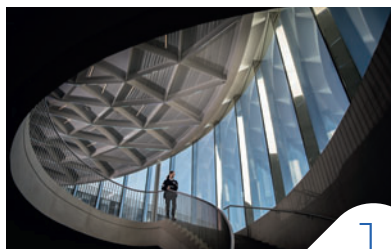


2018 Integrated Management report and Environment & Society reporting

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2018

REFERENCE DOCUMENT

Including the annual Financial Report

A world leader in gases, technologies and services for Industry and Health, Air Liquide is present in **80 countries** with approximately **66,000 employees** and serves more than **3.6 million customers and patients**. Oxygen, nitrogen and hydrogen are essential small molecules for life, matter and energy. They embody Air Liquide's scientific territory and have been at the core of the Company's activities since its creation in 1902.

Air Liquide's ambition is **to be a leader in its industry, deliver long-term performance and contribute to sustainability**. The Company's customer-centric transformation strategy aims at profitable growth over the long term. It relies on **operational excellence, selective investments, open innovation** and a **network organization** implemented by the Group worldwide. Through the commitment and inventiveness of its people, Air Liquide leverages energy and environment transition, changes in healthcare and digitization, and delivers greater value to all its stakeholders.

Air Liquide's revenues amounted to **21 billion euros** in 2018, and its solutions that protect life and the environment represented more than 40% of sales. Air Liquide is listed on the Euronext Paris stock exchange (compartment A) and belongs to the CAC 40, Euro Stoxx 50 et FTSE4Good indexes.



The original French version of this Reference Document was filed with the French financial markets authority (AMF), on 03/06/2019, in accordance with article 212-13 of its General regulations. It may be used in support of any financial transaction if it is supplemented by a prospectus approved by the AMF. This document was prepared by the issuer and its signatories assume responsibility.



Visit
our website www.airliquide.com

This document is a non-binding "free" translation from French into English and has no legal value other than an informative one. Should there be any difference between the French and the English version, only the text in French language shall be deemed authentic and considered as expressing the exact information published by Air Liquide.

A financial and technical glossary is provided at the end of the document – pages 359 to 362.

A GLOBAL PRESENCE

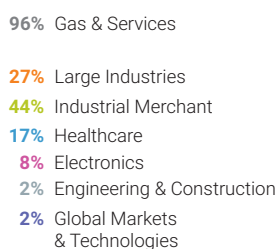
Present in

80
COUNTRIES

~66,000
employees

A world leader
in gas, technologies
and services
for Industry
and Health

2018 GROUP REVENUE BY ACTIVITY



27% of revenue for Gas & Services for Industry ^(a) realized in developing economies

2018 GROUP REVENUE BY REGION AND BY ACTIVITY, FOR GAS & SERVICES (G&S)

EUROPE



AMERICAS



ASIA-PACIFIC



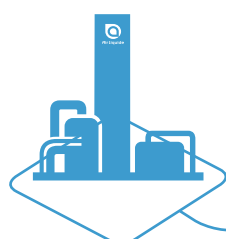
MIDDLE EAST & AFRICA



(a) Gas & Services for Industry (GSI): Large Industries, Industrial Merchant, Electronics.

A WIDE RANGE OF MARKETS AND A STRONG BUSINESS MODEL

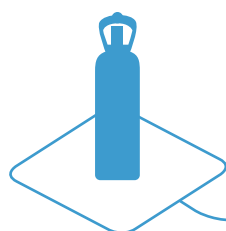
KEY ELEMENTS BY BUSINESS LINE ^(a)(b)



LARGE INDUSTRIES

28% of Gas & Services
5,685 millions euros
+7% in 2018
+3% on average over 5 years

High **capital intensity**
Customers in metals, chemicals, refining and energy
Industrial basin and **pipeline network** strategy
Long-term contracts (15 years), **take-or-pay** clauses and **indexed** energy cost
Synergies with other business lines



INDUSTRIAL MERCHANT

46% of Gas & Services
9,181 millions euros
-1% in 2018
+13% on average over 5 years

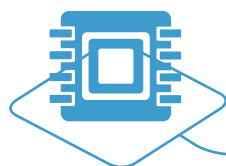
More than 2 million customers
Technological solutions adapted to customers' businesses
Importance of **logistics**
High number of **end-markets**



HEALTHCARE

17% of Gas & Services
3,486 millions euros
+2% in 2018
+5% on average over 5 years

Services activity in a regulated sector
1.6 million patients
Geographical **density**
Sophisticated information systems essential for the activity



ELECTRONICS

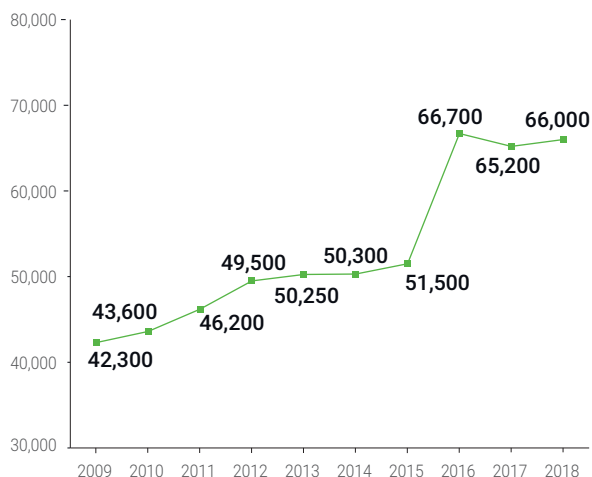
9% of Gas & Services
1,755 millions euros
+7% in 2018
+9% on average over 5 years

Technological solutions with **ultra-purity gases** and **advanced materials**
Long-term contracts for nitrogen with **take-or-pay** clauses and **indexed** energy cost
Concentration of the activity in **Asia**

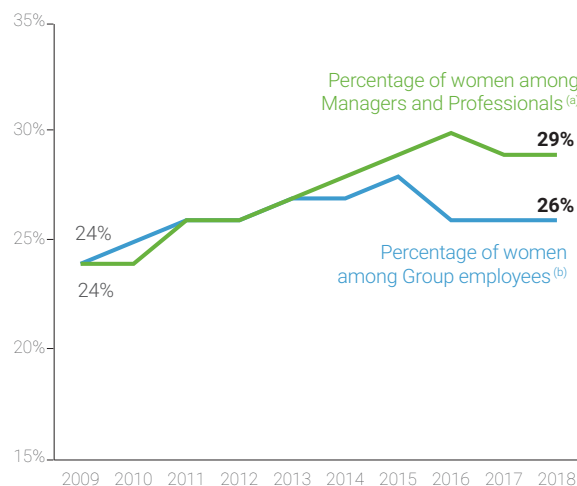
(a) Gas & Services bring together the following business lines: Large Industries, Industrial Merchant, Healthcare, and Electronics. See details in section "Description of Activities" page 19.
(b) Published data.

DRIVEN BY COMMITTED WOMEN AND MEN

NUMBER OF EMPLOYEES SINCE 2009



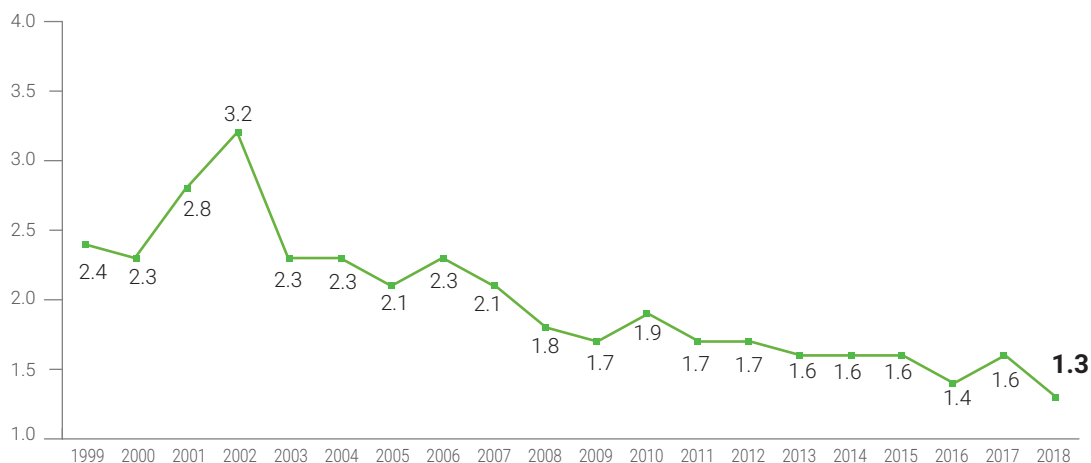
GENDER DIVERSITY EVOLUTION SINCE 2009



(a) Including Airgas since 2017.

(b) Including Airgas since 2016.

FREQUENCY OF ACCIDENTS (a) (b)



(a) Number of lost-time accidents with at least one lost day per million hours worked by Group employees.

(b) Including Airgas since 2017.

Air Liquide Foundation

Several hundreds of employees involved

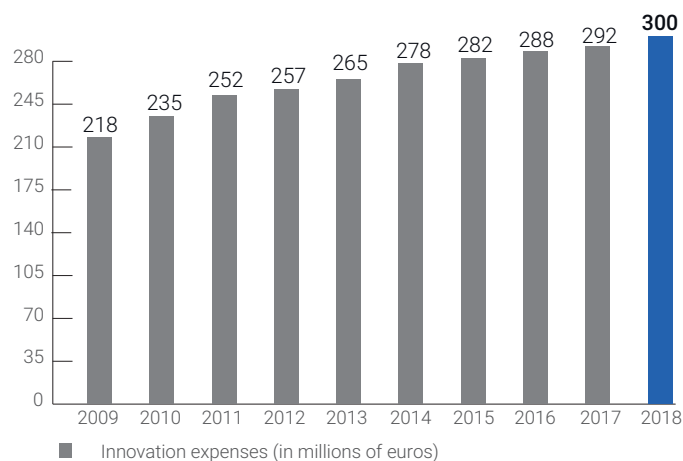
More than 300 projects in around 52 countries for 10 years

| Internal Governance in 2018 | Corporate Governance in 2018 |
|--|---|
| 97% of the Group's employees belong to an entity that has a local Code of Conduct, for which they are committed to comply | 73% of Board members are independent Directors |
| >90% of revenues subject to international control system processes | 45% of Board members are women |
| | 55% of Board members are non-French |

AN INNOVATIVE COMPANY

INNOVATION EXPENSES

INNOVATION EXPENSES SINCE 2009



309

new patents filed in 2018

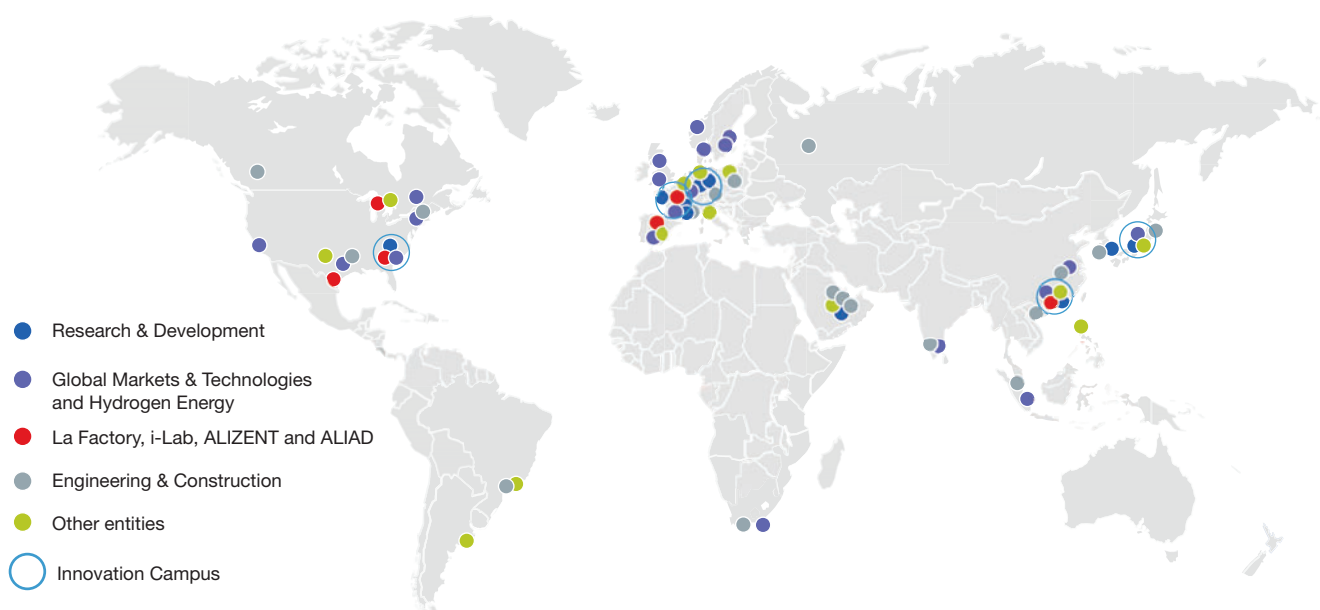
More than 200

industrial and scientific partnerships

GLOBAL NETWORK SUPPORTING INNOVATION

4,000

employees in entities dedicated
or contributing to innovation

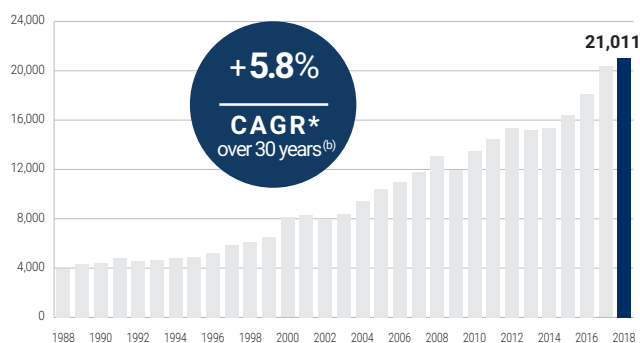


REGULAR AND SUSTAINED PERFORMANCE

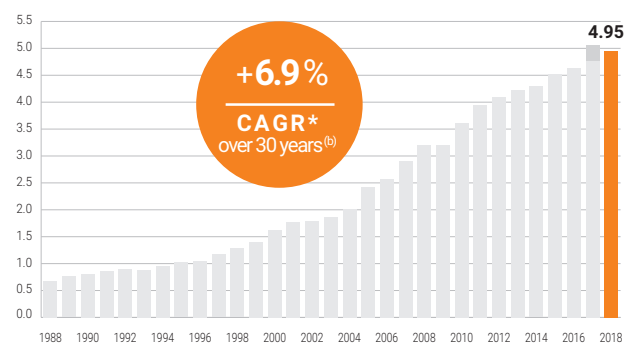
Created in
1902

18.3%
2018 Gas & Services Operating Margin / Revenue

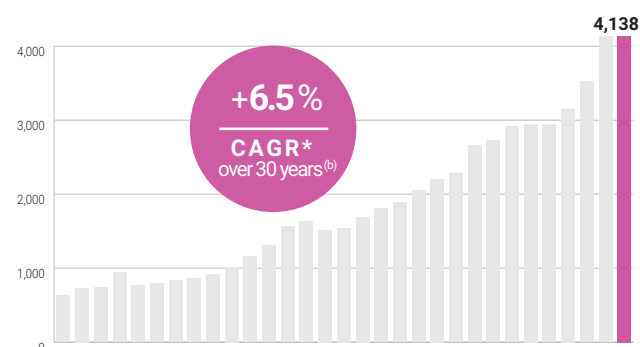
REVENUE
(in million euros)



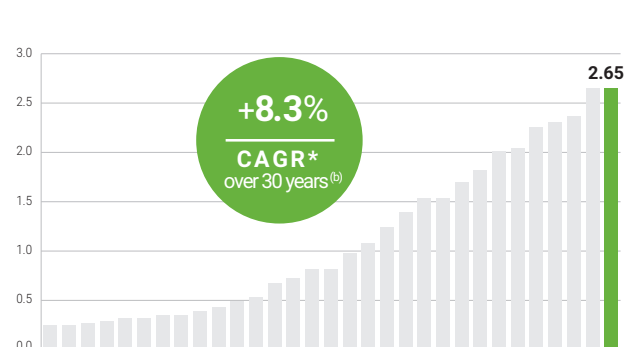
EPS^(a)
(in euros)



CASHFLOW
(in million euros)



DIVIDEND^(a)
(in euros per share)



* Compound Annual Growth Rate.

(a) Adjusted for the 2-for-1 share split in 2007, for free share attributions and for a 0.974 factor reflecting the value of the rights of the capital increase completed in October 2016.

(b) Calculated according to prevailing accounting rules over 30 years.

TSR

Total Shareholder Return
for a single registered share

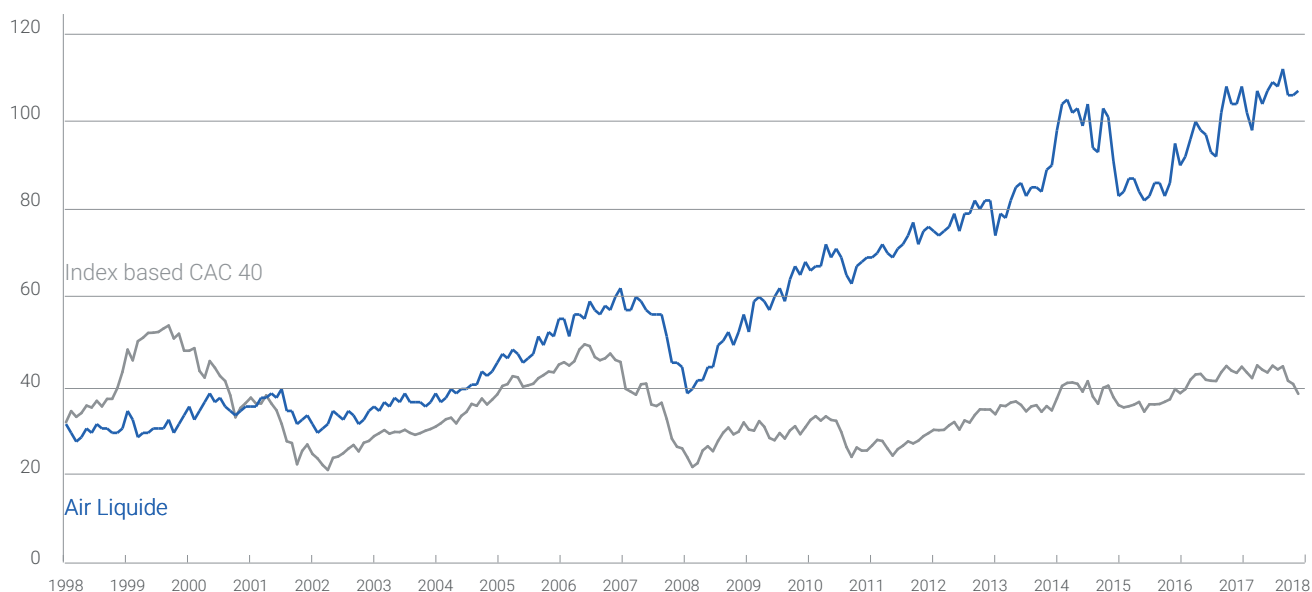
+8.5%
over 5 years^(c)

+12.6%
over 10 years^(d)

(c) At December 31, 2018, for an invested capital since December 31, 2013.

(d) At December 31, 2018, for an invested capital since December 31, 2008.

STOCK MARKET PERFORMANCE



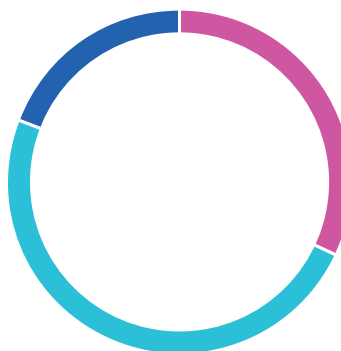
| | 2014 | 2015 | 2016 | 2017 | 2018 |
|--|--------------|--------------|--------------|--------------|--------------|
| Market Capitalisation at December 31 <i>(in millions of euros)</i> | 35,470 | 35,672 | 41,085 | 45,003 | 46,571 |
| Closing share price ^(a) <i>(in euros)</i> | | | | | |
| At December 31 | 91.07 | 91.78 | 96.05 | 105.05 | 108.45 |
| high | 91.73 | 109.49 | 96.41 | 111.45 | 115.15 |
| low | 74.78 | 86.28 | 78.55 | 90.41 | 97.94 |
| Net earnings ^(b) – EPS <i>(in euros)</i> | 4.29 | 4.53 | 4.64 | 5.16 | 4.95 |
| Net Dividend per share ^(b) – DPS <i>(in euros)</i> | 2.25 | 2.30 | 2.36 | 2.65 | 2.65 |
| Pay ratio | 53.9% | 52.5% | 56.0% | 52.8% | 55.1% |
| Dividend yield | 2.5% | 2.5% | 2.5% | 2.5% | 2.4% |
| Ex-dividend date | May 18, 2015 | May 23, 2016 | May 15, 2017 | May 28, 2018 | May 20, 2019 |

(a) Adjusted following current Euronext regulation.

(b) Data for 2014, 2015 and 2016 adjusted for attribution of free shares and capital increase.

SHARE OWNERSHIP BREAKDOWN AT DECEMBER 31, 2018

- 32%** Individual shareholders
- 50%** Foreign institutional investors
- 18%** French institutional investors
- > 0%** Treasury shares



SUSTAINABLE DEVELOPMENT APPROACH

GROUP'S AMBITION

To be a leader in its industry – Deliver long term performance
Contribute to sustainability



COMMITMENTS

Air Liquide is signatory of the United Nation's **Global Compact**
and the **Responsible Care®** Global Charter



NEOS OBJECTIVES AND KPI

Prevent global warming and improve air quality

To reduce by **30%** the carbon intensity by 2025 vs 2015^(a)

For 2018, the carbon intensity is 4.9, which represents a 22% reduction compared to 2015 carbon intensity (6.3) and a 74% progress toward the 2025 target (4.4).

Be engaged in an active dialogue with all stakeholders

Increase the number of women among managers and professionals to **35%** and

Hire **33%** of young graduates among managers and professionals by 2025

In 2018, Air Liquide had 29% of women among engineers and managers and young graduates represented 28% of the recruited engineers and managers.



NON-FINANCIAL RATING AGENCIES

Air Liquide publishes a detailed report and monitors its environmental footprint in its Reference Document. These indicators are audited by an independent verifier and are part of a transparency approach that is recognized by specialized bodies and non-financial rating agencies.



A-



GOLD



(a) In kg CO₂ equivalent / euro EBITDA.



1

INTEGRATED MANAGEMENT REPORT

HISTORY OF THE AIR LIQUIDE GROUP

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Description of the business model
Prerequisites to action: safety, ethics
and the respect of human rights
Description of activities
Competition

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Strategy
NEOS company program
and mid-term objectives
Steering strategy

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HISTORY OF THE AIR LIQUIDE GROUP

1902

ORIGIN

Air Liquide was born of innovation and began with the encounter between two men: Georges Claude, inventor of an industrial process for the production of oxygen from liquid air, and Paul Delorme, a visionary entrepreneur.

1906

FIRST INTERNATIONAL DEVELOPMENTS

Gas, by its very nature, is difficult to transport and thus local production is required. This was one of the reasons why Air Liquide set its sights internationally early on, building numerous production units abroad. Development was rapid in Europe (1906), Japan (1907), Canada (1911) and the United States (1916).

1913

LISTING ON THE STOCK EXCHANGE

The critical role played by shareholders became evident in the first years of the Company's development. Listed on the Paris Stock Exchange in 1913, the share celebrated its hundredth-year of listing in 2013. Air Liquide has endeavored to forge a strong and privileged relationship with its shareholders based on exceptional stock market performance, with an average annual increase in its share price over the 100 years to 2013 of +11.9%.

1952

THE CRYOGENIC REVOLUTION

Storing gas in liquid form in cryogenic tanks allows vast quantities to be transported by road or rail within a radius of approximately 200-250 km from the production site.

1960

PIPELINE NETWORK STRATEGY

By delivering gas to several customers through pipelines, Air Liquide adopted a network strategy for the first time, linking its gas production units to one another. The Group increased its production capacity to meet soaring demand from large industries: firstly, for oxygen in the steel industry, and secondly, for nitrogen in chemicals.

The Large Industries business was launched with customers committing to long-term contracts of 15 years or more. The Group currently manages more than 9,400 km (\approx 5,800 miles) of pipelines worldwide, in particular in the US along the Gulf Coast of Mexico, from the north of France to the Benelux, in the Ruhr Valley in Germany and in several Asian countries including China and Singapore.

1962

SPACE INDUSTRY

Convinced of the industrial potential of cryogenics, Jean Delorme, Chairman & CEO of Air Liquide, decided to create a research center near Grenoble dedicated to these technologies. The first applications were rapidly integrated in the space industry. Air Liquide has been a partner of the space adventure for 65 years. The Group's contribution has been in the production of the fluids essential for take off (oxygen, hydrogen, helium and nitrogen), the supply of associated services, in the design and production of tanks, launchers and cryogenic satellite equipment.

1970

A TRADITION OF INVENTIONS

The Claude Delorme Research Center located in the Paris-Saclay plateau and now called the Paris Innovation Campus, was created in the greater Paris region. The center was created to enhance gas production technologies and their applications. It is evidence of the Group's desire to better understand the industrial processes of its customers and develop new gas applications to better satisfy their requirements. The Center also develops partnerships with universities and industrial companies. Currently, the Group also has research centers in Europe, North America and Asia.

1976

A TECHNOLOGICAL BREAKTHROUGH

With the Sasol project in South Africa, for the production of synthetic fuel, Air Separation Units (ASUs) have scaled up, dramatically increasing in size. Following this technological breakthrough, Air Liquide became the leader in large ASUs, and remains so today. At the end of 2017, the world's largest oxygen production unit was commissioned by the Group in South Africa for its customer Sasol.

1985

A NEW MARKET: ELECTRONICS

In Japan, the Group began to supply ultra-high purity gases to the semi-conductor industry: this involves carrier gases, mainly nitrogen, used to transport the specialty gases and keep the chip production tools inert, and specialty gases that are used directly in the manufacturing of semi-conductors. In 1987, Air Liquide inaugurated the Tsukuba Research Center in Japan, which is dedicated to the electronics industry.

1986

MAJOR ACQUISITION

The Group acquired Big Three in the United States in 1986, a Large Industries business along the Gulf Coast.

1995

EXTENDED OFFERING: HYDROGEN AND STEAM

In addition to oxygen and nitrogen, as part of its commitment to protecting the environment and promoting energy efficiency, Air Liquide extended its offering to hydrogen and steam. To ensure the success of this new offering, the Group used its business model, which is behind the success of its air gas business, and deployed from the beginning a basin strategy based on a pipeline network, providing customers with flexibility, distribution reliability and service quality at the best price.

HEALTHCARE

Originally an oxygen supplier to hospitals, Air Liquide became a specialist in the healthcare sector. The Group launched its Home Healthcare business and set up a dedicated network of specialist teams. Medical gases were progressively classified as drugs and manufacturers were required to file market authorizations. The Group also ushered in the hygiene sector, a business that naturally complemented hospital services. More recently, Air Liquide launched research programs in therapeutic gases, used for resuscitation and pain relief.

2000

INTERNATIONAL EXPANSION

The Group invested massively in China in the early 2000s; the country has been a major growth market for industrial gases and Air Liquide entered into numerous air gas contracts.

The Group acquired part of Messer Griesheim activities in Germany, the United Kingdom and the United States.

2007

ORGANIZATION BY BUSINESS LINE

The Air Liquide growth drivers for the coming decades are solid and sustainable, based on changing lifestyles: industrial growth of developing economies, increasing energy needs and environmental challenges, healthcare and high technology. To capture this growth, the Group created a new organizational structure based on four World Business Lines. They combine the technical and operational expertise which are specific to each of the businesses of the Group – Large Industries, Industrial Merchant, Healthcare and Electronics – and centralize the specific market expertise. The Group remains geographically focused, but each zone or country benefits from the support and experience of the business lines to accelerate its development.

Conscious of the strategic dimension of Engineering & Construction capabilities, the Group acquired Lurgi in 2007. This company provides Air Liquide with major proprietary technologies such as hydrogen and carbon monoxide production units, or processes relating to gasification or CO₂ purification, adding to the Group's historical competencies in cryogenics. Thanks to this acquisition, the Group now has a complete technological offering and greater engineering capacity.

2009

RESILIENCE IN AN UNPRECEDENTED CRISIS

Affected by a global economic crisis of unprecedented magnitude, the Group focused its efforts on the management of its cash, costs, and investments (capital expenditures). Having tested the solidity of its long-term contracts, Air Liquide confirmed its resilience and demonstrated the relevance of its business model. In a context of global recession, the Group showed itself to be an exception, posting a stable net profit while preserving the strength of its balance sheet.

2010-2012

NEW TERRITORIES, NEW ACQUISITIONS

The Group accelerated its presence in new territories, including Turkey and Mexico, and strengthened its presence in China. These developments contributed to the increase of the developing economies' share of Gas & Services revenue from 16% in 2009 to 24% in 2018.

A weaker growth environment in advanced economies, particularly in Western Europe, led to Air Liquide intensifying its acquisition efforts. At the end of 2012, two major home healthcare players joined the Group: LVL Médical in France and Gasmedi in Spain.

2013-2015

NEW INITIATIVES IN THE INNOVATION FIELD – HYDROGEN ENERGY

Innovation is central to Air Liquide's strategy. In 2013, Air Liquide launched two initiatives to promote open innovation: i-Lab (innovation Lab) and ALIAD, the Group's capital risk subsidiary, to make minority investments in innovative technology start-ups. In 2014, the Group decided on new investments with the modernization of the Research Center near Versailles, the creation of a center for the development and industrialization of gas cylinders for industry and healthcare, and the launch of a technical center of excellence for cryogenic production technologies. In 2015, Air Liquide inaugurated Cryocap™ in France, a unique industrial installation that enables the capture of CO₂ released during hydrogen production via a cryogenic process. After being purified, the captured CO₂ can be used to meet a variety of industrial needs for carbonic gas supply.

In addition, on a worldwide scale, Air Liquide actively contributes to the development of the hydrogen energy activity by supporting automotive manufacturers launching fuel cell electric vehicles on the market. Air Liquide contributes to the construction of hydrogen charging stations (United States, Japan, France, Germany, Belgium, Denmark, the Netherlands and Korea), the majority of which are generally accessible to the public.

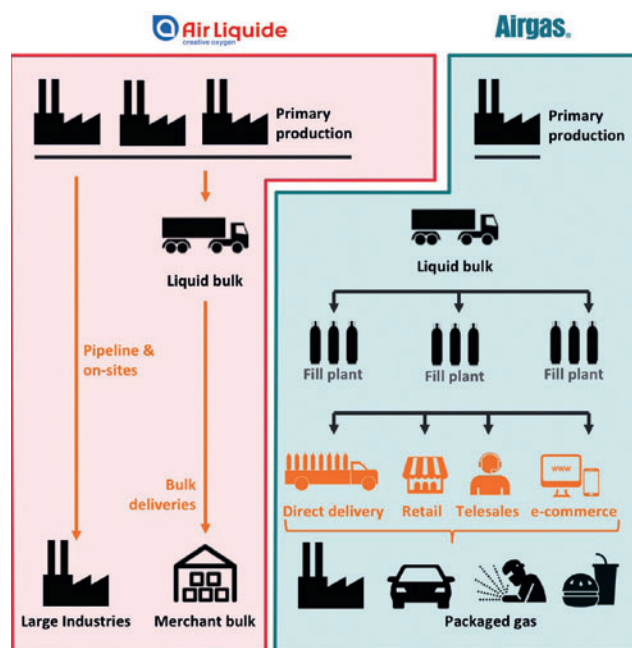
2016

AIRGAS ACQUISITION BY AIR LIQUIDE

On May 23, 2016, Air Liquide completed the acquisition of the American company Airgas. This acquisition enabled the Group to combine two highly complementary businesses and be present on all market segments. At the end of 2018, the United States represented 34% of Gas & Services revenue.

In the US, Air Liquide's presence was primarily upstream with production both in Large Industries (over 23,000 tons per day of oxygen production capacity, over 2,200 miles/3,500 kilometers of pipelines, principally along

the Gulf Coast) and in Industrial Merchant in liquid gases. Air Liquide also served customers in Electronics and Healthcare (medical gases to hospitals only, no home healthcare). Airgas is primarily focused on downstream distribution with 300 fill plants and 900 branches/retail stores delivering packaged gases and hardgoods to more than one million Industrial Merchant and Healthcare customers (medical gases). Airgas also enjoys the most advanced multi-channel network in the United States, including telesales and e-commerce platforms which allow for next-day direct deliveries from national warehouses for a whole range of complementary products.



The integration of this upstream and downstream coverage creates significant value. Air Liquide aims to reach its target of 300 million US dollars in synergies at the beginning of 2019, i.e., more than a year before initially planned. Cost synergies account for around 70% of total synergies and are the result of sourcing optimization, better loading of Air Liquide and Airgas' assets, distribution efficiencies and reorganizations. Growth synergies come from cross-selling the various Gas & Services offers to both customer bases. They also result from the roll-out of Air Liquide technologies via Airgas' various distribution networks, as well as support for Airgas customers in their international expansion (in Canada and Mexico in particular). These represent approximately 30% of the total amount of synergies.

Moreover, Air Liquide believes that the Airgas model, in terms of products, digitization of businesses, and business model, may be applied in certain regions outside the United States. These additional strategic synergies are not included in the 300 million US dollars already announced.

With this acquisition, Air Liquide strengthens its leading position in the United States, the largest industrial gas market worldwide. This market also enjoys the strongest growth among advanced economies. The US market is expected to deliver 20 to 25% of the global industrial gases market's mid-term growth. This market is supported by long-term structural strengths such as competitive natural gas and energy prices driving investments and industrial production.

Approximately half of the US packaged gas market is composed of independent distributors. This current fragmentation of the US market provides further opportunities for growth as Airgas and Air Liquide have significant experience in integrating bolt-on acquisitions

THE LAUNCH OF THE NEW COMPANY PROGRAM 2016-2020: NEOS

The Group acquired a new dimension following the acquisition of Airgas and thus entered a new phase of its development. On July 6, 2016, Air Liquide published its new mid-term company program, NEOS, for the 2016-2020 period.

Air Liquide's strategy for profitable growth over the long-term is that of a customer-centric transformation. It is based on operational excellence and the quality of its investments, on open innovation and the network organization already implemented by the Group worldwide. Air Liquide's ambition is to be a leader in its industry, deliver long-term performance and contribute to sustainability.

CREATION OF THE GLOBAL MARKETS & TECHNOLOGIES BUSINESS

To step up the development of offerings in new markets, the Group created the Global Markets & Technologies business, responsible for the incubation of new activities in the field of energy transition and the maritime sector, by leveraging technologies (Space, Aerospace, Cryogenics, scientific exploration).

2017

REFOCUSING ON GAS & SERVICES BUSINESSES

Following the disposal of its Aqua Lung (diving) and Air Liquide Welding (welding) subsidiaries, Air Liquide focused on its Gas & Services businesses and the implementation of its NEOS company program. The Gas & Services businesses now represent 96% of the Group's revenue at the end of 2018.

NEW VISUAL IDENTITY FOR THE GROUP

To mark its transformation, the Group created a new logo, the fifth since the Company was founded 115 years ago. This new visual identity, which embodies the change within Air Liquide, is that of a leading Group, expert and innovative, that is close to its stakeholders and open to the world.

2018

INTEGRATION OF AIRGAS

Air Liquide has already achieved the majority of the cost and growth synergies resulting from the integration of Airgas. The 300 million US dollar target will be reached at the beginning of 2019, i.e., more than a year before initially planned.

INAUGURATION OF THE PARIS INNOVATION CAMPUS

Air Liquide inaugurated its Paris Innovation Campus in the Paris-Saclay innovation Cluster, in the greater Paris region. This new Campus illustrates the Group's "open innovation" approach, especially on energy transition and the environment, healthcare and digital transformation. It includes the Group's largest, fully renovated, Research & Development Center. From 2019, the Innovation Campus will also host a deep-tech start-up accelerator.

ENERGY TRANSITION AND CLIMATE OBJECTIVES

For many years now, Air Liquide has been committed to sustainable growth aimed, in particular, at limiting its CO₂ emissions and those of its customers. On November 30, 2018, Air Liquide announced its Climate objectives, including the commitment to reduce its carbon intensity by 30% between 2015 and 2025, with a global approach that includes its assets, its customers, and ecosystems. The objectives are the most ambitious in the sector and are in line with the NEOS company program.

In this respect, the Global Markets & Technologies activity is stepping up sales to energy transition-related markets, driven by the biomethane sector with the start-up of several production units in Europe and the United States, and by hydrogen energy with the commissioning of new hydrogen charging stations for mobility. Moreover, the Hydrogen Council, which was founded in 2017, brings together more than 50 global leaders in the energy, transport and industry sectors to promote hydrogen with a view to achieving climate change-related objectives, and has held a meeting in China for the first time.

BUSINESS MODEL

1. Description of the business model

Air Liquide creates value for society, the environment and ensures the Company's long-term sustainability. The diagram below set out the Air Liquide Group's business and value creation model.

RESOURCES and STAKEHOLDERS

HUMAN CAPITAL AND STAKEHOLDERS

- 66,000 employees, with a range of profiles
- 29% of women among managers and professionals
- 4,000 employees contribute to innovation
- Long-term shareholders, of which 410,000 are individual shareholders
- Cooperation with 70,000 suppliers and more than 100 universities.
- Regular dialog with the authorities and local communities

INDUSTRIAL CAPITAL

- 3.1 billion euros of investment decisions in 2018
- Almost 300 million euros per year in innovation expenses
- Proprietary technologies and 11,000 patents
- A strong presence in major industrial basins
- 565 production units, 24 million cylinders, 12,000 trucks

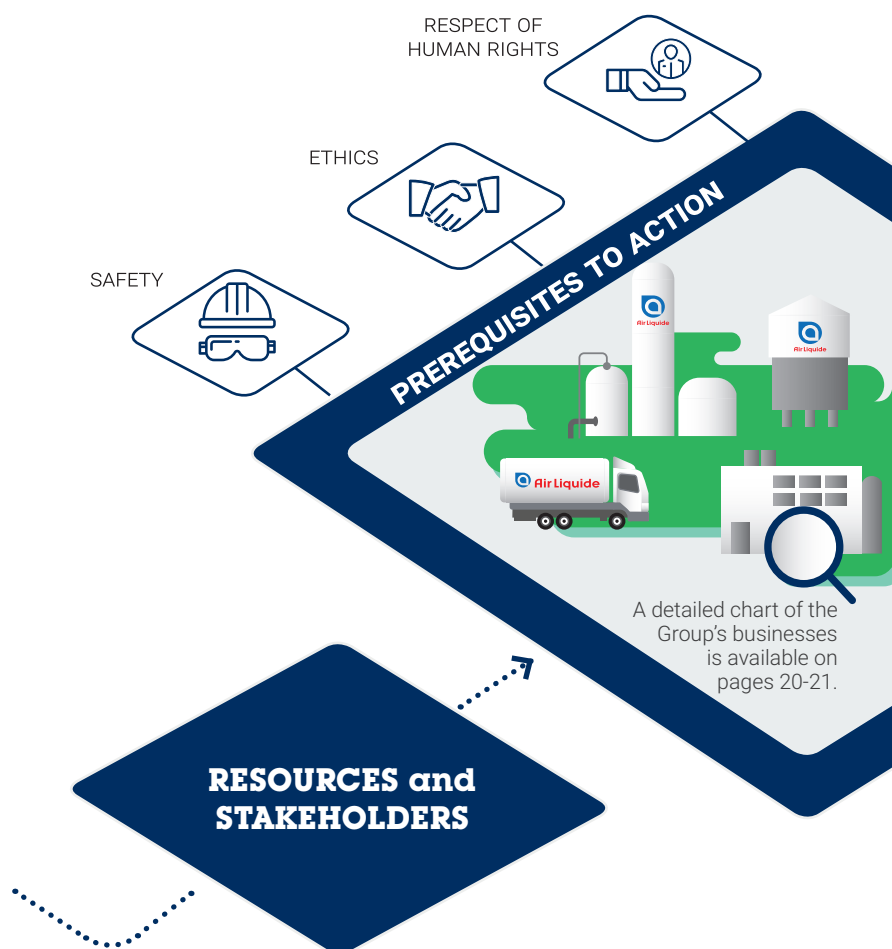
FINANCIAL CAPITAL

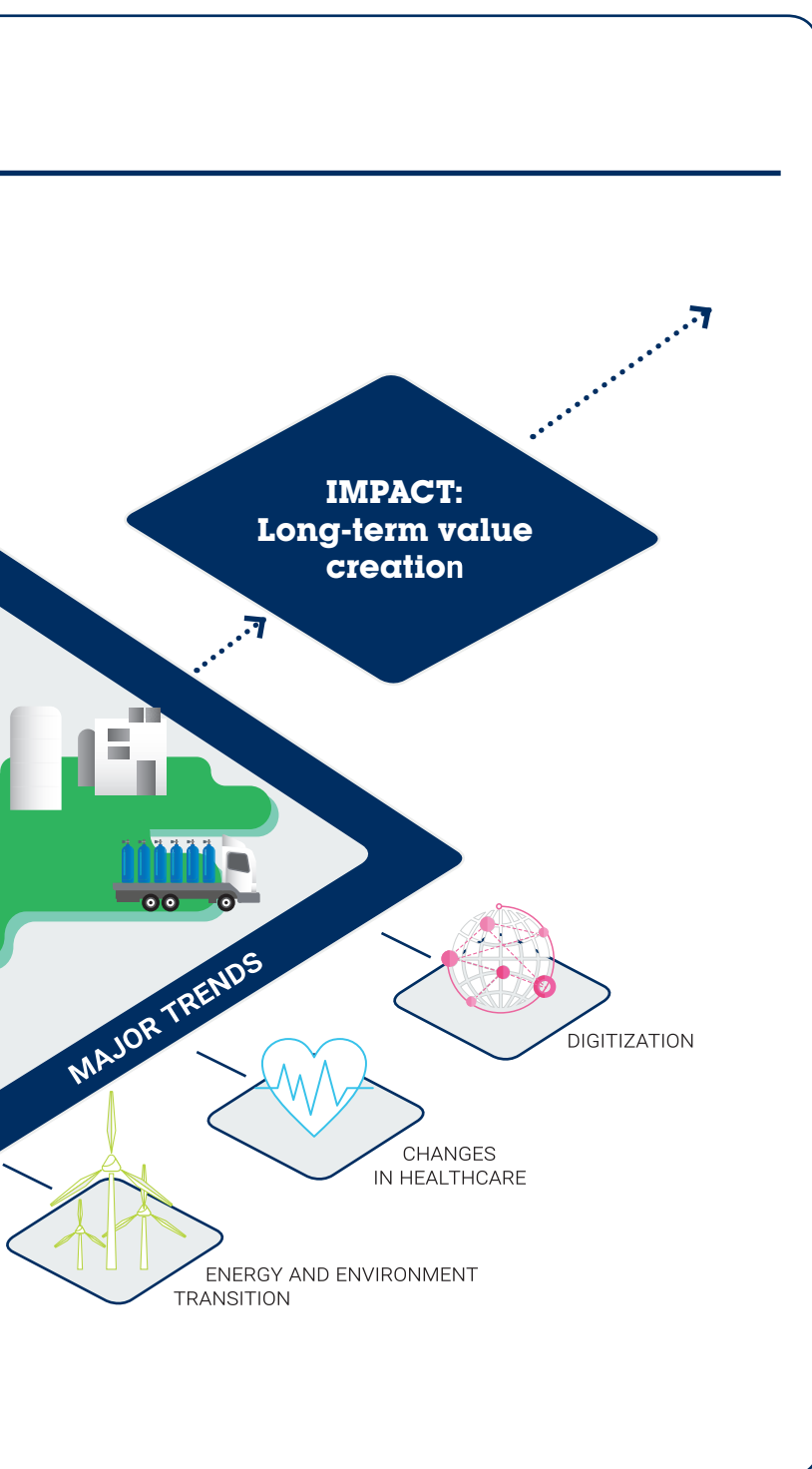
- Long-term customer contracts
- Breakdown of share capital: 32% individual shareholders and 68% institutional shareholders
- Strong balance sheet
- "A" credit rating

AIR LIQUIDE BUSINESS: gas, technologies and services for Industry and Health

The Group is a global leader in gas, technologies and services for industry and healthcare and supports the growth of all economic sectors by drawing on its extensive scientific and technical expertise. Its offering includes:

- The production and valorization of molecules
- The integration and marketing of proprietary technologies
- The provision of services and digital solutions





IMPACT: Long-term value creation

COMPANY

- Priority given to the safety of employees, customers, subcontractors and suppliers
- Support for more than 2 million industrial customers worldwide
- Introduction of the "Voice of Customer" program in 45 countries
- The Healthcare business, with 1.6 million patients cared for in their homes and service provided to 15,000 hospitals
- More than 230 critical suppliers assessed based on their environment, social, business ethics and procurement policies
- Local growth: present in 80 countries, dense territorial coverage
- Air Liquide Foundation projects

ENVIRONMENT

- > 40% of sales are related to solutions to protect life and the environment
- Climate objectives: reducing the Group's carbon intensity by 30% between 2015 and 2025
- 70% of electricity consumed by the Group is low-carbon or renewable
- 10.9 million tons of CO₂ avoided by the Group's customers, thanks to Air Liquide solutions
- 9,400 km of pipelines, reducing road transport
- Creation of the Hydrogen Council for a low-carbon society

LONG-TERM SUSTAINABILITY

- Revenue: +5.8% ^(a) compound annual growth rate (CAGR) over 30 years
- Adjusted net earnings ^(b) per share: +6.9% ^(a) compound annual growth rate (CAGR) over 30 years
- Adjusted dividend ^(b) per share: +8.3% ^(a) compound annual growth rate (CAGR) over 30 years
- 29th free share attribution in 2017
- 5 Chairman & CEOs since 1902
- Employee loyalty: 93% loyalty rate among managers and professionals ^(c)

(a) Data calculated according to prevailing accounting rules over 30 years.

