,080**	**5,457**
Inventories		
Trade receivables	862	886
Other receivables	3,861	4,061
Short-term investments and cash equivalents	338	492
Accrued income and deferred charges	19	18
Total assets	**18,366**	**19,340**
SHAREHOLDERS' EQUITY AND LIABILITIES		
Shareholders' equity	**11,337**	**11,207**
Capital	1,588	1,588
Issue premiums	1,200	1,200
Reserves	1,982	1,982
Net income carried forward	6,566	6,436
Provisions and deferred taxes	**309**	**323**
Financial debt	**3,353**	**3,015**
due in more than one year	2,652	2,050
due within one year	701	965
Trade liabilities	**84**	**80**
Other liabilities	**3,256**	**4,670**
Accrued charges and deferred income	**27**	**45**
Total shareholders' equity and liabilities	**18,366**	**19,340**

The decrease of the total assets (€ (974) million) is the combination of:

- a decrease of financial assets by € (598) million, resulting mainly from the net impact of:
  - equity reductions in Solvay Finance Luxembourg (€ (1,720) million), in Belgian subsidiaries (€ (376) million) and in Solvay GmbH (€ (41) million);
  - the increase of the investment held in Solvay Holding Inc through capital contributions of € 1,616 million;
- a decrease of current assets by € (377) million, resulting mainly from:
  - the decrease of other receivables (€ (200) million) following the reimbursement of loans by the affiliates and movements of current accounts towards affiliates; and
  - the decrease of the cash at bank (€ (154) million).

The financial debt totals € 3,353 million (compared to € 3,015 million at the end of 2018). The increase of € 338 million is due to:

- the repayment of intercompany debt for € (700) million;
- the issuance of Senior bonds (€ 600 million); and
- the increase of commercial paper (€ 454 million).

After taking into the account the “Short term investments and cash equivalents” as well as the intercompany loans in “Other receivables”, net financial debt amounts to € 1,944 million (against € 2,561 million at the end of 2018). The decrease in net financial debt results mainly from intercompany flows (dividends, capital increases and decreases).

Other liabilities include current accounts towards affiliates, as well as the dividends to be paid in 2020 (€ 397 million).

Shareholders equity increases by € 130 million due to the excess of the profit for the year over the dividend.

Income statement of Solvay SA (summary)

In € million	2019	2018
Operating income	**987**	**1,024**
Sales	13	11
Other operating income	974	1,013
Operating expenses	**(855)**	**(982)**
Operating profit	**132**	**42**
Financial income and expenses	413	495
Profit for the year before taxes	**545**	**537**
Income taxes	(18)	(11)
Profit for the year	**527**	**526**
Profit for the year available for distribution	**527**	**526**

In 2019, the profit for the year of Solvay SA amounted to € 527 million, compared with € 526 million in 2018.

It includes:

- the operating result amounting to € 132 million, compared with € 42 million in 2018. The increase is mainly driven by higher recharges to affiliates;
- financial gains and losses of which:
  - dividends received from its various financial investments amounting to €1,469 million, partly offset by impairment on shares (€ (985) million), including impairment on shares of Solvay Finance Luxembourg (€ 820 million) after distribution of reserves to fund the capital increase in Solvay Holding Inc. In 2018 Solvay SA received dividends for € 177 million and recognized a capital gain of € 370 million resulting from the sale of investments within the Group;
  - the differential between interest expense and income on its financing activities amounting to € (64) million, to be compared with an amount of € (62) million in 2018.

An amount of € 6,963 million including the profit for the year is available for distribution.

Profit available for distribution

In € million	2019	2018
Profit for the year available for distribution	**527**	**526**
Carried forward	6,436	6,307
Total available to the General Shareholders' Meeting	**6,963**	**6,833**
Appropriation		
Gross dividend	397	397
Carried forward	6,566	6,436
Total	**6,963**	**6,833**

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Declarations:
Auditor's reports & Declaration by the persons responsible

Deloitte.

Solvay SA/NV

Assurance report of the statutory auditor on a selection of social, environmental and other sustainable development information for the year ended 31 December 2019

Assurance report of the statutory auditor on a selection of social, environmental and other sustainable development information for the year ended 31 December 2019

Pursuant to your request and in our capacity of statutory auditor of Solvay SA / NV ("the Company"), we hereby present you our assurance report on a selection of social, environmental and other sustainable development information disclosed in the Solvay Group Annual Integrated Report for the year ended 31 December 2019 (the "2019 Annual Integrated Report"), identified by the symbol and .

Responsibility of the Company

This selection of information (the "Information") extracted from the 2019 Annual Integrated Report has been prepared under the responsibility of Solvay Group management, in accordance with internal measurement and reporting principles used by Solvay Group (the "Reporting Framework"). The Reporting Framework consists of specific definitions and assumptions that are summarized in section "Extra-financial statements" of the 2019 Annual Integrated Report.

Responsibility of the Statutory Auditor

It is our responsibility, based on the procedures performed by us, to express:

- *"Limited assurance" for the Information identified by the symbol* as included in the 2019 Annual Integrated Report
- *"Reasonable assurance" for the Information identified by the symbol* as included in the 2019 Annual Integrated Report

The complete list of Information in scope of our assurance engagement together with the type of assurance has been included in appendix A of this report.

We conducted our procedures in accordance with the international standard as defined in ISAE (International Standard on Assurance Engagements) 3000. With respect to independence rules, these are defined by the respective legal and regulatory texts as well as by the professional Code of Ethics, issued by the International Federation of Accountants ("IFAC").

Nature and scope of procedures

We have carried out the following procedures:

- *General procedures:*
    - We assessed the appropriateness of the Reporting Framework with respect to its relevance, completeness, neutrality, clarity and reliability, by taking into consideration, when relevant, the sector reporting practices.
    - We have verified the set-up within Solvay Group of the process to obtain, consolidate and check the selected Information with regard to its completeness and consistency. We have familiarized ourselves with the internal control and risk management procedures relating to the compilation of the information. We have conducted interviews with individuals responsible for social, environmental and other sustainable development reporting.