(b) Adjusted for the 2-for-1 share split in 2007, the free share attribution and the capital increase completed in October 2016.

(c) Rate calculated based on resignations.

2. Prerequisites to action: safety, ethics and the respect of human rights

2.1. SAFETY

Safety is an integral part of Air Liquide's operational excellence.

Air Liquide, as a responsible industry player, is committed to efficiently and under all circumstances reducing the exposure of its employees, customers, subcontractors and suppliers to professional and industrial risks. Commitment to safety is total, visible, accompanied by unshakable vigilance and must allow the achievement of the zero-accidents objective.

Safety is a joint commitment and the responsibility of each individual. Prevention, protection, early detection and rapid reaction are at the heart of the Group's concerns. This commitment is reiterated in the General Statement of Air Liquide's Principles of Action, which details the Group's approach in terms of all its stakeholders. These Principles are shared with all entities and are available on the Group's website (<https://www.airliquide.com/group/groups-principles-action>).

Safety measures

Air Liquide continues to implement safety measures in three areas:

- the safety of individuals (Air Liquide employees and subcontractors);
- road safety;
- process safety.

The safety of individuals is part of a pro-active approach which engages Air Liquide employees and those of its subcontractors.

All Group employees have the ability and duty to ensure their safety and that of their colleagues. Being aware of dangers and risks, applying the rules and taking care of others – all this contributes to reducing the risk of accidents and strengthening Air Liquide's safety culture. Therefore, recognizing contributions in terms of safety, sharing the same values and developing trust-based relationships are key strengths for Air Liquide.

This includes, in particular, safety leadership training and regular workstation-based training courses. Air Liquide's managers encourage safety efforts, by demonstrating their commitment on-site and awarding good practices. Air Liquide's managers encourage safety efforts, by demonstrating their commitment on-site and awarding good practices.

The safety of subcontractors requires particular attention. Air Liquide uses subcontractors within the course of its business and pays particular care to the following:

- assessing the level of maturity and performance of subcontractors' safety measures before any sales commitment is made;
- integrating safety clauses in the terms of contracts;
- jointly establishing a work structure with comprehensive and detailed safety instructions;
- communicating Air Liquide's safety values and standards as well as the regulations in force that must be complied with; being as demanding and rigorous with subcontractors as with our own employees;
- supervising subcontractors in the execution of services;
- carrying out safety reviews once the work is complete, sharing feedback with subcontractors.

Road safety is part of an ambitious program launched in 2015 and adapted to Group businesses. This program has three main objectives: ensuring that rules laid down by the Air Liquide Group are efficiently applied across all subsidiaries, deploying the new technologies which help drivers drive safely, and sharing know-how between the various Group subsidiaries. According to region, the following measures are worth highlighting:

- the installation of onboard cameras and IT solutions which, according to their type, can detect driver fatigue and distractions, help change driving habits where necessary, or provide visibility of the vehicle's surroundings;
- at local and international level, increased exchanges on road safety both internally as well as with Air Liquide service providers and other organizations specialized in this subject. Moreover, Air Liquide organizes a European day of discussions and capitalization on transport safety with its service providers each year;
- initiatives which lead to a real change in behavior to implement a dynamic culture of road safety among Air Liquide employees and the employees of the Group's subcontractors.

Process safety addresses risks relating to industrial facilities and products. This process draws on Air Liquide's Industrial Management System (IMS) and requires:

- the identification of specific industrial risks for each business;
- knowledge of scenarios and their potential consequences;
- the effective and efficient implementation of appropriate preventative and protective safety measures for each of these risks; and finally, feedback to facilitate learning, awareness-raising, the promotion of a safety culture and to improve prevention.

2.2. ETHICS

2.2.1. Ethical approach and program

Integrity and transparency are the cornerstones of the Group's ethical approach. They govern behaviors and actions of all employees.

Integrity includes honesty and impartiality.

Transparency is based on the principles of sincerity and openness.

Individual and collective commitment is key to adopt ethical behavior based on integrity and transparency.

The Group's ethical approach is structured so that rules of conduct are shared and respected by all, in particular in regards to the respect for Human Rights, social rights and the environment.

This approach is set out in an ethical program which includes the following points:

- the behavior expected from all employees which is part of the General Statement of the Group's Principles of Action;
- relayed codes developed through internal procedures;
- the awareness-raising and training program;
- the whistleblowing and control system.

2.2.2. A dedicated structure

To support the roll-out of this Ethical program, a dedicated organization has been set up:

- An Ethics Committee, composed of Air Liquide's various global functions (Human Resources, Legal, Group Control, Operations, Sustainable Development Departments, etc.), validates the ethical program's guidelines and may, if necessary, make post-fraud sanction recommendations;
- The Group Control Department, which is responsible for Ethics, reports directly to one of the Group's Executive Vice Presidents;
- An Ethics Officer is responsible for providing advice and support to entities in the implementation of the four above-mentioned areas and in the treatment of fraud and deviations. This Officer also suggests improvements to the Ethical program by integrating strategic challenges, best practices and regulatory developments. For example, the Ethics Officer integrated the anti-corruption obligations set out in the Sapin 2 Act into the Group's existing procedures. He relies on a network of ethics correspondents present in each of the Group's geographic regions and business lines.

2.2.3. Codes and procedures

Rules for ethics and conduct, which are shared and actively circulated among all Group employees through the BLUEBOOK (the Group's reference framework which includes policies, codes and procedures which apply to all the entities), are set out in particular within the Code of Conduct and the Anti-Corruption Code of Conduct.

2.2.4. The key concepts of the Code of Conduct, the employees' Ethics Charter

Each Group subsidiary must apply the key concepts of the Code of Conduct. This decentralized approach combines respect for local customs and regulations and the Group's ethical commitment. The subsidiaries thus embrace the Group's ethical principles by writing their own Codes of Conduct themselves in their working language.

Full details of these key concepts are available on the Group's website <https://www.airliquide.com/group/code-conduct-key-concepts>.

An e-learning module exists on the employee Code of Conduct which sets out the Group's ethics approach and presents key concepts through case scenarios. This module is mandatory and must be followed by all employees each year.

The Anti-Corruption Code of Conduct

Air Liquide's commitment, which is set out in the introduction to the Principles of Action, to prohibit all forms of corruption is supported by a major anti-corruption program. The Group has formalized an Anti-Corruption Code of Conduct. This Code has been made available to all entities and is available on the website at <https://www.airliquide.com/group/anti-corruption-code-conduct>. This Anti-Corruption Code of Conduct provides a reminder of the anti-corruption laws and deals with relations with intermediaries, specific cases such as mergers, acquisitions and partnerships, types of payments requiring particular attention, as well as administrative and accounting traceability requirements and sanctions applicable in the event of non-compliance with this Code.

Moreover, the Group has a Supplier Code of Conduct which includes a chapter on the prevention of corruption.

An e-learning module covers the Anti-Corruption Code of Conduct. It is primarily intended for those teams which are most exposed to corruption-related risks (sales, procurement, administrative management, and so on) and managers. For these employees, this training module is mandatory each year. It is supplemented by classroom-based training every three years.

2.2.5. Respect for competition law

Codes have been established in regard to proper behavior concerning respect for competition law, especially in Europe, the United States and Asia. The most important rules are also included in the employees' Local Codes of Conduct. For some of the Group's activities, Healthcare in particular, specific Codes of Conduct on competition law have also been developed.

Audits are jointly conducted on a regular basis by the Group's Internal Audit Departments and an external attorney. They carry out tests and interviews to identify and correct practices at risk or any deviations observed. Awareness-raising meetings on compliance with competition law are also held throughout the Group. Finally, an e-learning program was launched covering competition law-related practices and international principles.

2.2.6. The whistleblowing system

The Group has a formal whistleblowing system at all its entities, whereby employees can anonymously alert an independent external service provider of any deviations from the Code of Conduct of their entity. Employees can file this alert in their own language by telephone or through the provider's dedicated website. All reports are dealt with confidentially and as quickly as possible. The Group guarantees that any employee who reports something in good faith will not be sanctioned or any retaliatory measures taken. It also reiterates in the Code of Conduct that the processing of reports is supervised by the Group's Ethics Officer.

This system is an additional solution to the usual process for reporting incidents within the entities: through managers and the Human Resources teams. It helps to accelerate the processing of reports received, and thus to minimize their potential impact on individuals and the organization.

2.3. RESPECT FOR HUMAN RIGHTS

Air Liquide is dedicated to the highest standards for the conduct of its business and its Chairman and Chief Executive Officer has signed the United Nations Global Compact, an initiative in which the 10 founding principles relate to Human Rights, international labor standards, the environment and the fight against corruption. Signatories of the Global Compact are committed to:

- support and respect the protection of internationally proclaimed Human Rights;
- ensure that they are not complicit in Human Rights abuses;
- uphold the freedom of association and the recognize the right to collective bargaining;
- help eliminate all forms of forced or compulsory labor;
- contribute to the effective abolition of child labor;

- help eliminate all discrimination in respect of employment and occupation;
- apply a precautionary approach to environmental challenges;
- undertake initiatives to promote greater environmental responsibility;
- encourage the development and diffusion of environmentally-friendly technologies;
- act against corruption in all its forms, including extortion and bribery.

Air Liquide's letter of commitment, signed by its Chairman may be viewed on the Air Liquide and Global Compact websites.



Air Liquide also complies with the international rules of the International Labour Organization (ILO) in terms of labor law and follows guidelines for multinational companies issued by the OECD. These Guidelines encourage the reasonable conduct of companies in terms of professional relationships, Human Rights, the environment, taxation, the publication of information, anti-corruption, the interest of consumers, science and technology, and competition.

Moreover, Air Liquide has signed the Responsible Care® Global Charter of the International Council of Chemical Associations (ICCA) which aims to improve global performances in the chemical industry in terms of health, safety and the protection of the environment.



3. Description of activities

The Group classifies its activities as follows: Gas & Services, Engineering & Construction, Global Markets & Technologies. Additional information is available in the "2018 Performance" section of this chapter.



3.1. GAS & SERVICES

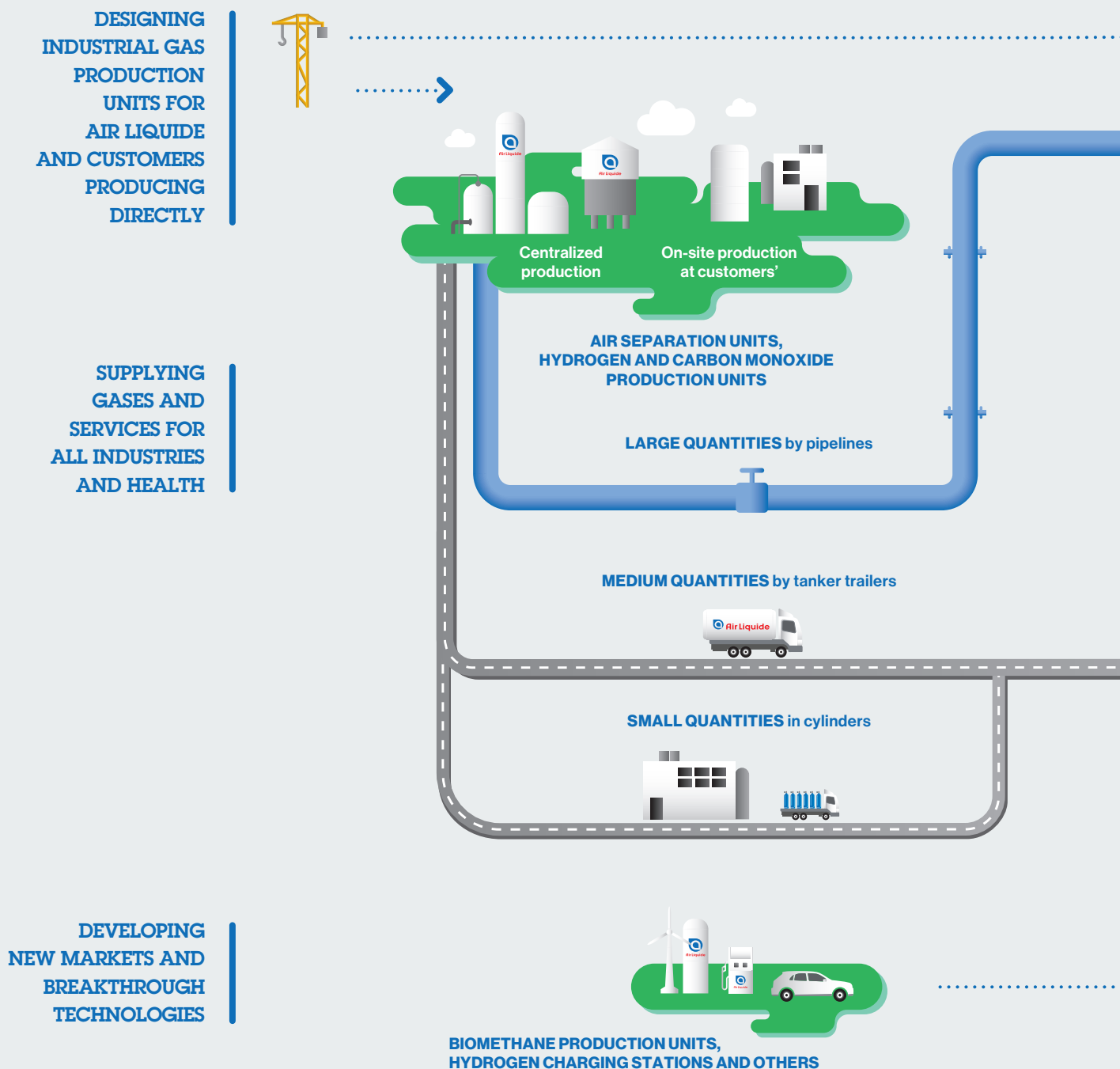
The supply of gas involves local production in order to limit transport costs. Therefore, Air Liquide gas production units are located throughout the world and can supply many types of customers and industries with the relevant volumes and services required. Air Liquide's structure is made up of a base, in Paris, and four hubs: Americas, Europe, Asia Pacific and Middle East and Africa. These hubs draw on the Group's expertise and presence in these geographic regions.

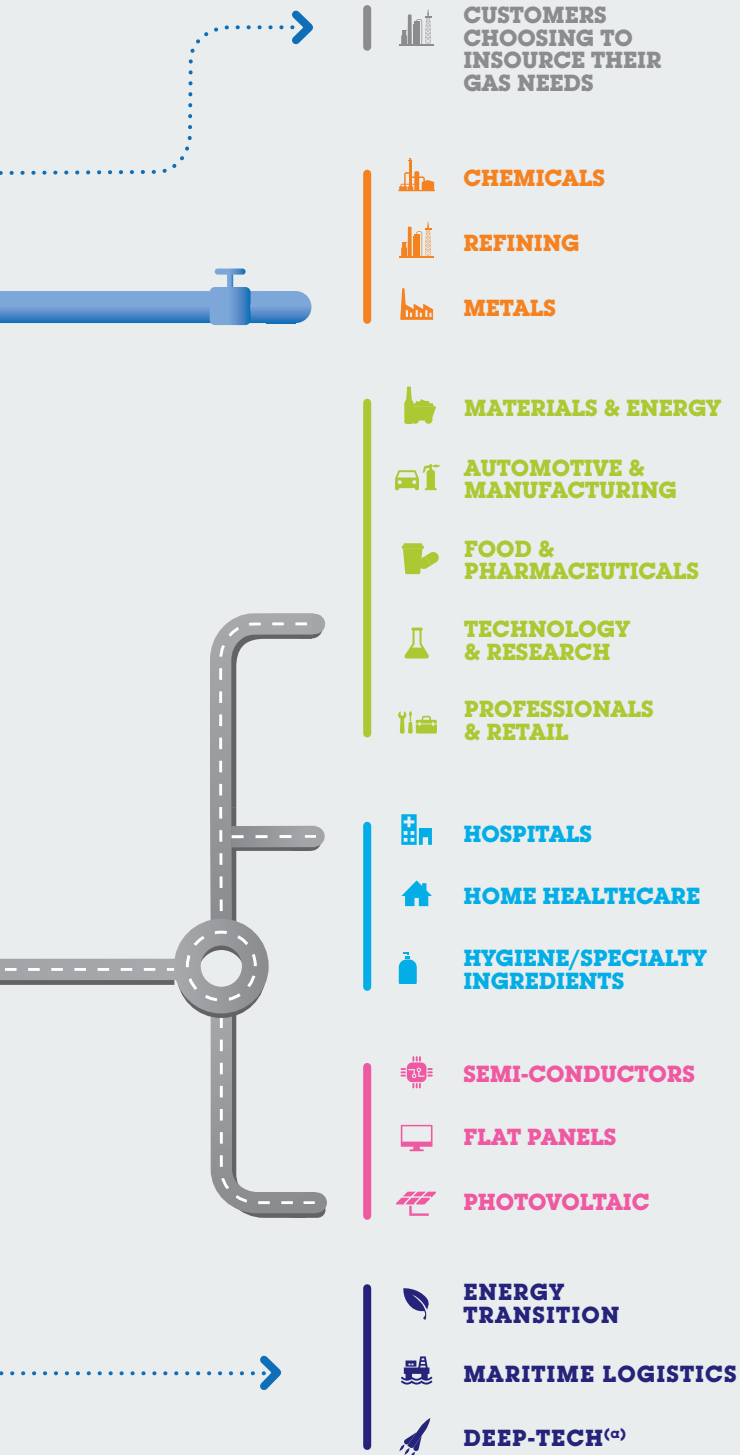
Moreover, the operational management of Gas & Services businesses is led by the World Business Lines to better adapt to changes in the different markets:

- **Large Industries** supplies industrial gases by operating major production units. It serves customers in the metals, chemicals, refining and energy industries with high gas consumption, requiring delivery through a dedicated plant or pipeline. Large Industries also supplies the Group's other business lines;

- **Industrial Merchant** supplies a wide range of different gases, application equipment and associated services. It serves industries of all sizes that require quantities smaller than those for customers of Large Industries. The product is either distributed in bulk, in liquid form, for medium and large quantities, or in cylinders, in gaseous form, for small quantities;
- **Healthcare** supplies medical gases, hygiene products, medical devices and services to hospitals and patients in their homes. It also produces and distributes healthcare specialty ingredients for the cosmetics, pharmaceutical and vaccine markets;
- **Electronics** supplies gas and services mainly for the production of semi-conductors, but also for flat panels and photovoltaic panels.

AIR LIQUIDE SUPPORTS THE GROWTH OF ALL ECONOMIC SECTORS





ENGINEERING & CONSTRUCTION

Building plants and equipment for gas production



LARGE INDUSTRIES

Producing and delivering gases in large quantities



INDUSTRIAL MERCHANT

Serving a wide range of customers thanks to the Group's expertise in gases and processes



HEALTHCARE

Providing gases, medical products and services to support our clients and patients, in the hospital and at home



ELECTRONICS

Designing, manufacturing, and providing molecules and equipment for this sector



GLOBAL MARKETS & TECHNOLOGIES

Providing technological solutions (molecules, equipment and services) for new markets

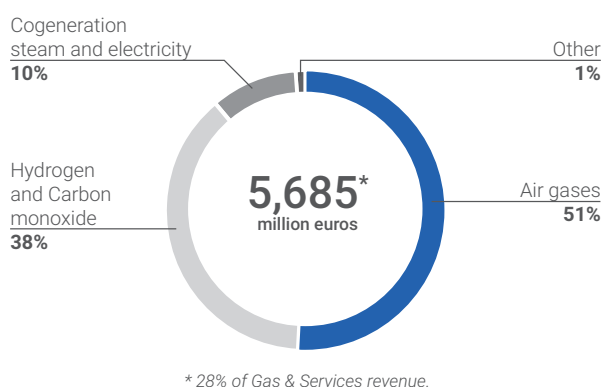


(a) Scientific breakthroughs and disruptive technologies that can fundamentally change design and production methods.

LARGE INDUSTRIES

The Large Industries business line proposes gas and energy solutions to customers in the metals, chemicals, refining and energy industries, which are essential for their own industrial production, to improve process efficiency and to make their plants more environmentally friendly. The world leader in this sector, Air Liquide benefits from dedicated in-house development and engineering teams, differentiating proprietary technologies and rigorous processes for selecting investments and carrying out projects.

2018 LARGE INDUSTRIES REVENUE BY ACTIVITY



Large Industries key figures

- 369 large Air Separation Units;
- 52 hydrogen and/or carbon monoxide production units;
- > 9,400 km of pipeline network;
- 19 cogeneration plants.

The Large Industries business line provides oxygen, nitrogen, argon, hydrogen and carbon monoxide through a network of plants and pipelines. The Group also operates cogeneration plants to supply customers with steam and electricity.

The **chemicals** industry uses mainly oxygen, hydrogen and carbon monoxide in its manufacturing processes, as well as nitrogen to inert its installations.

The **refining** industry requires hydrogen to desulfurize fuels and break up heavy hydrocarbons. The demand for hydrogen is growing due to the combination of increasingly stringent emissions legislation and the use of heavier hydrocarbons.

In the **metals** industry, Air Liquide supplies large volumes of oxygen to steel producers notably, the use of which improves their energy performance and reduces significantly their CO₂ emissions. The majority of new projects are currently located in developing economies.

Numerous industries linked to **energy** or **chemicals** use large quantities of oxygen to transform coal, natural gas or liquid hydrocarbons into syngas for the production of chemical products, synfuel or electricity. To meet customer requirements, the supply of large quantities of gas is critical. Air Liquide supplies its customers directly by pipelines from a dedicated plant or different plants linked by a network. Air Liquide has built its pipeline networks progressively over the last 40 years. With a total length of more than 9,400 kilometers (≈ 5,800 miles), these networks stretch, for example, across Northern Europe, from Rotterdam through to Dunkirk, and along the Gulf Coast in the United States from Lake Charles (Louisiana) to Corpus Christi (Texas). Many other mid-sized local networks have also been built in other significant and fast-developing industrial basins in Germany, Italy, Singapore and, more recently, China.

The use of industrial gases is critical for these various industrial processes. As any discontinuity in the supply necessitates a stoppage of the customer's production operations, supply reliability is crucial. However, although vital, gas supply generally represents a very small part of total production cost for the customer.

The raw materials necessary for the production of industrial gases vary according to the type of gas and the location of the production unit. The production of oxygen and nitrogen requires air and a large quantity of electricity. Hydrogen and carbon monoxide production units mainly consume natural gas and little electricity. Cogeneration units consume natural gas and water. The energy and capital intensity of these industrial processes is generally high.

The supply of gas is generally contracted for 15 years. For certain projects this can be extended to 20 years and beyond. The signing of new contracts for new industrial customers' sites is a strong predictor of future growth. Within these contracts, the Group guarantees long-term service continuity and a high level of reliability with respect to the gas supply via a high-performing industrial solution. In return, the contracts include the indexation of input costs, mainly electricity and natural gas, and guaranteed minimum volumes through take-or-pay clauses.



Key points

The **Large Industries** business operates under long-term contracts, where costs are indexed, in particular, to energy costs. These contracts, which include take-or-pay clauses, offer considerable visibility of future revenue and protection in the event of a significant fall in customer volume consumption (below the minimum take-or-pay level). The long investment cycle and high capital intensity require a solid balance sheet. The signing of new contracts is a strong predictor of future growth.

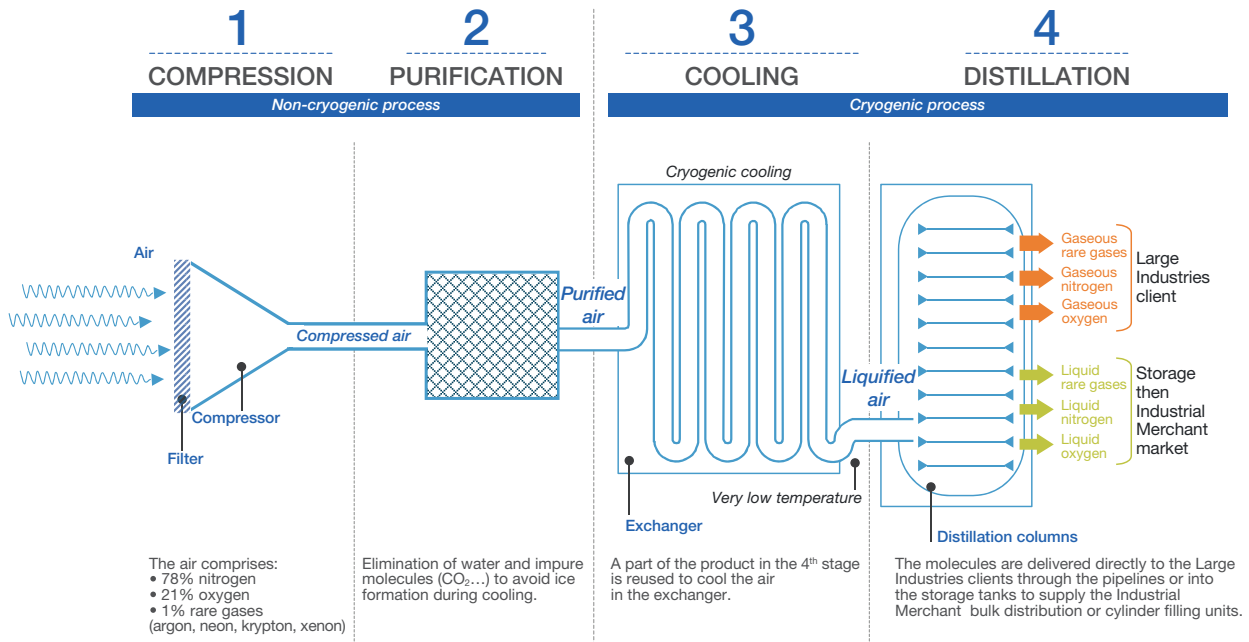
Air Liquide is developing a pipeline network strategy in the industrial basins in order to provide customers with greater supply reliability while optimizing operating costs.

Large Industries processes

Air gases production (ASU: Air Separation Unit)

An ASU compresses, liquefies and distills air in order to separate it into its different components: 78% nitrogen, 21% oxygen, 1% argon and rare gases (neon, krypton and xenon). Only certain large ASUs can produce rare gases. Electricity consumption is significant.

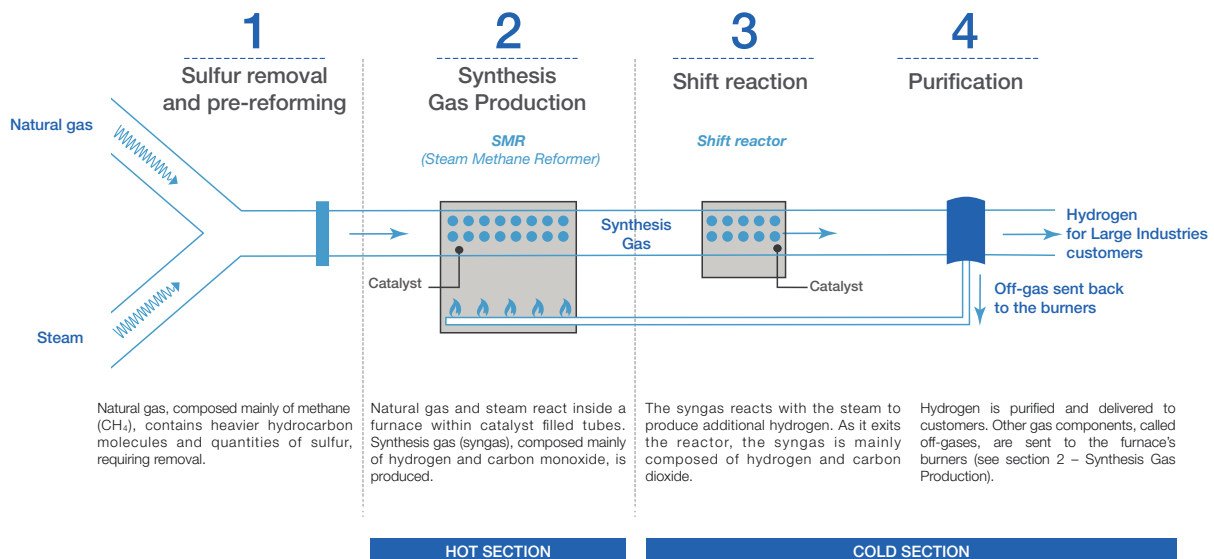
SIMPLIFIED DIAGRAM OF AN AIR SEPARATION UNIT'S OPERATION



Hydrogen and carbon monoxide production (SMR: Steam Methane Reformer)

By steam reforming natural gas, an SMR produces hydrogen and carbon monoxide. The most significant raw material is natural gas; electricity and water consumption is modest.

SIMPLIFIED DIAGRAM OF A HYDROGEN UNIT'S OPERATION



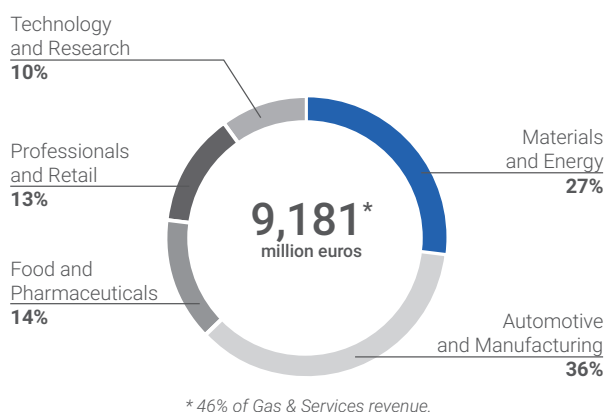
Cogeneration

Cogeneration consists of simultaneously and efficiently producing electricity and steam generally by consuming natural gas and water. The electricity is used by the plant or supplied to the local network, while the steam is required for certain industrial processes.

INDUSTRIAL MERCHANT

The Industrial Merchant business line serves a wide range of markets and customers – craftsmen, SMEs, large multinational industrial groups – offering comprehensive gas solutions for the implementation and optimization of their industrial processes. Supported by a global network of business experts and extensive geographical coverage, Air Liquide provides more than two million customers with innovative solutions including industrial gases, welding equipment, application and safety equipment and related services.

2018 INDUSTRIAL MERCHANT REVENUE BY END-MARKET



Industrial Merchant key figures

- ~ 20 million cylinders;
- ~ 12,000 trucks;
- ~ 60,000 cryogenic tanks at customers sites;
- > 1,000 on-site units;
- ~ 35,000 employees;
- ~ 1,000 stores.

The Industrial Merchant activity serves five primary markets:

- **Materials and Energy:** customers in this market use a wide range of different gases. Oxygen is used to reduce energy consumption in glass and metal manufacturing processes and to treat wastewater. Nitrogen is used to create inert atmospheres for the conservation of oxygen-sensitive products. Carbon dioxide is used in drinking water treatment, helium for professional deep-water diving and magnetic resonance imaging. Nitrogen and carbon dioxide can be used for the enhanced recovery of oil and gas and, in certain cases, the reduction of water and solvent consumption.

➤ ZOOM ON...

THE GLASS INDUSTRY: in all areas of glass, customers use oxygen to facilitate the melting of raw materials, to reduce fossil fuels and to reduce their emissions of pollutants such as nitrogen oxide. For plate glass manufacturing for construction and automotive industries, glassmaker customers also use nitrogen and hydrogen to improve the quality and transparency of their products, while for container glass used in packaging (bottles, flasks, etc.) or for tableware, customers use oxygen to eliminate manufacturing defects and obtain a quality appearance. These manufacturers receive delivery either by truck, in the form of cryogenic liquid, or by small generators of on-site gas production (on-site units) for larger furnaces. Air Liquide provides the storage and accessories for the measuring and controlling of gas flow as well as combustion technologies, such as burners designed by its engineers, to maximize the performance and efficiency of melting furnaces.

- **Automotive and Manufacturing:** argon and argon mixtures are used for metal parts welding in manufacturing industries, hydrogen and nitrogen for heat treatment, specialty gases for waste gas analysis, helium for airbags, and rare gases (krypton, xenon) for lighthouses and thermal insulation. Oxygen and acetylene are used in metal heating and cutting operations. Air Liquide therefore enables customers to produce high quality products, while improving their manufacturing processes and preserving their working environment.

ZOOM ON...

MANUFACTURING: many operations in manufacturing involve cutting, welding or heat treatment of metal parts. Industrial gases play an essential role in improving site productivity while ensuring the quality of the manufacturing. They are supplied in gaseous form at high pressure, with cylinders often equipped with innovative integrated trigger valves, or in liquid form for the larger production sites. The Air Liquide experts support their customers by proposing the most adapted gas solutions to their processes and specific needs. Argon, carbon dioxide or helium are essential molecules to ensure the quality of arc welding, oxygen and acetylene are used for metal cutting, nitrogen or oxygen for laser cutting, argon or nitrogen for new 3D printing processes while nitrogen or hydrogen are essential for physicochemical treatments such as annealing, carburizing or tempering, making it possible to achieve the final mechanical properties. Air Liquide installs storage or panopies of packaged gases at client sites as well as the associated equipment to control the relative processes, including devices for measuring and controlling the atmosphere of heat treatment furnaces.

- Food and Pharmaceuticals:** the Group's technologies help increase shelf-life and improve food and pharmaceutical manufacturing and cooling processes. The three major activities in this market are the supply of carbon dioxide for beverages, gas mixtures for modified atmosphere packaging, and nitrogen for inerting or freezing food. Air Liquide ensures these products comply with prevailing market regulations and in particular gas traceability.

ZOOM ON...

FOOD FREEZING: Eating habits are changing profoundly and becoming more global. Today, consumers are looking for sustainable food, healthier and safer. Cryogenics allows food temperatures to drop very quickly, avoiding surface dehydration and the formation of large ice crystals in the product. This process makes it possible to preserve all the taste properties of frozen foods. Air Liquide provides and guarantees customers as to the quality and food safety of the nitrogen or liquid carbon dioxide required for deep freezing in accordance with the regulatory traceability specifications. Air Liquide also provides agri-business with deep freezing tunnels or cabinets as developed by its engineers, thus enabling them to process their production directly while guaranteeing the best conditions of hygiene, quality, productivity and efficiency. Air Liquide ensures the adjustment and maintenance of this equipment and provides customers with the expertise needed to integrate and use its deep freezing equipment along their production line.

- Technology and Research:** industrial gases are used in the assembly and encapsulation of electronic components in optoelectronics processes – particularly LED manufacturing and optic fiber and silicon cylinder drawing. Specialty gases required, in particular for the calibration of analysis instruments, are widely used in research centers and analytical laboratories. Specific, highly technical gases and equipment have been developed for these various applications.

ZOOM ON...

OPTOELECTRONICS: the production of an optical fiber initially requires the production of a silica bar called a preform. This preform is consolidated with hydrogen, oxygen and helium, then melted in an oven and stretched into an optical fiber at a speed of 1,500 to 2,000 meters per minute. The stretched fiber is then cooled with helium. Air Liquide assists optical fiber manufacturers by supplying these high purity gases. Moreover, the base material used by the white and blue LEDs requires a nitrogen atom. For this process, UHP (ultra-high purity) ammonia is injected during the deposition phase. Liquid at room temperature, the ammonia must be heated to take on its gaseous form. The Air Liquide induction heating solution, which evaporates UHP ammonia more efficiently, allows its customers to use large volumes of this gas. Air Liquide proposes all of the gases intended for the manufacture of LEDs, including equipment and installation facilities.

- Professionals and Retail:** a wide range of gases are offered for use in plumbing, heating, ventilation, air conditioning, industrial maintenance and auto repair activities, mostly for welding. These gases are often sold in special-purpose packaging – cylinders in compressed gaseous form, tailored to customer usage requirements. Across a number of countries, notably in North America, Air Liquide also offers a complete range of welding equipment, wires and units, as well as all personal protective equipment required in order to be able to work safely, enabling customers who are craftsmen and contractors to find quickly and in the same place all the elements they need to carry out their welding activities.

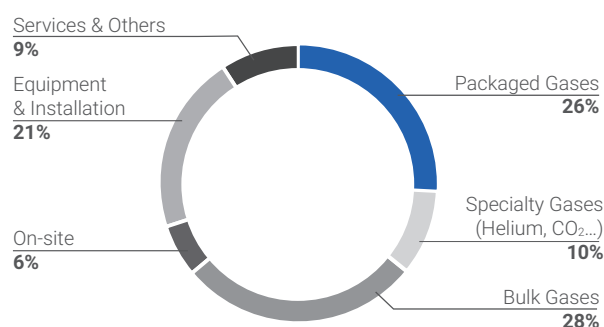
Industrial Merchant sells packaged gases (high-pressure gas cylinders) through multiple channels to cover all customer needs: over the phone, e-commerce and/or via its distribution network. Cylinders can be delivered directly to the customers' doors or picked up through the distribution network with optimized inventory management based on cylinder traceability. Air Liquide's expertise in customer processes is always offered.

Gas supply modes

Industrial Merchant provides gas using the supply mode which is best adapted to customer's needs. These include one or several of the following supply modes:

- **On-site production units:** for Industrial Merchant customers with major volume requirements, oxygen, nitrogen or hydrogen generators can be installed at customers' sites (called "on-site units"). Supply is contracted over a long period of time, up to 15 years, and includes a backup system which guarantees supply continuity. This supply mode also significantly reduces the number of kilometers traveled to deliver gases to customers.
- **Bulk:** for medium- and large-scale needs or cryogenic systems, gases are provided in liquid form and distributed by trucks. Bulk customers consume the gas directly in liquid form (for example, in the agri-business) or in gaseous form after vaporization.
- **Cylinders:** for smaller scale needs and use on building sites, gases are distributed in cylinders. From an operational point of view, the main sources gases (nitrogen, oxygen, argon, CO₂) are delivered in liquid form to a filling center where they are stored in liquid form and then, after vaporization, transformed into gaseous form and stored in cylinders of different capacities (typically 5 to 50 liters). Gases can be mixed together to better meet customers' needs. Cylinders are then directly delivered to customers or to distributors and stores by a fleet of adapted trucks.

2018 INDUSTRIAL MERCHANT REVENUE BY ACTIVITY



The distribution of gas in cylinders and bulk remains traditionally local with transport distances rarely exceeding a radius of 200 to 250 kilometers around the production site. To ensure this local presence, the Industrial Merchant business relies mainly on the gas production capacity of Large Industries and thereafter develops its own distribution logistics. Air Liquide ensures the reliability of the gas supply and guarantees the quality of the materials used (storage tanks and cylinders). The gas usage and applications equipment are generally investments made by Air Liquide, who also covers their maintenance.



Key points

Industrial Merchant is characterized by a wide range of customers, markets, applications, and solutions and services. The contract terms can be up to five years for cylinders and liquid gas supply and up to 15 years for small on-site gas generators. Revenue comes from the sale of gas and related services.

It is a business based on expertise and services with a high technology and innovation content, extremely local, with dense geographic coverage as a key factor. The competitive environment can vary between areas.

Innovation with regards to markets, products and applications is a major growth driver. Business growth is generally dependent on local industrial production growth trends.

HEALTHCARE

The Healthcare business line provides gases and medical products, specialty ingredients and services which support patients along the continuum of care, from the hospital to their home, and help protect the most vulnerable lives. Air Liquide is one of the world leaders in this business sector, which is subject to both stringent regulatory requirements as well as to multiple stakeholders (patients, doctors and payers). The business line provides products and services in four areas:

- **Medical Gases:** Air Liquide provides medical gases to 15,000 hospitals and clinics. Among the main medical gases and their areas of application, Air Liquide provides: medical oxygen for respiratory diseases and intensive care units; medical nitrous oxide, a mixture of oxygen and nitrous oxide O₂/N₂O (KALINOX™) and xenon (LENOXe™) for anesthesia/analgesia; and nitrogen monoxide (KINOX™ and VasoKINOX™) for resuscitation.

Air Liquide ensures compliance with the strictest of safety and quality standards through the installation and maintenance of medical gases' distribution networks in hospitals and permanent inventory control.

- **Home Healthcare:** Air Liquide cares for more than 1.6 million patients in their homes suffering from chronic diseases. Once the diagnosis and treatment is established by a doctor, the long-term treatment requires patient education, on-going support, interventions by trained nurses or technicians and the implementation of therapies in the fields of respiratory, perfusion or other.

Air Liquide has developed an offer beyond oxygen therapy and helps take care of patients suffering from chronic obstructive pulmonary disease, obstructive sleep apnea, chronic respiratory insufficiency, diabetes, pulmonary arterial hypertension, and Parkinson's disease, providing them with services for long-term follow-up care.

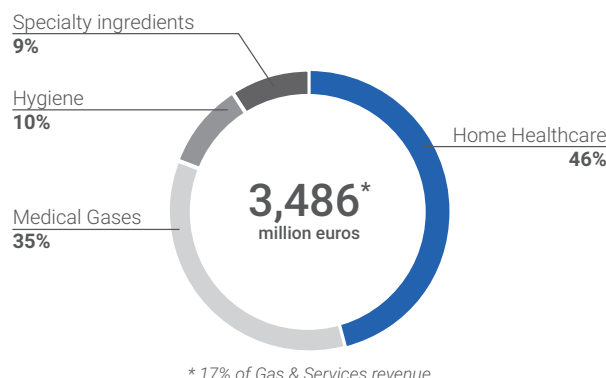
Demographic and sociological factors such as an aging population and urbanization are contributing to the increase in the number of chronic diseases. Air Liquide's Home Healthcare business strives to meet these public health challenges as well as the growing constraints on health spending in advanced economies, by avoiding hospitalization and developing digital monitoring. In developing economies, Home Healthcare is growing in areas where health systems are being introduced.

- **Hygiene:** with its subsidiary Schülke, a leader in hospital disinfection, Air Liquide contributes to the fight against infections and pandemics through a wide range of products used in hospitals and private practice (dentists, family practitioners, etc.).

For example, Air Liquide provides skin disinfectants for the pre-surgical preparation of patients as well as for medical staff, antiseptics and other products for wound-healing and medical instrument disinfection. These products can be found in operating units and medical wards.

- **Healthcare Specialty Ingredients:** for over 70 years, through its subsidiary Seppic, Air Liquide has designed and developed innovative specialty ingredients for the healthcare sector, in particular adjuvants for vaccines, film-coating systems for the pharmaceutical industry as well as a complete range of eco-friendly thickeners, stabilizers, emulsifiers and active ingredients for the cosmetics market.

2018 HEALTHCARE REVENUE BY ACTIVITY



The Healthcare activity, in particular Medical Gases, mainly relies on the gas production capacities of Large Industries and develops its own distribution logistics. Medical gases have a drug designation status which requires market authorization from the country's health authorities. They are subject to specific pharmaceutical traceability and are supplied in gas or liquid form by qualified personnel. The integration of the Industrial and Healthcare activities has led to synergies and industrial efficiency.

Over the last 20 years, Air Liquide strengthened a leading healthcare role in Western Europe, Canada and Australia. The Group also has businesses in the United States (medical gases only), South America and certain Asian, African and Eastern European countries. It continues to grow in all regions, in particular according to the expansion of healthcare systems. As a result, approximately 71% of the Healthcare business line's sales are in Europe and around 22% in the Americas.



Key points

The **Healthcare** business produces and distributes medical gases for hospitals and provides medico-technical healthcare services for the care of patients at home. It operates in a strict regulatory framework. Density, quality of support services and efficiency are essential criteria that help to offset pricing pressures of healthcare systems, particularly in advanced economies.

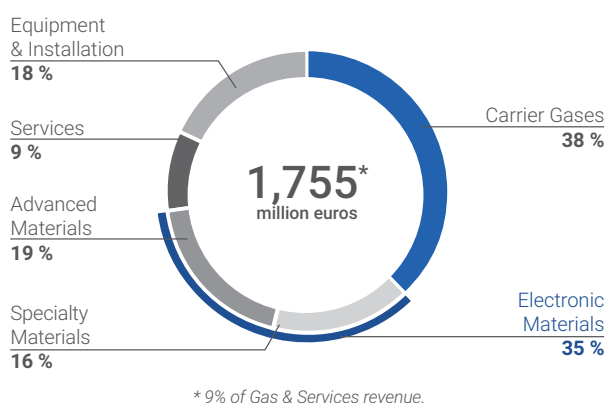
Air Liquide is present along the continuum of care: from treatment of acute diseases (with medical gases in hospitals), to treatment of chronic diseases at home (with Home Healthcare), and prevention/well-being (with businesses in Hygiene and Healthcare Specialty Ingredients).

With aging populations and the escalating need for care due to the increase in chronic diseases, as well as the continuing expansion of healthcare systems in developing economies, the Healthcare activity represents a solid growth driver for the Group.

ELECTRONICS

Thanks to its long-term vision, Air Liquide provides innovative solutions to the semi-conductor, flat panel and photovoltaic markets, leveraging its expertise, global infrastructure and strategic proximity to manufacturers. Its products and services respond to increasingly challenging customer demands for improved mobility, connectivity, computing power and energy consumption. Technological progress is constant and a growth driver for industrial gases.

2018 ELECTRONICS REVENUE BY PRODUCT



- **Carrier Gases:** Carrier gases (primarily ultra-pure nitrogen) supplied by on-site facilities, are intended for the transport of molecules and materials as close as possible to the chip manufacturing, providing the inerting required to protect the electronic systems. The need for a regular and constant supply of carrier gases requires long-term commitments for up to 15 years from customers with the building of production units near their premises or even on the customer's site.
- **Electronic Materials:** **Electronic Specialty Materials** are used in semi-conductor, flat panel and solar cell manufacturing. **Advanced**

Materials are key to the processes used in semi-conductor manufacturing. The acquisition of Voltaix in 2013 extended the Group's range of advanced deposition materials. The Group develops and markets offers with strong added value, including the ALOHA™ and Voltaix offers. The most sophisticated of these advanced materials are developed in cooperation with customers and are essential for the miniaturization of new electronic chips.

- **Equipment & Installation:** the Electronics business line also supplies equipment and installs gas distribution units and networks for ultra-pure gases and chemical products, at its customer's facilities.
- **Services:** on site, manufacturers can rely on the Group's expertise in the total management of fluids and equipment as well as on its cutting-edge analytical services used to continuously improve production processes.

The Electronics business model is primarily based on long-term carrier gas supply agreements with the necessity for continuous technological innovations to satisfy the needs of the major industrial players by designing new advanced materials also called precursors.

Air Liquide's Electronics business is based near its customers, including 72% in Asia, 21% in the Americas and 7% in Europe.



Key points

The Group's **Electronics** activity covers four different activities: **Carrier gases with a business model based on long-term contracts including minimum volumes guaranteed by take-or-pay type clauses**; **Electronic Materials with a high level of technical expertise**; **Equipment & Installation sales which are correlated to the growth of semi-conductor plants**; **Services**. In a growing electronics sector, the mix of business specific to Air Liquide with its long-term contracts, offers a true competitive advantage.

3.2. ENGINEERING & CONSTRUCTION

To provide customers with the gases required for their industrial production, Air Liquide engineers have developed innovative proprietary technologies. The Group designs and constructs gas production units, from the feasibility study stage through to the delivery of the complete installation, for its own use or for sale to customers who prefer to insource their gas requirements. Air Liquide complies with the increasingly strict safety, reliability and competitiveness requirements of Air Separation Units and hydrogen units.

Since the acquisition of Lurgi in 2007, the Group has expanded its range of technological expertise. It possesses its own proprietary technologies (as developed by Lurgi over 50 years) to produce hydrogen and carbon monoxide through steam methane reforming. This acquisition also expanded the Group's offering of natural gas conversion technologies to produce syngas, synthetic natural gas, methanol, propylene, liquid fuels and biofuels. This expanded Engineering & Construction aptitude has assisted the Group's involvement, upstream of industrial gas production projects as well as in the development of its customer processes, thus boosting sales growth.

The majority of Air Liquide's Engineering & Construction business is geared toward industrial gas production technologies, and in particular the manufacture of air gas or hydrogen and carbon monoxide production units.

To cover all of the primary industrial markets and manage its production costs, the Engineering & Construction business has extensive geographical coverage with engineering centers located mainly in North America, Europe, Asia and the Middle East.

The Group favors the development of its gas sales business over equipment sales. Nonetheless, Engineering & Construction has a strategic value for the Group, both internally and externally.

Internally, the Group benefits from the relevant engineering resources during the investment phase of the projects of its Gas & Services businesses. It provides a high level of expertise, crucial to the design of efficient units which specifically respond to the needs of the Group's industrial gas customers. It provides support for the Group during site takeovers, by ensuring the appropriate assessment of the quality of assets purchased.

The Engineering & Construction business also serves third-party customers. Air Liquide designs and builds customized units which customers will own and operate. Also, this third-party customer business allows the Group to permanently assess the competitiveness of its own technologies and commercial offering. In particular, Air Liquide is able to forge close relations with customers who produce their own gas and better understand their industrial processes and investment projects. In certain cases, negotiations initially steered toward the sale of equipment were finalized by the signing of a long-term industrial gas supply contract. As part of this third-party customer business, the strategy consists of favoring research and equipment

supply contracts and to not support construction risks. Accordingly, Engineering & Construction's contribution to consolidated revenue can vary significantly from year to year.



Key points

The Engineering & Construction activity provides the Group with a genuine competitive edge, enabling it to offer turnkey solutions to its customers and to engage for its own purposes in a process of continuous improvement of industrial processes and reduction in the cost of its industrial assets.

In 2018, consolidated third-party Engineering & Construction sales totaled 430 million euros.

3.3. GLOBAL MARKETS & TECHNOLOGIES

The Global Markets & Technologies (GM&T) business delivers technological solutions (molecules, equipment and services) to support the new markets of energy transition, maritime logistics and deep tech, in order to accelerate Air Liquide's sustainable growth.

To support the energy transition, the GM&T business brings environmentally-friendly solutions to the clean energy market with hydrogen energy and bio Vehicle Natural Gas (bio-NGV), refrigerated transport using nitrogen, but also the treatment and injection of biomethane into the local domestic energy grid as a power source.

As a player in the deep tech sector, GM&T commercializes technologies dedicated to Space, Aerospace and scientific exploration. GM&T also supplies gases for players in the maritime sector and provides logistics and cryogenic transportation solutions, particularly by sea, for value added molecules such as helium.

Air Liquide masters the entire hydrogen supply chain, from production to storage, and from distribution to the development of applications for end users, thus contributing to the wider use of hydrogen as a clean energy source, notably for mobility. To date, the Group has designed and installed 120 hydrogen stations worldwide and invests in the production of carbon-free hydrogen (see pages 81 to 87 on innovation).

GM&T employs 1,900 people world-wide and generated 2018 revenue of 474 million euros.

3.4. THE STRENGTH OF AIR LIQUIDE'S MODEL

Among the four Gas & Services businesses, Large Industries and Healthcare are the two which are the least dependent on economic cycles. They represent 45% of Gas & Services revenue. Industrial Merchant is impacted by local industrial production momentum, whereas Electronics is linked to the semiconductor sector.

In Large Industries, the supply of gas is contracted for a duration of 15 years, or more for specific projects, and includes take-or-pay clauses which guarantee a minimum level of revenue.

Underlying trends for the Healthcare business (longer life expectancy, more sedentary lifestyles, urbanization) ensure growth in demand which is decorrelated from economic cycles.

Industrial Merchant serves a very wide range of markets and multiple customers in various industrial processes.

The development of the semiconductor industry with its numerous digital applications is the main source of sales growth in Electronics, an industry which is maturing.

The Group's capacity to innovate enables it to continuously improve its current offerings by integrating new technologies and new ways of working, developing differentiating solutions for its customers and patients, and drawing on its internal and external ecosystems to open up new markets. It contributes to the Group's robustness.

Moreover, through its four World Business Lines, the Group serves more than 3.6 million customers and patients in a variety of industries and across a wide range of regions, which provides high resistance to economic cycles. These characteristics, which are inherent to the industrial and healthcare gas business, reinforce the strength of the business model.

4. Competition

At a global level, the industrial gases industry comprises three main players: Air Liquide and Linde plc (Ireland), co-market leaders with sales in excess of 20 billion euros each, and Air Products (United States) with revenue which is more than two times lower. Linde plc is the new entity following the merger of equals between two global players, Linde AG (Germany) and Praxair (United States), which was completed in October 2018. There are also a number of global and regional players, such as Taiyo Nippon Sanso (Japan), Messer (Germany), PAG (China), Air Water (Japan) and Hangzhou Hangyang (China). Finally, numerous smaller-sized players are also present in local markets.

In Large Industries, the customer can choose between self-production and over-the-fence gas supply. Self-production is estimated to account for 80% of hydrogen production and 60% of oxygen production globally, although with significant geographical disparities. Companies self-producing gas thus remain the Group's greatest competition. In this respect, the potential to convert self-production into over-the-fence supply represents a major growth opportunity for the Large Industries business. The level of self-production varies strongly depending upon the geographic region, type of industry or local culture. In advanced economies, the supply of oxygen is largely over-the-fence, while the supply of hydrogen for refining remains primarily in-house. In developing economies, while relatively new, over-the-fence supply is accelerating significantly. Air Liquide, the world leader in Large Industries, is in competition with the other major global players and local players.

Industrial Merchant is a local business: transport costs limit the operating area to within 200 to 250 km of a production unit, except for high value-added gases such as argon and helium. This market, which is highly diversified due to the size and activity of its customers, thus includes numerous small and medium-sized local competitors, either ensuring gas production and distribution, or solely distributing gas.

3.5. SYNERGIES

The Group's various businesses serve one unique business line, that of industrial gases. The four business lines comprising the Gas & Services activities are closely tied by a strong industrial philosophy where proximity is key. The diagram pages 20 and 21 illustrates the sharing of production or distribution assets between the different business lines for a given geographic region. Due to this efficient industrial network, Air Liquide capitalizes on its proximity to its customers to anticipate their needs, understand market changes and offer innovative solutions.

The synergies enjoyed by all of the Group's businesses are not limited to the industrial aspect, but also include scientific and technological expertise, the innovation approach and Human Resources. The strong integration of the various World Business Lines thus allows the Group to create synergies, become stronger and to grow while creating long-term value.

In Electronics, five companies play a major role: Air Liquide, Linde plc, Versum (United States), Air Products and Taiyo Nippon Sanso. Air Liquide is the leader in this industry.

Finally, in Healthcare, most gas industry players also supply hospitals with medical oxygen, but few are present in the treatment of chronic diseases at home. In Home Healthcare, Air Liquide is number one in Europe, whereas Linde plc has a larger presence in the United States. This market remains fragmented in almost all regions with a multitude of small companies and associations. This fragmentation provides bolt-on acquisition opportunities. Finally, Air Liquide is the only industrial and medical gases company to have developed a Hygiene and Specialty Ingredients business.

In Engineering & Construction, Air Liquide also competes with industrial gas players. In "cold" technologies used for air gas separation, the main competitors are Linde plc, Hangzhou Hangyang (China), Kaifen (China) and Air Products. Chinese competitors are gaining ground due to strong demand in their country. In "hot" technologies used for producing hydrogen and the chemical conversion of syngas, the largest competitors are Technip (France), Haldor Topsoe (Denmark) and Linde plc.

Global Markets & Technologies is growing worldwide, on markets with a strong technological dimension as well as on new promising markets such as those relating to energy transition and the climate (for example, hydrogen energy). The competitive landscape varies greatly from market to market, with companies of various sizes: from multinationals to start-ups.

STRATEGY

1. Ambition

Air Liquide is a world leader in gases, technologies and services for industry and health. Its ambition is economic and societal. The Group thus strives to **be a leader in its industry, deliver long-term performance and contribute to sustainability.**

The ambition of being a leader in its industry implies adopting a pioneering role. Leadership goes beyond size alone, it is a state of mind. The Group aims to outperform in its core business, by generating growth exceeding that of its market. To do so, it must excel in customer experience, both in terms of safety and reliability of its products. Digital transformation, simplification of transactions and greater optionality are among the measures implemented to offer the best services and

generate efficiencies. Finally, the Group strives to be a major player in terms of innovation, by developing new solutions, in particular in energy transition, digital transition and healthcare;

Air Liquide's performance and its sustainability commitment go hand in hand.

The Group is committed to its economic performance and long-term value creation. It also strives to provide solutions that contribute to meeting the planet's societal and environmental challenges. This mission is key for both motivating the Group's teams and nurturing the long-term trust of stakeholders.

For more than 30 years, Air Liquide has posted strong performances which has driven its long-term growth outlook. This performance is due to both the nature of the industrial gases market and the strength of Air Liquide's business model.

Air Liquide's performance over 30 years

Revenue: +5.8% on average per year

Cash flow from operating activities before changes in working capital: +6.5% on average per year

Net profit: +7.5% on average per year

Earnings per share ^(a): +6.9% on average per year

Dividend per share ^{(a)(b)}: +8.3% on average per year

Safety – Reduction in the accident frequency rate: -2.1% on average per year.

Number of employees: +3.3% on average per year.

(a) Adjusted for the 2-for-1 share split in 2007, for free share attributions and for a factor of 0.974 reflecting the value of the preferential subscription rights of the capital increase completed in October 2016.

(b) Subject to the approval of the Shareholders' Meeting on May 7, 2019.

MARKETS WITH SUSTAINABLE GROWTH

The industrial gases sector has enjoyed steady growth over the last 100 years due to the ever increasing needs resulting from the emergence of new applications supported by innovation and technological research and to increased outsourcing by customers of their industrial gases needs. Demand has thus risen faster historically than industrial production.

Within this framework, the Group's strategic approach has shifted from a geographical viewpoint, where industrial growth was mainly coming from capacity increases in developing economies and the introduction of existing offerings by adapting them to local needs, to a market-based focus, where each country aims to attract new investments in growth sectors.

Air Liquide's innovation strategy aims to **transform the Group and widen the scope of its businesses** beyond its traditional areas of expertise by developing and presenting new offerings which focus on three major trends which are shaping the Group's markets: **energy transition, healthcare and digital transformation**. It is an integral part of the Group's **customer-centric transformation strategy**.

In particular, environmental challenges, and notably those related to the necessary energy transition, present many opportunities for the industrial gases market. Several applications help improve the energy efficiency of industrial processes and thus contribute to decreasing the industry's CO₂ emissions. Moreover, certain solutions/molecules such as biomethane and hydrogen energy are also an effective way to address particulate matter and greenhouse gas emissions from transport.

2. Strategy

Safety, the respect of ethics and human rights are key fundamentals for our operations. These requirements, which feature in the Group's Principles of Action, are at the heart of Air Liquide's corporate culture, in all countries in which it is present.

Building on these prerequisites, the Group's strategy is customer-centric. It aims to deliver profitable and responsible growth over the long term and is based on four cornerstones:

- operational excellence, thanks mainly to an outstanding customer experience, a reinforced competitiveness and the digitalization of our operations;

Due to the nature of its industrial businesses (the desulfurization of fuels, oxy-combustion, sharing of assets, etc.) and in Healthcare, Air Liquide has always contributed to improving the environment and society. The Group's strategy is therefore embedded into its wider Sustainability approach. Thus, all of the Group's businesses are rolled out in a way that contribute to major environmental and societal challenges, such as the climate and air quality, which are also growth drivers for Air Liquide.

- the quality of its investments, which is in line with the Group's business profile and targeting, as a priority, the most promising markets and technologies;
- open innovation, in both core business and groundbreaking technologies, by fostering external partnerships (universities, start-ups, etc.);
- a network-based structure, which provides agility and efficiency, supported by the use of collaborative digital tools.

Air Liquide's contribution to the United Nation's Sustainable Development Goals

Air Liquide contributes through its business and its commitment to reach certain Sustainable Development Goals (SDGs) introduced by the UN to eradicate poverty, protect the planet and guarantee prosperity for all by 2030.

To illustrate this contribution, environmental and societal achievements are associated with the relevant SDGs in the performance section of this report.



The Sustainable Development aspect of the strategy is centered on two goals which are described in the NEOS company program:

- preventing global warming and improving air quality.** The Group believes that these two environmental challenges are all the more essential in that its businesses lend it legitimacy and levers for action in these areas;

- strengthening dialog with stakeholders** with whom the Group interacts on a daily basis, including employees, customers, shareholders, suppliers, public authorities and NGOs as well as local communities.

The implementation of this strategy is reflected in the commitment and inventiveness of all Group employees.

3. NEOS company program and mid-term objectives

Following the Airgas acquisition, the Group acquired a new dimension and thus entered a new phase of its development. On the occasion of its Capital Markets Day in July 2016, Air Liquide has presented its vision of the evolution of its markets, its strategy, its growth prospects, and its new company program NEOS for the period 2016-2020, which marks a new step in the development of the Group.

In an economic environment characterized by moderate global growth and major changes related to scientific and technological advances, Air Liquide has identified three major long-term trends, which are sources of growth for its businesses. These trends are energy and environment transition, changes in healthcare, and digitization. The latter affects both asset management and the way in which the Group interacts with customers and patients, and is part of an open ecosystem.

Air Liquide's ambition is to be a leader in its industry, deliver long-term performance and contribute to sustainability. To address these key challenges and this new market potential, Air Liquide can rely on its leading positions in the major industrial basins worldwide, its proprietary technologies, its capacity for innovation, its solutions and services, its operational excellence, and its network organization.

The NEOS company program, for the period 2016-2020, provides a framework to build a Group sustainably more efficient, more connected to its stakeholders and more innovative and includes two sets of objectives.

3.1. FINANCIAL OBJECTIVES

The financial aims of the NEOS company program for the 2016-2020 period are based on:

- a revenue compound annual growth rate (CAGR) of +6% to +8%, including in 2017 the scope effect relating to the consolidation of Airgas, which contributes +2% to the CAGR;
- substantial recurrent efficiency gains of more than 300 million euros on average per year from 2017, in addition to synergies related to Airgas for a total amount above 300 million US dollars;
- a Return On Capital Employed (ROCE) above 10% by 2021-2022;
- maintaining its long-term "A" range rating thanks to the strength of its balance sheet.

The 300 million-US dollar target of cumulated synergies related to Airgas is reached in the 1st quarter of 2019.

The strong investment momentum in our customers' main markets led to an increase in investment opportunities for the Group and in the number of new long-term contracts signed. In this favorable environment for future growth and to ensure reaching the NEOS target of a ROCE in excess of 10% by 2021-2022, the Group significantly strengthened its efficiency program. As of 2019, the annual target for efficiencies is therefore set at more than 400 million euros.

3.2. ENVIRONMENTAL AND SOCIETAL OBJECTIVES

For Air Liquide, safety, ethics and the respect of Human Rights are prerequisites for any action. They are structural elements and are embedded into the corporate culture.

In terms of safety, the Group has set a zero-accidents objective for many years.

The NEOS company program also includes Sustainable Development objectives which support the Group's strategy and contributes to its long-term performance.

3.2.1. Preventing global warming and improving air quality

As part of its global approach to climate, Air Liquide is presenting the most ambitious objectives in its sector. The Group's commitments seek not only to **reduce the carbon intensity^(a) of its Assets (A)**, but also **to act with its Customers (C)** towards a sustainable industry and **to contribute to the development of a low-carbon society with the Ecosystems that are part of it (E)**. These objectives named "ACE" break down as follows:

Assets (A)

Within its activities, including production, distribution and services, Air Liquide is committed to **reducing its carbon intensity by 30% by 2025**, based on its 2015 emission levels. These objectives will be reached notably by:

- increasing by nearly 70% its purchases of renewable electricity (from 6 to 10 TWh/year);
- reducing by -5% the energy consumption per volume of production of its units;
- and reducing by -10% the carbon footprint of its bulk and cylinder products through the optimization of both production and transportation.

Customers (C)

With its customers, the Group is also committed to a sustainable industry by promoting low-carbon solutions. Thanks to its in-depth knowledge of customers' processes, Air Liquide is already offering technologies like oxy-combustion, which allows its customers to improve the energy efficiency of their industrial processes and reduce their emissions of CO₂ and pollutants. The Group is continuously innovating and developing new solutions, such as CO₂ capture and valorization, and the development of new materials for Electronics.

As part of the Climate objectives, the Group has stepped up its aim of developing new offers. The injection of hydrogen in blast furnaces and the use of its enScribe™ technology in electronics could have a major impact on the reduction of its customers' emissions.

Air Liquide has also positioned itself on emissions capture technologies for their storage or use (CCUS), which helps reduce their environmental footprint when there is no other alternative.

(a) In kg CO₂ equivalent / euro EBITDA.

Ecosystems (E)

With ecosystems, via an active dialog with key players (public policymakers, industrial partners, NGOs, etc.), Air Liquide is contributing to the development of a low-carbon society by:

- developing biomethane for industry and transport;
- proposing alternative solutions for refrigerated logistics;
- promoting hydrogen – in particular carbon-free hydrogen – which will play a key role in the fight against climate change and energy transition, with regards to both mobility and energy.

Climate Group's investment decisions

For all its major projects, Air Liquide includes an internal carbon price of 50 euros per ton of CO₂ in its investment decision process. This is a value that Air Liquide voluntarily sets for itself to assess the economic cost of greenhouse gases emissions. The analysis of investments with this internal carbon price ensures the robustness and sustainability of the customer project: for major projects, the potential costs associated with a possible tax on CO₂ emissions from Group's assets are reflected in the price of industrial gases and paid by the customer. This analysis also makes possible to validate the relevance and viability of the investment solution planned by Air Liquide and to propose low-carbon technological solutions, whenever possible.

3.2.2. Strengthening dialog with stakeholders

For Air Liquide, dialog with stakeholders is a strategic objective. Through these ongoing discussions, the Group is committed to:

- taking into account their issues;
- identifying priority development issues;
- sharing its ambition to contribute to a more sustainable world;

The stakeholders of Air Liquide are:

- **Group employees:** Air Liquide brings together 66,000 men and women of more than 150 nationalities, in 80 countries, who form multi-cultural teams with a host of skills. The Group strives to promote this diversity, encourage innovation and the commitment of employees, to meet customers' expectations and guarantee its long-term performance.

The Group has set itself the following Human Resources objectives for 2025 :

- 35% of women among managers and professionals in the Group's employees,
- 33% of recruitment of young graduates.

- **3.6 million customers and patients** currently place their trust in Air Liquide. They are all living in changing environments. Energy transition, health-related changes (an aging population, more sedentary lifestyles, urbanization) as well as digital transformation are all sources of new usages and new challenges. Moreover, the industrial offering is gradually shifting towards the end user and is therefore transforming the traditional value chain.

- For more than a century, the Group has fostered a close relationship with **its shareholders**, who are institutional investors and individuals. They are an integral part of its culture. Air Liquide's individual shareholders have supported the Group since its creation and still represent 32% of its share capital. They support the Group's growth through their loyalty, which allows Air Liquide to implement a long-term profitable growth strategy, based in particular on projects and long-term investments. Air Liquide attaches great importance to its relationship with its individual shareholders and institutional investors and maintains regular and high-quality dialog within them in a transparent manner.

- With its **suppliers**, Air Liquide is committed to building balanced relationships based on mutual trust and mutual benefit. The

Group guarantees a high level of safety, reliability, competitiveness and innovation among its suppliers, while ensuring the respect of ethics and sustainable development through its sustainable procurement policy.

- **Local communities:** the Group implements social measures in favor of the communities in the regions in which it operates, in partnership with its employees and its sites. These can be social entrepreneurial projects or projects led by the Air Liquide Foundation, for which the means have been increased (5 million euros over 5 years). They highlight Air Liquide's commitment to being a responsible company.

Furthermore, it is as part of this objective that Air Liquide is developing new forms of initiatives: "Inclusive Business" which sets up activities with a two-fold objective: the social impact of working with those at the bottom of the social pyramid to integrate them within our value chain and the economic viability to cement these initiatives over the long term.

- Concerning its relationships in **the public sphere**, Air Liquide leads initiatives on an international level.

The major initiatives of 2018 are presented in the Environmental and Societal Performance section (page 70).

The Group's relationship with its stakeholders and their governing principles are set out in chapter 4 (page 278).



Key points

CLIMATE OBJECTIVES

The Climate Group's commitments (ACE) aim to :

- reducing its carbon intensity of its assets (A) by 30% by 2025,
- act with its customers (C) for a sustainable industry,
- contribute to the development of a low-carbon society with the Ecosystems (E).

HUMAN RESOURCES OBJECTIVES 2025

The Group has set itself the following Human Resources objectives for 2025 :

- 35% of women among managers and professionals in the Group's employees,
- 33% of young graduates among managers and professionals recruitment.

4. Steering strategy

4.1. ORGANISATION

Various internal structures contribute to the definition and steering of the Group's strategy. Their roles are presented in the "Risk factors and internal control procedures" section on page 40 of this chapter.

SIC-R meetings (Strategic Investment Committee Review) are chaired by the Chairman and CEO in order to periodically review the Group's strategy, large investments and policies. The Executive Committee meets on a regular basis to review the strategy and its implementation.

Moreover, monthly meetings of the Group Performance Steering Committee are held to establish investment budgets and the action plans to undertake or amend in order to achieve the annual or multi-annual objectives.

Finally, investments are validated through the Resources and Investment Committees (RIC), the operation of which is described on page 37 of this chapter.

Over the past five years, Air Liquide has reinvented its innovation approach and has introduced a dedicated structure to manage the Group's Innovation strategy. The Innovation & Development Division (IDD) steers the innovation strategy on behalf of the Group's hubs and operations, and contributes to the Group's transformation. It is responsible for understanding the shift in customer and patient usages (energy transition, changes in healthcare, digital), defining and implementing the Group's technological roadmap (including Intellectual Property) and scientific knowledge of Essential Small Molecule properties (oxygen, nitrogen, hydrogen, CO₂, etc.) to develop new applications.

Taking environmental and societal challenges into account are also an integral part of the Group's strategy. The Sustainable Development Department, which reports to the Vice President in charge of Innovation and Development (a member of the Executive Committee who reports directly to the Chairman and CEO), contributes to the development of the strategy and defines the specific measures to be included in the NEOS company program. Moreover, this Innovation and Development Vice President takes part in the above-mentioned meetings and contributes their sustainable development vision.

4.2. INVESTMENT PROCESS

The Group's steady long-term growth is largely due to its ability to invest in new projects each year. Investment projects in the industrial gas business are spread throughout the world, highly capital intensive and supported by long-term contracts, in particular for Large Industries. Air Liquide has thus tailored its financing to the nature of its projects, based on the diversification of financing sources, the prudent management of the balance sheet and innovative financing methods. This financing policy is fundamental for the Group's continued development.

The Group's investments reflect its growth strategy. They can be classified into two categories:

- industrial investments, which bolster organic growth or guarantee the efficiency, maintenance or safety of installations;
- financial investments, which strengthen existing positions, or accelerate penetration into a new region or business segment through the bolt-on acquisition of companies or assets already in operation, as well as new technologies.

The nature of industrial investments differs from one World Business Line to the next: from gas production units for Large Industries and Electronics, to filling centers, logistics equipment, storage facilities, medical devices and management systems for Industrial Merchant, Electronics and Healthcare. The nature of investments is also highly varied within Global Markets & Technologies. Capital intensity varies greatly from one business to another.

4.2.1. Capital intensity

Capital intensity is the ratio of capital required to generate one euro of supplementary revenue, when projects or businesses reach maturity. This capital is either invested in industrial assets (production units, storage facilities, logistics equipment, etc.), or used as working capital to finance the development of the activities.

Capital intensity varies significantly from one business to another:

- Large Industries:
 - air gases production has a capital intensity of between 2 and 3. It varies with the trend in electricity prices;
 - hydrogen and cogeneration have a capital intensity of between 1 and 1.5, due to the high proportion of natural gas in the cost of sales. This capital intensity therefore varies with the changes in natural gas and electricity prices;
- Industrial Merchant capital intensity to launch the business in a new market is between 1.5 and 2;
- Electronics has an average capital intensity close to 1;
- Healthcare has a capital intensity, excluding acquisitions, of around 1 depending on the product mix.

The Group's capital intensity continues to vary depending on the business mix, project type and prices of raw materials.

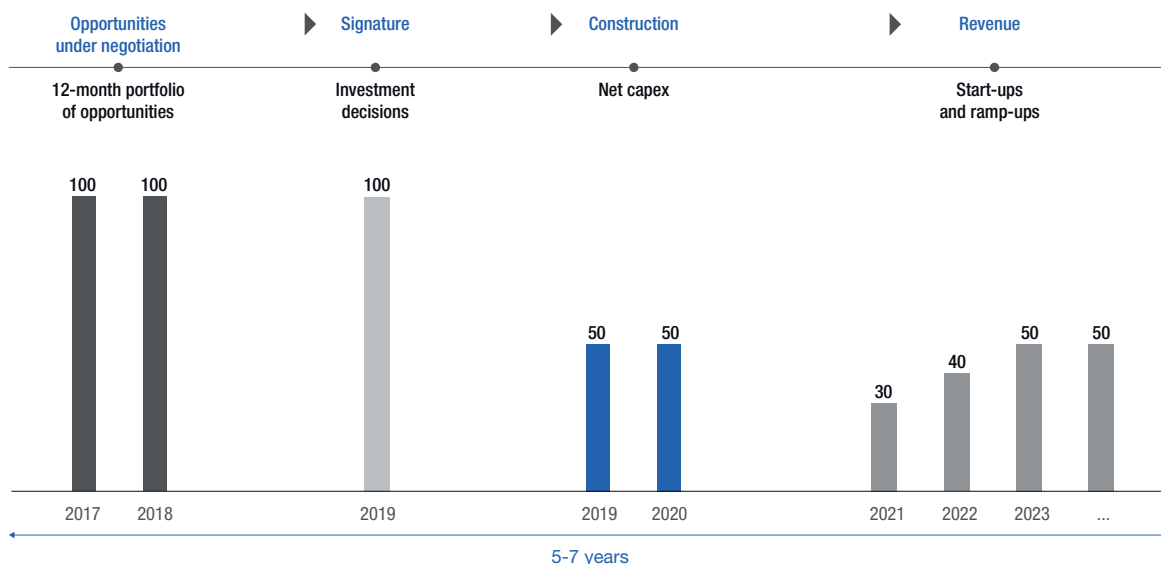
Whatever the capital intensity, any project must enable the Group to achieve its Return On Capital Employed (ROCE) objective over the long term. Therefore, for the same level of return on investment, the operating margin (OIR to revenue ratio) of a project will depend on the capital intensity of the activity in which the project is carried out.

4.2.2. The theoretical lifespan of gas production unit contracts

Long-term development is one of the key characteristics of the Industrial Gas business. It is particularly evident in the investment cycle, where there is approximately a five-year span between the study of a new

construction project for a Large Industries customer and the first corresponding industrial gas sales. Investment cycles in other business lines are generally shorter. Monitoring the lifespan of these projects is essential to anticipating the Group's future growth. The chart below provides details of each stage of this process based on the example of a Large Industries contract.

INVESTMENT CYCLE OF A LARGE INDUSTRIES CONTRACT



Applying a theoretical capital intensity of 2, an investment of 100 million euros in a new project should generate 50 million euros of sales per annum, when fully ramped-up.

➤ **Identification and Negotiation phase:** the project is included in the portfolio of investment opportunities and enters into the development process. Projects exceeding 5 million euros of investment are monitored within the portfolio of potential opportunities and split between those for which a decision is expected within 12 months and those for which the investment decision will take more than one year. Projects are then discussed and negotiated with the customer. Projects can be removed from the portfolio for several reasons:

1. the contract is signed, it is removed from the portfolio and therefore becomes an investment decision;
2. the project is abandoned by the customer;
3. the customer decides against an over-the-fence gas supply, or the project is awarded to a competitor;
4. the project is delayed beyond 12 months: it is removed from the 12-month portfolio but remains in the long-term portfolio.

➤ **Signature phase:** the two parties reach an agreement. The signing of a long-term contract represents an investment decision validated by the internal governance bodies. The project is removed from the portfolio of investment opportunities and is registered in current investments.

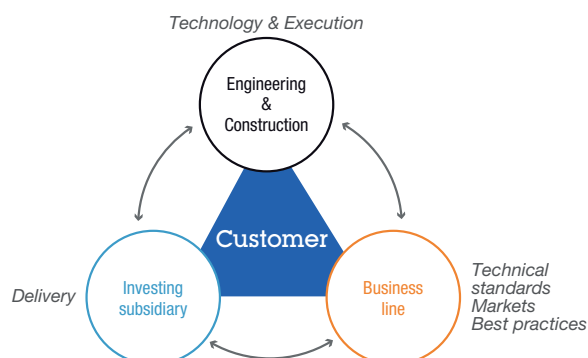
➤ **Construction phase:** the construction of the unit generally takes between 12 and 24 months and sometimes up to 36 months depending on the size of the project. This is the capital expenditure period. The project remains in current investments.

➤ **Revenue phase:**

1. **commissioning:** this corresponds to the start-up of the unit. Sales reflect the needs of the customer with a guaranteed minimum volume at the **take-or-pay** level, guaranteeing minimum profitability from the beginning of the contract;
2. **ramp-up:** this is the unit's ramp-up phase. Over the course of the contract term, volumes increase above the take-or-pay level to the nominal amount defined in the contract. Nominal capital intensity is achieved only at the end of this phase.

4.2.3. Governance of major growth projects

Three Air Liquide entities are at the heart of major growth projects, from development through to its execution.



The business line involved ensures the global customer relationship is monitored, provides the required know-how and ensures the overall consistency of the project, in terms of both contract and technical standards. It is also responsible for good internal governance practices.

The local subsidiary proposes the project and, once the contract has been signed, carries the investment on its balance sheet. It is then responsible for operations, customer relations and the project's financial profitability.

Engineering & Construction provides the technologies and guarantees that they are competitive, both overall and specifically for each project, thanks to a good industrial architecture solution. Engineering & Construction is responsible for the technical part of the execution of the project.

Potential projects are identified well in advance, based on good market knowledge and a strong local presence. The first stage includes selecting the opportunities in which the Group would like to invest both commercial and technical resources, in line with its global strategy. This selection process is followed by a series of validation stages.

During the development stage, the project is submitted for the approval of the geographic region on which it depends. At the Group level, two major bodies validate the relevance of the project: the RIC (Resources & Investment Committee – see below) which is responsible for assessing and validating investment requests, and the ERC (Engineering Risk Committee) which is responsible for assessing technical and execution risk.

Once the project has been decided on by Air Liquide and signed with the customer, it is executed by a team composed of representatives of the investing subsidiary and of Engineering & Construction, under the supervision of the geographic hub.

The type, complexity, geography and size of investment opportunities have changed significantly during recent years. A dedicated CIG (Capital Implementation Group) made up of experts strengthens the team in charge of executing investments.

During the start-up of a unit, project management is the responsibility of the local operational teams, under strict standards to ensure the site's security and integrity. The operational management of the unit is carried out by the local subsidiary, and the Group and hub's Operations Control monitors its financial performance.

The Resources & Investment Committee (RIC)

The purpose of these Committees is to assess and approve requests for investments that have been submitted, as well as medium and long-term contractual commitments and Human Resource requirements that may arise therefrom.

They meet regularly (usually once a month) for each hub (Houston, Frankfurt, Shanghai, and Dubai) and each World Business Unit (Healthcare, Engineering & Construction, Innovation & Development Division (IDD), Head Office).

Each Committee meeting is chaired by a member of the Executive Committee in charge of the hub or of the World Business Unit involved and brings together managers of the region and business line concerned by the investment, as well as representatives of the Group Finance Department, Engineering & Construction, and the Capital Implementation Group (CIG).

The Committee's decisions are reviewed by Executive Management.

The decision is based on a rigorous assessment of individual projects as well as each project's expected profitability. The following criteria are systematically reviewed:

- the location of the project: the analysis will take into account whether the project is based in an industrial basin with high potential, whether it is connected to an existing pipeline network, or whether it is in an isolated location;
- the competitiveness of the customer's site: based on size, production processes and particularly of their environmental footprint, cost of raw materials and access to markets;
- customer risk;
- exposure to the risk of corruption;
- contract clauses;
- end products and the stability of future demand for these products;
- quality and risk related to the technical solution;
- country risk: evaluated on a case-by-case basis and can lead to changes in the financing policy and its supplementary insurance cover;
- Social and Environmental Responsibility criteria, in particular relating to greenhouse gas emissions, water consumption, and relations with local communities.

Following approval by the RIC and signing with the customer, the project is transferred to the current investment category.

Investment cycle definitions

Investment opportunities at the end of the period

Cumulative value of investment opportunities taken into account by the Group for a decision within the next 12 months. Industrial projects generating revenue of more than 5 million euros for Large Industries and more than 3 million euros for other business lines. Includes replacement assets and efficiency projects. Excludes maintenance and security-related investments.

Decisions during the period

Cumulative value of industrial and financial investment decisions. Growth and non-growth industrial projects, including replacement, efficiency, maintenance and security assets. Financial decisions (acquisitions).

Investments backlog at the end of the period ^(a)

Cumulative value of investments for projects that have been decided but not yet started up. Industrial projects of more than 10 million euros, including replacement assets and efficiency projects, excluding maintenance and security.

Sales backlog

Cumulative value of forecast annual revenue, generated by current investments at the end of the period, fully ramped-up.

(a) Different from construction in progress (see note 13.1 to the consolidated financial statements on page 213) without threshold or business criteria.

4.3. FINANCING

The financing policy is regularly reviewed to provide the best possible support to the Group's development and take into account changes in financial market conditions, while respecting a credit profile in line with Standard & Poor's and Moody's long-term minimum "A" category rating. This credit profile depends on key ratios such as net debt to equity and cash flow from operating activities after change in working capital requirements to net debt.

The Air Liquide Group applies the following principles of prudence:

- ▶ pursuing the diversification of financing sources and spreading of debt maturities in order to minimize refinancing risk;
- ▶ backing commercial paper issues with confirmed credit facilities;
- ▶ hedging interest rate risk to ensure visibility of financing costs, in line with long-term investment decisions;
- ▶ funding investments in the currency of the operating cash flows, to ensure a natural currency hedging;
- ▶ a permanent centralization of funding and excess cash through Air Liquide Finance, a wholly-owned entity of L'Air Liquide S.A.

4.3.1. Diversifying and securing financing sources

Air Liquide diversifies its financing sources by accessing various debt markets: commercial paper, bonds and banks.