Solvay SA/NV
Assurance report of the statutory auditor on a selection of social, environmental and other sustainable development information for the year ended 31 December 2019

- At the sites that we have selected based on their activity, their contribution to the consolidated data, their location and a risk analysis, we have:
    - Conducted interviews to verify the proper application of procedures and obtained information to perform our verifications;
    - Conducted substantive tests, using sampling techniques, to verify the calculations performed and reconcile data with supporting evidence.
- All the audited sites and perimeters are listed in appendix B of this document.

- *"Limited assurance" for the Information identified by the symbol as included in the 2019 Annual Integrated Report:*
    - For the entity in charge of consolidation ("the Company"), as well as for the controlled entities, we have designed analytical procedures and verified, using sampling techniques, the calculations as well as the consolidation of this information in order to obtain limited assurance that the selected information does not contain any material errors that would question its preparation, in all material respects, in accordance with the Reporting Framework. A higher level of assurance would have required more extensive procedures.

- *"Reasonable assurance" for the Information identified by the symbol as included in the 2019 Annual Integrated Report:*
    - We conducted work of the same nature as the work described in section above (limited assurance) but in further detail, in particular performing an increased number of tests. In these cases, the selected sample represents between 12% and 20% of the published data.

Conclusion

- *For the indicators in scope of "limited assurance" (identified by the symbol)*

  On the basis of the procedures performed by us, nothing came to our attention that causes us to believe that the Information identified by the symbol as included in the 2019 Annual Integrated Report, is not prepared, in all material respects, in accordance with the Reporting Framework.

- *For the indicators in scope of "reasonable assurance" (identified by the symbol)*

  In our opinion, based on the procedures performed, the Information identified by the symbol as included in the 2019 Annual Integrated Report, has been prepared in all material respects in accordance with the Reporting Framework.

Observations

Without qualifying our conclusion above, we draw your attention to the following point:

- Although the process, definition, and underlying control environment of the Solvay Way self-assessments have been significantly revised in 2019 compared to 2018, they show room for improvement. They need to be reinforced in 2020.

Zaventem, 31 March 2020

The statutory auditor

Deloitte Bedrijfsrevisoren/Réviseurs d'Entreprises CVBA/SCRL
Represented by

Michel Denayer

Corine Magnin

Annex:

Annex A – Overview of indicators reviewed

Annex B – Overview of perimeter reviewed

Deloitte.

Deloitte Bedrijfsrevisoren/Réviseurs d'Entreprises
Coöperatieve vennootschap met beperkte aansprakelijkheid/Société coopérative à responsabilité limitée
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Member of Deloitte Touche Tohmatsu Limited

Solvay SA/NV
Assurance report of the statutory auditor on a selection of social, environmental and other sustainable development information for the year ended 31 December 2019

Appendix A - Overview of indicators reviewed

Indicators in **bold** are selected for reasonable assurance.

Reporting scope	Information	Audit Procedure	Audit scope
Sustainable business solutions	**Product portfolio assessed**	**Reasonable Assurance**	Group level
	Sustainable business solutions	**Reasonable Assurance**	Group level
Greenhouse gas emissions	**Greenhouse gas emissions intensity**	**Reasonable Assurance**	Group level
	GHG reductions achieved compared to last year (at constant scope and constant GHG accounting methodology)	**Reasonable Assurance**	Group level
	Direct and indirect CO_2 emissions (Scope 1 & 2)	**Reasonable Assurance**	Site level
	Other greenhouse gas emissions according to Kyoto Protocol (Scope 1)	**Reasonable Assurance**	Site level
	Total greenhouse gas emissions according to Kyoto Protocol (Scopes 1 & 2)	**Reasonable Assurance**	Site level
	Other greenhouse gas emissions not according to Kyoto Protocol (Scope 1)	Limited Assurance	Site level
Energy	Primary energy consumption	Limited Assurance	Site level
	Energy efficiency index	Limited Assurance	Site level
Air quality	Nitrogen oxides emissions – NO_x	Limited Assurance	Site level
	Nitrogen oxides intensity	Limited Assurance	Site level
	Sulphur oxides emissions – SO_x	Limited Assurance	Site level
	Sulphur oxides intensity	Limited Assurance	Site level
	Non-methane volatile organic compounds emissions – NMVOC	Limited Assurance	Site level
	Non-methane volatile organic compounds intensity	Limited Assurance	Site level
Water and wastewater	Freshwater withdrawal	Limited Assurance	Site level
	Freshwater withdrawal intensity	Limited Assurance	Site level
	Chemical oxygen demand (COD)	Limited Assurance	Site level
	Chemical oxygen demand intensity	Limited Assurance	Site level

Solvay SA/NV
Assurance report of the statutory auditor on a selection of social, environmental and other sustainable development information for the year ended 31 December 2019

Reporting scope	Information	Audit Procedure	Audit scope
Waste and hazardous materials	Non-hazardous industrial waste	Limited Assurance	Site level
	Hazardous industrial waste	Limited Assurance	Site level
	Total industrial waste	Limited Assurance	Site level
	Industrial hazardous waste not treated in a sustainable way in absolute volume	Limited Assurance	Site level
	Industrial hazardous waste not treated in a sustainable way intensity	Limited Assurance	Site level
	Substance of very high concern (SVHC) according to REACH criteria present in products sold	Limited Assurance	Group level
	Percentage of completion of Analysis of Safer Alternatives program for marketed substances	Limited Assurance	Group level
Employee health and safety	**Medical Treatment Accident Rate – for Solvay Employees, and contractors (MTAR)**	**Reasonable Assurance**	Site level
	Lost Time Accident Rate – for Solvay Employees and contractors (LTAR)	**Reasonable Assurance**	Site level
	Fatal accidents of Solvay employees and contractors	**Reasonable Assurance**	Site level
Employee engagement and wellbeing	Coverage by collective agreement	Limited Assurance	Group level
Solvay Way	Solvay Way Group profile	Limited Assurance	Site and Group level
Societal actions	Employees involved in local societal actions	Limited Assurance	Site level
Diversity and inclusion	Total headcount	Limited Assurance	Group level
	Percentage of women in the Group	Limited Assurance	Group level
	Headcount by employee category (senior manager, middle manager, junior manager, non-manager)	Limited Assurance	Group level
Process accident and safety	Process safety incident rate	Limited Assurance	Group level
	Number of incidents (M,H,C) with environmental consequences	Limited Assurance	Site level
	Number of incidents (M,H,C) with environmental consequences in which the limits of the operating permit were exceeded	Limited Assurance	Site level
Customer welfare	Solvay's Net Promoter Score (NPS)	Limited Assurance	Group level