Air Liquide uses the short-term commercial paper market, in France, through two French Commercial Paper programs of up to an outstanding maximum of 3 billion euros each, and in the United States through a US Commercial Paper program (USCP) of up to an outstanding maximum of 2 billion US dollars.

For its long-term financing, Air Liquide has a Euro Medium Term Note (EMTN) program to issue long-term bonds of up to an outstanding maximum amount of 12 billion euros. This program allows, in particular, for bonds to be issued in the principal currencies (euro, US dollar, Japanese yen) as well as in other currencies (Chinese renminbi, Swiss franc, pound sterling and Russian ruble). As part of the Group's policy to diversify its financing sources, Air Liquide also has access to a bond issue program on the domestic Chinese market for a maximum amount of 10 billion Chinese renminbi, maturing in February 2020.

The Group also raises funds through bank debt (loans and credit facilities) in selected geographies.

To avoid liquidity risk relating to the renewal of funding at maturity, and in accordance with the Group's internal policy, the Group limits its short-term debt maturities to an amount which is covered by committed credit facilities from its core banks.

Investments are generally funded in the currency in which the cash flows are generated, creating a natural currency hedge.

4.3.2. Centralization of cash and funding, excess cash and hedging

To benefit from economies of scale and facilitate capital markets financing (bonds and commercial paper), the Group uses a dedicated subsidiary, Air Liquide Finance. This subsidiary centralizes the vast majority of the Group's financing transactions. It hedges currency, interest rate and energy risk for the Group's subsidiaries in those countries where it is permitted by law.

In the countries where local regulations permit, Air Liquide Finance centralizes cash flow balances through direct or indirect daily cash pooling of these outstanding balances. When daily international cash concentration is not possible, there exist, nonetheless, local cash poolings which allow periodic intercompany loans to Air Liquide Finance.

Due to the currency matching within Air Liquide Finance, resulting from the currency hedging of intra-group loans and borrowings, these internal financing transactions do not generate a foreign exchange risk for the Group.

Air Liquide Finance, which centralizes the Group's financial hedging transactions, complies with EMIR requirements (European Market Infra-structure Regulation) relating to its status as a non-financial counterparty (NFC-): risk mitigation and derivative transaction reporting are in line with technical standards published by ESMA.

Furthermore, in certain specific cases (e.g. regulatory constraints, high country risk, joint ventures, etc.), the Group limits its risk by setting up specific financing in the local banking market, and by using credit risk insurance.

4.3.3. Staggering debt maturity schedules

To minimize the refinancing risk related to debt maturity schedules, the Group diversifies financing sources and spreads maturities over several years. Debt maturity schedules and maturities are regularly reviewed by Finance Committee, on a monthly basis.

Refinancing risk is also reduced by the regularity of the cash flow generated from Group activities.

4.3.4. Use of bank guarantees

Group subsidiaries require from time to time bank guarantees, mostly in favor of Engineering & Construction and Healthcare customers, either during the tender period (bid bond), or after contract award, during contract execution until the end of the warranty period (advance payment bond, retention bond, performance bond, and warranty bond).

The most common bank guarantees are advance payment bonds and performance bonds.

In the Group's ordinary course of business, certain subsidiaries are required to provide financial payment guarantees to secure rental or insurance obligations.

The projects, for which these guarantees are granted, are regularly reviewed by management and should guarantee payment calls become probable, the necessary provisions are recorded in the consolidated financial statements.

RISK FACTORS AND INTERNAL CONTROL PROCEDURES

1. Risk factors

The Group identifies the risk factors to which it is exposed using a formal risk management approach.

The risks presented below, at the date of this Reference Document, are the risks that the Group considers may have a significant negative impact on its business, results, outlook, or reputation, should they occur. The list of these risks is, however, not exhaustive and other risks, unknown at the date of this document, could occur and have a negative effect on the Group's business.

As part of the Group's risk management approach, the Group is committed to regularly assessing the risks and to reducing the likelihood that they will occur or their potential impact by implementing the internal control and risk management procedures described on page 45, as well as formalized and specific action plans.

1.1. SPECIFIC BUSINESS-RELATED RISKS

The industrial gas business is characterized by a significant technology content (both in the design phase and the construction of production units), local production capacity, high capital intensity, and substantial energy requirements.

The risks associated with these characteristics are mitigated by various factors which include primarily the diversity of industries and customers served by the Group, the multiple applications that it offers them, as well as the large number of geographical locations in which it operates. In addition, a significant share of business is subject to specific contracts, a strict investment project authorization and management process, and a tailored energy policy.

1.1.1. Industrial risks

Industrial risks are linked to the various industrial processes and distribution methods implemented by the Group. They are distributed over a large number of sites from which it operates.

The Group's key priority is safety, with a formal objective of "zero accidents, on every site, in every region, in every unit". The safety results for the past 25 plus years illustrate the long-term effectiveness of Group's actions in this area.

Over and above the usual risks inherent in all industrial activities, Air Liquide's businesses entail more specific risks relating to:

- ▶ products: the intrinsic properties of certain products packaged by the Group classifies them in the dangerous materials category, for which tailored procedures and means are required to ensure safety and compliance with local regulations as a minimum;

- ▶ processes and their operation: cryogenics is used to separate gases by distillation, store them and transport them. This very low temperature technique requires specific means of control and protection. The same applies for high temperature techniques, used in particular in the production of hydrogen. In addition, pressure is central to the Group's processes. Pressurized equipment must be designed with security features restricting uncontrolled release which may trigger accidents;
- ▶ logistics and transportation: each year, delivery vehicles, sales staff and technicians travel many kilometers. Non-compliance by the drivers with the highway code or the lack of regular maintenance of vehicles would expose drivers and third parties to increased risks of accidents. Preventive measures are regularly implemented, such as awareness campaigns. In addition, industrial sites use a lot of motorized lifting gears. Training and authorization are required to operate them;
- ▶ engineering and construction: industrial risks are factored in and must commence at the design phase of future installations. Subsequently, during the construction phase, the lack of prevention plans and rigorous organization would hamper the coordination among the various trades; the project and competences management tools aim to reduce these risks;
- ▶ delivery reliability: a variety of solutions aimed at reducing the risks of fault in the systems supplying gas to customers: direct pipeline connection from a production unit, on-site storage with remote surveillance enabling the automatic trigger of resupply or bar-coded gas cylinders ensuring the traceability of products;
- ▶ challenges in the medical area: the products and services for the healthcare and wellbeing of patients are regulated by internal standards and specific regulations, and must be subject to particular attention by the teams in question.

To manage these risks, the Group has an Industrial Management System (IMS), that is described in greater depth in Internal control and risk management procedures on page 47.

1.1.2. Industrial investment-related risks

The Group may be exposed to certain risks specific to its industrial investments. Each investment project may be affected, particularly in its profitability, by different factors linked primarily to project location, customer quality, the strength of its projects, and particularly the respect of its implementation schedule, the competitiveness of the site, as well as to design, cost estimates and the construction of gas production units.

Moreover, in new emerging markets such as those related to energy transition, the Group may be exposed, in addition to the above-mentioned risks, to risks related to the degree of maturity of some of these market segments or in certain regions.

The investment authorization process is led by Resources & Investment Committees, which apply extremely strict appraisal criteria to projects. The investment decision-making process is detailed in the "Strategy management" section on page 35.

1.1.3. Supply-related risks

Electricity and natural gas are the main raw materials used by production units. Their availability is thus essential to the Group. Due to the geographic spread of its activities, Group supply contracts are diversified. Where the local market permits, Group subsidiaries secure these resources through medium to long-term supply commitments and competitive bidding scenarios with local suppliers with the objective of achieving the most reliable and competitive energy costs, with a low-carbon footprint, available on the market. The Group passes on cost variations to its customers via indexed invoicing integrated into medium and long-term contracts.

Moreover, the Group may be temporarily exposed to supply shortages for certain molecules which are only produced at a limited number of sites, in particular with worldwide reach.

Commodity risk is described in note 26.1 to the consolidated financial statements on page 238.

1.1.4. Risks relating to unit design and construction

Air Liquide enters into contracts to design and build production units worldwide. The primary role of Group Engineering is to undertake internal investment projects. It also performs projects for third-party customers that are selected based on criteria aimed at limiting the risks associated with these Engineering & Construction activities.

These projects generally extend over several years. Potential risks relating to design, purchasing, transport or construction and more generally to the overall quality of work may arise at different stages of the project. Risks relating to these projects are often greater during the construction stage, in particular for turnkey projects:

- the quality and delivery times for critical equipment, on the one hand, and on-site construction costs and deadlines on the other may give rise to project start-up setbacks and impact project profitability;
- unexpected technical problems may also arise as a result of new innovative processes being implemented. Preliminary tests on pilot or demonstration units are therefore meant to help reduce such risks prior to commercial implementation;
- certain projects are located in regions of the world that may be a source of specific political or economic risks and are therefore subject to reinforced monitoring.

The impact of the risks described above depends also on the contractual commitments given to customers.

Measures to limit commitments on the most complex projects are described in the Internal control and risk management procedures on page 48.

1.1.5. Business-related risks

The primary business-related risk is the risk of customer bankruptcy or closure of a customer's production site. The diversity of the Group's geographic presence in 80 countries distributes the risk among customers and markets. The Group's subsidiaries serve a very large number of customers (more than two million worldwide) in a broad range of industries: chemicals, steel, metals, refining, food, pharmaceuticals, automotive, healthcare, electronics, photovoltaic and research laboratories, etc. The Group's top customer represents around 2% of revenue, the Group's top 10 customers represent around 11% of revenue and the top 50 customers represent around 25% of revenue.

Moreover, a significant part of the Industrial Gas business is covered by customer contracts, with commitment periods specific to the relevant business line:

- the Large Industries business and a third of the Electronics business respectively rely on 15-year to 20-year, and up to 15-year, take-or-pay secured contracts, ensuring a guaranteed minimum revenue. These contracts provide strong future cash flow predictability;
- the contracts in the Industrial Merchant business, generally with a one to five-year duration, also include services relating to storage and cylinders;
- in the Healthcare business, positions vary between health systems, with certain countries awarding one to five-year contracts on a regional and pathology basis following public tenders.

In addition, the business of some Group clients may be interrupted following major climatic or political events.

The impact on the Group of the risks of customer business interruption following major climatic or political events is, however, limited by the wide diversity of countries in which it operates. This impact can be offset by the necessary recourse to gases in critical situations. Indeed, gases are needed to secure industrial or chemical installations (inert gases), maintain local industrial activity (essential to industrial processes) and even sustain life (medical gases). They are therefore often protected or prioritized depending on the situation.

The amount of operating receivables as well as allowance for doubtful receivables are shown in note 18 "Trade receivables" to the consolidated financial statements on page 217.

Finally, on a worldwide level it is noted that the planned merger between Linde AG and Praxair, confirmed at end-2018, will result in a change in the competitive landscape in certain regions, with a particular impact on divestiture operations that will involve the competition authorities.

1.2. FINANCIAL AND TAX RISKS

Financial risk management is a priority for the Group.

The financial risk management processes are detailed on page 48, in accordance with a governance structure that defines the role of the Finance Department, the various Committees and the role of local entities.

The Finance Department also analyzes country and customer risks on investment decisions; it participates in Investment Committee meetings.

1.2.1. Foreign exchange risk

Since industrial and medical gases are not transported over long distances, most products are manufactured in the country where they are sold. The Group considers that its activities and its profitability have a low level of exposure to currency fluctuations.

Foreign exchange transaction risk is related both to cash flows arising from royalties, technical support and dividends, as well as to foreign currency commercial cash flows from operating entities. These commercial cash flows in foreign currencies are not material when compared to consolidated revenue on an annual basis. This foreign exchange transaction risk is managed through the hedging policy implemented by the Finance Department.

Furthermore, the Group provides a natural hedge and reduces its exposure to exchange rate fluctuations by raising debt in the currency of the cash flows generated to repay debt. Thus, financing is raised either in local currency, or when sales contracts are indexed in euros or US dollars, in foreign currency (EUR or USD).

The Group presents its financial statements in euros. Foreign exchange risk related to the translation of local currency financial statements into euros mainly corresponds to the sensitivity to the main foreign currencies – the US dollar (USD), the Japanese yen (JPY) and the Chinese renminbi (CNY).

Following the acquisition of Airgas in the United States, the exposure of the Group's revenue and assets to the US dollar has increased, as has the Group's US dollar denominated debt, with a risk linked to the translation of the financial statements:

- large fluctuations in the value of the euro against the US dollar will have a more significant impact on the Group's published results than before the acquisition;
- these foreign exchange variations will have an impact on the figures presented in the Group's balance sheet, particularly concerning the debt.

Note 25.3 to the consolidated financial statements presents the net indebtedness by currency and note 26.1 to the consolidated financial statements describes the foreign exchange transaction risk management process and the derivative instruments used, as well as sensitivity to foreign currency exchange rates.

1.2.2. Interest rate risk

The interest rate risk is mainly linked to the fluctuation of future cash flows on debt when the rate is variable, indexed to indices such as Euribor or Libor. The Group's objective is to reduce the impact of interest rate fluctuations on its interest expenses and, guided by the principle of prudence, to finance long-term assets with shareholders' equity and fixed-rate long-term debt. Since most of Air Liquide's investments are based on long-term contracts (10 to 20 years), a policy promoting interest rate risk hedging ensures control over financing costs when deciding on long-term investments.

Group policy is to maintain, over a medium to long-term period, a majority of total debt at fixed rates, mainly by using firm or option hedges. This approach enables the Group to limit the impact of interest rate fluctuations on financial expenses.

Due to the increased level of indebtedness resulting from the Airgas acquisition, and particularly in case of a significant increase in interest rates upon future renewals of bonds in euros and in US dollars issued post-acquisition, the Group may find itself obliged to devote a more significant portion of cash flows from its operational activities to service the debt.

Note 25.4 to the consolidated financial statements presents the fixed-rate portion of debt and note 26.1 to the consolidated financial statements describes the sensitivity of the Group's financial expenses to interest rate fluctuations and the interest rate repricing schedule for fixed-rate debt and interest rate risk hedging instruments.

1.2.3. Risk involving credit ratings

As anticipated, following the Airgas acquisition, S&P downgraded L'Air Liquide S.A.'s credit rating for the long-term debt by two notches (from A+ to A-). A stable outlook was associated with this credit rating as well as the first credit rating issued by Moody's (A3) in May 2016. In addition, like all groups that are subject to ratings, Air Liquide could suffer a negative impact on its ability to finance its continuing operations and to refinance its debt should a rating agency significantly downgrade its rating below their current levels, due to a higher level of indebtedness than expected or for other credit-related reasons.

1.2.4. Financial counterparty and liquidity risk

Financial counterparty risk primarily relates to outstanding amounts on short-term investments and derivative instruments for hedging, to trade receivables, and to credit facilities contracted with each bank. To ensure its development and independence, the Group must have sufficient and permanent sources of liquidity, meaning adequate financing resources available at any time and at the lowest cost from banks and financial markets. In this area, the Group adopts a prudent approach to counterparties and their diversification, applying a strict limit on individual outstandings.

Note 26.1 to the consolidated financial statements describes financial counterparty and liquidity risk for the year ended December 31, 2018. Notes 18.1 and 18.2 to the consolidated financial statements provide a breakdown of trade and other operating receivables and allowances for doubtful receivables.

1.2.5. Tax risks

The Group is exposed to tax risk in certain countries, due to changes in applicable regulations, which may have an impact on its activities or its results. Its Tax Department and operational Finance Departments monitor these changes carefully to ensure the Group complies with these regulations.

1.3. DIGITAL RISKS

The Group's activities, expertise and, more generally, its relations with all the stakeholders (customers, suppliers, communities of experts, etc.) depend on increasingly dematerialized and digitalized operations. These operations rely on interdependent information systems and communication networks both in functional, technical, as well as human level terms.

The Group's pursuit of this digital transformation increases its exposure to risks in both data confidentiality and in the availability of IT systems and applications. For data confidentiality, the increase in expectations and requirements for protection also adds the risk of regulatory non-compliance.

These risks, which impact all economic and political players, are increasing in intensity due to the severity and frequency of digital attacks and to their changing nature (historically, cyber risks constituted industrial espionage or data hacking and have come to involve the risks of cyber criminality, cyber attacks, and extortion). These attacks, which spread rapidly, have the potential to affect all regions and businesses, with extremely significant impacts on industrial processes (disturbance of production or distribution activities), the capacity for communication, notably internal, and on the Group's image (digital identity theft, dissemination of false information, etc.).

This constant and rapidly changing background requires continuous strengthening of the Group's preventative and monitoring measures and of its ability to react within the priority areas and activities. The Digital Security Policy and the associated risk management operational program are described on page 49.

1.4. ENVIRONMENT AND SOCIETY RISKS

In terms of environment and society risks, the Group is mainly exposed to risk relating to:

- greenhouse gas emissions;

and, to a lesser extent, to other risks such as:

- resource management;
- discharges into air and water;
- physical risks;
- health and safety risks.

1.4.1. Greenhouse gas emissions

Electricity used by Air Liquide to power its production units, mainly those which produce air gases, generate CO₂ emissions at electricity suppliers which are known as indirect emissions. The Group's two other main activities, namely hydrogen production and cogeneration, account for nearly 15% of large production units and use combustion processes emitting CO₂ (direct emissions).

Greenhouse gas emission risk is closely monitored for compliance with the relevant legislation and any changes to this legislation.

1.4.2. Resource management

Air Liquide's competitiveness depends on the efficiency of its operations. The Group thus permanently strives to minimize its consumption of commodities.

Through its Engineering & Construction business, the Group designs its own production units. For example, it adapts the design of these units to customers' needs, technological developments and energy costs. Air Liquide also operates Air Separation Units and hydrogen units and therefore benefits from a virtuous circle of steady improvement from the design stage through to the units' operation. Old units are replaced by new ones that are more efficient in terms of the consumption of resources whenever circumstances enable it.

The main resources consumed by the Group are electricity and natural gas. Water is another resource necessary for the Group's main processes. Air Separation Units use water exclusively for cooling purposes during the separation process. Hydrogen production units require water in the form of steam in the reaction producing hydrogen. Finally, the cogeneration units produce steam, which is mainly supplied to customers.

1.4.3. Discharges into air and water

Discharges into air and water in the industrial and medical gas business are limited, by nature. Around 85% of the Group's large production units separate the components of atmospheric air, i.e. oxygen, nitrogen, argon and rare gases. These plants "without chimneys" do not use any combustion processes and consume almost exclusively electrical energy. They are particularly environmentally-friendly as they emit almost no sulfur oxides or nitrogen oxides. Cogeneration and hydrogen production units use a combustion process and emit small quantities of nitrogen oxide and sulfur oxide.

1.4.4. Physical risks

Physical risks include natural disasters linked to climate change that can disrupt the smooth running of operations.

Adaptation measures covering risks relating to the scarcity of water in geographic regions under water stress as well as extreme weather-related phenomena exist at the main sites affected.

1.4.5. Health and safety risks

Finally, the Group may be exposed to health and safety of persons risks for which the specific measures are implemented.

Moreover, the Group complies with the highest standards in terms of the respect of Human Rights which are included in its internal policies.

1.5. HUMAN RESOURCE MANAGEMENT RISKS

The long-term performance of the Air Liquide Group is driven, in particular, by the quality of its employees, their expertise and their commitment.

By the nature of its activities, the Group is committed to ensuring development of the scientific and technical competencies required for innovation and efficient working of its operations.

However, the Group may be faced with difficulties in attracting and sustaining the required skills at the right time and in the right place, in particular in emerging markets where the Group is expanding its activities, or in regions where the employment market is strained. Moreover, due in particular to digitization, the Group may be faced with a change in the expertise required in some of its businesses, which must be anticipated as best as possible.

The Group ensures the building of a performance-focused, attractive professional environment, through a Human Resources policy aiming to identify, attract, retain and develop competent employees with diverse backgrounds. The objectives of this policy are set out on page 51.

1.6. GEOPOLITICAL RISKS

Considering the changing international climate, the terrorist threat, and the increased tensions between or in certain regions, the Group, its employees, its sites and assets may be exposed locally to security, economic or financial risks in certain countries, for which specific measures are implemented.

In terms of Brexit, the Group's direct exposure appears limited, due to the negligible weight of its business in the United Kingdom. However the Group, as many others, maybe exposed to the indirect consequences of Brexit (for which the schedule, form and global impact remain unclear, at the time of writing), in particular the macro-economic impact.

1.7. LEGAL RISKS

The Group has a worldwide presence. Its companies operating industrial and medical gas production facilities must comply with the rules and regulations in force locally, particularly in the technical field, and monitor any changes.

In Healthcare in particular, the regulatory environment constantly evolves and specific regulatory constraints exist which relate notably to public markets, to the marketing of products which may be subject to drug regulatory control, and the protection of private information on each patient. In this domain, the evolution of the regulatory environment is monitored with particular vigilance and is accompanied by the implementation of adapted reinforced means.

In addition, the Group is faced with the risks relating to contracts and competition law, as well as anti-corruption and international trade issues that are also subject to individual monitoring.

To the Group's knowledge, there have been no governmental, judicial or arbitration proceedings, including any such proceedings which are pending or threatened, of which we are aware, which may have or have had, in the past 12 months, significant impacts on the financial situation or profitability of the Company and/or Group.

Liabilities and contingent liabilities related to disputes are described in notes 23 and 31 to the consolidated financial statements.

Innovation and intellectual property-related risks

The Group's business is not dependent on technologies patented by third-parties; it relies mainly on technologies, processes and designs which are mostly protected by patents, drawings and models, and utility models as well as by brands; these technologies, processes and designs are developed internally, notably by its Research & Development, Marketing, Engineering and Global Markets & Technologies teams, as well as through partnerships with third parties. In addition, third-party technologies can be incorporated in implementing its business.

There is a risk of third-party rights being infringed, in particular when several market players are developing similar technologies. The Group is also developing innovative activities through collaboration with partners, acquisitions, or buying shares in innovative entities: risks may arise in the breakdown between stakeholders of rights and obligations relating to intellectual property and in the treatment of confidential information.

Measures aimed at ensuring governance of intellectual property are set out on page 51.

1.8. INSURANCE MANAGEMENT

The Group has adequate insurance coverage, underwritten by first-rate insurers, for civil liability, property damage and business interruption.

1.8.1. Property damage and business interruption

Group property and business interruption are covered by property and casualty insurance policies underwritten in each country in which the Group operates. Almost all of these policies are integrated into an international program.

These policies, which are generally of the "All Risks" form, cover fire, lightning, water damage, explosions, vandalism, impact, machinery breakdown, theft and, depending on the country and in limited amounts, natural disasters.

Business interruption is insured for most production sites under these same policies. The coverage period for business interruption is 12 to 18 months. Deductible amounts are correlated to the size of the sites. Insurers conduct regular visits at the main industrial sites for risk prevention purposes.

1.8.2. Civil liability

In terms of civil liability, the Group maintains two separate covers, one for the North American zone and another for the rest of the world. The North American zone is covered by insurance underwritten in the United States. For the other zones, the Group has subscribed an umbrella policy, underwritten in France, which covers both the Company and its subsidiaries outside of the United States and Canada, beyond any local coverage provided for the subsidiaries.

These two policies cover liability of the Group companies for any damage they might cause to a third party in the course of doing business (operational risk) or arising from their products (product risk).

The coverage amounts underwritten exceed 500 million euros. Both policies are built on several overlapping insurance lines and each line has been underwritten for a given amount with several insurers sharing the risk. Beyond the first line, the upper lines pick up the excess risk from the lower lines.

The policy underwritten by the Company in France serves as an umbrella for subsidiaries outside North America. Under this umbrella, each foreign subsidiary has its own policy covering damages to third parties incurred through its businesses or products. The amount insured for each subsidiary in its policy depends on the amount of its revenue. The coverage under the Group's umbrella policy is supplemental to any local amounts.

1.8.3. Captive reinsurance

A portion of property damage and business interruption risk is kept by the Group via a captive reinsurance company located in Luxembourg, which also participates in the coverage of the Group's civil liabilities excluding the North American zone as well as in the coverage of goods transported.

This company covers claims of up to a maximum of 27 million euros per year with sub-limits per claim adapted to the nature of the claim. Beyond these amounts, risks are transferred to third-party insurers. Their management is entrusted to a captive manager approved by the Luxembourg Insurance Commission.

2. Internal control and risk management procedures instituted by the Company

This section describes the main internal control and risk management procedures instituted by the Company.

They are based on the reference framework of the internal control and risk management system, developed under the supervision of the French financial markets authority (AMF) and which were prepared with contributions from several departments (particularly Finance, Group Control, Legal, Safety and Industrial Systems, etc.).

2.1. INTERNAL CONTROL

In addition to the Principles of Action, (<https://www.airliquide.com/group/groups-principles-action>) which reaffirm the Group values with particular reference to stakeholders (shareholders, customers and suppliers, employees, etc.), the Group's codes, policies, and procedures are grouped together in an overall reference manual, the BLUEBOOK, which is available to employees on the Intranet. They constitute a set of internal control and risk management documents, which must be implemented by each entity included in the Group's consolidated financial statements.

The BLUEBOOK is the cornerstone of the Group's internal control system, which aims to ensure that:

- the Group's activities and the conduct of its members:
 - comply with laws and regulations, internal standards and applicable best practices,

- comply with the objectives defined by the Company, especially in terms of risk prevention and management policies,
- contribute to safeguarding the Group's assets;
- all financial and accounting information communicated either internally or externally gives a true and fair view of the situation and activity of the Group and complies with prevailing accounting standards.

Generally, the Group's internal control system should contribute to the management of its activities, the efficiency of its operations and the efficient use of its resources.

As with other "assurance systems", it cannot provide an absolute guarantee that the Group's objectives will be met.

In 2018, the Group pursued the actions undertaken in previous years, with more than 70 material Group entities and shared service platforms (representing over 90% of consolidated Group revenue), reviewing the appropriateness of their internal control system in relation to the Reference Framework for internal control and risk management systems. These entities also implemented actions aimed at improving their control system in terms of annual guidelines defined at the beginning of the year by the hubs and World Business Units, the Group Control Department and the Finance Department. The latter two together organize these improvement measures and report on their progress to the Group's Executive Management then to the Audit and Accounts Committee.

Audits are coordinated by the Group Control Department and the Statutory Auditors, based on a joint work program, to verify assessments of the internal control system and the correct implementation of key operating controls, including in small and medium-sized entities based on a framework of key control processes adapted for their use.

In 2018, the Group continued its efforts to improve the quality of its internal control and risk management system, in particular with the launch of a Group project to strengthen its efficiency in terms of organization and tools, and furthermore:

- the updating and supplementing of certain Group codes and policies, in particular (i) for ethics and prevention of corruption – updating of Codes of Conduct and of corruption risk mapping, and (ii) the launch of a Group project to adapt the crisis management system to the specific needs of cyber risk;
- the strengthening of certain tools: for operations control – the implementation of a new digital platform (Business Intelligence or BI) to facilitate analysis and improve the Group's data reliability in several areas such as HR, finance, safety, and operations;
- other specific actions have been undertaken:
 - in digital security, both the expansion of the CyberAll program with continued compliance initiatives for the General Data Protection Regulation (GDPR) and the launch of a program to adapt the digital protection to industrial assets;
 - in ethics, the supplementing of procedures on third parties and traceability of training for the most exposed populations.

2.2. ORGANIZATION

The Group is organized and based on a consistent Group strategy. It is supported by a method of management which centers on mid-term objectives that are categorized by business, as well as a steering process for activities based on annual budgetary objectives, which are further categorized down to the individual plan level. As part of the NEOS company program, the organization has developed into a network structure that promotes communication and shortens decision-making circuits.

The organization breaks down into:

- hubs which ensure the presence and representation of the Group in the main global regions. With the base (L'Air Liquide S.A. Head Office), they are responsible for defining the Group's operational strategy and its global performance. They accommodate the representatives of the Corporate functions and World Business Lines who ensure that the Group strategy is properly implemented locally;
- entities, grouped in groups of countries (Clusters) for internal pooling of resources, which provide operational management of their activities and implement Group strategy in those countries where the Group has a presence;
- the World Business Lines, which:
 - with the hubs and Strategy Department, prepare the medium-term strategic goals for the businesses they represent,

- have responsibility for strategic marketing, the transformation of their respective businesses, industrial policy and the suitability of skills in their specific areas of business;

- the World Business Units specific to certain businesses (Healthcare, Engineering & Construction);
- the Innovation & Development Division, which brings together all the research and innovation resources, technology development, Digital teams (La Factory, ALIZENT, i-Lab), the Global Markets & Technologies (GM&T) WBU, and Hydrogen Energy.

This organization also includes the Corporate functions, which notably comprise the three key control departments that report to Executive Management:

- the Finance Department, which is responsible for:
 - the reliability of accounting and financial information,
 - the Group's financial and tax risk management,
 - the drafting of Group objectives and monitoring of performance by operations control, based on financial data prepared by the accounting teams and analysis conducted by the financial teams of the various entities;
- the Group Control Department, which:
 - provides expertise and assistance to entities in the roll-out of their risk management approach (see below) and builds a Group synthesis,
 - verifies the effective application of internal control and risk management procedures through audits carried out according to a defined program presented to the Group's Audit and Accounts Committee. This program, developed and based on the risk analysis, is regularly monitored by the Audit and Accounts Committee in liaison with the Environment and Society Committee (for environmental and societal issues). Audit Reports are systematically supplemented by corrective action plans, which are supervised by a member of the Executive Committee. These reports, as well as subsequent follow-up reports, are the subject of various communications and periodic discussions with the Statutory Auditors,
 - helps Group entities ensure compliance with and promotion of both the Group's ethical values, particularly through training and awareness-raising actions and the treatment of fraud and deviations (all these actions, organizations, and tools are presented in detail in the Extra-financial Performance Declaration), as well as with international trade regulations,
 - provides guidance to Group entities, through the Digital Security Department, which reports directly to the Group Control Department, on the identification and protection of their data, systems, and digital applications (definition of rules, roll-out expertise and advice, control of proper implementation);
- the Legal Department, which identifies legal risks, issues internal guidelines and codes, and then oversees their proper implementation. It also monitors the main litigation cases and manages insurance.

Finally, this organization relies on a framework of authorizations and delegations:

- to members of the Executive Committee and certain departments and services in order to define their commitment and payment powers for commercial transactions (sales or purchasing);
- to certain executives in charge of entities or sites in France in particular, in order to ensure the prevention and control of industrial risks in terms of hygiene and safety;
- to certain financial executives, in order to ensure the security of transactions and financial flows.

The managers of the various Group subsidiaries exercise their duties under the control of the Boards of Directors and in accordance with laws and regulations applicable in the countries where they operate.

2.3. RISK MANAGEMENT

To ensure the continued development of its activities, the Group must actively pursue an approach to prevent and manage the risks (especially industrial and financial risks) to which it is exposed.

In terms of the Group's business activities, industrial risk management must essentially focus on prioritizing safety and security while maintaining a permanent focus on the reliability of installations.

Financial risk management requires strict control over investments, combined with prudent and rigorous practices regarding the accounting and financial aspects of the activities.

The Group formal risk management approach aims to ensure:

- the regular identification of the different forms of risk (industrial, financial and other) encountered by the Group during the pursuit of business activities, which are assessed according to both potential damage and probability of occurrence;
- the assessment of the risk management level of each risk based on a common scale with respect to the quality of policies, organizational structures, processes and controls in place;
- the progress of the main corrective action plans undertaken to mitigate these risks, by focusing monitoring activities on a limited number of priorities.

This three-phase risk management process (mapping, management levels, mitigation plans) covers over 70 entities representing more than 90% of consolidated Group revenue.

The Risk Management Department within the Group Control Department leads this approach using:

- resources dedicated by the hubs, World Business Units and World Business Lines to manage the approach in their respective scopes of responsibility (under the supervision of the Boards of Directors of the entities concerned) and by providing a summary thereof;
- the work of members of the Risk Committee that it coordinates (described on page 52).

The Audit and Accounts Committee reviews Group risk management based on presentations covering:

- the progress of the approach (on an annual basis);
- each major risk management system based on a multi-year program structured according to the challenges;
- internal audit summaries of these risk management systems.

Finally, an annual summary of risk management actions undertaken by the Group is presented to the Board of Directors; each year it validates the Audit Committee's provisional program which is presented to it beforehand, as well as a list of subjects of strategic interest or with particular relevance that will be presented in a more specific manner.

2.4. AREAS OF CONTROL

The main internal control and risk management procedures established and communicated by the Group in the BLUEBOOK aim to:

2.4.1. Ensure the safety and security of people, products and installations, as well as the reliability of operations, in compliance with the rules and regulations for accident prevention

To this end, the Group has an Industrial Management System (IMS), which operates based on:

- empowerment of the Management bodies governing the Group's various entities for the effective implementation of this system;
- the issue of key management and organizational procedures that aim to ensure:
 - regulatory compliance,
 - design management,
 - industrial risk management,
 - hygiene, health and environmental management,
 - training and certification of personnel,
 - management of operating and maintenance procedures,
 - management of industrial purchasing,
 - change management,
 - analysis and treatment of incidents and accidents,
 - shared technical standards within Group entities.

The IMS document base is updated and supplemented on an ongoing basis.

The Safety and Industrial Systems Department and the Industrial Departments of the relevant World Business Lines supervise and control the implementation of the IMS, by notably relying on:

- on-going awareness-raising actions for teams by providing specifically related training;
- the presentation of various indicators designed to review performance in terms of the safety and reliability of operations;
- process audits to verify the implementation conditions and compliance of operations with IMS requirements;
- technical audits carried out by the Industrial Departments to ensure the compliance of operations with Group rules.

Safety performance of operations and their level of compliance with IMS requirements are regularly monitored by the Executive Committee.

Moreover, considering the changing international climate and in particular the terrorist threat, the Group, which is present in many countries, has defined and rolled out additional measures to protect its employees and secure its products and sites that are most exposed locally to an external threat.

2.4.2. Ensure very strict control of Group investments and commitments with:

- an in-depth review of investment requests using very strict assessment criteria as well as the medium and long-term contractual commitments which may arise therefrom, within the Resources and Investments Committees (described on page 53);
- control of investment decisions through the specific follow-up of authorizations granted as well as contributions expected and seen during the initial years. In addition, the subsidiaries are obliged to report (above certain thresholds) all budget overruns and implement corrective action plans aimed at ensuring the profitability of the investments concerned; for the largest ones, they are supported by experts ("Capital Implementation" teams) in order to secure good preparation as well as execution;
- more in-depth profitability analyzes (comparative analysis prior and subsequent to completion) for certain significant investments.

2.4.3. Ensure control of energy purchasing, particularly with respect to availability and matching with Group commitments to customers

The energy management policy defines rules governing energy purchasing and the related decision-making processes. The Enrisk Group Committee reviews the procurement strategies of the entities, validates the most significant commitments and ensures the relevant policies are properly applied, in particular in terms of sustainable development.

Each month, the Enrisk Group Committee brings together the Vice President in charge of the Large Industries World Business Line, the Energy Vice President and the Group Deputy Chief Financial Officer.

Meeting minutes are sent to all Executive Committee members.

2.4.4. Manage financial and tax risks

Financial decision-making governance is the responsibility of the two Finance Committees (Strategic Finance Committee and Operational Finance Committee), with the former considering issues relating to the financing strategy and the latter dealing with the practical methods of its implementation.

The Company has defined financial policies, which forbid speculative transactions notably on financial instruments, and that are subject to regular review. These policies were brought together in a Group financial policy. These procedures set out the principles and procedures for the management of financial risks to which the business is exposed, notably in relation to:

- foreign exchange risk: the Company has defined methods for hedging its main foreign exchange risks, whether this is borne by the holding companies or the operating entities, in terms of authorized hedging instruments, the decision process and the execution of transactions;

- interest rate risk: the Company has defined methods managed on a centralized basis for the hedging of interest rates related to indebtedness that is carried in major currencies (mainly EUR, USD, JPY, and CNY), which represent more than 90% of total net indebtedness with:
 - a selection of authorized tools,
 - the hedging decision processes,
 - methods of executing transactions.

For other foreign currency indebtedness, rules have been defined in order to ensure that the transactions initiated to hedge interest rate risk are consistent with Group objectives;

- counterparty risks: the Company has defined rules aimed at ensuring that the Group's counterparties are sufficiently diversified and solid (commitment limits/minimum rating);
- liquidity risks: the Company has defined rules aimed at ensuring the Group has an appropriate level of "confirmation" and diversification (by type and maturity) for all external financing sources. The Group staggers short- and long-term repayment maturities over time in order to limit amounts to be refinanced each year and has precautionary facilities.

These measures are supplemented by treasury management rules adapted to local circumstances, which are aimed at ensuring compliance and security of transactions and optimizing the management of liquidity (forecasting of cash in/cash out, etc.).

The application of this financial policy is controlled by the Finance Department. The majority of transactions are executed directly on a centralized basis (financing and management of related interest rate risk, hedging of foreign exchange risk), which is completed by consolidated reports provided by various Group entities on a monthly or quarterly basis, depending on the type of risk.

The activities are managed on the basis of highly segregated duties, using a multilateral negotiation platform, cash management software, and a communication platform linked to the Swift banking network.

As far as tax is concerned, the Group focuses on complying with laws and regulations. Modifications of laws and regulations are followed and monitored by its Tax Department and its local Financial Departments.

The Group's tax charter supports its ambition to remain a leader in its sector by acting in a responsible manner, consistent with the Group's long-term growth strategy. Air Liquide has defined the following principles which govern its tax policy, in line with article L. 225-102-1 of the French Commercial Code:

- Group entities must respect the laws and regulations in force, as well as the international standards that affect it such as those of the OECD, in particular on transfer prices;
- Group entities ensure that tax returns and payments are completed in compliance with local regulations. They complete the required tax returns according to the jurisdictions in which the Group operates;
- the Group is committed to acting with integrity in all tax-related matters. It aims to operate in a transparent manner and build constructive, long-term relationships with the tax authorities;

- the Group deals with tax-related matters by banning tax havens and does not make use of shell corporations without economic substance;
- the Group protects value for its shareholders by taking measures to minimize double taxation phenomena. Furthermore, it acts to minimize fiscal risk.

Its tax strategy is in line with the Group's strategy. It is transparent, sustainable in the long term and complies with the Code of Conduct.

Within this governance framework, the Group's tax affairs are managed by a team of dedicated, qualified tax experts, which work closely with management and respect the Group's values.

2.4.5. Ensure the reliability of financial and accounting information

In order to guarantee the quality and reliability of financial and accounting information produced, the Group primarily relies on a set of accounting principles and standards, as well as a consistent accounting and management reporting system and feeds both the Group statutory consolidation process and the management analysis that is under the responsibility of independent departments, which report to the Finance Department.

The Group accounting manual, which includes the Group financial policy, defines the accounting rules and principles as well as the consolidation methods applicable and states the formats applicable for reporting financial and accounting information. This manual is regularly updated by the Finance Department with the amendments to IFRS or their interpretations.

Management and Accounting Reports are each prepared under the responsibility of independent but interactive departments that follow identical methods and principles:

- this independence allows for the enhancement of information and analysis through the use of complementary indicators and data, particularly those which are specific to each business;
- the fact that these bodies are interactive provides for better control of the reliability of information through the systematic and regular reconciliation of data.

The reports primarily include:

- monthly management reporting, known as the "Monthly Flash Report", that provides information on revenue and the main financial indicators: income statement, cash flow from operating activities, net indebtedness and the amount of investments authorized and committed;
- quarterly reporting, known as the "Management Control Report", which provides details of the primary items of the income statement, balance sheet and cash flow statement;
- a quarterly "variance" analysis report to assess the various components of the change in operating income recurring.

These three documents are compiled by each management entity according to a predefined yearly timetable.

They are systematically accompanied by comments on activities drawn up by the Director and the controller within the entity, and are consolidated at Group level with a breakdown for each hub and business;

- quarterly reporting for accounting consolidation is compiled by each subsidiary which, in addition, must provide (on a semi-annual basis) information on off-balance sheet commitments that include in particular:
 - energy purchasing,
 - financial guarantees and deposits,
 - all other contractual commitments.

Accounting consolidation statements and monthly reporting are escalated to the Central Consolidation Department. This department prepares the consolidated data and works in conjunction with the Operations Control Department, whose duty is to analyze and comment on the results, identify and explain any differences with respect to forecasts, and to update the forecasts.

As part of the scope of the Group Performance Steering Committee, a rolling forecast for the rest of the current year is systematically presented by the Finance Department, in order to identify, when applicable, any differences with respect to yearly targets and take the necessary steps.

Through regular controls, the Finance Department ensures the effective application of accounting methods and principles in the various Group entities. The most complex accounting standards, particularly those relating to employee benefits (IAS 19R), methods of consolidation (IFRS 10/11), the classification of major Large Industries' contracts (IFRS 15) and derivative financial instruments (IAS 32, IFRS 7, IFRS 9) are subject to tighter controls or treated directly by the Finance Department.

It also relies on audits carried out by the Group Control Department, with which it has regular contact.

The quality and reliability of financial and accounting information also depends on information systems which are increasingly integrated (such as ERP), a Group consolidation software package.

The project, which aims to further harmonize ERPs, continues on the basis of the definition of an accounting and financial framework tailored to the various Group businesses.

2.4.6. Ensure the protection of Group data and IT applications

The Digital Security Policy sets the basic rules governing the identification of digital security stakes and handling of associated risks, and outlines the roles and responsibilities in this area. It is accompanied by:

- procedures describing, in particular, how to secure data and applications, detect and deal with incidents;
- codes outlining principles to be respected by users and IT administrators.

The Digital Security Department reports directly to the Group Control Department and uses resources set aside in the hubs, groups of countries (clusters), World Business Units and World Business Lines to coordinate and control in conjunction with the IT Department the roll-out of this policy from a risk assessment that is regularly updated according to the development of threats. This roll-out is centered on a long-term operational program aimed at defining the key areas and measures to be taken under the supervision of a member of the Executive Committee, with in particular:

- risk prevention and awareness raising for employees using teaching tools such as phishing campaigns, e-learning courses on information protection and use of IT tools, etc.;
- better consideration of digital security from the project design phase, as an inherent part of any resulting solution, and continued treatment of IT vulnerabilities, protection of critical applications and of the most sensitive information; monitoring of digital threats and major cyber incidents that could affect the Group's activities, particularly through penetration testing;
- implementing regulatory compliance for the organization using specific projects or programs (Military Planning Act, General Data Protection Regulation, etc.); for the latter, a framework agreement was drafted governing data sharing within the Group, and a mechanism for the handling and processing of complaints was introduced;
- revision of the incident management system completed by undertaking a diagnosis to assess the quality and efficiency of the protection of our sensitive digital assets.

Moreover, the Group has launched a project aimed at adapting the crisis management system and operational continuity plans to the specificities of the risk of a cyber attack; it has also launched a multi-year program aimed at supplementing the mechanism for the digital protection of industrial assets.

2.4.7. Manage environmental and societal risks

All the Group's operations are subject to local regulations as well as the codes, policies and procedures (Principles of Action, procurement policy, IMS, etc.) contained in the BLUEBOOK, with these tools relating to environmental subjects. Moreover, each subsidiary must reassess its environmental risks and their related action plans on an annual basis.

The Group's strategy also aims to support its development while limiting its environmental impact, in particular its carbon footprint and certain environmental risks (emissions into the atmosphere, annual water supply, etc.) which are part of the criteria for analyzing investment projects.

An environmental and societal risks procedure has been published in the BLUEBOOK. It includes an analysis and the identification of risks and the related preventative measures.

The Group also announced its Climate objectives in 2018, accompanied by quantified targets to measure and improve its environmental impact. Air Liquide's Climate objectives commit the Group to taking active operational measures, as well as with its customers and more generally step up its actions in favor of a low-carbon society.

The Group is also attentive to risks associated with extreme weather-related phenomena, which are the subject of specific adaptation plans on the main sites located in high-risk areas.

Vigilance plan

The aim of the Group's vigilance plan is to identify risks and prevent serious violations with respect to Human Rights and fundamental freedoms, to the health and safety of persons and to the environment, which may result from the activities of the Group, its subcontractors, or suppliers with whom Air Liquide has an established business relationship.

The report on the vigilance plan actions that have been implemented is explained below.

Air Liquide's vigilance plan applies to all Group subsidiaries, subcontractors and suppliers with whom the Group has an established business relationship. It is applied as follows:

Associated risks

- The environmental and societal risks are clearly identified in the Group's global risk mapping.
- A detailed analysis of these risks enabled the drafting of a dedicated mapping covering all Group businesses. These risks are described on page 43.
- This risk analysis was supplemented by a mapping of supplier risks based on the methodology drawn up by the Group Procurement Department. This methodology allows subsidiaries to identify their critical suppliers based on seven main principles.
- Suppliers who present CSR risks are automatically classed as critical suppliers for the Group, and, as such, require a dedicated qualification process.

Regular assessment of subsidiaries, subcontractors and suppliers

- All Group subsidiaries are subject to social, safety and environmental reporting each year. Data are reported, analyzed, consolidated and published in the Reference Document. These data are audited by the independent verifier and are subject to an action plan when non-compliance with Group expectations is identified.
- For suppliers identified as critical, the Group continues, with the support of EcoVadis, to assess their performance in great detail (more than 230 assessments completed in 2018) focusing on the following subjects: the environment, social issues, corporate ethics and the supply chain.

Risk mitigation measures and the prevention of serious harm

- Air Liquide has formalized in the BLUEBOOK, its values, policies, procedures and internal Codes of Conduct, in order to mitigate CSR risks. In terms of safety and the environment, the IMS provides a framework for operations. The Group's commitment in terms of Safety, ethics and Human Rights (see "Prerequisites to action" section on page 16) highlight that these are prerequisites that are taken into account in all of the Group's businesses.

- To reduce risks and prevent the grave abuse of Human Rights, health and safety of individuals, and the environment by suppliers, Air Liquide routinely sends the Supplier's Code of Conduct to all Group suppliers in order to promote and enforce practices relating to Human Rights, ethics, the environment and safety. This Code can be found on Air Liquide's website (<https://www.airliquide.com/group/sustainable-procurement>).
- Moreover, a sustainable development clause is included in the Group's new contracts and framework agreements with its suppliers. This clause covers the option for Air Liquide to assess the supplier's sustainable development performance, as well as the obligation to implement adequate corrective measures. It also includes a compulsory reporting element for the supplier, in particular on safety, energy and water consumption and atmospheric emissions, as well as Human Resources.
- The Group also conducts on-site Sustainable Development audits for certain suppliers that are considered to be particularly at risk in this area, following unsatisfactory evaluations. They are conducted according to recognized external benchmarks, often by a specialized external auditor. Following these audits, corrective action plans are drawn up. In certain cases, the business relationship may be suspended while the supplier brings its practices into compliance.
- In addition to these measures, the Group also has procurement procedures and provides training (see page 287 Sustainable procurement – chapter 4).

Whistleblowing mechanism and compilation of reports

- The current whistleblowing tool, Ethicall, allows employees and external collaborators to report deviations from the Code of Conduct, including on subjects relating to Human Rights, health, hygiene and safety in the workplace as well as environmental protection.

Monitoring system

- Beyond, the report on the actions stated above, the monitoring system that includes the key indicators is provided in chapter 4 (see page 287 Sustainable procurement).
- The Board of Directors' Environment and Society Committee was informed of the monitoring of the implementation of the Vigilance plan.

2.4.8. Ensure the development of the Group's expertise and talents

The Human Resources policy defines the main rules, together with the roles and responsibilities of the different parties in their implementation, with respect to, among others:

- the acquisition and sustaining of requisite skills, in particular through the SPRING long-term program, which identifies and manages critical skills. Training provided under the Air Liquide University brand also contributes to this goal and, in particular, e-learning courses attended by an increasing number of users (more than 55,000 in 2018) in a wide range of domains (ethics, industrial safety, competition law, digital security, etc.);
- supporting employees in their personal development throughout their career, particularly thanks to training, with the continuing roll-out of improvement tools for the management of training

programs (LMS: Learning Management System), the management of careers and skills (TMS: Talent Management System) and the communication of career advancement opportunities (TAS: Talent Acquisition System);

- measuring and recognizing performance and contributions for all employees. Other than remuneration policies, the Group's specific programs promote, for example, technical expertise (Technical Community Leaders), inventors (inventor recognition program) and entrepreneurs.

2.4.9. Ensure that laws, regulations and internal management rules are respected within the Group, notably in the legal and intellectual property areas

- With the Group legal policy, which encompasses:
 - a Group procedure relating to Powers (limitations and delegations) for use by Group entities;
 - a Group procedure on the governance of subsidiaries (Boards of Directors) ;
 - an Insurance Guide for all Group entities;
 - Group codes on how to behave in order to comply with competition laws (including Europe, the United States and Asia-Oceania), accompanied by surprise audits and training that includes e-learning;
 - a memorandum, specifying the rules to be observed to prevent market abuse (insider trading) ;
 - various contract guides (for Large Industries, Engineering & Construction, Industrial Merchant, Electronics and Financing) and Codes of Good Practices (for Healthcare);
 - an anti-corruption program: this program leverages the active involvement of Executive Management and management; it includes, in particular, key principles of the Codes of Conduct and an Anti-Corruption Code rolled out within the subsidiaries and accessible online, as well as a highly efficient awareness-raising and training program tailored for populations exposed to corruption-related risks, and a strengthened roll-out of the whistleblowing system. This program was further reinforced to take into account requirements related to the Sapin 2 Law. In particular, based on an updated corruption risk map, third-party assessment procedures were extended and specific accounting controls for certain types of transactions were introduced. This program is coordinated by the Group Ethics Officer who relies on a network of ethics correspondents that was enlarged in 2018 and the support of the Operational Departments in the hubs and businesses.
- In intellectual property, with a Group policy and procedures aimed at:
 - ensuring Air Liquide's compliance with valid patents and other intellectual property rights held by third parties in its different areas of business, particularly for verifying freedom to operate;
 - protecting Group intellectual property, by protecting its inventions, designs and brands through their identification (on an official filing basis) and in the event of partnerships or other third-party relations targeting innovation;
 - managing the Group's obligations in terms of the recognition of their inventors.

To this end, the Group relies on an Intellectual Property Department, comprising professionals located at the Group's head office and in the main geographic regions.

2.5. MONITORING OF CONTROL MEASURES

The Board of Directors exercises its control over Group management based on the various quarterly activity reports it receives from Executive Management and the work of the Audit and Accounts Committee, according to the methods and principles described above (reports, debriefings, etc.).

Executive Management exercises its control over risk management, in particular through SICR meetings (Strategy – Investment – Corporate Policies Review) and the monthly Group Performance Meetings (described on page 35).

It also relies on existing reports and:

- Executive Committee meetings, with, in particular, debriefings from the Safety and Industrial System Department regarding Group performance in terms of security and the progress of current actions;
- work carried out by the Finance Department, and the Group Control Department;
- recommendations made by various Group Committees set up to ensure enhanced management of certain commitments and more significant stakes (the role and members of these Committees are described below).

These control measures are enhanced by the involvement of operational departments and the Executive Committee in the implementation and follow-up of actions needed to improve and strengthen the quality of internal controls.

The Risk Committee

The purpose of this Committee is to provide support and expertise to the hubs, World Business Units and World Business Lines which must implement and coordinate the risk management approach in their respective scopes of responsibility.

It brings together the Corporate functions: Group Control (notably covering ethics and digital security), Legal, Finance, Communication, Safety and Industrial System, Human Resources and Group Operations Control Departments.

Chaired by the Chairman and CEO and attended by two Executive Vice Presidents and the Strategy Director, it meets twice a year to, on one hand, report on the progress of priority mitigation measures for major risk, prepare a risk management synthesis and define Group orientations and, on the other hand, examine certain strategic risks more closely.

The Finance Committees

The Strategic Finance Committee

The purpose of this Committee is to verify the effective application of the Group's financial policy, to approve financial management proposals and suggestions that have been submitted and to approve the rules governing the Group's financial policy, which are subjected to regular review.

It brings together the Executive Vice President - Chief Financial Officer, the Group Corporate Finance and Treasury Director, and the Corporate Finance Director who meet under the authority of the Chairman & CEO.

The Committee meets at least three times a year and upon request, if necessary.

The Operational Finance Committee

The purpose of this Committee is to make day-to-day decisions concerning the financial management of the Group, to propose structuring transactions to the Strategic Finance Committee and to ensure their implementation after approval.

It brings together the Group Executive Vice President - Chief Financial Officer, the Corporate Finance and Treasury Director, and the Corporate Finance Director, assisted by a Committee Secretary.

The Committee meets every four to six weeks, and the minutes of these meetings are sent to the Chairman and CEO.

The Resources & Investment Committees (RIC)

The purpose of these Committees is to assess and approve requests for investments that have been submitted, as well as medium and long-term contractual commitments and Human Resource requirements that may arise therefrom.

They meet regularly (usually once a month) for each hub and each World Business Unit.

Each Committee meeting is chaired by a member of the Executive Committee in charge of the hub or of the World Business Unit involved and brings together managers of the region and business line concerned by the investment, as well as representatives of the Group Finance Department, Engineering & Construction, and the Capital Implementation Group (CIG).

The Committee's decisions are reviewed by Executive Management.

The Ethics Committee

The purpose of this Committee is to supervise the Group's ethics program (monitoring of actions undertaken to prevent deviations, proposing short- and medium-term orientations) and to recommend sanctions in case of significant deviation.

It brings together the Legal, Group Control, and Human Resources Departments as well as a representative of operational functions; it meets at least once per year and more often when required.

The Digital Security Committee

This Committee is responsible for setting the strategic directions for digital security and for ensuring the operational progress of certain Group projects (industrial IT, digital innovation, etc.).

It brings together the IT, Digital Transformation, and Digital Security managers and other Corporate Departments when required. It meets each month under the chairmanship of a member of the Executive Committee.

PERFORMANCE

Group revenue for 2018 stood at **21,011 million euros**, up **+6.1%** on a comparable basis and above the high end of the NEOS target range. It was supported by high Gas & Services sales growth, **+5.2%**, increasing sequentially, an improvement in Engineering & Construction (**+31.5%**) and strong growth in Global Markets & Technologies (**+29.6%**). The negative currency impact of -3.6% in 2018 eased over the year, mainly due to a stronger US dollar against the euro. The energy impact, which was negative during the 1st quarter, turned positive as of the 2nd quarter, and reached +1.3% over the year. The sale of the Airgas Refrigerants business at the end of 2017 led to a significant scope impact of -0.5% in 2018. Published Group revenue was therefore up +3.3% over 2018.

Gas & Services revenue reached **20,107 million euros** in 2018, up **+5.2%** on a comparable basis. All zones contributed to the growth.

- ▶ Gas & Services revenue in the **Americas** totaled **7,982 million euros** in 2018. Growth, which continued to improve quarter-on-quarter, stood at **+5.2%** for the year. Large Industries activity level was high (+5.4%) in both air gases and hydrogen. Industrial Merchant sales posted strong growth (+4.6%) with a high price impact. Healthcare revenue continued to improve markedly (+8.2%), despite a limited contribution from bolt-on acquisitions. Electronics posted revenue growth of +6.7% over the year.
- ▶ Revenue in the **Europe** zone totaled **7,111 million euros**, up **+2.5%** over the year. Large Industries sales improved (+1.9%) in particular in air gases. Growth was solid in Industrial Merchant (+3.2%), with price impacts increasing throughout the year. Healthcare continued its steady growth (+4.8%), mainly driven by organic sales growth.
- ▶ Revenue in the **Asia Pacific** zone totaled **4,359 million euros** in 2018, up **+8.2%**. In Large Industries, higher sales (+3.5%) benefitted from the ramp-up of units in the 1st half and from start-ups at the end of the year. Industrial Merchant was up markedly in the zone (+7.0%), especially in China. Electronics revenue posted record growth of +17.1%, with strong gas sales and exceptionally high Equipment & Installation sales.
- ▶ Revenue in the **Middle East and Africa** zone amounted to **655 million euros**, up **+15.5%** over the year. In Large Industries, 2018 sales benefited from the start-up in December 2017 of the largest Air Separation Unit in the world in South Africa. Business momentum remained high in Egypt.

Gas & Services revenue benefited from a strong contribution from all business lines. **Industrial Merchant** growth was solid, **+4.5%**, supported by high price impacts (+2.5%), which were stronger in the 2nd half (+3.1%) than in the 1st half (+1.9%). **Large Industries**, **+4.7%**, benefited in particular from a major start-up in South Africa in December 2017 and sustained demand in oxygen, notably in the Americas and Asia. Sales growth in **Healthcare** was strong, **+5.7%**, despite a limited contribution from bolt-on acquisitions. **Electronics** posted record growth of **+9.9%**, with a marked increase in Carrier Gases and Advanced Materials and exceptionally high Equipment & Installation sales.

Engineering & Construction revenue for 2018 totaled **430 million euros**, up **+31.5%** compared with 2017. It benefited from the gradual improvement in order intake seen since the beginning of 2017.

Global Markets & Technologies sales were up **+29.6%** in 2018 at **474 million euros**, the biogas activity being the main contributor to this growth.

The **additional Airgas synergies** in 2018 amounted to **76 million US dollars** and reached a **cumulated 290 million US dollars** since the acquisition. The **300 million-US dollar target of cumulated synergies is therefore reached in the 1st quarter of 2019, i.e., more than a year before initially planned**.

For the year, **efficiencies** amounted to **351 million euros**, largely above the NEOS company program's annual target of more than 300 million euros. The strong investment momentum in our customers' main markets led to an increase in investment opportunities for the Group and in the number of new long-term contracts signed. In this favorable environment for future growth and to ensure reaching the NEOS target of a ROCE in excess of 10% by 2021-2022, **the Group is significantly strengthening its efficiency program. As of 2019, the annual target for efficiencies is therefore set at more than 400 million euros**.

The Group's **operating income recurring (OIR)** reached **3,449 million euros** in 2018, +6.7% excluding the currency impact. The **operating margin (OIR to revenue)** stood at 16.4% and at **16.6% excluding the energy impact**, which corresponds to a **+10 basis point** improvement compared with 2017. Excluding the energy impact, the operating margin for **Gas & Services** increased by **+30 basis points** compared with 2017.

Net profit (Group share) amounted to **2,113 million euros** in 2018, up **+4.2%** compared with the "recurring" net profit for 2017 which excluded exceptional items and the impact of the US tax reform that had no impact on cash flow, and up **+8.7%** when also excluding the currency impact.

Cash flow from operating activities before changes in working capital requirement totaled 4,138 million euros and stood at **19.7% of Group sales**. It allowed in particular the financing of net industrial capital expenditures, which reached 2.2 billion euros, and the decrease of the debt-to-equity ratio, down from 80% at the end of 2017 to 68.8% at the end of 2018. **Gross industrial capital expenditures** represented **10.7% of sales**.

Industrial and financial investment decisions exceeded **3.1 billion euros**, a **+22%** increase compared with 2.6 billion euros in 2017. This was a record level excluding major acquisitions. Despite this particularly high level of investment decisions, the **12-month portfolio of investment opportunities** totaled **2.6 billion euros**, as of December 31, 2018, up **500 million euros** compared with 2017.

The **return on capital employed after tax (ROCE)** stood at **8.0%**, a **+30 basis point** increase compared with the recurring ROCE at the end of 2017 (7.7%). Excluding the currency impact, ROCE improved by **+60 basis points**. The Group confirmed the NEOS target of returning to a ROCE above 10% by 2021-2022.

Moreover, for many years now, Air Liquide has been committed to a **sustainable growth**, notably to limit its own CO₂ emissions as well as those of its customers. The Group presented on November 30, 2018 its **Climate objectives**, in particular the **30% reduction objective in its carbon intensity* between 2015 and 2025**, with a global approach that

includes its assets, its customers, and ecosystems. These objectives are the most ambitious of its sector and are in line with its NEOS company program.

Unless otherwise specified, all variations on revenue commented below are made on a comparable basis, which excludes the currency, energy (natural gas and electricity) and significant scope impacts. The reference to Airgas corresponds to the Group Industrial Merchant and Healthcare activities in the United States.

1. Key Figures

| (in millions of euros) | FY 2017 | FY 2018 | 2018/2017 published change | 2018/2017 Recurring change ^(b) | 2018/2017 comparable change ^(a) |
|--|---------------|----------------------------|----------------------------------|---|--|
| Total Revenue | 20,349 | 21,011 | +3.3% | | +6.1% |
| Of which Gas & Services | 19,642 | 20,107 | +2.4% | | +5.2% |
| Operating Income Recurring | 3,364 | 3,449 | +2.5% | | +7.6% |
| Operating Income Recurring (as % of Revenue) | 16.5% | 16.4% | -10 bps | | |
| Variation excluding energy | | +10 bps | | | |
| Other Non-Recurring Operating Income and Expenses | (344) | (162) | | | |
| Net Profit (Group Share) | 2,200 | 2,113 | | +4.2% | +8.7% ^(c) |
| Adjusted Earnings per Share (in euros) | 5.16 | 4.95 | | +4.0% | |
| Adjusted Net Dividend per Share (in euros) | 2.65 | 2.65 ^(h) | | | |
| Net Cash Flow from Operating Activities ^(d) | 4,254 | 4,716 | +10.9% | | |
| Net Capital Expenditure ^(e) | 1,850 | 2,272 | | | |
| Net Debt | 13,371 | 12,535 | | | |
| Debt-to-Equity ratio | 80% | 68.8% | | | |
| Return On Capital Employed – ROCE after tax | 8.2 % | 8.0 % | | +30 bps ^(f) | +60 bps ^(g) |

(a) Change excluding the currency, energy (natural gas and electricity) and significant scope impacts, see reconciliation in appendix.

(b) Change compared to 2017 recurring net profit, i.e. 2,029 million euros (excluding the exceptional items and the impact of the US tax reform that had no impact on cash flow).

(c) Change compared to 2017 recurring net profit and excluding currency.

(d) Cash flow after changes in working capital requirements and other items.

(e) Including transactions with minority shareholders.

(f) Change compared to 2017 recurring ROCE.

(g) Change compared to 2017 recurring ROCE and excluding currency.

(h) Subject to the approval of the Annual General meeting on May 7, 2019.

* In kg CO₂ equivalent / € Operating income recurring before depreciation and amortization.

2. Income Statement

REVENUE

| Revenue (in millions of euros) | FY 2017 | FY 2018 | 2018/2017 published change | 2018/2017 comparable change |
|-----------------------------------|---------------|---------------|-------------------------------|--------------------------------|
| Gas & Services | 19,642 | 20,107 | +2.4% | +5.2% |
| Engineering & Construction | 335 | 430 | +28.4% | +31.5% |
| Global Markets & Technologies | 372 | 474 | +27.3% | +29.6% |
| TOTAL REVENUE | 20,349 | 21,011 | +3.3% | +6.1% |

| Revenue by quarter (in millions of euros) | Q1 2018 | Q2 2018 | Q3 2018 | Q4 2018 |
|---|--------------|--------------|--------------|--------------|
| Gas & Services | 4,831 | 4,938 | 5,066 | 5,272 |
| Engineering & Construction | 85 | 95 | 105 | 145 |
| Global Markets & Technologies | 94 | 119 | 100 | 161 |
| TOTAL REVENUE | 5,010 | 5,152 | 5,271 | 5,578 |
| 2018/2017 Group published change | -3.2% | +0.7% | +6.6% | +9.1% |
| 2018/2017 Group comparable change | +6.0% | +5.6% | +6.0% | +6.8% |
| 2018/2017 Gas & Services comparable change | +5.0% | +5.1% | +5.2% | +5.6% |

Group

Group revenue for 2018 stood at **21,011 million euros**, up **+6.1%** on a comparable basis and above the high end of the NEOS target range. It was supported by high Gas & Services sales growth, **+5.2%**, which increased quarter-on-quarter, an improvement in Engineering & Construction (**+31.5%**) and strong growth in Global Markets & Technologies (**+29.6%**). The negative currency impact of -3.6% in 2018 eased over the year, mainly due to a stronger US dollar against the euro. The energy impact, which was negative during the 1st quarter, turned positive as of the 2nd quarter, and reached +1.3% over the year. The sale of the Airgas Refrigerants business at the end of 2017 led to a significant scope impact of -0.5% in 2018. Published Group revenue was therefore up +3.3% over 2018.

Gas & Services

Gas & Services revenue reached **20,107 million euros** in 2018, up **+5.2%** on a comparable basis. This was driven by a strong contribution from all business lines and all zones. Industrial Merchant growth was solid, **+4.5%**, supported by high price impacts (+2.5%), which were stronger in the 2nd half (+3.1%) than in the 1st half (+1.9%). Large Industries, **+4.7%**, benefited in particular from a major start-up in South Africa in December 2017 and sustained demand in oxygen, notably in the Americas and Asia. Sales growth in Healthcare was strong, **+5.7%**, despite a limited contribution from bolt-on acquisitions. Electronics posted record growth of **+9.9%**, with a marked increase in Carrier Gases and Advanced Materials and exceptionally high Equipment & Installation sales. As published revenue was up +2.4%; the energy impact, at +1.4%, did not offset the unfavorable currency and scope impacts (at -3.7% and -0.5% respectively).

| Revenue by geography and business line (in millions of euros) | FY 2017 | FY 2018 | 2018/2017 published change | 2018/2017 comparable change |
|--|---------------|---------------|-------------------------------|--------------------------------|
| Americas | 8,150 | 7,982 | -2.1% | +5.2% |
| Europe | 6,776 | 7,111 | +5.0% | +2.5% |
| Asia-Pacific | 4,081 | 4,359 | +6.8% | +8.2% |
| Middle East & Africa | 635 | 655 | +3.2% | +15.5% |
| GAS & SERVICES REVENUE | 19,642 | 20,107 | +2.4% | +5.2% |
| Large Industries | 5,336 | 5,685 | +6.6% | +4.7% |
| Industrial Merchant | 9,261 | 9,181 | -0.9% | +4.5% |
| Healthcare | 3,401 | 3,486 | +2.5% | +5.7% |
| Electronics | 1,644 | 1,755 | +6.7% | +9.9% |

Americas

Gas & Services revenue in the Americas totaled **7,982 million euros** in 2018. Growth, which continued to improve quarter-on-quarter, stood at **+5.2%** for the year. Large Industries activity level was high (+5.4%) in both air gases and hydrogen. Industrial Merchant sales posted strong growth (+4.6%) with a high price impact. Healthcare revenue continued to improve markedly (+8.2%), despite a limited contribution from bolt-on acquisitions.

AMERICAS GAS & SERVICES 2018 REVENUE

17% Large Industries
68% Industrial Merchant
10% Healthcare
5% Electronics



- **Large Industries** posted revenue growth of **+5.4%** in 2018. The start-up of the OCI unit in the United States at the end of the 2nd quarter and the ramp-up of units in Latin America contributed to the increase in oxygen volumes. Hydrogen sales were also up, driven by high demand. The cogeneration activity in Canada enjoyed favorable electricity market conditions in Alberta in 2018.
- **Industrial Merchant** sales were up **+4.6%** over the year. Growth in the United States was driven by very solid cylinder gas and hardgoods sales, which benefited from favorable conditions in most end markets, in particular in Metal Fabrication, Construction and Energy. In Canada, cylinder gas and hardgoods sales were up, in particular in the Metal Fabrication end market, and offset weaker liquid nitrogen volumes for oil well services in Alberta. Growth in South America retained momentum, with a marked increase in liquid gas volumes in Brazil in particular. Price impacts increased towards the end of the year, reaching +4.2% in the 4th quarter, and stood at **+3.0%** for the year, in line with inflation.
- **Healthcare** revenue grew strongly, **+8.2%**, in 2018 despite a limited contribution from bolt-on acquisitions. Medical Gases growth was strong in the United States, driven in particular by the success of cylinders with a digital interface and increased sales to proximity care customers. Business momentum continued in Latin America, in particular in Brazil and Colombia, notably in Home Healthcare.
- **Electronics** posted revenue growth of **+6.7%** over the year, with an increase in Carrier Gases and Advanced Materials sales and exceptionally high Equipment & Installation sales.

Europe

Revenue in the Europe zone totaled **7,111 million euros**, up **+2.5%** over the year. Large Industries sales improved (+1.9%) in particular in air gases. Growth was solid in Industrial Merchant (+3.2%), with price impacts increasing throughout the year. Healthcare continued its steady growth (+4.8%), mainly driven by organic sales growth.

EUROPE GAS & SERVICES 2018 REVENUE

33% Large Industries
30% Industrial Merchant
35% Healthcare
2% Electronics

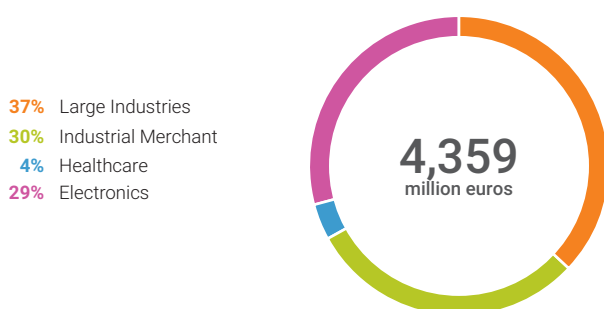


- **Large Industries** revenue was up **+1.9%** in 2018, with air gas sales increasing, in particular in France, Benelux and Italy, and increased cogeneration activity in Benelux. Hydrogen sales were impacted in the 2nd half by major customer turnarounds, in particular in Benelux. Momentum was particularly strong in Turkey with the start-up of a new unit during the 4th quarter. The Group also launched its operations in Kazakhstan during the 3rd quarter with the takeover of a hydrogen production unit to meet the needs of the national oil company.
- **Industrial Merchant** sales were up **+3.2%** in 2018, with growth solid throughout the year and particularly strong during the 4th quarter at +4.7%. The majority of the countries contributed to this growth. Cylinder gas sales improved at a faster pace in the 2nd half of the year, but the increase remained below that of liquid gas sales. Growth continued at a very high pace in Turkey and in Eastern Europe, in particular in Poland and Russia. Price impacts increased quarter-on-quarter, gradually catching up with the rate of inflation, and reached **+1.5%** for the year and +2.6% for the 4th quarter.
- **Healthcare** continued to improve steadily posting mostly organic sales growth of **+4.8%**, with bolt-on acquisitions having a limited contribution. Home Healthcare momentum remained very strong with, in particular, a marked increase in the number of diabetic patients in Scandinavia. Growth in sales of Medical Gases for hospitals was impacted by constant price pressure. Specialty Ingredients revenue grew significantly.

Asia Pacific

Revenue in the Asia Pacific zone totaled **4,359 million euros** in 2018, up **+8.2%**. In Large Industries, higher sales (+3.5%) benefitted from the ramp-up of units in the 1st half and from start-ups at the end of the year. Industrial Merchant was up markedly in the zone (+7.0%), especially in China. Electronics revenue posted record growth of +17.1%, with strong gas sales and exceptionally high Equipment & Installation sales.

ASIA PACIFIC GAS & SERVICES 2018 REVENUE



- **Large Industries** sales were up **+3.5%** in 2018, driven by the contribution from the ramp-up of units during the 1st half and from several start-ups in China at the end of the year. These additional sales largely offset the loss of revenue from the disposal of three isolated units in Northern China at the end of 2017. Customer demand was solid, in particular for hydrogen in South Korea and for air gases in South-East Asia.
- **Industrial Merchant** revenue grew strongly, **+7.0%**, over the year, with performances varying greatly by country. In China, growth exceeded +15% for the year, driven by the strong increase in cylinder gases and liquid argon volumes as well as by higher prices. Revenue in Japan declined slightly. Sales were up in Australia, notably in liquid gas for the mining sector. Price impacts stood at **+1.8%** for the year and at +1.2% for the 4th quarter, due to softer price impact in China following five consecutive quarters of strong growth.

- **Electronics** revenue posted a record increase of **+17.1%** in 2018. This was driven by strong momentum for Advanced Materials, in particular in South Korea, China and Taiwan, and the ramp-up of Carrier Gases units in Singapore, Taiwan, China and Japan. Equipment & Installation sales were also exceptionally high, and posted growth above +50%.

Middle East and Africa

Revenue in the Middle East and Africa zone amounted to **655 million euros**, up **+15.5%** over the year. In Large Industries, 2018 sales benefitted from the start-up in December 2017 of the largest Air Separation Unit in the world in South Africa. Business momentum remained high in Egypt, with the start-up of an Air Separation Unit during the 1st quarter 2018 and growing volumes in Industrial Merchant. Healthcare continued its development, in particular in Saudi Arabia, where an acquisition at the end of 2017 led to the local launch of the Home Healthcare activity.

Engineering & Construction

Engineering & Construction revenue for 2018 totaled **430 million euros**, up **+31.5%** compared with 2017. It benefitted from the gradual improvement in order intake seen since the beginning of 2017.

Order intake reached **807 million euros** at the end of December 2018, a double-digit increase compared with 2017. Air Separation Units accounted for more than half of all orders. These included Group projects and third-party customer orders, notably in Asia.

Global Markets & Technologies

Global Markets & Technologies sales were up **+29.6%** in 2018 at **474 million euros**. The main contributor to this growth was the biogas activity, which benefitted from the ramp-up of a major landfill biogas purification unit in the United States and four smaller farm waste biogas purification units in France and in the United Kingdom. Maritime and Advanced Technologies activities also posted strong growth.

Order intake was up more than +30% at the end of December and reached **460 million euros**.



Global Markets & Technologies

- Air Liquide and 10 large Japanese companies, representing several industries and finance, announced the creation in March of the **"Japan H2 Mobility" consortium** for the purpose of accelerating the deployment in Japan of hydrogen stations and fuel cell electric vehicles. The 11 founding companies will contribute to the development of a large-scale hydrogen infrastructure in order to build a network of 320 stations by 2025, and 900 by 2030. Today, there are about 100 stations already in operation in Japan. For its part, **Air Liquide will install and operate some 20 stations by 2021.**
- In March, Air Liquide inaugurated a new **hydrogen station** near Versailles in France. This station will fuel two **hydrogen-powered buses**, scheduled for **rollout in 2019**, and supplement the Paris hydrogen taxi fleet "Hype" which is developing rapidly. This is the **third station that has been installed by Air Liquide in the Greater Paris Area.**
- Air Liquide has commissioned **three new biomethane production units, in the United States, in France, and in the United Kingdom** in the 1st quarter 2018, doubling its biomethane production capacity, which now stands at 60 MW, the equivalent of 500 GWh for a full year of production. Over the course of the last four years, the Group has decided around **100 million euros in investments** in biomethane production. The Group operates 10 production units around the world, designed to purify biogas in order to transform it into biomethane and inject it into the natural gas network.
- Early September, Air Liquide inaugurated in Hobro, **Denmark, HyBalance, a pilot site for the production of carbon-free hydrogen**, in the presence of the project's partners. This facility uses **electrolysis technology** and allows **to balance the electricity grid and store surplus electricity in the form of hydrogen** that will be used in industry and transportation. The electrolyser, with a capacity of 1.2 MW, enables the production of around 500 kg of hydrogen a day without releasing CO₂. As part of this project initiated in 2016, Air Liquide developed, built, and is operating the facility that produces hydrogen from water electrolysis as well as the filling center for its customers delivered by trailers.
- At the end of November, Air Liquide announced the construction of the **first world scale liquid hydrogen production unit dedicated to the hydrogen energy markets**, located in the **Western U.S.** Air Liquide expects to invest more than **150 million US dollars** for the production of nearly 30 tons of hydrogen per day that will serve the growing needs of the hydrogen mobility market in California.
- At the end of January 2019, Air Liquide announced that it acquired an **18.6% stake in the capital of the Canadian company Hydrogenics Corporation**, a leader in electrolysis hydrogen production equipment and fuel cells. This strategic transaction represents an **investment of 20.5 million US dollars** (18 million euros). Air Liquide and Hydrogenics have also entered into a **technology and commercial agreement** to jointly develop electrolysis technologies.

OPERATING INCOME RECURRING

Operating income recurring before depreciation and amortization reached **5,215 million euros**, up **+1.4%** as published compared with 2017, and **+5.3%** excluding the currency impact.

Purchases were up +7.2%, in particular due to the increase in energy prices. Equipment purchases were also up for the Equipment & Installation activity in Electronics as well as for Engineering & Construction. Besides, the continued attention paid to costs and efficiencies allowed for **personnel costs** and **other expenses and income** to grow at a slower pace than sales (+0.2% and +0.8% respectively, compared with published sales growth of +3.3%).

Depreciation and amortization reached **1,766 million euros**, down -0.7% due to the currency impact. Excluding the currency impact and despite the impact of start-ups and ramp-ups, depreciation and amortization growth remained lower than revenue growth. This development also reflected the large number of contract renewals in 2018 in our main Large Industries basins.

At the end of 2018, **Airgas synergies** represented a **cumulated 290 million US dollars** since the acquisition in May 2016. These included 231 million US dollars of cost synergies, i.e., more than the initial objective, and 59 million US dollars of growth synergies. The **300 million-US dollar target of cumulated synergies is therefore reached in the 1st quarter of 2019, i.e., more than a year before initially planned.** The integration of Airgas is now complete.

For the 2018 fiscal year, synergies amounted to 76 million US dollars. The share of **growth synergies** continued to rise and represented more than 40% of synergies for the year. These came from the rollout of cross-selling offerings in the United States, such as small onsite generators using Air Liquide technology offered to Airgas customers and cylinder gases and hardgoods now available to Air Liquide customers. Supporting Airgas customers in their expansion in Canada and Mexico is another example of growth synergies.

For the year, **efficiencies** amounted to **351 million euros**, largely above the NEOS company program's annual target of more than 300 million euros. They included a contribution from Airgas for the first time in 2018, which amounted to 31 million euros. They represented savings of 2.3% of the cost base and 2.9% excluding Airgas. Industrial Merchant was the greatest contributor, with more than one third of efficiencies, followed by Large Industries and Healthcare. Moreover, approximately 50% of these efficiencies related to industrial projects which mainly target a decrease in logistic costs and the optimization of production unit operation. The accelerated rollout of remote operation centers (Smart Innovative Operations, SIO) was a major example of this in 2018. Almost one third of efficiencies related to procurement savings, notably for the purchases of molecules in Electronics, equipment in Home Healthcare, and energy in Large Industries. The remaining efficiencies mainly related to administrative efficiencies and realignment plans in several countries and businesses, including Engineering & Construction.

The strong investment momentum in our customers' main markets led to an increase in investment opportunities for the Group and in the number of new long-term contracts signed. In this favorable environment for future growth and to ensure reaching the NEOS target of a ROCE in excess of 10% by 2021-2022, **the Group is significantly strengthening its efficiency program. As of 2019, the annual target for efficiencies is therefore set at more than 400 million euros**, compared with a target of more than 300 million euros previously. Half of the additional efficiencies will be related to the integration of Airgas in the program and half from the reinforcement of asset pooling and platform sharing projects, as well as an acceleration in the implementation of digital solutions.

The Group's **operating income recurring (OIR)** reached **3,449 million euros** in 2018, a published increase of +2.5%, or +6.7% excluding the currency impact. The **operating margin (OIR to revenue)** stood at 16.4% and **16.6% excluding the energy impact**, which corresponds to a +10 basis point improvement compared with 2017.



Purchases and Efficiencies

- One year after the launch of the first **remote operation center** in France, Air Liquide inaugurated in January 2018 in **Malaysia** its Smart Innovative Operations (SIO) Center for the Southeast Asia Pacific region. The SIO Center enables the remote management of production for **18 Air Liquide Large Industries production units** spanning eight countries across the region, as well as optimizing energy consumption and improving reliability at these sites. Air Liquide invested **20 million euros** in this project.
- At the end of November, Air Liquide announced a **new agreement** to purchase 50 megawatts (MW) of **renewable wind electricity** from a subsidiary of NextEra Energy Resources, LLC, the world's largest generator of renewable energy. By using the wind-generated electricity, Air Liquide **will save 1.5 million tons of CO₂ emissions** over the term of the agreement.

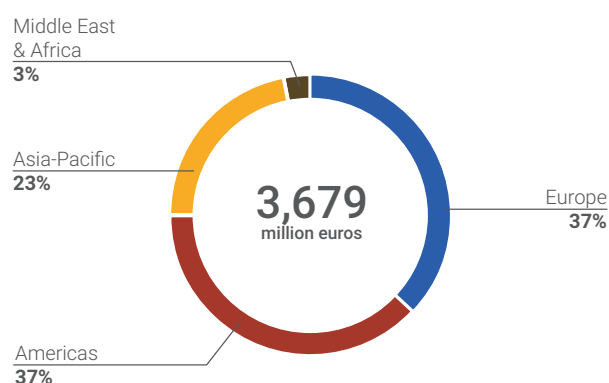
Gas & Services

Operating income recurring for Gas & Services amounted to **3,679 million euros**, an increase of +2.6% as published compared with 2017. The operating margin as published was 18.3%. **Excluding the energy impact**, it stood at **18.6%**, representing a **+30 basis point** increase compared with 2017.

In an environment where global inflation is stronger, sales prices increased +1.5% for the year, thanks in particular to the Industrial Merchant business which was up **+2.5%**. Prices were down slightly in Electronics and almost flat in Healthcare.

Efficiencies totaled **315 million euros** in 2018 for Gas & Services.

GAS & SERVICES 2018 RECURRING OPERATING INCOME



| Gas & Services Operating margin ^(a) | 2017 | 2018 | 2018, excluding energy |
|--|--------------|--------------|------------------------|
| Americas | 16.8% | 17.2% | 17.2% |
| Europe | 19.3% | 19.2% | 19.8% |
| Asia-Pacific | 19.7% | 19.2% | 19.5% |
| Middle East & Africa | 17.2% | 16.0% | 15.0% |
| TOTAL | 18.3% | 18.3% | 18.6% |

(a) Recurring operating income/revenue, as published figures.

Operating income recurring for the **Americas** zone stood at **1,369 million euros** in 2018, stable **(+0.3%)** compared with 2017 due to the depreciation of the US dollar against the euro and the disposal of Airgas Refrigerants activity. Excluding the energy impact, the operating margin stood at 17.2%, an increase of **+40 basis points** compared with 2017. The Industrial Merchant operating margin improved markedly, notably due to the contribution from Airgas synergies and a high price impact. Conversely, strong Equipment & Installation sales in Electronics and the disposal of Airgas Refrigerants business had a dilutive effect on the margin.

Operating income recurring in the **Europe** zone reached **1,368 million euros**, an increase of **+4.5%**. Excluding the energy impact, the operating margin was 19.8%, a **+50 basis point** increase mainly due to price impact getting stronger throughout the year in Industrial Merchant and efficiencies generated across all business lines in the zone. Moreover, the active management of the business portfolio that led to the disposal of a small Equipment & Installation business in Electronics also had an accretive impact on the margin.

Operating income recurring in the **Asia Pacific** zone stood at **837 million euros**, an increase of **+4.1%**. Excluding the energy impact, the operating margin was 19.5%, down **-20 basis points**. The exceptionally high level of Equipment & Installation sales in Electronics and several Large Industries unit start-ups in China during the 2nd half had a slightly dilutive impact on the margin. Nevertheless, the Industrial Merchant operating margin improved, driven by cylinder gas sales growth and efficiencies.

Operating income recurring for the **Middle East and Africa** zone amounted to **105 million euros**, a decrease of **-3.9%** compared with 2017. Excluding the energy impact, the operating margin totaled 15.0%, a decrease of **-220 basis points**. After a transitional period in relatively exceptional operating conditions, the hydrogen production units in Yanbu, Saudi Arabia, have now reached their nominal operating mode marked by a structural adjustment of the operating margin.

Engineering & Construction

Operating income recurring for Engineering & Construction totaled **-4 million euros**, penalized by a business volume which remained insufficient. Nevertheless, the gradual improvement in the business contributed to the return to a positive operating income recurring in the 2nd half which should continue to improve gradually to reach a margin of between 5% and 10% in the medium term.

Global Markets & Technologies

Operating income recurring for Global Markets & Technologies reached **50 million euros** with an operating margin of 10.5% for the year; it was higher in the 2nd half (12.0%). A portion of these activities is in start-up phase and the margin level, which depends on the nature of the projects carried out during the period, may vary significantly.

Research & Development and Corporate costs

Research & Development expenses and Corporate costs stood at **277 million euros**, a +14.2% increase compared with 2017, due to an increase in research and the ramping-up of the Group's digital transformation.

NET PROFIT

Other operating income and expenses showed a **net balance of -162 million euros**. This was mainly related to costs for realignment plans in various countries and businesses, in particular Engineering & Construction, Airgas integration costs and provisions for exceptional geopolitical risks.

The **financial result of -353 million euros** was down compared with 2017 (-489 million euros). Net finance costs, at -303 million euros, were down -28.1% and benefited from a non-recurring gain of around 55 million euros generated during the 1st half of the year by the unwinding of hedging instruments relating to debt restructuring in the United States. Excluding this impact, the **average cost of net indebtedness**, at **3.0%**, was down by **-20 basis points** compared with 2017.

Income tax expense stood at **731 million euros**, a +523 million euros increase compared with 2017 when an exceptional non-cash gain of 586 million euros was recognized mainly due to the US tax reform. The effective tax rate was **24.9%** in 2018, a +450 basis point improvement over the recurring effective tax rate of 2017. This decrease was mainly due to the reduction of the US federal income tax rate from 35% to 21% coupled with exceptional items, notably in France during the 1st half of the year and in the Netherlands during the 2nd half of the year.