Solvay SA/NV
Assurance report of the statutory auditor on a selection of social, environmental and other sustainable development information for the year ended 31 December 2019

Reporting scope	Information	Audit Procedure	Audit scope
Management of the legal, ethics and regulatory framework	Total claims made	Limited Assurance	Group level
	Total claims closed including cases for which there was insufficient information or cases that were misdirected or referred	Limited Assurance	Group level
	Unsubstantiated claims among resolved cases	Limited Assurance	Group level
	Substantiated claims among resolved cases	Limited Assurance	Group level

Note: For FY19, the reasonable assurance on the Solvay employee engagement index has been excluded compared to FY18 as no measurements took place.

Solvay SA/NV
Assurance report of the statutory auditor on a selection of social, environmental and other sustainable development information for the year ended 31 December 2019

Appendix B - Overview of audited sites, GBUs and functions

Audited sites	Country	Audited reporting scope								
		Greenhouse gas emissions	Energy	Air quality	Water and wastewater	Waste and hazardous materials	Employee health and safety	Process accident and safety	Solvay Way	Societal Actions
Paulinia	Brazil						●	●	○	●
Curtitiba	Brazil	●	●							
Devnya	Bulgaria						●	●	○	●
Clamecy	France	●	●	●	●	●	●	●	○	●
Bad Hoennigen	Germany						●	●	○	●
Roha	India	●	●	●	●	●	●	●	○	●
Massa	Italy	●	●	●	●	●	●	●	○	●
Riga	Latvia	●	●							
Atequiza Jalisc	Mexico	●	●	●	●	●	●	●	○	●
Singapore Ayer	Singapore	●	●	●	●	●	●	●	○	●
Warrington	UK			●	●	●	●	●		
Borger, TX	USA			●	●	●	●	●	○	●
Deer Park, TX	USA								○	●
Green River, WY	USA	●	●	●	●	●	●	●	○	●
Orange, TX	USA						●	●		●
Willow Island, WV	USA	●	●	●	●	●	●	●	○	●

A selection of indicators audited ○

All relevant indicators audited ●

Audited GBUs and functions	Solvay Way	Customer Welfare
GBU Aroma Performance	○	●
GBU Fibras		●
GBU Novecare		●
GBU Peroxides	○	
GBU Specialty Polymers	○	
Investor stakeholder	●	

A selection of indicators audited ○

All relevant indicators audited ●

Solvay SA

Statutory auditor's report to the shareholders' meeting for the year ended 31 December 2019 - Consolidated financial statements

Solvay SA | 31 December 2019

Statutory auditor's report to the shareholders' meeting of Solvay SA for the year ended 31 December 2019 - Consolidated financial statements

In the context of the statutory audit of the consolidated financial statements of Solvay SA ("the company") and its subsidiaries (jointly "the group"), we hereby submit our statutory audit report. This report includes our report on the consolidated financial statements and the other legal and regulatory requirements. These parts should be considered as integral to the report.

We were appointed in our capacity as statutory auditor by the shareholders' meeting of 14 May 2019 in accordance with the proposal of the board of directors issued upon recommendation of the audit committee and presentation of the works council. Our mandate will expire on the date of the shareholders' meeting deliberating on the financial statements for the year ending 31 December 2021. We have performed the statutory audit of the consolidated financial statements of Solvay SA for 19 consecutive periods.

Report on the consolidated financial statements

Unqualified opinion

We have audited the consolidated financial statements of the group, which comprise the consolidated statement of financial position as at 31 December 2019, the consolidated income statement, the consolidated statement of comprehensive income, the consolidated statement of changes in equity and the consolidated statement of cash flows for the year then ended, as well as the summary of significant accounting policies and other explanatory notes. The consolidated statement of financial position shows total assets of 21 307 million EUR and the consolidated income statement shows a profit for the year then ended of 157 million EUR.

In our opinion, the consolidated financial statements give a true and fair view of the group's net equity and financial position as of 31 December 2019 and of its consolidated results and its consolidated cash flow for the year then ended, in accordance with International Financial Reporting Standards (IFRS) as adopted by the European Union and with the legal and regulatory requirements applicable in Belgium.

Basis for the unqualified opinion

We conducted our audit in accordance with International Standards on Auditing (ISA), as applicable in Belgium. In addition, we have applied the International Standards on Auditing approved by the IAASB applicable to the current financial year, but not yet approved at national level. Our responsibilities under those standards are further described in the "Responsibilities of the statutory auditor for the audit of the consolidated financial statements" section of our report. We have complied with all ethical requirements relevant to the statutory audit of consolidated financial statements in Belgium, including those regarding independence.

We have obtained from the board of directors and the company's officials the explanations and information necessary for performing our audit.

We believe that the audit evidence obtained is sufficient and appropriate to provide a basis for our opinion.

Key audit matters

Key audit matters are those matters that, in our professional judgment, were of most significance in our audit of the consolidated financial statements of the current period. These matters were addressed in the context of our audit of the consolidated financial statements as a whole and in forming our opinion thereon, and we do not provide a separate opinion on these matters.