The **share of profit of associates** amounted to **4 million euros**, compared with 5 million euros in 2017. The **share of minority interests in net profit** reached 94 million euros, an increase of **+2.2%**, as the profit from subsidiaries with minority shareholders rose, particularly in China.

For the record, **net profit from discontinued operations** for 2017 (-37 million euros) reflected the impact of the disposal of Air Liquide Welding.

Net profit (Group share) amounted to **2,113 million euros** in 2018, down -3.9% as published, but up **+4.2%** compared with the "recurring" net profit for 2017 which excluded exceptional items and the impact of the US tax reform that had no impact on cash flow, and up **+8.7%** when also excluding the currency impact.

Net earnings per share, at **4.95 euros**, were up **+4.0%** compared with the "recurring" net earnings per share for 2017, in line with the increase in net profit (Group share). The average number of outstanding shares used for the calculation of net earnings per share as of December 31, 2018 was **426,674,123**.

CHANGE IN THE NUMBER OF SHARES

| | 2017 | 2018 |
|--|--------------------|--------------------|
| Average number of outstanding shares ^(a) | 426,409,142 | 426,674,123 |
| Number of shares as of December 31, 2017 | | 426,731,852 |
| Options exercised during the year | | 185,549 |
| Capital increase reserved for employees | | 1,049,529 |
| NUMBER OF SHARES AS OF DECEMBER 31, 2018 | | 427,966,930 |

(a) Restated in 2017 for the impact of the free share attribution on October 4, 2017.



Change in the number of shares

- At the end of October, Air Liquide announced an **increase in share capital reserved for employees**. This transaction, which forms part of the Group's policy to develop employee share ownership, covers more than seventy countries. Air Liquide aims to **further associate its employees** to the Group's development and its performance over the long-term.

DIVIDEND

At the Annual General Meeting on May 7, 2019, the payment of a dividend of **2.65 euros per share** as well as **a free share attribution of 1 for 10** will be proposed to shareholders for the fiscal year 2018. The total estimated pay-out taking into account share buybacks and

cancellations would amount to **1,165 million euros**, representing a **pay-out ratio of 55%** of the published net profit. The ex-dividend date is scheduled for May 20, 2019 and the payment is scheduled for May 22, 2019.

3. 2018 Cash Flow and Balance Sheet

| | | |
|---|--------------|--------------|
| (in millions of euros) | 2017 | 2018 |
| Cash flow from operating activities before change in working capital | 4,133 | 4,138 |
| Change in working capital requirement | 188 | 613 |
| Other items | (67) | (35) |
| Net cash flow from operating activities | 4,254 | 4,716 |
| Dividends | (1,099) | (1,234) |
| Purchases of property, plant and equipment and intangible assets, net of disposals ^(a) | (1,850) | (2,272) |
| Increase in share capital | 70 | 138 |
| Purchase of treasury shares | (158) | (64) |
| Impact of exchange rate changes and net indebtedness of newly consolidated companies & restatement of net finance costs | 780 | (448) |
| Change in net indebtedness | 1,997 | 836 |
| Net indebtedness as of December 31 | (13,371) | (12,535) |
| DEBT-TO-EQUITY RATIO AS OF DECEMBER 31 | 80% | 69% |

(a) Including transactions with minority shareholders.

NET CASH FLOW FROM OPERATING ACTIVITIES

Cash flow from operating activities before changes in working capital requirement totaled 4,138 million euros, stable (+0.1%) compared with 2017, and stood at **19.7% of Group sales**.

Net cash flow from operating activities after changes in working capital requirement amounted to **4,716 million euros**, up **+10.9%** compared with 2017, and reached **22.4%** of sales. This improvement is the result of measures taken to reduce working capital requirement.

CHANGES IN WORKING CAPITAL

Working capital requirement (WCR) **decreased by -613 million euros** in 2018. This improvement mainly came from Gas & Services, where trade receivables were down, notably thanks to the introduction of a non-recourse factoring program at Airgas. Engineering & Construction WCR was also down, albeit to a lesser extent, and that of Global Markets & Technologies was stable. Working capital requirements excluding tax came to **4.1% of sales**, down compared with the 2017 ratio of 6.4%.

CAPITAL EXPENDITURE

In 2018, **gross capital expenditure** totaled **2,380 million euros**, including transactions with minority shareholders.

| (in millions of euros) | Industrial investments | Financial investments ^(a) | Total capital expenditures ^(a) |
|------------------------|------------------------|--------------------------------------|---|
| 2014 | 1,902 | 273 | 2,175 |
| 2015 | 2,028 | 395 | 2,423 |
| 2016 | 2,259 | 12,180 | 14,439 |
| 2017 | 2,183 | 144 | 2,327 |
| 2018 | 2,249 | 131 | 2,380 |

(a) Including transactions with minority shareholders.

Proceeds from the sale of fixed assets, for a total of **103 million euros**, related to smaller non-strategic assets. These disposals were part of active business portfolio management.

Net capital expenditure, including the buyout of minority interests, amounted to **2,272 million euros**.

Industrial capital expenditure

Gross industrial capital expenditure for the Group amounted to **2,249 million euros** in 2018, up +3.1% compared with 2017. They represented **10.7% of sales**. For Gas & Services, this expenditure totaled **2,071 million euros** and their geographical split is described below.

| (in millions of euros) | Gas & Services | | | | Total |
|------------------------|----------------|------------|--------------|------------------------|--------------|
| | Europe | Americas | Asia Pacific | Middle East and Africa | |
| 2017 | 578 | 690 | 509 | 154 | 1,931 |
| 2018 | 676 | 861 | 461 | 73 | 2,071 |

Financial investments

Financial investments amounted to **131 million euros**, including transactions with minority shareholders of one million euros.

NET INDEBTEDNESS

Net indebtedness at December 31, 2018 reached **12,535 million euros**. Despite a negative currency impact and an increase in the dividend, net indebtedness declined -836 million euros compared with the end of 2017 due to a very high level of net cash flow from operating activities in 2018. The **debt-to-equity ratio** stood at **68.8%** at the end of December 2018, a strong decline compared to 80% at the end of 2017.



Debt issue

- In March, Air Liquide successfully completed a **first bond issuance on the Chinese mainland market** ("Panda") for an aggregate nominal amount of **2.2 billion renminbi (approximately 280 million euros)**, becoming one of the first European companies to issue on this market. This transaction bears coupons of **5.95% and 6.40%** for a **3-year and a 5-year maturity** respectively. The 5-year issuance, the longest maturity ever achieved by a European company on the Panda market, reflects the long-term dimension of the Group's activities. The proceeds of this issue will be used to finance new investments in China and to refinance debt related to previous investments in China.

ROCE

The return on capital employed after tax (ROCE) stood at **8.0%**, a **+30 basis point** increase compared with the recurring ROCE at the end of 2017 ^(a) (7.7%). Excluding the currency impact, ROCE improved by **+60 basis points**. The Group confirmed the NEOS target of returning to a ROCE above 10% by 2021-2022.

(a) Which excludes from 2017 net profit the non-cash impacts of exceptional items and the US tax reform.

4. Investments and financing

INVESTMENTS

The momentum in investment projects seen in recent quarters continued. Investment decisions reached a record level, while the 12-month portfolio of opportunities increased sharply.

Investment decisions and investment backlog

| <i>(in billions of euros)</i> | Industrial investment decisions | Financial investment decisions (acquisitions) | Total investment decisions |
|-------------------------------|---------------------------------|---|----------------------------|
| 2014 | 1.9 | 0.2 | 2.1 |
| 2015 | 1.9 | 0.5 | 2.4 |
| 2016 | 2.0 | 12.2 | 14.2 |
| 2017 | 2.4 | 0.2 | 2.6 |
| 2018 | 3.0 | 0.2 | 3.1 |

In 2018, **industrial and financial investment decisions** exceeded **3.1 billion euros**, a **+22%** increase compared with 2.6 billion euros in 2017. This was a record level excluding major acquisitions. At 1,173 million euros, 4th quarter decisions were particularly high.

Industrial investment decisions amounted to **2,960 million euros**. These included nine major investments in Large Industries, of which five are in key industrial basins for the Group, in Benelux and along the Gulf Coast of the United States, three are in developing economies, in Eastern Europe and in China, and one efficiency investment was in Japan. Industrial investment decisions in Electronics were up more than +40% compared with 2017 and reached a record high in 2018. These included nine ultra-pure nitrogen supply investments for major

players in the integrated circuit industry, mainly in Asia. Moreover, investment decisions in Global Markets & Technologies, linked to the energy transition, were up markedly in 2018, in particular for hydrogen energy and biomethane.

Financial investment decisions reached approximately **160 million euros** for the year. These mainly included bolt-on acquisitions in Industrial Merchant, in the United States (seven companies were acquired by Airgas in 2018) and in China, as well as in Healthcare.

The **investment backlog** totaled **2.2 billion euros**, an increase of almost 100 million euros compared with 2017. It is expected to bring a future contribution to annual sales of approximately **0.9 billion euros per year** after full ramp-up of the units.



Industrial and financial investment decisions

- Air Liquide announced in April having signed a new **long-term contract with Covestro**, a world-leading supplier of high-tech polymer materials, **for the supply of hydrogen** to their new production site in the port area of Antwerp. Air Liquide will invest **80 million euros** in the construction of a hydrogen production unit fitted with a new proprietary technology that **improves energy efficiency and the overall environmental footprint of the production process**. **By capturing carbon and upgrading the recovered CO₂**, this model is part of a **circular economy system**. The hydrogen produced will also enable Air Liquide to supply customers in this industrial basin in Europe.
- Air Liquide and Evraz, a world major steel producer, have signed a **long-term contract for the supply of oxygen, nitrogen and argon** in Novokuznetsk, Russian Federation. Air Liquide will invest **around 130 million euros** for the construction of two state-of-the-art Air Separation Units of **1,500 ton per day of oxygen each**. These plants will improve energy efficiency and the overall **environmental footprint** of the production process.
- In April, Air Liquide announced having signed a new **long-term contract in the United States with LyondellBasell to supply oxygen** to their new petrochemical plant in Texas, expected to be completed in 2021. This new propylene oxide/tertiary butyl alcohol plant (PO/TBA) is expected to be the largest in the world upon construction. The oxygen will be sourced from **Air Liquide's pipeline system** which spans more than 2,000 miles along the coasts of Texas and Louisiana, part of the largest pipeline system in the world.
- With the **acquisition** of the respiratory division of **Thimar Al Jazirah Company (TAC)** in **Saudi Arabia**, announced in early January, Air Liquide enters the Home Healthcare market in Saudi Arabia, where the Group already supplies medical gases to hospitals. This division is specialized in the distribution of respiratory equipment and related services. TAC is the main player in this field, serving over **1,400 patients** at home throughout the country. In **2016**, the Home Healthcare division of TAC generated a **revenue of over 5.5 million euros**.
- Air Liquide extends its service offering of Home Healthcare activity via the **acquisition at the beginning of April of the start-up EOVE**, a French company specialized in the **design and manufacture of ventilators** for home-based patients suffering from chronic respiratory failure. EOVE developed an innovative solution: a connected portable ventilator that takes into account the mobility needs of patients and facilitates the practice of doctors.
- Airgas announced, in May, **the acquisition of the assets and operations of Weiler Welding Company**, a full-service industrial gas, beverage and gas welding supply business, based in Moraine, Ohio. **This transaction marks the 500th acquisition in Airgas' 36-year company history**.
- In June 2018, Air Liquide announced the **acquisition of a minority stake in the Chinese startup STNE** (Shanghai Sino-tran New Energy Automobile Operation CO., Ltd.) to **accelerate the rollout of hydrogen-powered electric truck fleets in China**. This agreement fits in the Chinese government's 13th five-year-plan, which aims notably to support the development and sale of hydrogen-powered electric vehicles serving clean mobility.

Start-ups

There were **17 start-ups** during 2018 including Fujian Shenyuan in China in December: six start-ups in the Americas including four in the United States; four in Europe including the Kazakhstan takeover, which marks the Group's entry into this country; five in Asia including three in China; and two in the Middle East and Africa in Egypt. Fujian Shenyuan also contributes for one month of activity, all tests being

successfully completed and all necessary permits being obtained, while discussions are still going-on regarding the full implementation of certain contract clauses.

Over 2018, the contribution to sales of unit start-ups and ramp-ups totaled **270 million euros**. The largest contribution came from the start-up of a major Air Separation Unit in South Africa at the end of December 2017.



- In December 2017, Air Liquide has started-up the **world's largest oxygen production unit** for **Sasol**, an international integrated energy and chemicals company. Air Liquide invested around **200 million euros** for the construction of this unit, with a total production capacity of **5,000 tonnes of oxygen per day** in Secunda (around 140 km East of Johannesburg). Owned and operated by Air Liquide, it is the first time that Sasol has chosen to outsource its oxygen needs to a specialist of industrial gas production at this site.
- The start-up of this major unit in South Africa is also a new source of rare gases. In 2018, several **multi-year contracts worth a total of more than 50 million euros supplying xenon and krypton** have been signed by Air Liquide and the semiconductor and the satellite industries. The **semiconductor industry** uses xenon or krypton in its new processes to produce high-end flash memories at a lower cost. The **all-electric propulsion satellites** also use xenon, enabling significant launching costs reduction.
- Early September, **Air Liquide starts supplying hydrogen in Kazakhstan** through the **acquisition of hydrogen and purification units** with a total capacity of up to 30,000 Nm³/h. This investment of 12 million euros by Air Liquide Munay Tech Gases (ALMTG) marks **the first step in the cooperation between Air Liquide and KazMunayGaz (KMG)**. The hydrogen and steam produced will be delivered to the Pavlodar Oil Chemistry Refinery (POCR) in the context of a long term Gas Supply Agreement.

Investment opportunities

The **12-month portfolio of investment opportunities** totaled **2.6 billion euros**, as of December 31, 2018, up **500 million euros** compared with 2017, despite a particularly high level of investment decisions. Indeed, new projects in the portfolio represented amounts that exceeded those signed by the Group, awarded to the competition or delayed. The portfolio of investment opportunities had not reached this level since the end of 2015.

The Americas remained the leading region within the portfolio with more than one third of opportunities followed by Asia, which increased its relative share. Opportunities mainly came from the chemicals and metals industries in Large Industries, which represented two thirds of the portfolio, and from the integrated circuit industry in Electronics.

Around half of projects had investments of less than 50 million euros and five projects had investments of between 100 and 150 million euros. The **average size of projects was down compared with prior years to around 20 million euros**, which contributed to a better distribution of risk and ensures more regular future growth. The portfolio of opportunities also included some takeovers that would have a faster contribution to growth.

2018 FINANCING

"A" category rating confirmed

Air Liquide is rated by two main rating agencies, Standard & Poor's and Moody's. The long-term rating from Standard & Poor's for Air Liquide is "A-" and from Moody's "A3". These are in line with the Group's strategy. Moreover, the short-term ratings attributed to Air Liquide are "A2" for Standard & Poor's and "P2" for Moody's. Standard & Poor's, on October 11, 2018, and Moody's, on June 18, 2018, confirmed their ratings and have maintained their stable outlook.

Diversifying and securing financial sources

As of December 31, 2018, financing through capital markets accounted for 94% of the Group's total debt, for an amount of bonds outstanding of 12.4 billion euros, across all programs, and 0.7 billion euros of commercial paper.

As of December 31, 2018, the total amount of credit facilities had increased significantly, from 3.1 billion euros, to 3.6 billion euros. The amount of bilateral credit facilities decreased from 1.8 to 1.6 billion euros, as one facility reached maturity, and was renewed for an amount that was 0.2 million euros lower. The Group also renewed a syndicated credit facility, taking the amount from 1.3 billion euros to 2 billion euros. This facility will mature in December 2023, and has two extension options of one year each.

As of December 31, 2018, the amount of total debt maturing in the next 12 months was 2.5 billion euros, stable compared to the amount at December 31, 2017.

2018 issues

In March 2018, Air Liquide Finance successfully completed a **first bond issuance on the Chinese mainland market** ("Panda") for an aggregate

nominal amount of **2.2 billion Chinese renminbi (approximately 280 million euros)**. Income from this issue was used to finance new investments and to refinance debt related to previous investments in China.

Moreover, as of the end of 2018, outstanding bonds issued under the EMTN program amounted to 5.9 billion euros (nominal amount).

Net indebtedness by currency as of December 31

| | 12/31/2017 | 12/31/2018 |
|------------------|-------------|-------------|
| Euro | 31% | 45% |
| US dollar | 52% | 37% |
| Chinese renminbi | 5% | 3% |
| Japanese Yen | 3% | 3% |
| Other | 9% | 12% |
| TOTAL | 100% | 100% |

Investments are generally funded in the currency in which the cash flows are generated, creating a natural currency hedge. In 2018, US dollar debt decreased markedly, following the financing in euros of a share of debt in US dollar contracted for Airgas acquisition. The weighting between the euro and the US dollar has thus shifted in favor of the euro. Moreover, the debt in US dollars has benefited from a favorable currency impact. Debt denominated in Chinese renminbi decreased in volume and share, as the cash flow generated was used to repay a portion of the debt. Debt denominated in Japanese yen remains stable.

Centralization of cash and funding

Air Liquide Finance continued to pool the cash flow balances of Group entities. In 2018, Air Liquide included the Australian dollar in its daily cashpooling, which now contains 14 currencies.

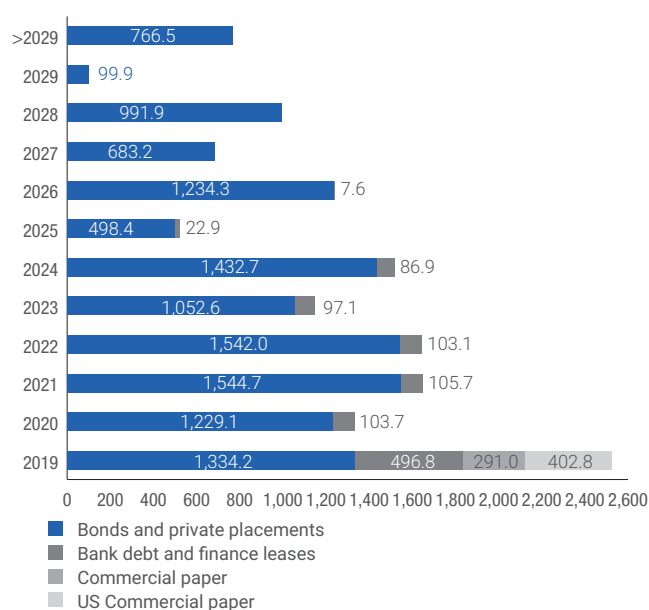
As of December 31, 2018, Air Liquide Finance had granted, directly or indirectly, the equivalent of 15.4 billion euros in loans and received 4.4 billion euros in excess cash as deposits. These transactions were denominated in 28 currencies (primarily the euro, US dollar, Singapore dollar and Chinese renminbi). The direct and indirect scope (including subsidiaries where cashpooling is carried out locally before being centralized at Air Liquide Finance) included around 390 subsidiaries.

Debt maturity and schedule

The average of the Group's debt maturity stood at 5.9 years at December 31, 2018. This is a slight decrease compared with December 31, 2017, due to bond issues which reached maturity in 2018 without renewal, through the use of cash.

The following chart represents the Group's debt maturity schedule. The single largest annual maturity represents approximately 18% of total debt.

DEBT MATURITY SCHEDULE



APPENDICES

Estimated impact of IFRS 16 on the fiscal year 2019

As of January 1, 2019, the Group financial statements will include the impacts of the mandatory adoption of the standard IFRS 16 « Leases » issued on January 13, 2016. **The Group will not restate the financial statements of prior periods.** The standard **will not affect the recognition of revenue** for the Group as a lessee, as mentioned in the paragraph 3 of accounting principles of the consolidated financial statements (pages 192 and 193). The main impact of the application of IFRS 16 for the Group as a lessee consists of the recognition on the balance sheet of all lease contracts, without distinction between finance and operating leases. In the course of its activity, the Group as a lessee enters in contracts mainly for the following type of assets:

- Land, buildings and offices;
- Transportation equipment, in particular for Industrial Merchant and Healthcare;
- Other equipment.

Any contract containing a lease leads to the **recognition on the lessee's balance sheet of a lease liability** measured at the present value of the remaining lease payments **and a right-of-use asset** measured at the amount equal to the lease liability, adjusted by the amount of any prepaid or accrued lease payments as well as of any provision for onerous leases recognized in the balance sheet as of December 31, 2018.

Data collection and quantitative analysis of the impacts on the Group's financial statements are being finalized but the Group anticipates the following impacts:

- **Consolidated Balance Sheet:** The Group estimates that the first application of IFRS 16 would lead to the recognition on January 1, 2019, of a right-to-use and a lease liability in the range of **1.3-1.5 billion euros**.
- **Consolidated Income Statement.** The operating expenses linked to lease contracts will from now on be accounted for as Depreciation & Amortization and Finance Costs:
 - The **Operating Margin before Depreciation & Amortization** ^(a) should increase by approximately **+100 basis points**;
 - The **Depreciation & Amortization on Revenue** ratio should increase by approximately **+100 basis points**;
 - The Operating Income Recurring (OIR) should increase slightly, the impact of which on the **OIR on sales ratio should be limited to a maximum of +10 basis points**;
 - The Group **does not expect any material impact on the Net Profit**.
- **Return on Capital Employed (ROCE):** with the recognition of an additional debt, the ROCE should decrease by **-10 to -20 basis points**.

(a) Operating Income Recurring before Depreciation & Amortization on Revenue

Currency, energy and significant scope impacts (Year)

Applied method

In addition to the comparison of published figures, financial information is given excluding currency, natural gas and electricity price fluctuation and significant scope impacts.

- Since industrial and medical gases are rarely exported, the impact of currency fluctuations on activity levels and results is limited to euro translation impacts with respect to the financial statements of subsidiaries located outside the euro zone. **The currency effect** is calculated based on the aggregates for the period converted at the exchange rate for the previous period.
- In addition, the Group passes on variations in the cost of energy (electricity and natural gas) to its customers via indexed invoicing integrated into their medium and long-term contracts. This indexing can lead to significant variations in sales (mainly in the Large Industries business line) from one period to another depending on fluctuations in prices on the energy market.
 - **An energy impact** is calculated based on the sales of each of the main subsidiaries in Large Industries. Their consolidation allows the determination of the energy impact for the Group as a whole. The foreign exchange rate used is the average annual exchange rate for the year N-1.
 - Thus, at the subsidiary level, the following formula provides the energy impact, calculated for natural gas and electricity respectively:
 - Energy impact = Share of sales index to energy year (N-1) x (Average energy price over the year (N) - Average energy price over the year (N-1))
 - This indexation effect of electricity and natural gas does not impact the operating income recurring.
- **The significant scope effect** corresponds to the impact on sales of all acquisitions or disposals of a significant size for the Group. These changes in scope of consolidation are determined:
 - for acquisitions during the period, by deducting from the aggregates for the period the contribution of the acquisition,
 - for acquisitions during the previous period, by deducting from the aggregates for the period the contribution of the acquisition between January 1 of the current period and the anniversary date of the acquisition,
 - for disposals during the period, by deducting from the aggregates for the previous period the contribution of the disposed entity as of the anniversary date of the disposal,
 - for disposals during the previous period, by deducting from the aggregates for the previous period the contribution of the disposed entity.

| (in millions of euros) | FY 2018 | FY 2018/2017 Published Growth | Currency impact | Natural gas impact | Electricity impact | Significant scope impact | FY 2018/2017 Comparable Growth |
|-----------------------------------|---------|-------------------------------------|--------------------|-----------------------|-----------------------|-----------------------------|--------------------------------------|
| Revenue | | | | | | | |
| Group | 21,011 | +3.3% | (752) | 186 | 93 | (98) | +6.1% |
| Impacts in % | | | -3.6% | +0.9% | +0.4% | -0.5% | |
| Gas & Services | 20,107 | +2.4% | (733) | 186 | 93 | (98) | +5.2% |
| Impacts in % | | | -3.7% | +0.9% | +0.5% | -0.5% | |
| Operating Income Recurring | | | | | | | |
| Group | 3,449 | +2.5% | (142) | - | - | (26) | +7.6% |
| Impacts in % | | | -4.2% | | | -0.8% | |
| Gas & Services | 3,679 | +2.6% | (141) | - | - | (26) | +7.3% |
| Impacts in % | | | +3.9% | | | -0.7% | |

The operating margin excluding energy impact corresponds to the operating income recurring on sales excluding energy. For the year 2018 and at Group level it stands at 16.6% = 3,449 / (21,011 – 186 – 93).

The sale of the **Airgas refrigerants** business in October 2017 generated a significant scope impact on 2018 revenue, the details of which is broken down per quarter below:

| (in millions of euros) | Q1 2018 | Q2 2018 | Q3 2018 | Q4 2018 | 2018 |
|------------------------|---------|---------|---------|---------|-------|
| Airgas refrigerants | (35) | (36) | (26) | (1) | (98) |
| Impacts in % | -0.7% | -0.7% | -0.5% | -0.0% | -0.5% |

The 2017 recurring net profit (Group share) reached 2,029 million euros and corresponded to the published net profit (Group share) of 2017 excluding the non-cash impacts of non-recurring items and the US tax reform. The currency impact on the 2018 net profit (Group share) was 92 million euros. The 2018/2017 change compared to 2017 recurring net profit and excluding energy stood therefore at (2,113 + 92) / 2,029 – 1 = +8.7%.

Return on Capital Employed – ROCE

Applied method

Return on capital employed after tax is calculated based on the Group's consolidated financial statements, by applying the following ratio for the period in question: For the numerator: net profit – net finance costs after taxes for the period in question. For the denominator: the average of (total shareholders' equity + net indebtedness) at the end of the past three half-years.

| ROCE FY 2018 (in millions of euros) | | 2017 (a) | H1 2018 (b) | 2018 (c) | ROCE Calculation |
|---|--|----------|-------------|----------------|---------------------|
| | Profit for the period | | | 2,207.4 | 2,207.4 |
| | Net finance costs | | | -303.4 | -303.4 |
| | Effective tax rate ^(a) | | | 25.5% | 25.5% |
| | Net financial costs after tax | | | -226.0 | -226.0 |
| | Profit for the period - Net financial costs after tax | | | 2,433.4 | 2,433.4 |
| Denominator ((a)+(b)+(c))/3 | Total equity | 16,718.4 | 16,769.4 | 18,207.4 | 17,231.7 |
| | Net indebtedness | 13,370.9 | 14,217.3 | 12,534.9 | 13,374.4 |
| | Average of (total equity + net indebtedness) | | | | 30,606.1 |
| ROCE | | | | | 8.0% |

(a) Excluding non-recurring tax impacts.

| ROCE FY 2017 (in millions of euros) | | 2016 (a) | H1 2017 (b) | 2017 (c) | ROCE Calculation |
|--|--|----------|-------------|----------------|---------------------|
| | Profit for the period | | | 2,291.6 | 2,291.6 |
| | Net finance costs | | | -421.9 | -421.9 |
| | Effective tax rate * | | | 29.4% | 29.4% |
| | Net financial costs after tax | | | -297.9 | -297.9 |
| | Profit for the period - Net financial costs after tax | | | 2,589.5 | 2,589.5 |
| Denominator ((a)+(b)+(c))/3 | Total equity | 17,125.0 | 16,049.0 | 16,718.4 | 16,630.8 |
| | Net indebtedness | 15,368.1 | 15,610.1 | 13,370.9 | 14,783.0 |
| | Average of (total equity + net indebtedness) | | | | 31,413.8 |
| Published ROCE | | | | | 8.2% |
| ROCE EXCLUDING THE NON-CASH IMPACTS OF THE 2017 EXCEPTIONAL ITEMS | | | | | 7.7% |

* Excluding non-recurring tax impacts.

Return on capital employed after tax was at **8.0%**, up **+30 basis points** from **recurring ROCE at the end of 2017** (7.7%)**. Excluding the currency effect, the improvement was **+60 basis points**:

- The numerator, net profit - net finance costs after taxes in 2018, became 2,532.5 million euros

- The denominator, the average of (total shareholders' equity + net indebtedness) at the end of 2017, the 1st half of 2018 and 2018, became: 30,413.0 million euros.
- The ROCE excluding the currency effect, corresponding to the two elements above, therefore became $2,532.5/30,413.0 = 8.3\%$, which gave an improvement of +60 basis points compared to the ROCE published at the end of 2017, which was 7.7%.

5. Environment and society

This part presents the Group's most significant sustainability actions, in response to the risks and challenges set out in "Risk factors and internal control procedures" on page 40. These results are closely monitored and are at the heart of the Group's performance. Additional information and the reporting of environmental and social risks are also presented in chapter 4 of this document.

The main environmental and societal risks, the risk management policies applied by the Group and the results of these policies described in chapters 1 and 4, represent the Extra-financial Performance Declaration – (article L. 225-102-1 para. 1).

5.1. PREREQUISITES TO ACTION: SAFETY, ETHICS AND THE RESPECT OF HUMAN RIGHTS

5.1.1. Safety: a key Air Liquide value

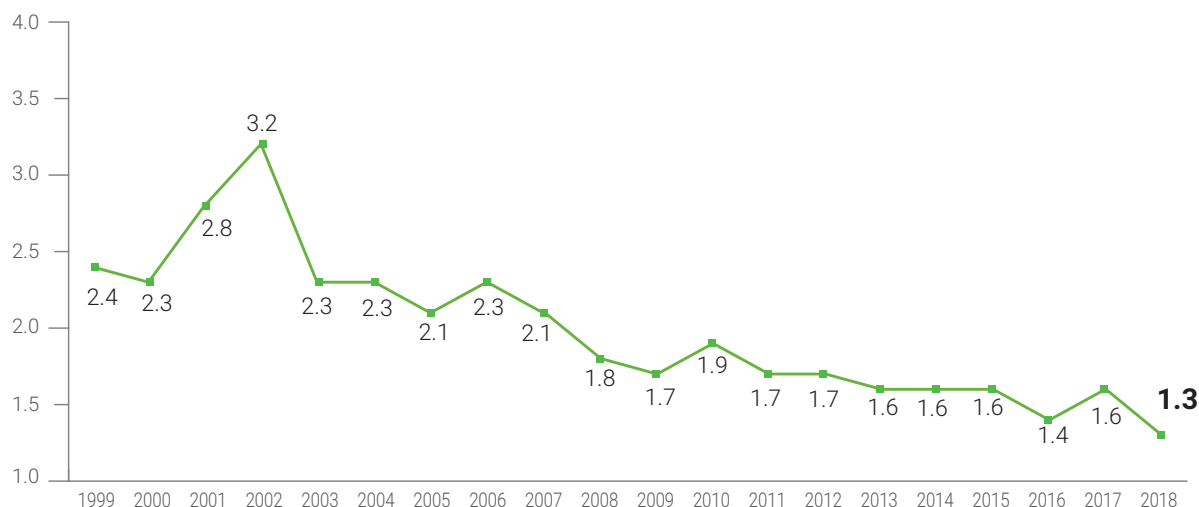
Long-term performance is at the heart of Air Liquide's ambition. To achieve this, prerequisites include Safety, Ethics and the respect of Human Rights and the Environment. Regarding Safety, Air Liquide has a "zero accidents" objective.

2018 Safety results

Air Liquide's employees lost-time accident frequency rate was 1.3 at the end of 2018, a 20% improvement compared to 2017. **This is the lowest frequency rate the Group has achieved in 20 years.**

** Which excludes from 2017 net profit the non-cash impacts of exceptional items and the US tax reform.

FREQUENCY OF ACCIDENTS ^(a) ^(b)



(a) Number of lost-time accidents with at least one lost day per million hours worked by Group employees.

(b) Including Airgas since 2017.

These results include the safety performance of newly-acquired companies, in particular Airgas and Home Healthcare subsidiaries such as Oxymaster in Colombia.

Key success factors can be seen in these various acquisitions. First, carrying out an on-site review is an essential step to identify potential risks and discrepancies which need to be addressed before defining priorities and in particular putting in place the required resources; notably safety and risk management functions. Second, the full commitment of the new subsidiary's entire management board is paramount. Finally, the upgrading of infrastructure and equipment at risk is key, with the allocation of a specific budget.

In 2018, Air Liquide unfortunately experienced three fatal accidents among its employees and five among its subcontractors, mostly on the road. In response to these tragedies and led by the Group's Executive Committee, coordinated action plans were implemented, in particular in terms of road safety and safety leadership expectations.

Industrial Management System

Almost 15 years ago, Air Liquide introduced an Industrial Management System (IMS) dedicated to its businesses. This system has changed work methods significantly and improved process management in safety, reliability, protection of the environment and industrial risk management. Rolled out across the Group, its implementation is regularly assessed by specific IMS internal audits. Building on the experience acquired, a project was launched in 2018 to adapt the IMS, in order to improve its efficiency in all Group entities. While maintaining

the strong fundamentals of the current IMS, the protocol will be simplified, roles and responsibilities made clearer and governance strengthened. New tools, some of which digital, will be made available to the operating entities.

5.1.2. Ethics

The Code of Conduct supports the Group's anti-corruption program (see pages 17 and 44).

This Code of Conduct is adapted at the local level for Group employees. In 2018, 97% of them belonged to subsidiaries that have a local Code of Conduct. The employees who do not yet have a local Code of Conduct primarily belong to entities recently acquired by the Group and undergoing integration. Currently, these Codes of Conduct have been translated into more than 20 languages to ensure their appropriation by all employees.

The whistleblowing system

Air Liquide has a whistleblowing* system covering all Group entities. Almost 300 reports were received during 2018 mainly from the United States, Brazil, the United Arab Emirates and France, as well as from 30 other countries. Human Resources issues accounted for more than 70% of the reports and the remaining issues related to fraud and other subjects such as safety. Around one fourth of the reports processed were sufficiently detailed to implement corrective measures or disciplinary sanctions. The whistleblowing system is also accessible to external collaborators (temporary workers, service providers, etc.)

* Airgas has a specific alert system.

5.1.3. Human Rights

Air Liquide is dedicated to the highest standards for the conduct of its business and its Chief Executive Officer signs the United Nations Global Compact. Air Liquide's letter of commitment, signed by its CEO may be viewed on the Air Liquide and Global Compact websites.

Air Liquide also complies with the rules of the International Labour Organization (ILO) in terms of labor law and follows guidelines for multinational companies issued by the OECD. These Guidelines

encourage the reasonable conduct of companies in terms of professional relationships, Human Rights, the environment, taxation, the publication of information, anti-corruption, the interest of consumers, science and technology, and competition.

Moreover, Air Liquide has signed the Responsible Care® Global Charter of the International Council of Chemical Associations (ICCA) which aims to improve global performances in the chemical industry in terms of health, safety and the protection of the environment.

5.2. CLIMATE ACHIEVEMENTS IN 2018

5.2.1. Climate objectives

CLIMATE OBJECTIVES



At the end of November 2018, Air Liquide announced its 2025 Climate objectives.

As part of a global approach named A.C.E., the Group has set objectives which are the most ambitious in its sector. These commitments therefore focus not only on **reducing the carbon intensity of its Assets (A)**, but also on **working with its Customers (C) towards a sustainable industry and taking part in the emergence of a low-carbon society with all its Ecosystems (E)**.

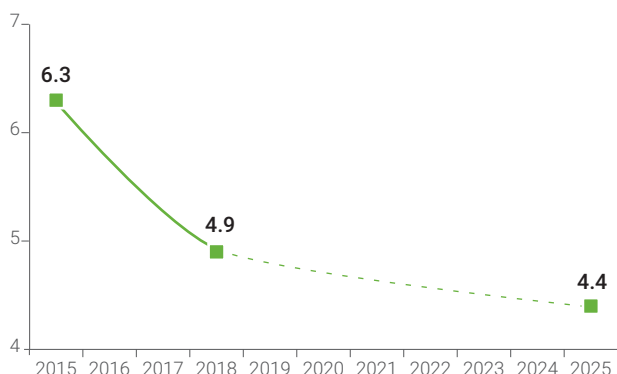
Working with the Group's Assets (A)



Within its production, distribution and services activities, Air Liquide is committed to reducing its carbon intensity^{(a) (b)} by 30% by 2025, based on its 2015 emission levels.

For 2018, the carbon intensity is 4.9, which represents a 22% reduction compared to the 2015 carbon intensity (6.3) and a 74% progression toward the 2025 target (4.4).

CARBON INTENSITY



(a) In kg CO₂ equivalent / euro EBITDA.

(b) EBITDA calculated at constant exchange rates on the basis of 2015 exchange rates.

Air Liquide has identified three key levers over the period 2015-2025 to reach this objective:

Increasing its purchases of renewable electricity by nearly 70%

To increase its purchases of renewable electricity from 6 TWh in 2015 to 10 TWh in 2025, Air Liquide has introduced a proactive approach to renewable electricity procurement through direct contracts with producers (called PPA – Power Purchase Agreements). Moreover, the Group has included the energy mix in the selection criteria of its suppliers. This lever also includes the improvement targeted by the Paris Agreement for the energy mix of the countries where the Group operates.

For 2018, the amount of renewable energy purchased by Air Liquide totaled 7.4 TWh. **The change since 2015 represents 35% of the ambition set for 2025.**



Air Liquide has signed an agreement to purchase 50 megawatts (MW) of renewable wind electricity from a subsidiary of NextEra Energy Resources, LLC, the world's largest producer of renewable energy. The wind farm that will supply the 50 MW to Air Liquide is under development in Menard County, Texas, and is scheduled to be completed by the fourth quarter of 2020.

Thanks to this agreement, Air Liquide expects to supply a significant portion of its growing industrial gas production assets in Texas using renewable energy sources. By using the wind-generated electricity, the Company will save 1.5 million tons of CO₂ emissions over the term of the agreement.

Improving the energy efficiency of its production units by 5%

In this area, the Group aims to reduce the energy consumption by unit of volume of its plants by 5%. First, the efforts of the innovation teams which permanently push the limits of the Group's main technologies, should lead to benefits in terms of the performance of the most recent production units.

Moreover, the Group has decided to invest more in the modernization of its production units by equipping them with cutting edge technologies.

Finally, thanks to the automation and centralization of its operations, the Group has optimized the performances of its plants – in particular in terms of energy consumption – resulting in both efficiency gains and a reduction in its environmental footprint (CO₂ avoided emissions).

In 2018, the Group' ASUs efficiency improved, with a 1.5% reduction in energy consumption per m³ of air gas produced compared to 2015.

However, the performance of HyCO units declined, with an increase of 0.4% in energy consumption per m³ of hydrogen produced since 2015.

Overall, efficiency has increased by 1%, representing 21% of the target to be achieved in 2025.

**A new remote operations center in South-East Asia**

One year after the launch of its first remote operation center in France, Air Liquide inaugurated in 2018 its Smart Innovative Operations (SIO) Center for the South-East Asia Pacific region, located in Malaysia. The SIO Center enables the remote management of the production for 18 Air Liquide Large Industries units spanning eight countries across the region.

Through big data combined with the Group's expertise, the workflow of each Air Liquide production unit linked to the SIO Center is adapted in real time to the needs of each customer. The SIO Center enables 24/7 responsiveness to customer demand and improves the energy efficiency of our assets, by leveraging predictive maintenance to ensure continuous supply.

Reducing the carbon footprint of its bulk and cylinder products by 10% through the optimization of both production and transportation and the efficiency of delivery rounds.

Today, only 15% of the air gases or hydrogen produced by Air Liquide are transported by road (the rest of the deliveries are carried out, either by pipeline or through units directly installed at the customers' sites). Moreover, thanks to the success of the delivery optimization programs,

the efficiency of industrial gases transportation continues to improve. In 2018, and following the integration of Airgas into the Group's reporting, the efficiency of our distribution decreased by 2.6% compared to 2015, but the target of a 10% improvement by 2025 is maintained.

Moreover, Air Liquide aims to convert 20% of its fleet of trucks to alternative fuels by 2025. The first project has been launched in Europe which aims to convert 50% of its trucks during this period (including trucks operated by subcontractors).

EVOLUTION OF THE DISTANCE TRAVELED PER TON OF LIQUID INDUSTRIAL GAS DELIVERED^(a)

| 2014 | 2015 | 2016 ^(b) | 2017 | 2018 |
|------|------|---------------------|------|------|
| 94.8 | 92.2 | 90.3 | 93.3 | 94.6 |

(a) In kilometers per ton delivered for the Industrial Merchant activity. 2008 base of 100.

(b) Excluding Airgas.

Taking action with customers (C)



With its customers, the Group is committed to working towards a clean and sustainable industry. Thanks to its essential molecules management (oxygen, hydrogen, CO₂, etc.) and its in-depth knowledge of its customers' processes, Air Liquide offers technologies which allow its customers to improve the energy efficiency of their industrial processes and reduce their emissions.

Air Liquide has identified two key levers to reach this objective:

Rolling out low-carbon offerings and solutions

Air Liquide provides its customers with the possibility of outsourcing some of their processes in order to pool assets and thus reduce the amount of energy used by up to 20%.



Air Liquide starts up the world's largest oxygen production unit in South Africa

In 2018, Air Liquide started up in South Africa the world's largest oxygen production unit for its customer Sasol, an international integrated energy and chemicals company. Owned and operated by Air Liquide, it is the first time that Sasol had chosen to outsource its oxygen needs at this site to an industrial gas production specialist.

This outsourcing decision confirms Sasol's trust in Air Liquide's technological expertise and ability to innovate. The new unit, with a total production capacity of more than 5,000 tons of oxygen per day, was designed and built by Air Liquide's Engineering & Construction teams using proprietary technologies, including several air compression process innovations. It allows Sasol to decrease its annual electricity consumption by more than 20% and contributes to reducing its carbon footprint by 200,000 tons of CO₂ each year.

The Group is also developing offerings which will reduce transport-related emissions, in particular through on-site production and new generation cylinders which are 40% lighter than those made of steel.

Through its promotion of oxy-combustion technology, Air Liquide has already helped its customers to avoid more than 10.7 Mt of CO₂ emissions in 2018.

Co-developing innovative procedures with its customers

Air Liquide is working in partnership with its customers to introduce new solutions that will reduce the environmental footprint in various business areas:

- either by reducing, where possible, customers' CO₂ emissions;
- or by capturing CO₂ to give it a second life (CCU ^(a) – Industrial Merchant business and Large Industries customers) or by storing it permanently (CCS ^(b) – storage in old offshore natural gas reserves, for example).



A new range of advanced etching materials: enScribe™

Semi-conductor manufacturers must meet growing needs for data storage capacity with the quantity of data being 300 times greater today than it was 10 years ago, while at the same time, components have reached nanometric scale. In this new environment, balancing compactness and performance represents an ongoing challenge.

To support its customers in this goal, Air Liquide has developed enScribe™, a new family of advanced etching materials.