Solvay SA | 31 December 2019

Key audit matters	How our audit addressed the key audit matters
1. Goodwill Impairment tests • As a consequence of the group's transition into a specialty chemicals company, significant goodwills have arisen from acquisitions. At 31 December 2019 goodwills amount to 4 468 million EUR and represent 21% of the consolidated total assets. • In accordance with IFRS requirements, the carrying value of goodwill is tested annually for impairment by comparing the carrying amount of each cash-generating unit ("CGU") or group of CGUs to its value in use. • Based on the headroom that exists per CGU or group of CGUs as well as sensitivity analyses performed on the valuation and cash flow assumptions used in the impairment test, we have determined the **business assumptions** of the following CGUs or group of CGUs as focus area in our audit: **Composite Materials** and **Technology Solutions**. The goodwill balances for these CGUs or group of CGUs respectively amount to 1 334 and 966 million EUR at 31 December 2019, representing the two largest goodwill balances per CGU or group of CGUs of the group. The difference between the CGU's carrying amount and the value in use ("headroom") is below the other CGUs. • Additionally, management recorded an impairment of 825 million EUR on the **Oil & Gas** cash generating unit in September 2019. Significant judgement was required to estimate the recoverable amount of this CGU (mainly discount rate, forecasted EBITDA and long term growth rate).	• We have reviewed the goodwill impairment and the budgeting/forecasting processes which allowed us to identify relevant controls; • We evaluated and challenged management's determination of CGUs or group of CGUs for the purpose of goodwill impairment testing; • We tested the carrying amounts of the CGUs or group of CGUs used in the impairment test for reconciliation with the financial reporting system; • We evaluated whether the valuation methodology is appropriate in the circumstances and whether the methodology used for determining the value in use is applied consistently with the preceding periods; • We assessed and challenged the reasonableness of the valuation assumptions (discount rate and long-term growth rate); • We assessed and challenged the reasonableness of the cash flow assumptions, both in the projection period as in the terminal period; • We performed benchmarking and sensitivity analyses with peers and analyst reports, on valuation and cash flow assumptions; • We tested the arithmetic accuracy of the overall model; • We recalculated the impairment recorded for Oil & Gas and evaluated the allocation over the different asset categories; • We reviewed and tested the management's reconciliation of the valuations, used for impairment testing purposes, to the entity's market capitalization;

Solvay SA | 31 December 2019

Key audit matters	How our audit addressed the key audit matters
• We have also focused on the **valuation assumptions** (discount rate and long-term growth rate) considering the important sensitivity to said assumptions, and the fact that management applied the same discount rate for all the CGUs. • As a consequence, we consider goodwill impairment test for the 3 CGUs or group of CGUs mentioned above to be a key audit matter. • Management's disclosure on impairment of goodwill is included in Notes F21 and F27 of the consolidated financial statements.	• We involved our valuation specialists to assist us in performing certain of the above procedures; • We assessed and reviewed the completeness and accuracy of the disclosures in the notes in accordance with IAS 36.
2. Defined benefit obligations • The defined benefit net liability, amounting to 2 475 million EUR, consists of defined benefit obligations (5 511 million EUR) offset partially by (recognized) plan assets (3 036 million EUR). The largest post-employment benefit plans in 2019 are located in the United Kingdom, France, the United States, Germany and Belgium. These five countries represent 94% of the total provisions for defined benefit obligations. • Defined benefit obligations is a key audit matter mainly as the amounts are significant, the assessment process is complex and it requires key management estimates to determine the actuarial assumptions and fair value of assets. The actuarial assumptions used in the measurement of the group's pension commitments involve judgements in relation to mortality, price inflation, discount rates, and rates of pension and salary increases, around which there are inherent uncertainties. • Management's disclosure on defined benefit obligations is included in Note F34A of the consolidated financial statements.	• We assessed and challenged management's assumptions (actuarial and other assumptions), the numerical data, the actuarial parameters, the calculation of the provisions as well as the presentation in the consolidated statement of financial position and the notes to the consolidated financial statements based on the actuarial reports; • Our audit of the fair value of the plan assets was carried out on the basis of respective bank and fund confirmations; • We assessed and reviewed the completeness and accuracy of the disclosures in the notes in accordance with IAS 19; • We involved in this review our actuaries. We also reviewed the internal controls, mainly around database maintenance and update of assumptions.

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Key audit matters	How our audit addressed the key audit matters
3. IFRS 16 *Leases* – First time adoption	
• Solvay has implemented IFRS 16, *Leases* effective 1 January 2019. The group has chosen to apply IFRS 16 under the modified retrospective approach. Therefore, the prior reporting period presented is not restated. IFRS 16 modifies the accounting treatment of operating leases at inception, with the recognition of a right of use on the leased asset and of a liability for the lease payments over the lease contract term. • As of 1 January 2019, lease liabilities recognized in accordance with IFRS 16 amounted to 433 million EUR (excluding those that were part of liabilities associated with non-current assets held for sale). Leased assets relate mainly to buildings, transportation equipment and industrial equipment. • In order to compute the transition impact of IFRS 16, a significant data extraction exercise was undertaken by management to summarize all lease data such that the respective inputs could be accumulated for the purposes of determining the transition impact and accounting for the adoption of the new standard and subsequent accounting thereof. • The impact of IFRS 16 transition is a key audit matter considering it relies upon a number of key judgments, primarily relating to lease term, discount rates, and service component in lease rental payments.	• Our audit approach consisted of assessing the relevance of the methodology and compliance with applicable accounting principles used by the group in determining the main assumptions relating to lease term, discount rates, and service component in lease rental payments. • We assessed the design and implementation of key controls pertaining to the determination of IFRS 16 transition impact and subsequent accounting thereof. • We assessed the accuracy of the underlying lease data by agreeing a representative sample of leases to original contracts or other supporting information, and checked the integrity and arithmetic accuracy of the IFRS 16 calculations as of transition and for subsequent accounting. • We assessed completeness of lease arrangements accounted under IFRS 16 through reconciliation to the group's lease commitments, and by investigating key service contracts to assess whether they contained a lease under IFRS 16. • We also assessed the appropriateness of the disclosures in the Basis of Preparation, Notes F23 and F35 to the consolidated financial statements.

Responsibilities of the board of directors for the preparation of the consolidated financial statements

The board of directors is responsible for the preparation and fair presentation of the consolidated financial statements in accordance with International Financial Reporting Standards (IFRS) as adopted by the European Union and with the legal and regulatory requirements applicable in Belgium and for such internal control as the board of directors determines is necessary to enable the preparation of consolidated financial statements that are free from material misstatement, whether due to fraud or error.

In preparing the consolidated financial statements, the board of directors is responsible for assessing the group's ability to continue as a going concern, disclosing, as applicable, matters to be considered for going concern and using the going concern basis of accounting unless the board of directors either intends to liquidate the group or to cease operations, or has no other realistic alternative but to do so.

Responsibilities of the statutory auditor for the audit of the consolidated financial statements

Our objectives are to obtain reasonable assurance about whether the consolidated financial statements as a whole are free from material misstatement, whether due to fraud or error, and to issue a statutory auditor's report that includes our opinion. Reasonable assurance is a high level of assurance, but is not a guarantee that an audit conducted in accordance with ISA will always detect a material misstatement when it exists. Misstatements can arise from fraud or error and are considered material if, individually or in the aggregate, they could reasonably be expected to influence the economic decisions of users taken on the basis of these consolidated financial statements.

During the performance of our audit, we comply with the legal, regulatory and normative framework as applicable to the audit of consolidated financial statements in Belgium. The scope of the audit does not comprise any assurance regarding the future viability of the company nor regarding the efficiency or effectiveness demonstrated by the board of directors in the way that the company's business has been conducted or will be conducted.

As part of an audit in accordance with ISA, we exercise professional judgment and maintain professional skepticism throughout the audit. We also:

- identify and assess the risks of material misstatement of the consolidated financial statements, whether due to fraud or error, design and perform audit procedures responsive to those risks, and obtain audit evidence that is sufficient and appropriate to provide a basis for our opinion. The risk of not detecting a material misstatement resulting from fraud is higher than for one resulting from an error, as fraud may involve collusion, forgery, intentional omissions, misrepresentations, or the override of internal control;
- obtain an understanding of internal control relevant to the audit in order to design audit procedures that are appropriate in the circumstances, but not for the purpose of expressing an opinion on the effectiveness of the group's internal control;
- evaluate the appropriateness of accounting policies used and the reasonableness of accounting estimates and related disclosures made by the board of directors;
- conclude on the appropriateness of the use of the going concern basis of accounting by the board of directors and, based on the audit evidence obtained, whether a material uncertainty exists related to events or conditions that may cast significant doubt on the group's ability to continue as a going concern. If we conclude that a material uncertainty exists, we are required to draw attention in our statutory auditor's report to the related disclosures in the consolidated financial statements or, if such disclosures are inadequate, to modify our opinion. Our conclusions are based on the audit evidence obtained up to the date of our statutory auditor's report. However, future events or conditions may cause the group to cease to continue as a going concern;
- evaluate the overall presentation, structure and content of the consolidated financial statements, and whether the consolidated financial statements represent the underlying transactions and events in a manner that achieves fair presentation.

- obtain sufficient appropriate audit evidence regarding the financial information of the entities and business activities within the group to express an opinion on the consolidated financial statements. We are responsible for the direction, supervision and performance of the group audit. We remain solely responsible for our audit opinion.

We communicate with the audit committee regarding, amongst other matters, the planned scope and timing of the audit and significant audit findings, including any significant deficiencies in internal control that we identify during our audit.

We also provide the audit committee with a statement that we have complied with relevant ethical requirements regarding independence, and we communicate with them about all relationships and other matters that may reasonably be thought to bear on our independence, and where applicable, related safeguards.

From the matters communicated to the audit committee, we determine those matters that were of most significance in the audit of the consolidated financial statements of the current period and are therefore the key audit matters. We describe these matters in our report unless law or regulation precludes any public disclosure about the matter.

Other legal and regulatory requirements

Responsibilities of the board of directors

The board of directors is responsible for the preparation and the content of the directors’ report on the consolidated financial statements, the statement of non-financial information attached to the directors’ report on the consolidated financial statements and other matters disclosed in the annual report on the consolidated financial statements.

Responsibilities of the statutory auditor

As part of our mandate and in accordance with the Belgian standard complementary to the International Standards on Auditing (ISA) as applicable in Belgium, our responsibility is to verify, in all material respects, the director’s report on the consolidated financial statements, the statement of non-financial information attached to the directors’ report on the consolidated financial statements and other matters disclosed in the annual report on the consolidated financial statements, as well as to report on these matters.

Aspects regarding the directors’ report on the consolidated financial statements and other information disclosed in the annual report on the consolidated financial statements

In our opinion, after performing the specific procedures on the directors’ report on the consolidated financial statements, this report is consistent with the consolidated financial statements for that same year and has been established in accordance with the requirements of article 3:32 of the Code of companies and associations.

In the context of our statutory audit of the consolidated financial statements we are responsible to consider, in particular based on information that we became aware of during the audit, if the directors’ report on the consolidated financial statements and other information disclosed in the annual report on the consolidated financial statements, are free of material misstatements, either by information that is incorrectly stated or otherwise misleading. In the context of the procedures performed, we are not aware of such a material misstatement.

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The non-financial information as required by article 3:32, § 2 of the Code of companies and associations, has been disclosed in the directors' report on the consolidated financial statements. This non-financial information has been established by the company in accordance with the Global Reporting Initiative (GRI) framework. As requested by Solvay management, we have issued a separate limited and reasonable assurance report on a selection of social, environmental and other sustainable development information in accordance with the International Standard on Assurance Engagements ISAE 3000. In accordance with article 3:75, § 1, 6° of the Code of companies and associations we do not express any opinion on the question whether this non-financial information has been established in accordance with the GRI framework mentioned in the director's report on the consolidated financial statements. For information not included in our specific assurance report on non-financial information, we do not express any assurance on individual elements that have been disclosed in this non-financial information.

Statements regarding independence

- Our audit firm and our network have not performed any prohibited services and our audit firm has remained independent from the group during the performance of our mandate.
- The fees for the additional non-audit services compatible with the statutory audit, as defined in article 3:65 of the Code of companies and associations, have been properly disclosed and disaggregated in the notes to the consolidated financial statements.

Other statements

- This report is consistent with our additional report to the audit committee referred to in article 11 of Regulation (EU) No 537/2014.