Designed for the 3D construction of a new generation of memory chip, the innovative materials of enScribe™ are capable of etching the new chip structures very deeply. Moreover, due to their chemical structure, they have a lower lifespan in the atmosphere, thus helping to reduce the impact of the etching process on the environment. Its products are designed to reduce the Global Warming Potential (GWP) impact that is typically associated with most gases currently used in etching processes.

Its use, for a single customer, has already reduced the global emissions of the semi-conductor industry by 1%, which represent 117,000 tons of CO₂-eq. per year.

(a) Carbon Capture & Usage.

(b) Carbon Capture & Storage.

Acting for the planet and ecosystems (E)



With ecosystems, via an active dialog with key players (public authorities, industrial partners, NGOs, etc.), Air Liquide is contributing to the development of a low-carbon society.

Air Liquide has identified four key levers to reach this objective:

Expanding the circular economy^(a)

Air Liquide currently owns around 10 biomethane production units and some 60 charging stations. Through the construction of new biomethane units, the Group contributes to the purification of biogas, in particular in Europe and the United States. For further information, please refer to page 82.

For road freight transport, the use of biomethane reduces fine particles emissions by 85%, CO₂ emissions by 90% and noise emissions by 50% compared with diesel. The use of biomethane is growing and diversifying into the industrial and transport sectors by using new efficient and environmentally-friendly applications. In 2018, this use has made it possible to avoid 84,000 tons of CO₂ emissions.



Pot-au-Pin Énergie initiative in Cestas

Planète Végétal – a carrot and leek farmer operator – and Air Liquide have joined forces to create Pot-au-Pin Énergie to valorize biomass from the farm to produce biomethane.

At the end of the process, the biomethane is injected into the natural gas distribution network, which supplies Air Liquide's multi-energy station in Cestas, located 3 km from the production site. This station distributes biomethane (bio-NGV), an alternative to fossil fuels, to Casino Group carriers.

The Pot-au-Pin Énergie initiative shows that the biomethane value chain contributes to the development of the **circular economy** by bringing together local players who are working together to make the **energy transition** happen.

Facilitating clean refrigerated transport

Refrigerated transport is changing and cryogenic technologies are at the forefront of this change. The use of molecules for cryogenics in refrigerated transport helps reduce noise emissions and improve the carbon assessment of vehicles. Air Liquide's expertise in cryogenics has led to the development of Blueeze™, an innovative solution (based on liquid nitrogen) for refrigerated transport by truck, and Cryocity™ (based on CO₂), aimed at inter-urban delivery and reducing air and sound pollution.

Promoting hydrogen for clean mobility

Air Liquide is investing in low-carbon hydrogen production assets as well as in a distribution network for hydrogen mobility. To date, Air Liquide has installed more than 120 stations worldwide.



First large liquid hydrogen production unit

Air Liquide announced the construction of the first large liquid hydrogen production unit dedicated to the hydrogen energy markets in the Western United States. The Group has also signed a long-term contract with First Element Fuel Inc. (FEF), a major player in hydrogen distribution in California, to supply hydrogen to its network of stations in California. The plant will have a production capacity of nearly 30 tons of hydrogen per day – an amount that can fuel 35,000 Fuel Cell Electric Vehicles (FCEVs). Through this investment of more than 150 million US dollars, Air Liquide will contribute to the large-scale rollout of hydrogen mobility on the West Coast of the United States.

(a) Even if the fight against food waste is not a subject considered a priority by Air Liquide because of its industrial activity, the circular economy initiatives participate in the fight against this food waste.

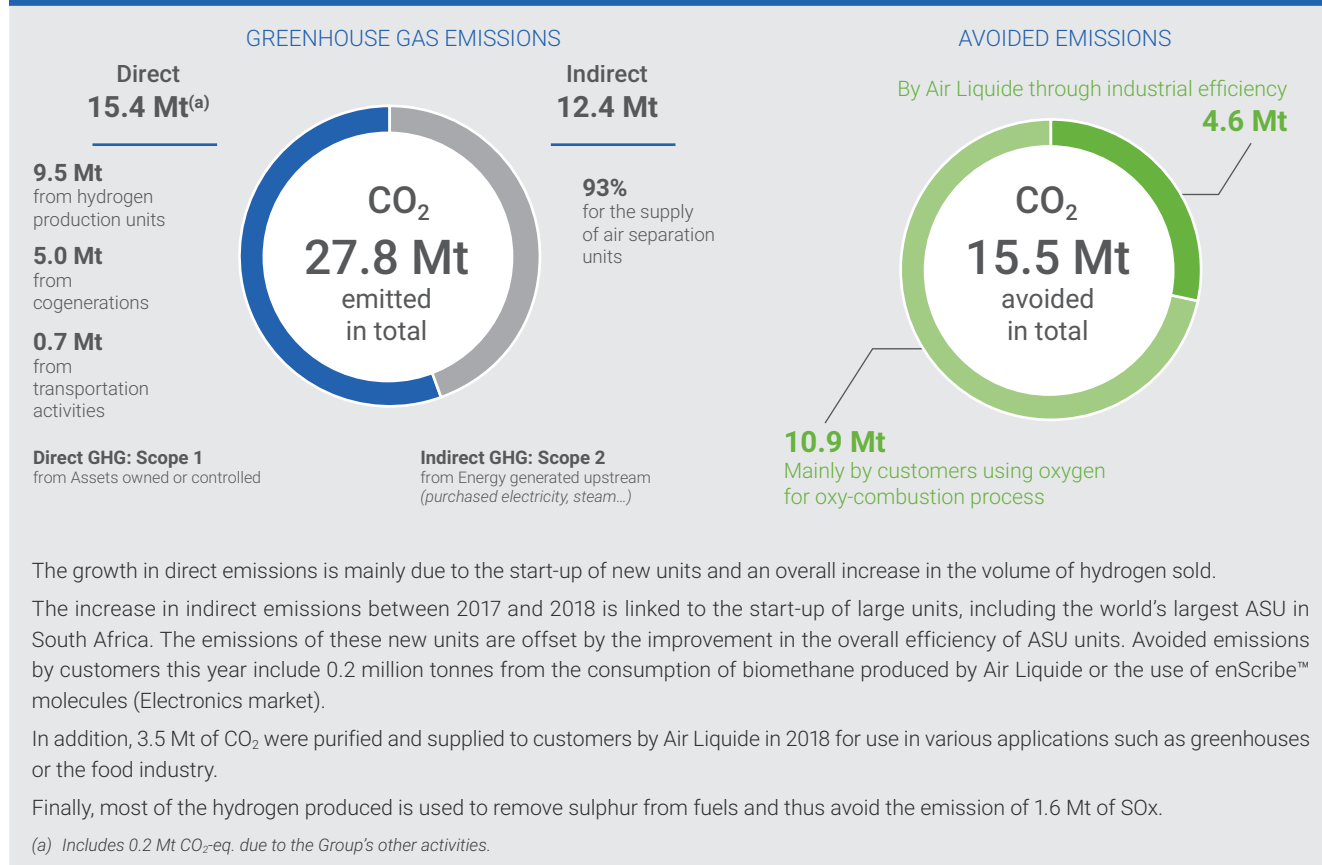
Creating a global hydrogen economy

Air Liquide is a key driver in the creation of a global hydrogen economy. The Group was one of the founders of the Hydrogen Council, a global initiative to share their vision and ambition for hydrogen to drive the energy transition and achieve climate change targets. Hydrogen can make final usages carbon-free, such as in transport, energy for industry or heating and residential electricity. At the same time, hydrogen can

play a major role in the storage of surplus energy in markets dominated by renewable energies.

Thus, in September 2018, Air Liquide inaugurated a pilot site for the production of carbon-free hydrogen: HyBalance. This 1.2 MW-capacity facility uses electrolysis technology to balance the electricity grid and store surplus electricity in the form of hydrogen that will be used in industry and transportation.

2018 report on Air Liquide's greenhouse gas emissions



5.3. DIALOG WITH STAKEHOLDERS IN 2018

For Air Liquide, dialogue with stakeholders is a strategic objective announced in the NEOS corporate program. Through ongoing discussions with its stakeholders, the Group is committed to:

- ▶ taking into account their issues;
- ▶ identifying priority development issues;
- ▶ sharing with these stakeholders its ambition to contribute to sustainability.

In this field in 2018, the Sustainable Development Department sponsored a survey on the expectations of civil society towards companies in partnership with five other French industrial groups within the

Observatory for Materiality. This survey was carried out by the Institut du Capitalisme Responsable, in partnership with the IFOP (the French Institute of Public Opinion) on a sample of 3,000 persons representing civil society in France, Germany and Poland in November 2018. This survey highlighted that civil society expected concrete measures from companies, in particular environmental and social measures.

Participants identified the major challenges arising from their country's current issues (survey carried out in mid-November 2018):

- ▶ France: the environment, unemployment, terrorism;
- ▶ Germany: immigration, the environment;
- ▶ Poland: healthcare, employment, purchasing power.

5.3.1. Employees



A new Human Resources strategy

In 2018, Air Liquide's Human Resources teams drew up a new Human Resources strategy which is in line with the Group's overall objectives.

Due to major environmental changes, the time had come to redefine priorities for the next three to five years.

This new strategy takes into account feedback from operations and employees to reflect the Group's diversity, business model and various regions. Our global Human Resources principles must be applied by taking into account local culture and context. Nevertheless, several fundamentals are necessary to create a common culture and state of mind among the various teams across the world.

Three societal trends fueled reflection on this new Human Resources strategy:

- ▶ the coexistence of several generations among whom the Company must facilitate interactions and engagement;
- ▶ digital transformation;
- ▶ the VUCA environment (Volatility, Uncertainty, Complexity, Ambiguity) of today's world.

In an environment which is undergoing profound transformation, Air Liquide has developed a Human Resources strategy to identify, attract, maintain and develop competent employees from all walks of life. This strategy is based on the following three priorities:

- ▶ encouraging employee engagement as a key factor of the Company's performance;

- ▶ developing an agile and collaborative structure which is more in line with global changes and employees' expectations;
- ▶ anticipating the "work of the future" to better understand future transformations (digital, artificial intelligence, etc.).



Key points

HUMAN RESOURCES OBJECTIVES

- ▶ 35% of women among managers and professionals;
- ▶ 33% of young graduates among manager and professional recruitments.

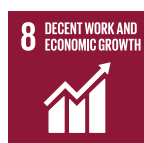
These objectives are described in greater detail in chapter 4, page 278 to highlight the gradual introduction of this strategy within the Group and take into account the risks identified in the chapter "Human resource management risks" on page 44.

To measure its implementation, an indicator for assessing employee engagement is currently being drawn up.

In 2018, 29% of Air Liquide's managers and professionals were female.

In 2018, 28% of Air Liquide's managers and professionals recruits among managers and professionals were young graduates.

5.3.2. Shareholders



2018 stock market performance and overall shareholder return

In 2018, the stock market performance of Air Liquide's share was 3.24% (vs. -10.95% for the CAC 40).

On the other hand, 29 allotments of free shares have been made since 1962.

At 31 December 2018, the overall financial performance of the Air Liquide share, i.e. the rate of return on invested capital, or Total Shareholder Return (TSR)^(a), amounts to:

END OF 2018 DATA

| TSR | 5 years | 10 years | 20 years |
|-------------------------------|---------|----------|----------|
| Air Liquide Registered shares | 8.5% | 12.6% | 9.6% |
| Air Liquide bearer shares | 8.2% | 12.1% | 9.1% |
| CAC40 reinvested dividends | 5.2% | 7.8% | 4.0% |

(a) The TSR is an annualized rate of return for a shareholder who buys his shares at the beginning of the period and resells them at the end of the period. This calculation takes into account the evolution of the share price, the dividends reinvested in shares as well as the allocations of free shares, both increased by the loyalty bonus, and includes the impact related to the increase capital of 2016.

Measures taken in favor of shareholders in 2018

Individual shareholders

Individual shareholders have been contributing to and supporting the Group's growth since its creation. Shareholders' trust and loyalty are key to Air Liquide's growth. For more than a century, the Group has been dedicated to involving them in its growth and has fostered a long-term relationship based on transparency, dialog and proximity.

At the end of 2018, more than 410,000 individual shareholders of the Group owned 32% of the capital, the highest percentage among companies in the CAC 40.

Meeting with shareholders

The Shareholders' Meeting: The 2018 Shareholders' Meeting welcomed 3,569 people and almost 130,000 votes are counted each year. The dates for the next Air Liquide Combined Shareholders' Meeting are Tuesday May 7, 2019; Tuesday May 5, 2020; and Tuesday May 4, 2021.

"Post-Shareholders' Meeting" conferences: the Chairman and Chief Executive Officer visits several towns and cities in France to present the Group's results, strategy and outlook.

Conferences and trade shows: the Director of Shareholder Services and his teams regularly meet with shareholders. Talks at business schools, universities and colleges are also organized, so that the future generations have an early awareness of the culture of the stock market and of the major role of the shareholder in financing the economy.

Institutional investors

The Investor Relations team met with more than 600 investors in 2018 during 18 roadshows, 22 conferences and many individual meetings. Members of the Executive Committee took part in some of these events.

In 2018, these roadshows and conferences were held in Europe, notably in London, Paris and Frankfurt, and in North America, primarily in New York, Boston and Los Angeles.

These meetings provided the opportunity to discuss subjects related to strategy and performance, Socially Responsible Investment (SRI) and corporate governance with investors. On November 30, 2018, an event was organized in Paris during which Air Liquide announced its Climate objectives.

Initiatives in favor of the climate: TCFD and SBTi

The Group believes that the major challenges facing our society can be met through active dialog. For this reason, it has been an active member of the TCFD (Task Force on Climate-related Disclosures), a task force which brings together institutional investors, audit firms and listed companies with the aim of developing recommendations for voluntary disclosures regarding financial risks linked to climate change. The TCFD's recommendations were published in July 2017.

Today, like all European companies, the Air Liquide Group applies the European Directive on extra-financial reporting for the publication of information corresponding to 2018. This directive includes all of the recommendation made by the TCFD, except for the financial forecast for climate-related measures.

Although the Group believes that improved reporting on climate-related opportunities and risks may be of significant help in responding to global climate change challenges, it also believes that these recommendations must be implemented in a fair manner in a global competitive environment in order to be efficient.

In the same spirit of dialog and openness, and driven by its Climate objectives, announced in November 2018, the Group is working towards taking part in the Science Based Targets (SBTi) initiative. SBT is a certification created by a coalition of players committed to environmental issues. It is used by companies to validate GHG emission reduction objectives in line with the 2°C average temperature rise scenario.

However, for the moment, there is no sector approach that is specific to the Group's businesses, which main characteristic is to serve a wide range of economic sectors. Moreover, SBT's current methodology does not take into account avoided emissions, which is one of Air Liquide's major commitments for reducing emissions beyond its own businesses. Air Liquide will continue its efforts and discussions with the SBT initiative to better value its actions in favor of the climate.

Employee shareholders

The Group wishes to continue increasing the involvement of its employees at the global level in its development by encouraging them to play a greater role in the capital of L'Air Liquide S.A.

The regular organization of Capital Increases Reserved for Employees (ESPP) allows employees to become shareholders under preferential subscription conditions.

Two and a half years after the 2016 offer, the AL FOR YOU 2018 offer – the 14th of its kind – has been a success which underlines the continued commitment of all employees to their Group.

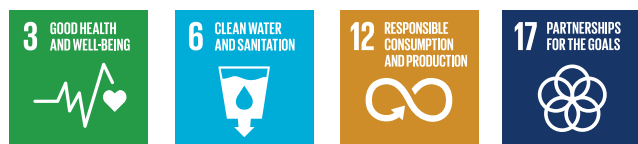
At the end of the second year of the Airgas integration, the results of the AL FOR YOU 2018 offer were as follows:

- 19,078 employees (and retired employees) – 29.4% of eligible staff – across 72 countries subscribed to a total of 1,049,529 shares;
- a +12.3% increase in subscriptions compared with 2016;
- a 29.4% participation rate (down slightly compared to the 2016 figure of -3.2%) – which should be viewed against the strong increase in the number of Group employees due to the integration of Airgas and the increase in the number of eligible retired employees (+23.1%).

At December 31, 2018, the share of capital held by the Group's current and former employees was estimated at 2.4%, of which 1.7% (within the meaning of article L. 225-102 of the French Commercial Code) corresponds to shares subscribed by employees during employee-reserved capital increases or held through mutual funds.

These employee share ownership transactions contribute significantly to increasing employee motivation and sense of belonging to the Group.

5.3.3. Customers and patients



Air Liquide contributes to its customers' performance

The Group pays particular attention to the satisfaction of its customers and patients and implements action plans to continuously improve it. Air Liquide, in particular, helps enable its industrial customers to operate in a safer, cleaner and more economic manner and supports them in their national and international expansion.

Customers: the focus of the Group's interest and actions

In an increasingly dynamic and competitive environment, Air Liquide focuses its attention on its customers and their satisfaction in order to provide them with long-term growth. To strengthen this priority, the Group Customer Department is supervised by a member of the Executive Committee.

The aim of this team is to contribute to the success of each of our 3.6 million customers and patients. The Customer Department is structured in a way which covers all business sectors and geographical regions, so that customers are the key focus of the Group's thinking and actions. The team is also the control center for customer satisfaction measurement and customer experience improvement programs, the

management of the Group's strategic accounts, commercial excellence and the sharing of best practices across regions and the Group's various business sectors.

Successful customer commitment

In 2018, feedback from tens of thousands industrial customers was received and showed that 85% of them are satisfied or very satisfied with Air Liquide. Customers particularly appreciate the quality of the Group's products and services, safety standards, as well as the attitude and efficiency of the teams with which they are in contact.

Partnership with patient associations

Air Liquide supports patient causes as part of its partnership with organizations which work to raise awareness and support treatment for chronic diseases. Air Liquide Healthcare and its entities support patient associations in all countries in which the Group is present. For example:

- Air Liquide is currently working in partnership with IDF Europe (International Diabetes Federation Europe), the European branch of the International Diabetes Federation, supporting it in its information and awareness-raising actions among patients suffering from diabetes, the general public and European public authorities.

Dietary behaviors are changing deeply and are being globalize. Consumers are now looking for a more responsible, healthier, safer food. This involves a reinvention of the agri-food chain in which Air Liquide is actively involved.

- The Group also supports IDF Europe in promoting diabetes research with the 2018 IDF Europe Young Researcher Prize which rewards the work of a young researcher under 40 who is involved in research aimed at improving the health of diabetic patients.

5.3.4. Sustainable procurement



The Group attaches great importance to the ability of its suppliers to offer long-term partnerships and to ensure a high level of safety, reliability, competitiveness and innovation, while guaranteeing that ethics, Human Rights and Sustainable Development are also taken into account.

Air Liquide rewarded as a supplier

In 2018, and for the third year in a row since 2016, Air Liquide was scored 67/100 by EcoVadis. This score puts the Group in the "Gold" category as an "advanced" supplier in terms of Sustainable Development (only 5% of suppliers fall within this category, which is the highest ranking). EcoVadis is the main global rating platform for the social and environmental performance of supply chains. The assessment covered the environment, social, business ethics and sustainable procurement. Air Liquide also works with this platform to assess the sustainable development performance of its own suppliers.

A recognized sustainable procurement approach

In April 2018, Air Liquide received recognition from EcoVadis in the "Sustainable Procurement: Stakeholder Engagement" category. These awards recognize best-in-class practices and commitment to founding sustainable procurement programs.

In May 2018, Air Liquide China and E&C China provided Sustainable Procurement training to around one hundred Chinese suppliers during a "Suppliers Day" in partnership with EcoVadis. Three suppliers received the "Air Liquide China 2017 Excellent CSR Supplier Award".

Sustainable procurement for all

In October 2018, the Group Procurement Department organized its first Business Meeting for the adapted and protected work sector with HandivAirsity which was launched by the Group in 2017. Among the one hundred or so guests, 15 ESATs (Organizations for the social and professional integration of disabled persons) and EAs (Adapted Companies) as well as our partner Handeco gave presentations to key players within the Group covering a wide range of businesses and services across the whole of France.

5.3.5. The Air Liquide Foundation and local communities



Created in 2008, the Air Liquide Foundation represents the Group's commitment to being a responsible enterprise. To celebrate its 10th anniversary, the Foundation has stepped up its actions with a 5-million euro budget for a new five-year term. The Air Liquide Foundation provides financial, material and Human Resources means to the projects which it supports in the countries where the Group is present.

In 2018, the Foundation approved projects in 21 countries, including one new country, Paraguay:

- ▶ three environmental research projects on climate change, methane flux in the marine environment and plastic atmospheric pollution;
- ▶ three healthcare/breathing research projects on respiratory tract infections in chronic respiratory pathologies and cystic fibrosis sufferers;
- ▶ 28 local development micro-initiatives in the fields of education and training, access to care, disability, social welfare and access to water and energy.

Over the past ten years, the Air Liquide Foundation has supported more than 300 projects in 52 countries. A dedicated website enables projects to be directly submitted online, in French or English. The website address is: www.fondationairliquide.com.

In 2018, the Air Liquide Foundation's Board of Directors welcomed a new qualified member, Dr. Sophie Szopa, a specialist in atmospheric chemistry at the Laboratoire des Sciences du Climat et de l'Environnement in Paris Saclay. This new appointment highlights the Group's commitment to air quality.

Moreover, in 2018 Air Liquide SA launched a micro-donation initiative to get employees involved in the Group's solidarity commitment. The micro-donation initiative allows employees to make a donation to the Foundation each month. The amount is automatically deducted from their payslip. The micro-donation is matched by Air Liquide S.A. (1 euro for 1 euro). Micro-donations collected are used to support the joint action of Group employees and NGOs in favor of educational programs and youth training courses in France and Africa.

Focus on the Foundation Awards

The Air Liquide Foundation Awards recognize the most innovative organizations among the ones supported by the Foundation. During the second edition (February 2018), two scientific organizations were singled out in the Research category for their projects promoting the environment and health.

New this year, the 2018 Awards for Societal Commitment also honored the commitment of Group employees working alongside associations on citizenship projects supported by the Foundation. In all, six employees and six organizations received awards. The Group's employees also awarded a special "Coup de coeur" prize to a project supported by Air Liquide employees.

5.3.6. Relationships with the public sphere

As part of its "Public Affairs" policy, in 2018 Air Liquide introduced transparency measures as recommended in the law relating to transparency, the fight against corruption and the modernization of economic activity (the Sapin 2 Law).

Air Liquide, listed since the end of 2017 in the "Interest Representatives" register which is managed by the High Authority of Transparency in Public Life (Haute Autorité pour la Transparence de la Vie Publique – HATVP), thus made its first disclosure in 2018 for interest representation activities for the July-December 2017 period. This disclosure can be accessed by the public on the HATVP's website (www.hatvp.fr).

In addition to compliance with the relevant laws and decrees, Air Liquide's Public Affairs teams in France have increased discussions and information sharing regarding the various interest representation measures relating to the Air Liquide businesses which they represent, both directly and indirectly via boards and professional bodies. These discussions, which took place throughout 2018, helped identify new measures with our counterparts in the public sphere that were better coordinated and more cross-divisional between the Group's various businesses in France and which offered greater clarity in our messages.

Air Liquide's Public Affairs teams will continue with this constructive momentum in 2019.

6. Innovation

6.1. TRANSFORMING THE GROUP AND PREPARING FOR FUTURE GROWTH

The Group's innovation expenses amounted to **300 million euros** in 2018. This amount is higher than that of the past five years. Innovation expenses correspond to the OECD definition, namely research and development, market launch and marketing expenses for new offerings and products.

Likewise, applying the OECD definition, **4,000 employees** work in entities dedicated to innovation or that contribute to innovation through the development and the market launch of new offerings and products.

Patented inventions contribute to the Group's competitiveness and the specialization of its offerings, and highlight the Group's capacity for technological innovation. **309 new inventions** were protected in 2018. These are complemented by third-party intellectual property rights, obtained by partnerships, which allow the Group to test new technologies and digital solutions. Air Liquide has a portfolio of 3,395 inventions, which are protected by at least one patent. Air Liquide's portfolio has more than 11,000 patents.

The **maturity** of this innovation approach helps **reduce development time and the market launch** of innovative solutions. It relies on the **Assets – Customers – Ecosystems (ACE) approach**: the Group focuses on the continuous improvement of its Assets by integrating new technologies and new ways of working, developing differentiating solutions for its Customers and patients, and drawing on its internal and external Ecosystems.

The Group focuses its innovation expenses on the three subjects related to the major trends shaping the Group's markets (see page 33): **energy transition, healthcare and digital transformation**. The proliferation of innovative technologies and solutions in the **energy transition** field, drawing on the strength of digital solutions and their integration in ecosystems, allowed the Group, in 2018, to **commit to low-carbon growth** as part of its Climate objectives.

Finally, the Group relies on a dedicated structure (see page 35). The Innovation & Development Division (IDD) steers the innovation strategy on behalf of the Group's hubs and operations, with support from the **Innovation Campus** and the **Labs**.

6.2. INNOVATE FOR LOW-CARBON GROWTH

The Group intends to dedicate around **100 million euros of its Innovation expenses** every year to reduce its carbon footprint and that of its customers. In addition to Innovation expenses, cumulative capital expenditure since 2014 totaled around 300 million euros in biomethane and hydrogen mobility.

6.2.1. Innovate to reduce carbon emissions

Assets (A)

The Group develops technologies to reduce its own emissions and offers cleaner solutions for other CO₂-emitting sectors: the Innovation

teams are currently working, for example, on improving the **energy efficiency** of production units, as well as on CO₂ capture and valorization technologies (CCS and CCUS).



Reducing the CO₂ emissions of our assets through energy efficiency

Air Liquide and Covestro signed a contract to supply hydrogen at Covestro's production site located in the port of Antwerp, Netherlands. The Group will invest 80 million euros to build a "new generation" hydrogen production unit. This new generation production unit will produce hydrogen **by recovering steam** produced during the process and **recycling** it as energy to power the production process. This technology, which **will reduce CO₂ emissions by 22,500 tons per year**, was developed by the R&D and Engineering & Construction teams.

To improve the energy efficiency of combustion in the steel and glass industries, Air Liquide provides **oxy-combustion solutions**. This process consists of enriching air with oxygen to reduce energy consumption, and is illustrated by the roll out of the **HeatOx** offering, in particular in China.

Moreover, by combining its **digital expertise** with its technological capabilities, Air Liquide plays an innovative role in **digital solutions** which help **optimize production operations**, with the implementation of Smart Innovative Operations (SIO) centers to remotely manage its production units in France, China and South-East Asia. The Group is also developing new solutions to **optimize the distribution channels** of its trucks which transport liquid products and cylinders.



Improving the performance of our assets, thanks to digital solutions

One year after the launch of its first remote operation center in France, in January 2018 Air Liquide inaugurated its *Smart Innovative Operations* (SIO) center for the *South-East Asia Pacific region*, located in Malaysia. The SIO Center enables the remote management of production for 18 Air Liquide Large Industries production units spanning eight countries across the region, as well as optimizing energy consumption and improving reliability at these sites. Air Liquide invested 20 million euros in this project. The SIO Center enables 24/7 responsiveness to customer demand and **improves production-unit energy efficiency**. It also uses predictive maintenance to anticipate certain equipment failures and program maintenance operations. In the connected plants, new digital technologies are being deployed to simplify maintenance and inspection management operations.

In **Healthcare**, new **patient telemonitoring solutions** and the ability to observe in real time and remotely the usage of medical devices, has helped reduce the number of house calls to patients suffering with sleep apnea, while also improving the quality of monitoring. Air Liquide's Healthcare teams can now intervene all along the patient path. Combined with the optimization of home visits, innovation in telemonitoring in France helped **reduce the number of kilometers traveled in 2018 by 800,000**, the equivalent of 150 tons of CO₂, despite an increase in the number of patients cared for compared with 2017.

Customers (C)

Innovation also focused on the **introduction of new low-carbon offerings and solutions** for the Group's customers. The Group aims to expand the **circular economy**, through the production and usage of biomethane. The Innovation teams are working on the purification and valorization of biogas, including the Group's membrane technology, as well as the production and injection of biomethane into the network and its distribution, in particular in fuel form (bio-NGV – bio Vehicle Natural Gas) a renewable non-fossil fuel which allows to reduce the carbon footprint of 90% and particulate matter emissions of 85%, compared to diesel.



Expanding the circular economy through biomethane

In 2018, Air Liquide commissioned **new biomethane production units in the United States, France and the United Kingdom**, considerably increasing its biomethane production capacity which now stands at 600 GWh for a full year of production. The Group operates 12 production units around the world, designed to purify biogas to transform it into biomethane and inject it into the natural gas network. The new biomethane facility in the United States, which was inaugurated in 2018 at the Northeast Mississippi Landfill (NEML) site, is the first large-scale unit built by Air Liquide in the United States. It purifies biogas from household waste treatment sites and transforms it into biomethane. In Europe, the units purify biogas from farm waste and transform it into biomethane. Part of this biomethane is used for trucks fueled by bio-NGV. In Cestas, near Bordeaux, Air Liquide inaugurated in 2018 a biomethane production unit and a multi-energy charging station nearby. Thanks to its control of the entire biogas valorization chain, Air Liquide is rolling out its clean mobility offering in France for road transport. By replacing fossil fuel with biomethane, a renewable energy, the Group is committed to a circular economy approach in favor of energy transition.

The Group's increased biomethane production reflects the **strong growth in new energy transition markets**, and Air Liquide's commitment to rolling out clean transport solutions for its customers.



Customers: an energy-saving cryogenic solution based on the Turbo-Brayton technology

Air Liquide has developed an **innovative and efficient cryogenic refrigeration solution**, based on its Turbo-Brayton technology, which enables the refrigeration and liquefaction of gases between 25K (-248°C) and 200K (-73°C). This solution **saves energy** as a result of its components, thanks to the automatic adjustment of the engine's speed depending on the level of refrigeration capacity required and thanks to a reduced footprint. Moreover, no oil is required for the engine to work, which is a real environmental advantage. This technology is currently mainly used to re-liquefy natural gas boil-off transported by tankers in liquefied form. In 2018, Air Liquide sold 16 cryogenic solutions based on its Turbo-Brayton technology.

Ecosystems (E)

Air Liquide continues to invest in **low-carbon hydrogen production assets** and announced, in 2018, an investment in a carbon-free hydrogen pilot plant in Denmark and in the first major liquid hydrogen production unit for the hydrogen energy market in the Western United States. Air Liquide plans to invest more than 150 million US dollars to build this plant with a generation capacity that will fuel 35,000 Fuel Cell Electric Vehicles. The Group has also signed a long-term contract with FirstElement Fuel Inc. (FEF), a major player in hydrogen distribution in the United States. This new plant is the first large-scale investment to support hydrogen energy solutions. Air Liquide and FEF have entered into an agreement outlining Air Liquide's intention to make an equity investment in FEF, a company which is already supported by Toyota and Honda.

The teams continue to innovate in hydrogen production and distribution processes.



Ecosystems: producing carbon-free hydrogen

Air Liquide inaugurated **HyBalance** in Hobro, Denmark, a **pilot site for the production of carbon-free hydrogen**, in partnership with Hydrogenics, LBST, Neas Energy, Hydrogen Valley, and with the support of Fuel Cells and Hydrogen Joint Undertaking (FCH JU). This facility uses electrolysis technology and allows for balancing of the electricity grid and storing of surplus electricity in the form of hydrogen that will be used in industry and transportation. Denmark is a pioneer in the integration of renewable energies into the national energy mix, with 40% of the country's electricity produced by wind turbines. By compensating for renewable energy intermittency, hydrogen offers a **solution for storing surplus electricity** to meet the challenges posed by the energy transition. In addition to industrial customers, the hydrogen that is produced is used to supply the network of five hydrogen charging stations installed and operated by the Copenhagen Hydrogen Network (CHN), a subsidiary of Air Liquide in Denmark.



Key points

Blue Hydrogen® is an Air Liquide initiative that aims to gradually lower the carbon content of its hydrogen production dedicated to energy applications. More precisely, Air Liquide is committed to achieving at least 50% of the carbon-free hydrogen necessary for these applications by 2020, by combining:

- the use of low-carbon energies, water electrolysis and reforming of biomethane;
- capture, storage and valorization technologies for the CO₂ emitted during the production of hydrogen from natural gas.

Even when produced using natural gas, hydrogen is a virtuous energy: over an equal distance traveled, the use of Fuel Cell Electric Vehicles decreases greenhouse gas emissions by 20% compared with combustion vehicles and does not emit any particulate matter.

Moreover, following the commitment which was confirmed in September 2018 by the Hydrogen Council (co-chaired by Air Liquide), 100% of hydrogen for mobility applications will be carbon-free by 2030.

The Group has designed and installed **120 hydrogen charging stations** for mobility around the world to date, providing it with feedback from its teams and partners to improve its customer experience and reduce costs ahead of a large-scale deployment.

To improve driver's user experience, Air Liquide has launched the **H2 Station Finder** mobile app which allows drivers to locate the closest hydrogen charging station, consult its capacity levels, and monitor the amount of CO₂ emissions avoided by charging their vehicles with hydrogen energy. This application was launched in California, where the Group has built hydrogen charging stations in Anaheim, Palo Alto, and at Los Angeles International Airport. It is also available in France.



Ecosystems: stepping up the roll-out of hydrogen charging stations

In **France**, Air Liquide has inaugurated a new hydrogen station in Loges-en-Josas, near Versailles. Designed and installed by Air Liquide with the support of the FCH JU and the European program 3Emotion, this station will fuel the hydrogen-powered buses launched in 2019 to run between Vélizy and Versailles. This is the third station that has been installed by Air Liquide in the Greater Paris Area and follows those commissioned near the Pont de l'Alma in Paris and the Paris-Orly Airport. With this new station, Air Liquide continues to support the growth of the 100-strong fleet of the "Hype" Parisian hydrogen-powered taxis by making a new charging station available.

In **Germany**, Air Liquide is a founding partner of "H2 Mobility Deutschland" joint venture, created in 2015. Great Wall Motor (GWM, China) joined the joint venture in October 2018. 60 hydrogen stations open to the public are in operation in Germany. Among them, 22 are based on Air Liquide technology, including 10 delivered in 2018.

In **Korea**, Air Liquide announced the installation of four new hydrogen charging stations for mobility, as part of the government's plan to install 310 stations for 81,000 Fuel Cell Electric Vehicles across the country by 2022.

In **Japan**, Air Liquide and 10 large Japanese companies, representing several industries and finance, created the "**Japan H2 Mobility**" consortium. This was in line with the Japanese government's ambition, to develop a large-scale hydrogen infrastructure in order to build a network of 320 stations by 2025, and 900 by 2030. Almost 110 stations are already in operation in Japan to date. Initially, the member companies of the "Japan H2 Mobility" consortium aim to provide 80 new hydrogen charging stations over the next four years, to recharge a fleet of nearly 40,000 Fuel Cell Electric Vehicles. Air Liquide will install and operate around twenty stations by 2021.

In **China**, Air Liquide and **Chinese start-up STNE** (Shanghai Sino-tran New Energy Automobile Operation CO., Ltd.) signed a partnership agreement to accelerate the roll out of hydrogen-powered electric truck fleets. This partnership includes the acquisition of a stake by Air Liquide in the Chinese start-up STNE, a hydrogen logistics platform for the urban delivery of goods. STNE aims to run a fleet of thousands of trucks and operate a network of around 10 hydrogen stations by 2020. Air Liquide has also signed a partnership agreement with Chengdu Huaqi Houpu Holding (HOUPU) to develop, manufacture and commercialize hydrogen charging stations in China.

6.2.2. Innovate to improve air quality

In large metropolitan areas worldwide, air quality is a major challenge: many citizens remain exposed to air pollution levels which exceed the World Health Organization's recommendations. Air Liquide is developing **solutions to improve air quality**, in particular through the use of cryogenic molecules for the refrigerated transportation of products.

Air Liquide's expertise in cryogenics has led to the development of the **Blueeze™** offering, a cryogenic refrigeration unit for the refrigerated transportation of products. This silent and innovative solution reduces particulate matter by 90% compared with diesel. Combined with bio-NGV, this solution represents real ecological and economic advantages for carriers, by reducing the carbon footprint of trucks.

Air Liquide is working on pilot projects to purify outdoor air in urban locations, through the capture of particulate matter, for polluted public areas such as underground platforms and stations.



Ecosystems: improving air quality

As part of the "Innovation for the air in our stations" call for tender by the Île-de-France region, Air Liquide will test an innovative solution in an SNCF train station in Paris. This solution uses a technology which consists of electrically charging particulates to capture them by forming aggregates that are easier to recover.

Air Liquide is also working on a pilot **indoor air purification solution**. Selected by Urban Lab, the experiment business of the City of Paris' development and innovation agency Paris&Co, this solution purifies indoor air by treating ventilated air within a building to reduce the CO₂ concentration of the indoor atmosphere. By simultaneously replacing fresh air with recycled air, the building's energy consumption is reduced. This procedure is based on a gas purification technology that the Group has mastered for a long time – adsorption. This technology captures certain gas molecules for better air quality. This trial system, which is installed in a building in France, will allow to validate and roll out this solution in commercial premises or with industrial customers.

6.3. A DEDICATED STRUCTURE TO DRIVE THE GROUP'S INNOVATION STRATEGY

The Air Liquide Group's **Innovation & Development Division (IDD)** drives the Group's innovation strategy and contributes to its transformation. This division brings together:

- **R&D**, with a focus on science and the knowledge of Essential Small Molecules (oxygen, hydrogen, nitrogen, CO₂, etc.) which constitute the Group's scientific territory;

- the drive and financing of **Engineering & Construction's Innovation initiatives**;
- the **Digital** teams (including i-Lab, La Factory and ALIZENT) which work with the Information Technology (IT) teams, to support the roll out of digital solutions;
- the **Global Markets & Technologies World Business Unit**, which provides technological solutions for new markets such as energy transition, maritime logistics and deep tech;
- the **Hydrogen Energy World Business Unit**, which focuses on markets opened by the use of hydrogen in energy transition and the hydrogen economy;
- **ALIAD**, Air Liquide's capital venture arm, whose role it is to invest in minority stakes in technology start-ups;
- the Group's **Intellectual Property** Department.

6.3.1. Digital solutions to boost innovation

2018 saw the **roll out**, in groups of countries (clusters) and Operations, of **digital solutions** designed and developed by La Factory and the Digital Fabs, reflecting the maturity and efficiency of the **Group's Digital transformation approach** which it launched in 2016.

The Digital Fabs work on specific subjects and steer the digital transformation approach related to a given business line or Corporate Function, drawing on the expertise of flexible multi-disciplinary teams, including various IT, World Business Line, Operations and Digital teams. In 2018, the *Large Industries Fab* continued with various initiatives, and contributed in particular to the rollout of the Smart Innovative Operations program, for example, the predictive maintenance approach implemented at more than 160 Group sites. This program contributes greatly to the Group's efficiency programs. The *Business Performance Management Fab* rolled out the BIG project, a shared platform within Air Liquide which compiles several data sources (financial, HR, safety, operations, etc.) and provides access to this information which is collected, sorted and analyzed using visual and interactive dashboards. Almost 5,000 employees use this platform to date. The *Customer Experience Fab* contributed to the Voice of Customers program, as was the case with the pilot program developed with the Operations teams in Benelux to simplify and improve their Customer services teams' experience. The *New Ways of Working Fab*, which contributed to supporting the teams in their transitions to a collaborative approach, greatly expanded the LINK platform which is used to share digital initiatives implemented in Operations and best practices. The new *Healthcare Fab* focused on the customer and patient experience.

To support digital transformation, La Factory contributed key expertise to various projects in terms of design, development, user research and in the data field. Moreover, the Group's **Data & Decisions Lab (d2Lab)** continued its work on data analysis, machine learning and artificial intelligence, as well as on financial mathematics and game theory.

6.3.2. Campuses to unite innovation ecosystems

In 2018, Air Liquide stepped up its open innovation strategy with the creation of **Innovation Campuses** in Europe, the United States and Asia, to **unite the innovation ecosystems** in which the Group has played a major role for many years.

These Innovation Campuses unite, in the same building, **the teams which contribute to innovation**, in particular the R&D teams, operational Business Development teams which are responsible for the local implementation of innovation as soon as it is launched, World Business Line employees, and the Innovation & Development teams.

These campuses are an integral part of the Group's **open innovation approach**. For many years, Air Liquide has adopted a **co-development approach for its solutions**, from the R&D to launch phases and right through to the end user, with its **customers, suppliers, universities and start-ups**. Campuses allow the Group to benefit from new expertise, favor new collaborative work methods, and thus bring innovative offerings to market more rapidly.



Inauguration of the Paris Innovation Campus

In September 2018, Air Liquide inaugurated its new **Paris Innovation Campus** on the Plateau de Saclay, in France. This campus brings together almost 500 employees, including 350 research staff, and has 48 laboratories. It is a high-energy performance building which allows new clean energies to be tested. During the inauguration, Air Liquide announced that in 2019 the Campus will host a **deep-tech start-up accelerator**. Not only will Air Liquide host start-ups but will grant them access to shared experimental facilities and customized support from Air Liquide experts, with the objective of accelerating the industrialization of their offerings.

Open on the world, this Campus benefits its location in the Plateau de Saclay to establish **many partnerships** with **research institutes** such as **the CEA, the CNRS, and the Institut de Recherche Technologique Systemx** on predictive maintenance, **the Institut Photovoltaïque d'Île-de-France (IPVF)** to develop technologies capable of producing high-yield low-cost solar cells, the **Additive Factory Hub** (additive manufacturing), as well as several collaborations with France's Universities and Grandes Écoles (Paris-Sud, Polytechnique, Centrale, etc.).



Scientific partnerships

For example, the Group created in 2018 a **shared laboratory with the CEA** to pool their complementary expertise and know-how in cryogenics – the analysis and production of very low temperatures – aimed, in particular, at space industry applications and fusion. This initiative showcases the long-term partnership between Air Liquide and the CEA as well as Air Liquide's commitment to researching groundbreaking solutions for deep tech markets.

In 2018, Air Liquide became a founding member of the **Fondation Université Grenoble Alpes**, aimed at promoting technological innovation and the development of educational and scientific innovation using an entrepreneurial and collaborative approach.

In Healthcare, the Group has continued its partnerships with the **Institut Pasteur** on new therapeutic applications of medical gases and with the Institut du Cerveau et de la Moelle épinière (Brain and Spine Institute) in neurodegenerative diseases. In 2018, Air Liquide formed a partnership with IDF Europe (International Diabetes Federation European Region), to support it in its information and awareness-raising actions among patients suffering from this condition and European public authorities, and to help advance diabetes research.

A global network

Since December 2018, the **Frankfurt Innovation Campus** houses the **High Temperature Center (HTC)**, composed of the Engineering & Construction teams and the R&D teams, to develop and industrialize innovative technologies related to the production and management of the two key molecules in energy transition: hydrogen and CO₂.