Zaventem, 31 March 2020

The statutory auditor

Deloitte Bedrijfsrevisoren/Réviseurs d'Entreprises CVBA/SCRL
Represented by

Michel Denayer

Corine Magnin

Deloitte.

Declaration by the persons responsible

The Board of Directors hereby declares that, to the best of its knowledge:

a. the financial statements, prepared in accordance with International Financial Reporting Standards ("IFRS"), give a true and fair view of the assets, liabilities, financial position, and earnings of the issuer and of the entities included in the consolidation,

b. the management report includes an accurate review of the business developments, earnings, and financial position of the issuer and of the entities included in the consolidation, as well as a description of the main risks and uncertainties that these entities face.

For the Board of Directors,

Nicolas Boël
Chairman of the Board of Directors

Ilham Kadri
Chairman of the Executive Committee and CEO
Director

Glossary

ADDITIONAL VOLUNTARY CONTRIBUTIONS RELATED TO EMPLOYEE BENEFITS PLANS

Contributions to plan assets in excess of Mandatory Contributions to employee benefits plans. These payments are discretionary and are driven by the objective of value creation.

ADJUSTMENTS

Each of these adjustments made to IFRS results is considered to be significant in nature and/or value. Excluding these items from profit metrics provides readers with relevant additional information on the Group's underlying performance over time because it is consistent with how the business' performance is reported to the Board of Directors and the Executive Committee. These adjustments consist of:

- Results from portfolio management and reassessments, and results from legacy remediation and major litigations (see note F5 in Financial Statements);
- Amortization of intangible assets resulting from PPA (see note F4 in Financial Statements) and inventory step-up in gross margin (see note F2 in Financial Statements);
- Net financial results related to changes in discount rates, coupons of perpetual hybrid bonds deducted from equity under IFRS, and debt management impacts (comprising mainly gains/(losses) related to the early repayment of debt) (see note F6 and F31 in Financial Statements);
- Adjustments of equity earnings for impairment gains or losses and unrealized foreign exchange gains or losses on debt;
- Results from equity instruments measured at fair value through other comprehensive income;
- Tax effects related to the items listed above and tax expense or income of prior years (see note F7 in Financial Statements);
- All adjustments listed above apply to both continuing and discontinued operations, and include the impacts on non-controlling interests.

BASIC EARNINGS PER SHARE

Net income (Solvay's share) divided by the weighted average number of shares, after deducting own shares purchased to cover stock options program.

CAPITAL EXPENDITURE (CAPEX)

Cash paid for the acquisition of property, plant and equipment, and intangible assets presented in cash flows from investing activities, and cash paid on the lease liabilities (excluding interests paid), presented in cash flows from financing activities. This indicator is used to manage capital employed in the Group.

CASH CONVERSION

Cash conversion is a ratio used to measure the conversion of EBITDA into cash. It is defined as (Underlying EBITDA + Capex from continuing operations) / Underlying EBITDA.

CARECHEM

Carechem 24 is a multilingual telephone advice service providing access to a team of trained responders 24 hours a day, 365 days a year. Carechem 24 provides companies all over the world with emergency product support during a hazardous materials incident.

CFROI

Cash Flow Return On Investment measures the cash returns of Solvay's business activities. Movements in CFROI levels are relevant indicators for showing whether economic value is being added, though it is accepted that this measure cannot be benchmarked or compared with industry peers. The definition uses a reasonable estimate (management estimate) of the replacement cost of assets and avoids accounting distortions, e.g. for impairments. It is calculated as the ratio between recurring cash flow and invested capital, where:

- Recurring cash flow = Underlying EBITDA + (Dividends from associates and joint ventures – Underlying earnings from associates and joint ventures) + Recurring capex + Recurring income taxes;
- Invested capital = Replacement value of goodwill and fixed assets + Net working capital + Carrying amount of associates and joint ventures;
- Recurring capex is normalized at 2.3% of the replacement value of fixed assets net of goodwill values;
- Recurring income taxes is normalized at 28% of (Underlying EBIT – Underlying earnings from associates and joint ventures).

CGU

Cash-generating unit.

CODE OF CONDUCT

Solvay is committed to responsible behavior and integrity, taking into account the sustainable growth of its business and its good reputation in the communities in which it operates.

CSR

Corporate Social Responsibility.

CTA

Currency Translation Adjustment

DILUTED EARNINGS PER SHARE

Net income (Solvay's share) divided by the weighted average number of shares adjusted for effects of dilution.

DISCONTINUED OPERATIONS

Component of the Group which the Group has disposed of or which is classified as held for sale, and:

- represents a separate major line of business or geographical area of operations
- is part of a single coordinated plan to dispose of a separate major line of business or geographical area of operations or
- is a subsidiary acquired exclusively with a view to resale.

DIVIDEND YIELD (NET)

Net dividend divided by the closing share price on December 31.

DIVIDEND YIELD (GROSS)

Gross dividend divided by the closing share price on December 31.

DJ STOXX

Dow Jones Stoxx is a European stock index composed of the 665 most important European shares.

DJ EURO STOXX

Dow Jones Euro Stoxx is a pan-European stock index which includes the 326 most important shares of the general Dow Jones index, belonging to eleven countries of the Eurozone.

EBIT

Earnings before interest and taxes. Performance indicator that is a measure of the Group's operating profitability irrespective of the funding's structure.

EBITDA

Earnings before interest and taxes, depreciation and amortization. The Group has included EBITDA as an alternative performance indicator because management believes that the measure provides useful information to assess the Group's operating profitability as well as the Group's ability to generate operating cash flows.

ENVIRONMENTAL PROTECTION AGENCY

The U.S. Environmental Protection Agency (EPA or USEPA) is an agency of the United States federal government which was created for the purpose of protecting human health and the environment by writing and enforcing regulations based on laws passed by Congress.

EQUITY PER SHARE

Equity (Solvay share) divided by the number of outstanding shares at year end (issued shares – treasury shares).

EURONEXT

Global operator of financial markets and provider of trading technologies.

FREE CASH FLOW

is calculated as cash flows from operating activities (excluding cash flows linked to acquisitions or disposals of subsidiaries and cash outflows of Additional Voluntary Contributions related to pension plans as they are of deleveraging nature as reimbursement of debt), cash flows from investing activities (excluding cash flows from or related to acquisitions and disposals of subsidiaries and other investments, and excluding loans to associates and non-consolidated investments, as well as related tax elements and recognition of factored receivables) and payment of lease liabilities and increase/decrease of borrowings related to environmental remediation. Prior to the adoption of IFRS 16, operating lease payments were included in the free cash flow. Following the application of IFRS 16, because leases are generally considered to be operating in nature, the free cash flow incorporates the payment of the lease liability (excluding the interest expense). Not including this item in the free cash flow would result in a significant improvement of the free cash flow compared to prior periods, whereas the operations themselves have not been affected by the implementation of IFRS 16.

FREE CASH FLOW TO SOLVAY SHAREHOLDERS

Free cash flow after payment of net interests, coupons of perpetual hybrid bonds and dividends to non-controlling interests. This represents the cash flow available to Solvay shareholders, to pay their dividend and/or to reduce the net financial debt.

FREE CASH FLOW CONVERSION

Calculated as the ratio between the free cash flow to Solvay shareholders (before netting of dividends paid to non-controlling interest) and underlying EBITDA.

FSB

Financial Stability Board

FTSEUROFIRST 300

The FTSEurofirst 300 Index tracks the equity performance across the region of the 300 largest companies ranked by market capitalization in the FTSE Developed Europe Index.

GEARING RATIO

Underlying net debt / total equity.

GRI

The Global Reporting Initiative (GRI) is a leading organization in the sustainability field. GRI promotes the use of sustainability reporting as a way for organizations to become more sustainable and contribute to sustainable development.

HPPO

Hydrogen peroxide propylene oxide, a new technology to produce propylene oxide using hydrogen peroxide.

ICCA

International Council of Chemistry Associations

IFRS

International Financial Reporting Standards.

IIRC

International Integrated Reporting Council

INTEGRATED REPORTING

This is a process founded on integrated thinking, which results in a periodic integrated report by an organization about value creation over time and related communications regarding aspects of value creation.

ISO 9001

The ISO 9001 standard defines a set of requirements for the establishment of a system of quality management in an organization, whatever its size and activity.

ISO 14001

The ISO 14001 family addresses various aspects of environmental management. It provides practical tools for companies and organizations looking to identify and control their environmental impact and constantly improve their environmental performance.

ISO 14040

The ISO 14040 standard covers life cycle assessment (LCA) studies and life cycle inventory (LCI) studies.

ISO 26000

The ISO 26000 is a global standard which provides guidelines for organizations that wish to operate in a socially responsible manner. The standard was published in 2010 after five years of negotiations among a large number of stakeholders worldwide. Representatives of governments, NGOs, industry, consumer groups, and the world of work were involved in its development. It therefore represents an international consensus.

LCA

Life Cycle Assessment

LEVERAGE RATIO

Net debt / underlying EBITDA of the last 12 months. Underlying leverage ratio = underlying net debt / underlying EBITDA of the last 12 months.

LOSS PREVENTION PROCESS

Loss prevention aims at maintaining production flow and profitability of the plants by providing risk mitigation. It also contributes to increasing the protection of people and the environment.

LTAR

Lost Time Accident Rate.

MANDATORY CONTRIBUTIONS TO EMPLOYEE BENEFITS PLANS

For funded plans, contributions to plan assets corresponding to amounts required to be paid during the respective period, in accordance with agreements with trustees or regulation, as well as, for unfunded plans, benefits paid to beneficiaries.

MATERIALITY

Organizations are faced with a wide range of topics on which they could report. The relevant topics are those that may reasonably be considered important for reflecting the organization's economic, environmental, and social impacts, or influencing the decisions of stakeholders, and therefore potentially merit inclusion in an annual report. Materiality is the threshold at which aspects become sufficiently important that they should be reported.

MTAR

Medical Treatment Accident Rate.

NATURAL CURRENCY HEDGE

A natural currency hedge is an investment that reduces the undesired risk by matching cash in and outflows.

NEAR MISS

accident or collision narrowly avoided

NET COST OF BORROWINGS

Cost of borrowings netted with interest on loans and short-term deposits, as well as other gains (losses) on net indebtedness.

NET FINANCIAL DEBT (IFRS)

(IFRS) net debt = Non-current financial debt + Current financial debt – Cash & cash equivalents – Other financial instruments. Underlying net debt reclassifies as debt 100% of the hybrid perpetual bonds, considered as equity under IFRS. It is a key measure of the strength of the Group's financial position and is widely used by credit rating agencies.

NET FINANCIAL CHARGES

Net cost of borrowings, and costs of discounting provisions (namely, related to post-employment benefits and HSE liabilities).

NET PRICING

The difference between the change in sales prices and the change in variable costs.

NET SALES

Sales of goods and value added services corresponding to Solvay's know-how and core business. Net sales exclude Revenue from non-core activities.

NET WORKING CAPITAL

Net working capital includes inventories, trade receivables and other current receivables, netted with trade payables and other current liabilities.

OCI

Other Comprehensive Income.

OECD

Organisation for Economic Co-operation and Development.

OHSAS 18001

OHSAS 18001 is an international occupational health and safety management system specification.

OPEN INNOVATION

Innovation that is enriched with outside expertise, through partnerships with the academic world and by shareholdings in start-ups, either directly or via investment funds.

OPERATIONAL DELEVERAGING

Reduction of liabilities (net debt or provisions) through operational performance only, i.e. excluding impacts from M&A and scope, as well as remeasurements impacts (changes of foreign exchange, inflation, mortality and discount rates).

ORGANIC GROWTH

Growth of net sales or underlying EBITDA excluding scope changes and forex conversion effects. The calculation is made by rebasing the prior period at the business scope and foreign exchange conversion rate of the current period.

OSHAS

United States Occupational Safety and Health Administration

PP

Unit of percentage points or 1.0%, used to express the evolution of ratios.

PPA

Purchase Price Allocation (PPA) accounting impacts related to acquisitions, primarily for Rhodia and Cytec.

PRICING POWER

The ability to create positive net pricing.

PSM

Process safety management

PSU

Performance Share Unit.

PRODUCT STEWARDSHIP

A responsible approach in managing risks throughout the entire life cycle of a product, from the design stage to the end of life.

RESEARCH & INNOVATION

It measures the total cash effort in research and innovation, regardless of whether the costs were expensed or capitalized. It consists of research & development costs from the income statement before netting of related subsidies and royalties, and where depreciation and amortization are replaced by related capital expenditure.

RESEARCH & INNOVATION INTENSITY

Research & innovation intensity is the ratio of research & innovation to net sales.

REACH

REACH is the European Community Regulation on chemicals and their safe use (EC 1907/2006). It deals with the registration, evaluation, authorization, and restriction of chemical substances. The law entered into force on June 1, 2007.

RESPONSIBLE CARE®

Responsible Care® is the global chemical industry's unique initiative to improve health, environmental performance, enhance security, and to communicate with stakeholders about products and processes.

RESULT FROM LEGACY REMEDIATION AND MAJOR LITIGATIONS

It includes:

- The remediation costs not generated by on-going production facilities (shut-down of sites, discontinued productions, previous years' pollution), and
- The impact of significant litigations.

RESULTS FROM PORTFOLIO MANAGEMENT AND REASSESSMENTS

It includes:

- Gains and losses on the sale of subsidiaries, joint operations, joint ventures, and associates that do not qualify as discontinued operations
- Acquisition costs of new businesses
- Gains and losses on the sale of real estate not directly linked to an operating activity
- Restructuring charges driven by portfolio management and reassessment, including impairment losses resulting from the shutdown of an activity or a plant and
- Impairment losses resulting from testing of CGUs.

It excludes non-cash accounting impact from amortization and depreciation resulting from the purchase price allocation (PPA) from acquisitions.

REVENUE FROM NON-CORE ACTIVITIES

Revenues primarily comprising commodity and utility trading transactions and other revenue, considered to not correspond to Solvay's know-how and core business.

ROCE

Return on Capital employed, calculated as the ratio between underlying EBIT (before adjustment for the amortization of PPA) and capital employed. Capital employed consists of net working capital, tangible and intangible assets, goodwill, rights-of-use assets, investments in associates & joint ventures and other investments, and is taken as the average of the situation at the end of the last 4 quarters.

ROE

Return on equity.

SAFETY DATA SHEETS

Safety Data Sheets are the main tool for ensuring that manufacturers and importers communicate enough information along the supply chain to allow safe use of their substances and mixtures.

SAELs

Solvay Acceptable Exposure Limits

SASB

Sustainability Accounting Standards Board. SASB's mission is to develop and disseminate sustainability accounting standards that help public corporations disclose material, decision-useful information to investors. That mission is accomplished through a rigorous process that includes evidence-based research and broad, balanced stakeholder participation.

SCMS

Solvay Care Management System

SDG

United Nations Sustainable Development Goals

SEVESO REGULATIONS

The Control of Major Accident Hazards Involving Dangerous Substances Regulations. These regulations (often referred to as "COMAH Regulations" or "Seveso Regulations") give effect to European Directive 96/82/EC. They apply only to locations where significant quantities of dangerous substances are stored.

SOCRATES

Global tool for industrial hygiene management

SOLVAY WAY

Launched in 2013 and aligned with ISO 26000, Solvay Way is the sustainability approach of the Group. It integrates social, societal, environmental, and economic aspects into the Company's management and strategy, with the objective of creating value shared by all of its stakeholders. Solvay Way is based on an ambitious and pragmatic framework serving as a tool of both measurement and progress. Solvay Way lists 49 practices – practices that reflect the Solvay Way's 22 commitments and are structured on a four-level scale (launch, deployment, maturity, performance).

SOP

Stock Option Plan.

SPM

The Sustainable Portfolio Management tool is integrated into the Solvay Way framework (linked to five practices). It serves as a strategic tool for developing information on our portfolio and analyzing the impacts of sustainability megatrends on our businesses.

SVHC

Substance of Very High Concern (SVHC) is a chemical substance, the utilization of which within the European Union has been proposed to become subject to legal authorization under the REACH regulation.

TCFD

Task Force on Climate-related Financial Disclosure

UN GLOBAL COMPACT

Voluntary corporate sustainability initiative to support companies to align strategies and operations with universal principles on human rights, labor, environment, and anti-corruption, and take actions that advance broader societal goals.

UNDERLYING

Underlying results are deemed to provide a more comparable indication of Solvay's fundamental performance over the reference periods. They are defined as the IFRS figures adjusted for the "Adjustments" as defined above. They provide readers with additional information on the Group's underlying performance over time as well as the financial position and they are consistent with how the business' performance and financial position are reported to the Board of Directors and the Executive Committee.

UNDERLYING NET DEBT

Underlying net debt reclassifies as debt 100% of the perpetual hybrid bonds, considered as equity under IFRS.

UNDERLYING TAX RATE

Income taxes / (Result before taxes – Earnings from associates & joint ventures – interests & realized foreign exchange results on RusVinyl joint venture) – all determined on an Underlying basis. The adjustment of the denominator regarding associates and joint ventures is made as these contributions are already net of income taxes.

VELOCITY

Total number of shares traded during the year divided by the total number of listed shares, using the Euronext definition.

VELOCITY ADJUSTED BY FREE FLOAT

Velocity adjusted as a function of the percentage of the listed shares held by the public, using the Euronext definition.

WBCSD

World Business Council for Sustainable Development.

YOY

Year on year comparison.

Shareholder's diary

May 6, 2020

First quarter 2020 results

May 12, 2020

Annual general meeting

May 18, 2020

Final dividend: ex-coupon date

May 19, 2020

Final dividend: record date

May 20, 2020

Final dividend: payment date

July 29, 2020

First half 2020 results

November 5, 2020

Nine months 2020 results

February 26, 2021

Full year 2020 results

More information
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