In the **United States**, Air Liquide and its subsidiary Airgas inaugurated, in November 2018, an **Advanced Fabrication Center at the Delaware Innovation Campus**. This Advanced Fabrication Center is devoted to the joint-development of technological solutions for manufacturing processes. It brings together experts from Air Liquide specialized in plasma and electric arc welding and cutting, in laser and additive fabrication, and in robotic and cobotic welding, and is equipped with new state of the art equipment and technology provided by partners for the purpose of carrying out tests, to better meet the needs of end-users.

Air Liquide works in partnership with several **DoE (US Department of Energy) laboratories** and participates in six multi-partner consortia, in particular the CAPD, led by the Carnegie Mellon University working on decision-making tools for the optimized management of production units and distribution. The **Delaware Innovation Campus** also enjoys numerous partnerships with Cornell, Carnegie Mellon and Delaware Universities in addition to Wharton Business School (University of Pennsylvania), in the fields of data science and artificial Intelligence, to improve the client/patient knowledge. In Canada, Air Liquide is working with the University of Montreal on the treatment and monitoring of patients suffering from Chronic Obstructive Pulmonary Disease (COPD).

The **Shanghai Innovation Campus**, which was opened in 2016, and which houses almost 250 employees including researchers, experts in customer applications and business development teams, has become a major center of innovation for the Group in the Asia Pacific region. It is home to the Smart & Innovative Operations remote management center for Air Liquide's production units in China. It has formed partnerships with **the Universities of Shanghai, Zhejiang and Jiatong**.

Finally, Air Liquide has completed the construction of its **Tokyo Innovation Campus**, in **Japan**, which as of 2019 will house the R&D, Global Markets & Technologies, ALTEC and Business teams in the city of Yokosuka, near Tokyo. This campus works in partnership with Kyoto University and Nagoya University on organic metals in gas separation and storage.

More than 60% of Research and Development projects were conducted under partnerships with laboratories, start-ups, industrial players and customers in 2018. Air Liquide steers 75 industrial partnerships and 126 scientific partnerships, and supports two research chairs in France with the École Centrale Paris and the Mines ParisTech.

To identify new partners, in 2018 Air Liquide launched its second **Scientific Essential Small Molecules Challenge**, aimed at boosting R&D as part of its open innovation approach. This year, the three topics selected aim to improve air quality and prevent global warming. This Scientific Challenge is open to teams from universities, private Research & Development departments, start-ups and public or private Institutes.

6.3.3. Dedicated Labs

In addition to its Innovation Campuses, the Group relies on labs, which focus on specific themes:

- the **i-Lab** for new usages and new methods of consumption, to identify and test new growth opportunities, via a user-centric approach;
- **La Factory** which brings together designers, developers, data scientists and user researchers to deliver digital solutions, in particular through the creation of prototypes that are then rolled out within the Group. It also develops digital practices;
- the **m-Lab (molecule Lab)**, focused on science and Essential Small Molecules (oxygen, nitrogen, hydrogen and carbon dioxide), which integrates recent advances in scientific knowledge and is constantly inventing new usages for these Essential Small Molecules, based on their unique properties;
- the **d2Lab**, dedicated to data science and decision sciences, aimed at developing the Group's scientific excellence in data analysis, financial mathematics and game theory, artificial intelligence and machine learning.

6.4. RECOGNIZING GROUP TEAMS WHICH CONTRIBUTE TO INNOVATION

The Group's innovation strategy relies on the creativity, curiosity and ability of its teams to deliver which is key to allowing Air Liquide to reinvent its business, anticipate the challenges of its markets and take into account the new usages of its customers and patients. The Group has not only implemented **internal programs** to encourage and recognize the talent and expertise of its technical experts who contribute to innovation, but also, since 2014, the talent of its internal entrepreneurs.

The **recognition of technical expertise** is a key factor for innovation. The Group has introduced **Technical Community Leaders (TCL)**, a promotion and recognition program for the technical field and for the expertise of Group employees which has six levels. Each level is a progression in terms of responsibilities, recognition and influence. Since the launch of TCL in 2003, **more than 3,000 Air Liquide experts** have been recognized, and play a key role in the sharing of knowledge and best practices, transferring technical expertise and developing the long-term expertise that Air Liquide will require in the future. In 2018, two Senior Fellows, five International Fellows, 21 International Senior Experts and 66 International Experts received this recognition.

The **#iNVENT** recognition program rewards **employee inventors** of patented inventions that are successfully marketed, or that give the Air Liquide a competitive advantage. Moreover, a trophy is awarded for the best invention of the year, selected from among the patent applications filed within each business in the past two years, and a bonus to inventors when a patent is delivered. This program ensures that inventors are rewarded quickly and the portfolio of inventions is managed more efficiently. More than **3,000 rewards** have been awarded to inventors employed by Air Liquide since 1997. These patented inventions mainly come from the employees in the Group's R&D, Engineering & Construction and Global Markets & Technologies teams, but also from certain operating entities.

Air Liquide also recognizes its **employee entrepreneurs** who contribute to innovation by imagining new ways of developing the Group's business or by adapting Group offerings to make them more customer-centric. In 2018, Air Liquide honored 102 internal entrepreneurs, in Paris and in all its hubs, during its annual Be Innovation event.

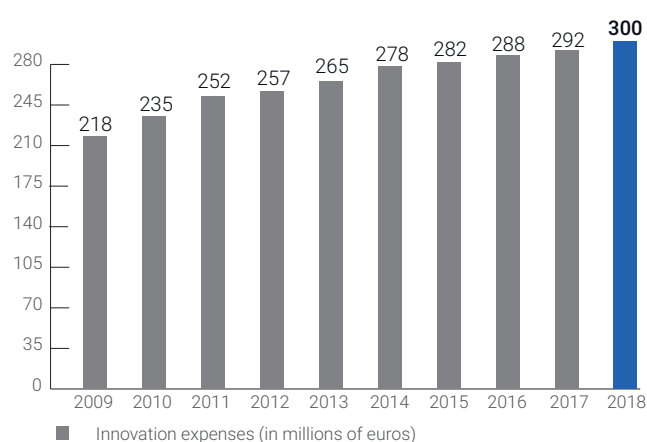
This collective intelligence approach, which involves the creation of transversal teams, with a strong diversity of profiles, contributes to the efficiency of innovation.

6.5. INNOVATION INDICATORS CONCERNING THE GROUP AS A WHOLE ^(a)

AS AT DECEMBER 31, 2018

| | |
|--|---------------------------------------|
| Number of employees working on innovation | 4,000 |
| including researchers | 1,200 researchers of 41 nationalities |
| including Global Markets & Technologies employees | 1,900 |
| including employees working on innovation in other entities | 900 |
| R&D industrial partnerships | 75 |
| R&D scientific partnerships (academic and technology institutes) | 126 |
| Start-ups collaborating with the Group | 100 |

INNOVATION EXPENSES



PATENTS

| | 2014 | 2015 | 2016 | 2017 | 2018 |
|---|-------|-------|-------|-------|-------|
| Number of inventions protected by at least one patent | 3,369 | 3,200 | 3,363 | 3,335 | 3,395 |
| New patent applications filed during the year | 287 | 271 | 296 | 318 | 309 |

(a) Applying the OECD definition.

OUTLOOK

2018 was a particularly strong year, whether we are looking at sales growth to 21 billion euros and the rise in net profit to 2.1 billion euros or the efficiencies and synergies achieved as well as the high level of industrial investment decisions.

Sales growth is the highest since 2011. All activities / businesses are growing, in particular Gas & Services activities, which account for 96% of the Group's revenue, with the last quarter particularly dynamic in Electronics and Industrial Merchant. From a geographic perspective, growth was also seen across the Board, especially for the Americas and Asia Pacific, particularly China.

The Airgas synergies are achieved a year ahead of schedule, confirming that the integration is now successfully completed. In addition, operating efficiency objectives were surpassed, contributing to the improved operating margin in Gas & Services, excluding the energy impact. As of 2019, the annual efficiency objective is raised to 400 million euros for the Group, which is 100 million euros more than the objective initially announced in the NEOS company program.

Cash flow grew and contributed to a significant reduction in the debt ratio, to 69%. The Group's balance sheet is strong and its ROCE improved, reaching 8.3% excluding the currency impact, in line with the NEOS objective.

In a context where industrial opportunities remain substantial, the Group's investment decisions reached more than 3 billion euros. Investment backlog amounted to 2.2 billion euros, supporting future growth.

Accordingly, assuming a comparable environment, Air Liquide is confident in its ability to deliver net profit growth in 2019, calculated at constant exchange rate.

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INTRODUCTION

Air Liquide's ambition is to lead its industry, deliver long-term performance and contribute to sustainability.

As part of its sustainable development strategy, the Group aims:

- to prevent global warming and to improve air quality;
- to strengthen dialog with all its stakeholders.

Climate issues and the energy transition are major subjects. Air Liquide strives to actively participate in the transition to a carbon-free economy by committing to improving air quality and limiting CO₂ emissions into the atmosphere.

Listening to and in-depth dialog with various stakeholders help Air Liquide better understand usage trends and reinforce its measures, in particular those in favor of the environment and local development.

Chapter 1 of the Reference Document presents the Group's integrated strategy, along with its financial, environmental, and societal performance.

Chapter 4 presents the Group's environmental and societal achievements, coupled with the related reporting. These achievements are monitored using key indicators which indicate their change. Just like the Financial Report, this Environmental and Societal Report is reviewed each year by an independent verifier. In 2018, 13 industrial sites and subsidiaries were audited.

For further information, the Group's website has a section dedicated to Sustainable Development: <https://www.airliquide.com/group/ambition-commitments-objectives>.

ENVIRONMENTAL ACHIEVEMENTS

In addition to the environmental performance presented in chapter 1 on page 70, this section highlights the Group's other environmental achievements, particularly in the areas of energy, water, biodiversity and air quality preservation.

1. Energy



Key points

The Group's electricity procurement

70%

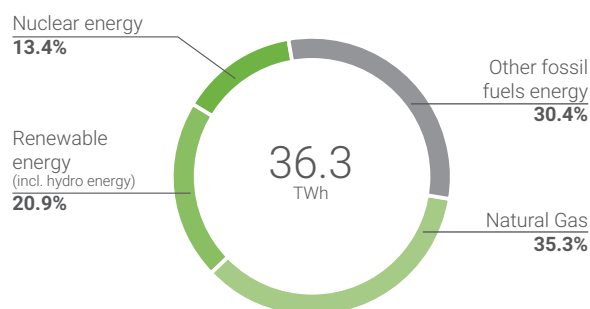
The percentage of electricity consumed by the Group which is low-carbon or renewable.

The role of energy procurement is essential for Air Liquide, in particular for its impact on the Group's indirect emissions (Scope 2).

The Group's energy procurement policy favors the purchase of electricity from suppliers who have made the choice to produce low-carbon solutions. Each time an electricity supply contract is up for renewal and for each new contract, Air Liquide always takes into account the suppliers' primary energy mix to assess and select its electricity suppliers. Moreover, to step up the pace of the transition towards supplying electricity with lower carbon content, in 2018 Air Liquide continued with the initiative launched in 2017 and has successfully signed a major renewable wind energy procurement agreement in Texas (United States). Opportunities in other regions are currently being assessed to increase the share of renewable energy procurement, in line with the Climate objectives announced.

By taking into account the different natures of primary energy used to produce electricity in the countries where Air Liquide is present, it is then possible to calculate a global breakdown by nature of the electricity used. This calculation includes the electricity produced from natural gas by the Group's cogeneration units. In 2018, 20.9% of electricity consumed was from a renewable source and 35.3% from natural gas composed mainly of methane. This molecule contains one carbon atom and four hydrogen atoms, the combustion of which generates around two-times less CO₂ emissions than coal per kWh of electricity produced.

ELECTRIC ENERGY ORIGIN USED IN 2018



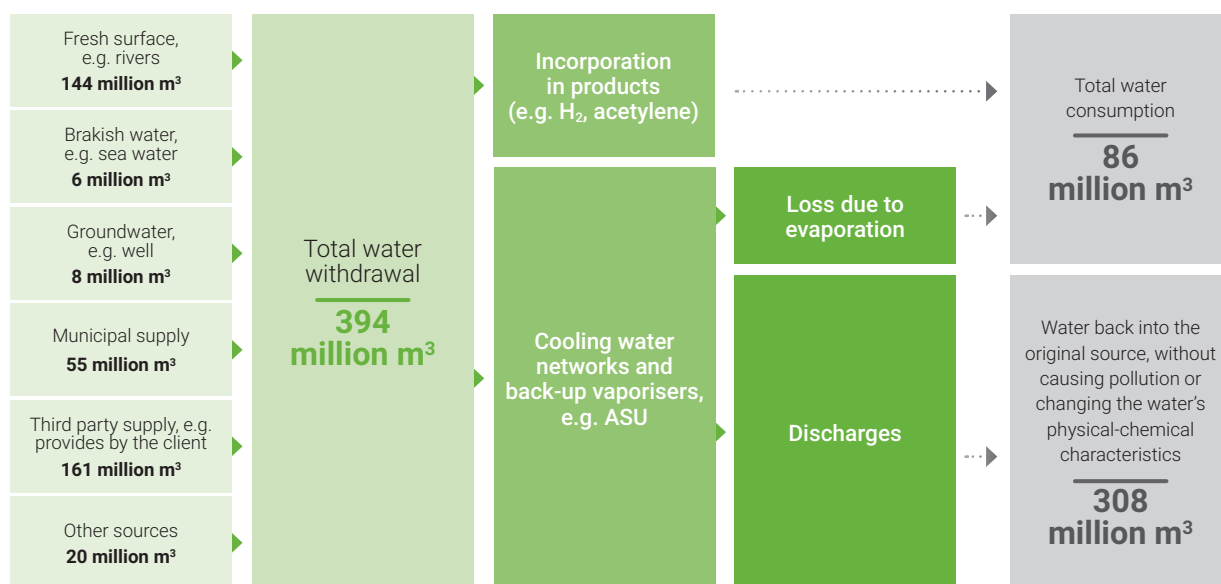
2. Water

In 2018, Air Liquide set up a task force dedicated to the valuable resource, water. Reporting methods were reviewed to take data into account in a more precise manner. This enables the Group to observe and control water management at its production sites more efficiently to reduce its consumption, particularly in areas of water stress.

Water consumption

In 2018, Air Liquide consumed 86 million m³ of water. This consumption is from the loss of water through evaporation during the cooling process as well as its incorporation in products, such as hydrogen and acetylene.

WATER USAGE WITHIN THE GROUP'S PROCESSES



In 2018, Air Liquide withdrew 394 million of m³ of water from various sources. 41% came from customers, 37% came from freshwater sources such as rivers or lakes, 14% from municipal supply and the remaining 8% from various other sources.

With regard to Air Separation Units, there are several types of cooling systems. Around 54%^(a) of these units have semi-open water recirculating systems which require back-up water. Around 38% of these units have open systems. In such cases, water comes from natural resources or third-party industrial systems. It is discharged back into

the original source, without causing pollution or changing the water's physical-chemical characteristics. Lastly, around 8% of these units have closed systems that consume no water.

6% of Air Liquide's sites are located in countries that, according to the World Resources Institute, will be under extremely high water stress in 2030. Today, this represents 6% of the annual water consumption of Air Liquide's industrial sites.

| | 2014 | 2015 | 2016 ^(a) | 2017 | 2018 |
|--|------|------|---------------------|------|------------------------------------|
| Annual water consumption (estimation in millions of m ³) | 70 | 79 | 77 | 81 | 86 * ^(b) ^(c) |

(a) Excluding Airgas.

(b) Represents less than 0.5 one-thousandth of the industrial water consumption of the countries under review.

(c) The deviation to 2017 is due to a more detailed measurement of water consumption on the production sites.

* Indicator verified by the independent verifier.

Water treatment solutions at customers' sites

Only 64% of the world's population has access to drinking water and 80% of wastewater is discharged into the environment without any treatment^(b). Moreover, the world's population is expected to increase from 7.5 to 9 billion inhabitants by 2050, but the quantity of available fresh water will remain the same. Finally, the scarcity of water and

environmental challenges are leading industrial players to seek reliable and economic technologies to treat and recycle water. Air Liquide has been a benchmark in water treatment for 35 years, and provides its customers with adapted solutions for the production of drinking water, the treatment of wastewater, cooling water and pH testing.

(a) The difference in percentage observed in 2017 (82% in semi-open circuit and 8% in open circuit) is mainly due to the better management of all the water use by the Group, in particular in open and closed systems for which the Group does not consume water.

(b) Water Quality and Wastewater on unwater.org (2017, Unesco).

3. Biodiversity

The impact of Air Liquide's activities on biodiversity is limited because the Group's production units are generally located on sites in industrial zones.

However, Air Liquide supports biodiversity preservation via its Foundation, which funds micro-initiatives around the world on environment-related local development, and scientific research projects in the field of environmental protection, focusing on projects that contribute to the preservation of our planet's atmosphere, and in particular air quality.

In recent years, the Air Liquide Foundation has sponsored the following projects:

- the work of the Institut de Recherche pour le Développement (IRD) and WWF France respectively on mangroves in the Indo-Pacific

region and the Indonesian and Gabonese forests. These works quantify and qualify the carbon cycle of mangroves and forests with the aim of protecting these ecosystems which are home to a wide range of biodiversity;

- the Observatoire Français d'Apidologie's (OFA) project to increase bee populations in Europe. The decline in bee populations is a major threat to biodiversity and agricultural production. The OFA is developing a natural and non-chemical solution that can be used sustainably to fight against Varroa mites, a parasite which attacks certain types of bees.

At the end of 2018, the Board of Directors also approved research projects on methane concentration and flux in the marine environment and the presence of plastic particles in the atmosphere.

4. Air quality

Air pollutants

Particulate Matter (PM)

This pollutant affects more people than any other. It is composed of a mix of sulfates, nitrates, ammonia, sodium chloride, black carbon, mineral dust and water. Its impact on health is extremely harmful as it reduces life expectancy by 6-18 months^(a). PM10 concentrations should be < 20 µg/m³.

Nitrogen oxide (NOx)

This pollutant can cause inflammation of the airways (asthma, lung conditions). Also a source of particulate matter & ozone (O₃). NOx concentrations should be < 40 µg/m³.

Sulfur oxide (SOx)

This pollutant can have a harmful effect on the respiratory system. It is also responsible for acid rain. Concentrations should be < 20 µg/m³.

(a) Data from the World Health Organization.

The desulfurization of oil-based fuels through hydrogen

Sulfur oxides released in the atmosphere cause serious respiratory difficulties. They are also responsible for smog and acid rain that leads to deforestation and the acidification of water.

Hydrogen is mainly used in refineries in order to desulfurize fuels and, as a result, contributes to cleaner transportation. The use of these fuels almost no longer generates sulfur oxide emissions, one of the main atmospheric pollutants.

In 2018, the hydrogen supplied by Air Liquide to its customers' refineries resulted in the avoidance of 1.6 million tons of sulfur oxide emissions being discharged into the atmosphere, which is more than ten times as much as the total sulfur oxide emissions of a country like France.

SOCIETAL ACHIEVEMENTS

1. The long-term engagement of employees

1.1. HUMAN RESOURCES

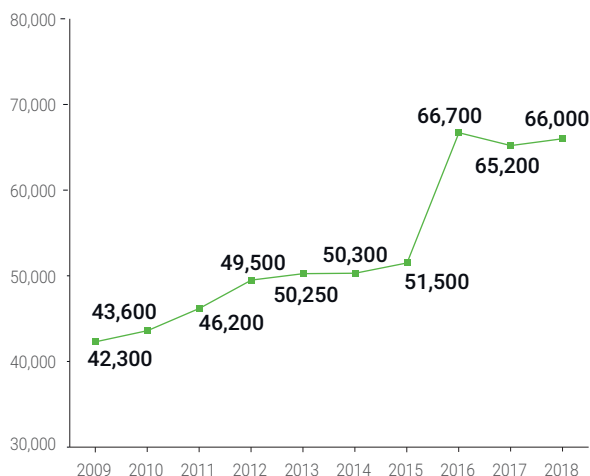
Air Liquide brings together 66,000 men and women of more than 150 nationalities, in 80 countries, who form multi-cultural teams with a host of skills.

The Group strives to promote this diversity, encourage innovation and the engagement of employees, to meet customers' expectations and guarantee Air Liquide's long-term performance.

In an environment which is undergoing profound transformation, Air Liquide has developed a Human Resources strategy to identify, attract, maintain and develop competent employees from all walks of life. This strategy is based on the following three priorities:

- encouraging employee engagement;
- developing an agile and collaborative structure;
- anticipating the "future of work".

GROUP HEADCOUNT



1.2. EMPLOYEES' ENGAGEMENT

1.2.1. Employees' voices

There is a direct link between employees' engagement and customer satisfaction which is at the heart of the NEOS company program. Employees' engagement is one of Human Resources' priorities. Air Liquide has launched "MyVoice", a program similar to the "Voice of Customer" project introduced as part of the customer-centric NEOS company program. This program has been designed to encourage feedback from employees and to rapidly implement measures resulting from this feedback. The platform was in its pilot phase at the end of 2018 and will be rolled out to all employees in the various Group subsidiaries during 2019.

1.2.2. Mobility for skills development

Air Liquide is continually looking to recruit diverse profiles to build multi-disciplinary and complementary teams.

The Group's diversity is characterized by the fact that there is no "standard career path". Quite the contrary, each employee adapts his or her career path according to their individual objectives and the career opportunities offered by the Group. Internal mobility and technical expertise are two major factors in career development.

The Technical Community Leaders (TCL) program enables talent in the technical sectors to access careers that offer recognition, satisfaction and influence. More than 3,000 experts have been recognized, playing a key role in sharing expertise, knowledge and technical excellence.

This community of the Group's technology experts contributes to the transfer of the technical know-how that Air Liquide will need in the future.

This development program aimed at our technical talent, TCL, also received particular attention in 2018 with the appointment of two Senior Fellows (the program's highest level of recognition), the first International Experts from the Airgas teams and greater gender equality with the appointment of the first female Fellow. This program is a key driver of innovation and contributes greatly to ensuring the Group's long-term reliability and safety.

1.2.3. Employee performance and remuneration

The performance review meeting is a key stage in employee development as it facilitates a discussion between an employee and their manager on performance and development, the assessment and setting objectives for the year ahead. In 2018, 80% of Group employees had a performance review meeting with their immediate supervisor.

The comprehensive remuneration of Group employees is based on three criteria:

- the position held;
- the degree of responsibility;
- performance.

Plus the factoring in of the situation of the local market, the Group's fair pay at hiring policy and current legislation. It is generally made up of a basic salary plus additional remuneration elements.

The variable portion of remuneration is devised locally for certain categories of employees to reward performance. In general, it depends on parameters such as the Group's earnings, the entity's earnings and individual performance, which is measured in quantitative and qualitative terms. By rewarding collective and individual performance, Air Liquide encourages everyone to collaborate and contribute to overall earnings.

Most of the managers and professionals have a variable remuneration, which includes Sustainable Development objectives.

Remuneration may also include benefits such as disability-incapacity-death insurance, health insurance, profit sharing^(a) or solutions to help balance work and family life which vary by country.

In 2018, 53% of Group employees received an individual variable portion as part of their remuneration (down 4% compared to 2017).

15% of managers' variable remuneration is linked to Sustainable Development criteria, such as safety, customer satisfaction, energy efficiency and equality.

Finally, the top 370 Group executives have a significant portion of their variable remuneration mandatorily linked to these criteria, for example, safety and Corporate Sustainability Program targets for their entity.

1.2.4. Well-being at work

The official definition of well-being in the workplace provided by the World Health Organization (WHO) considers this to be "a dynamic state of mind characterized by reasonable harmony between a person's abilities, needs and expectations, and environmental demands and opportunities". Moreover, one of these SDGs, defined by the UN, is specifically focused on health and well-being.

Safety, ethics and the respect of Human Rights are prerequisites for achieving a high-quality work environment. Well-being in the workplace has a direct impact on the engagement of employees and their performance.

In order to strengthen occupational well-being within Air Liquide, various initiatives were implemented within the Group to promote the work-life balance of its employees (support for new parents, access to service platforms and expertise, raising awareness of health-related issues).

Telecommuting is widespread among several of the Group's entities. This approach is a response to employees' wishes in terms of work-life balance.

1.2.5. Legal working hours

Each Group entity defines, in agreement with representative bodies and in line with local regulations, legal working hours which encourage engagement and performance.

In France, the general framework of legal working hours is defined in agreements signed with the unions. A few businesses operate with shift work. These concern fewer than 10 plants in the country, mainly in the Large Industries business line. A project is currently being deployed to reduce shift work.

On the other hand, the industrial businesses, as well as those in Healthcare, include on-call systems that are regularly discussed and are subject to agreements with the unions.

1.2.6. Renewing social dialog

The Group ensures that social dialog is encouraged and, in this context, an increasing number of Group employees (86% in 2018) have access to a representation, dialog or consultation structure.

In Europe, the European Works Council has 29 employee representatives from 13 countries. It was renewed in 2017 for a term of four years. The role and nature of exchanges within this body was strengthened by an agreement signed in 2014. Chaired by a member of the Executive Committee, the European Works Council met twice in 2018, for two ordinary meetings. Four other meetings of the Council's presiding officers also took place, including one meeting of the extended members and one informal meeting. The main themes dealt with during information and consultation meetings are safety, news on the Group's activities, especially in Europe, the annual financial statements, the Sustainable Development policy, strategy and its implementation in the different countries of Air Liquide's operations.

In France, the Group sought to improve social dialog, using a debate and project development approach. A social seminar was held to promote working together (employee representatives / trade unions and management / HR) towards a new ambition. This exercise helped define a roadmap and transformation projects:

- implementing changes to Group activities differently;
- modernizing social dialog and communications;
- strengthening local management in terms of social dialog;
- reviewing and working on employability against a backdrop where jobs are changing profoundly.

At the same time, Group companies in France have negotiated new structures for their representative bodies. The guiding principle and recommendation for the negotiation of agreements to establish Economic and Social Committees **was to strike a balance** between:

- **large-scale economic and strategic social dialog** with a wide range of continuously changing markets, which requires a strong ability for adaptation / transformation;
- **regular social dialog** which addresses the daily lives of employees in terms of working conditions, monitoring the implementation of HR policy, following up on agreements reached and projects undertaken, managing social and cultural activities.

During the first elections which took place, the main challenges included:

- **preparing the social dialog of the future**, to ensure that it is adapted to the Company's social and economic realities;
- **placing employees at the heart** of social dialog, making the actions of employee representatives more visible and understandable;
- **attracting new candidates** in order to build a representative body which correctly reflected the Company's employees.

In terms of employee savings plans, new agreements were signed within Group companies. These agreements allow employees to be more involved in the Company's performance. In France, 99.1% of employees benefited from these provisions.

(a) This method of remuneration, used in certain countries, is at the Company's initiative or in response to local legislation or market requirements.

1.3. AN AGILE AND COLLABORATIVE STRUCTURE

The second focus of the Human Resources strategy consists of creating an agile and collaborative structure capable of addressing the challenges of a constantly-changing world. This requires facilitating cross-divisional exchanges within our teams to ensure a sustainable performance.

1.3.1. Inclusion and diversity

Diversity is a priority of Air Liquide's Human Resources strategy and policy and the Group considers it a source of dynamism, creativity and performance.

It is a fundamental element of the organization, in terms of both businesses and employees, and drives the Group's long-term performance.

Our objectives at the Group level include enhancing diversity among managerial staff to better value the various cultures on which Air Liquide is based and to improve gender equality. In this respect, quantified targets have been set for the Group and its entities for gender and nationalities.

At the entity level, our aim is for our teams to be made up of employees which represent the environment in which they work.

Through this diversity policy, Air Liquide is strongly committed to fighting any form of discrimination.

A solid roadmap has been defined to achieve our objectives. A team within Human Resources is responsible for managing diversity projects. The Group's roadmap is based on three criteria:

- introducing diversity objectives at all our entities and ensuring the implementation of related actions plans, in particular for key populations (management positions, high-potential employees and technical experts);
- improving all of the Group's Human Resources processes to reduce any bias and avoid all forms of discrimination;
- promoting an inclusive culture to leverage the diversity of our teams.

1.3.2. Gender

The Group has set ambitious gender equality objectives aimed at reaching a rate of 35% of women among its employees in "Managers and Professionals" by 2025. These objectives are in line with the results obtained over the past ten years which have allowed the share of female "Managers and Professionals" within the Group to increase from 19% to 29%.

Women now represent 41% of employees considered as high-potential. This level must be maintained.

Five women are now members of the Group's Board of Directors.

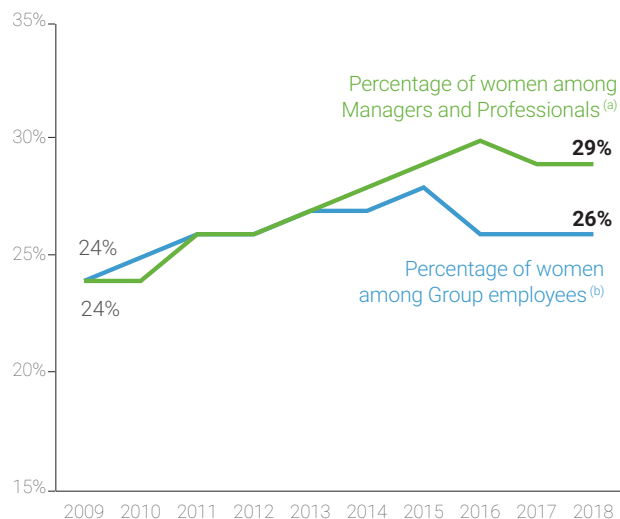
The Executive Committee has two women among its ten members (excluding Executive Officers). Among these, one was appointed to the Executive Committee upon her arrival within the Group in 2008, then appointed Executive Vice President in 2017; and the other was appointed to the Executive Committee in 2017.

More generally, and taking the highest level of responsibilities across the Group into account, women currently hold 15% of the Top 100 positions, and 19% among positions defined as Executive. This second percentage has increased from 4% to 19% over the past ten years.

The Group aims to achieve a rate of 25% of women in Executive positions by 2025.

Among the 10% of positions with the greatest level of responsibility within the Company *, 21% are held by women. These women have an average and median age of 50, i.e., 3.7 years and 5 years less respectively than the average age (53.7 years) and median age (55 years) of men in these positions. This difference is due to the policy to promote women at the highest level of responsibilities earlier on in their careers, and thus abolish career development discrepancies that may be seen in the absence of voluntary measures in this field.

PERCENTAGE OF WOMEN AMONG MANAGERS AND PROFESSIONALS



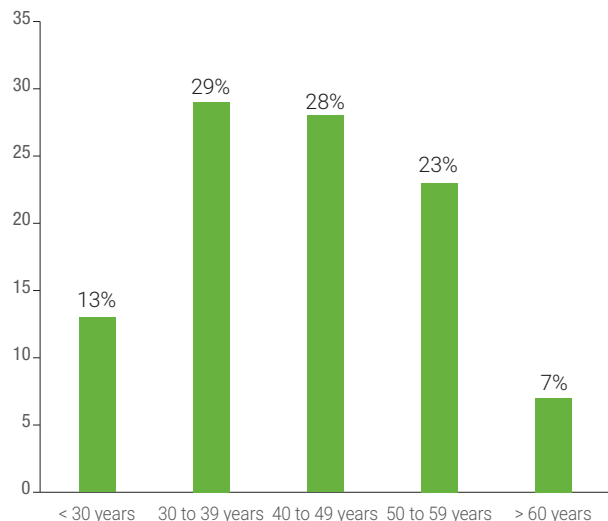
(a) Including Airgas since 2017.

(b) Including Airgas since 2016.

* i.e., 123 positions, including all members of the Executive Committee (excluding Executive Officers) as well as expatriate employees whose work contracts are suspended but whose career and remuneration continue to be managed by the Company during the suspension of their French contract.

1.3.3. Age

DISTRIBUTION OF EMPLOYEES BY AGE BRACKET IN 2018



■ Distribution of employees by age bracket

The Group has invested in better professional qualifications and training programs for young people to facilitate their integration into the business world.

Internship and apprenticeship contracts are encouraged by the Group. In France, 529 young people have benefited from work-study contracts and around 425 from an internship, combining theoretical learning at their university or school and a practical internship at Air Liquide.

Seniors will represent an increasing share of Air Liquide employees in the coming years. Their contribution to mentoring programs (notably the "Technical Career Leaders" program) and training programs aimed at younger generations will be further promoted.

Various initiatives have been introduced within the Group to ensure the support and engagement of employees nearing retirement age. For example in France:

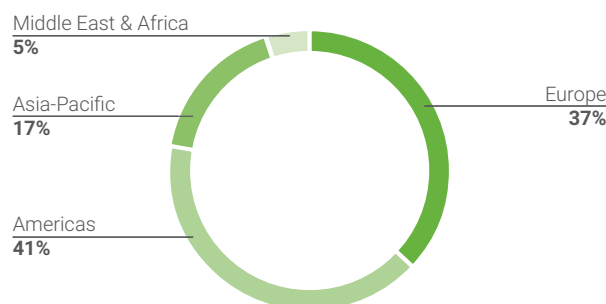
- a skill-based sponsorship pilot scheme was successfully launched in 2018;
- "Youth-employment contracts" were continued. These include an initiative which allows employees to prepare for their retirement, and in particular take early retirement.

1.3.4. Nationality

Air Liquide's senior managers are of 30 different nationalities. The Group's Board of Directors is composed of six different nationalities. In terms of total employees, more than 150 different nationalities are employed by the Group.

The Group has international exchange programs to attract and train young talent: the ALLEX program for managers and the EVE program for technicians (more than 400 people since their creation).

BREAKDOWN OF EMPLOYEES BY GEOGRAPHIC AREA



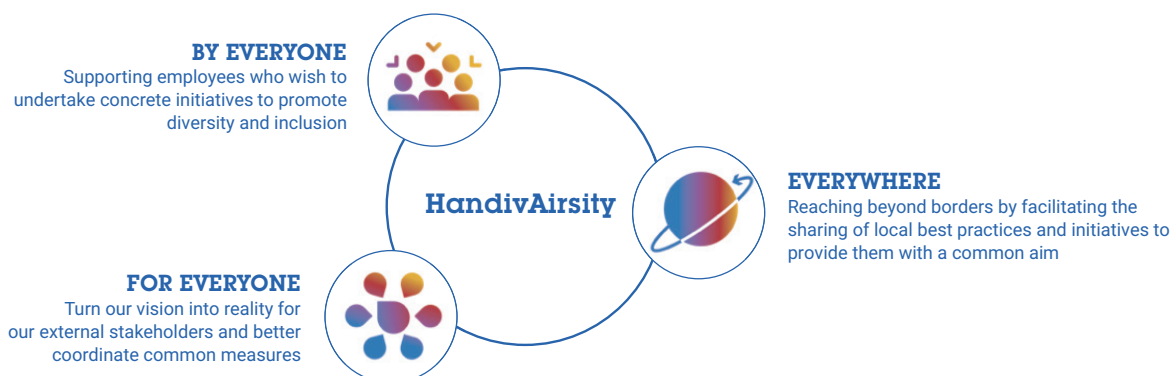
1.3.5. Disability

The Group has recently reviewed its Disability policy, which is now called HandivAirsity, in order to expand its inclusive culture to Europe and further promote the integration of employees with disabilities within the Company.

HandivAirsity involves a whole ecosystem of players on a European scale such as employees, shareholders, customers, and suppliers and provides the means to commit to working together to promote the inclusion of disability.

Through the policy's main guiding principle: "Our differences are our strength", the Group aims to value the uniqueness of each person for the benefit of all. HandivAirsity is driving this desired change: "by everyone, everywhere, for everyone". The HandivAirsity Charter encourages employees to maintain the momentum by taking part in concrete measures.

Since its creation, more than 1,000 employees from 22 different countries have signed the HandivAirsity Charter. More than one hundred events were organized during the 2018 Disabilities Week.



In France, thanks to the involvement of employees and workplace agreements in favor of recruiting employees with disabilities, a set of subsidiaries has seen an increase in the rate of employees with a disability from 1.75% in 2007 to 4.43% in 2018. More than 1 million euros is also subcontracted to firms in the adapted and protected sector.

1.3.6. Network-based structure

Air Liquide has a decentralized organizational structure which relies on its hubs and clusters (groups of countries or entities). This global scale network structure is more agile, favors initiative-taking and strengthens proximity with customers.

A collaborative workplace called "Kite" has been launched throughout the Group. Kite is changing every year to offer new services to its users. The Group therefore provides employees with the opportunity to create and access Google+ communities through the Kite collaborative workplace. These communities rally employees on several subjects: expertise, tools, events, procedures, shared interests, etc. They transform working methods, by favoring flexibility, efficiency, diversity and collective intelligence.

1.4. ANTICIPATING THE "FUTURE OF WORK"

The "Future of Work" cornerstone focuses on identifying the business lines and skills of the future. To do so, the Human Resources teams must understand and anticipate trends that are likely to transform our business.

1.4.1. Business lines and skills

The aim is to implement an efficient action plan to help employees evolve at the same pace as their business line. To support each employee in this new technological environment, Air Liquide University has developed:

- a "digital passport", which consists of several self-assessment questionnaires on digital culture in general, but also on the knowledge of Kite (the Group's collaborative workplace);
- for the first time, a Digital campus has been created where new training relating to all things digital (Data strategy, Digital marketing, Cybersecurity, and others) has been made available to all Group employees.

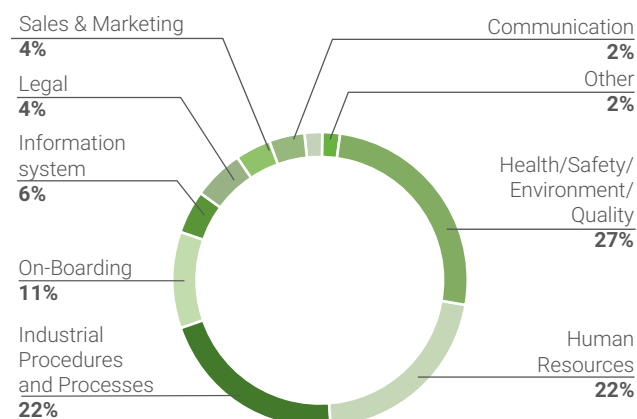
1.4.2. Career-long training and development

Air Liquide takes particular care to develop the competencies and expertise of its employees. Several ways of learning are proposed. Career development can take place throughout our careers and we must all take a proactive approach.

In 2018, the percentage of Group's employees who had at least one training session during the year was up, at 63%^(a).

The online training offering is upgraded every year and covers many topics such as safety, ethics, Human Resources processes, management and, more recently, digital technology.

BREAKDOWN OF TRAINING TOPICS ^(a)



(a) For the first time in 2018, Airgas training data is included in reporting figures.

Through its programs and structure, the University supports the Group's strategic initiatives and promotes the Air Liquide culture. Today, the University is present at the Group level and globally promotes new ways of learning, in both traditional and non-traditional ways. The Company's various businesses and functions thus have access to tools to design their own programs.

Modern teaching methods, for adults, are coupled with formal and informal skills, online training, lessons, support, mentoring, co-development, etc. The programs are as practical and relevant as possible, and use role play, mock exercises, workshops, case studies, guided discussions and various feedback mechanisms.

Among the University's programs, those on management and leadership cover all modern management situations, thus promoting the use of a shared language at the Group level. These programs help managers understand the increasingly volatile and complex world that surrounds them and provide the Group with the relevant expertise to maintain its leadership position over the long term.

In 2018, the launch of the digital campus, in cooperation with the digital transformation teams, helped raise awareness among various populations regarding new digital expertise: platform economies, data strategies, user-related research, cybersecurity, etc.

(a) For the first time in 2018, Airgas training data is included in reporting figures.

2. Shareholders: a long-term relationship



Key points

More than **64%**
of shareholders own their shares
for more than **10 years**

Shareholders have been contributing and supporting the Group's growth since its creation. During the 2016 acquisition of Airgas, they again confirmed their commitment to the Group's growth by participating massively in the capital increase in cash with preferential subscription rights. Today, it is thanks to their loyal support that Air Liquide can

continue to change and grow. Air Liquide's long-term profitable growth strategy and its commitment to its shareholders are therefore closely linked.

By promoting individual share ownership, through various measures in place and by offering shareholders the expertise of its dedicated service, Air Liquide fosters a close relationship based on dialog with its shareholders on a daily basis which focuses on the following key principles:

- promoting long-term share investment;
- encouraging shareholder loyalty through registered shares;
- promoting dialog and meetings;
- recognizing and promoting the shareholder's key role.

BREAKDOWN OF SHARE CAPITAL (AT DECEMBER 31, 2018)

| | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 |
|--|------|------|------|------|------|------|------|---------|------|------|
| Individual shareholders | 38% | 36% | 37% | 37% | 36% | 37% | 36% | 33% | 32% | 32% |
| French institutional investors | 26% | 23% | 21% | 19% | 19% | 17% | 18% | 20% (a) | 19% | 18% |
| Non-French institutional investors | 36% | 40% | 42% | 44% | 45% | 46% | 46% | 47% (a) | 49% | 50% |
| Treasury shares | > 0% | < 1% | > 0% | > 0% | > 0% | > 0% | > 0% | > 0% | > 0% | > 0% |
| Registered capital | 32% | 34% | 35% | 36% | 35% | 36% | 36% | 33% | 34% | 35% |
| Capital eligible for the loyalty bonus | 25% | 25% | 28% | 29% | 30% | 30% | 30% | 26% | 25% | 26% |

(a) In 2016, the proportion of institutional investors in the Group's capital increased due to their over-subscription to the capital increase.

Air Liquide regularly receives rewards for the quality of its financial communication and its transparency. In 2018, the Group received six shareholder-related awards, including the Agefi's 1st prize for "Composition of the Board" and "Shareholding democracy, transparency of information and quality of communication", Bronze prize for the best shareholder relations in the CAC 40 awarded by French magazine *Le Revenu*, the "Investor Awards for education" awarded by Boursorama and Opinion Way and the "Labrador Transparency Grand Prix" for its website. Air Liquide is also ranked among the Top 5 in the *Échos* Executives eCAC40 Barometer (4th) and has received an award for "strategic continuity".

The Chairman and Chief Executive Officer is personally involved in Shareholders' Meetings, shareholders' conferences and Shareholders' Communication Committees.

2.1. A STEADY LONG-TERM PERFORMANCE AND AN ATTRACTIVE REMUNERATION POLICY

Since its IPO in 1913, Air Liquide has always shown a profit and shared the fruits of its growth by rewarding its shareholders' confidence through a remuneration and loyalty policy that is based on regular dividend distribution, free share attribution and a loyalty bonus.

During the last 10 years, more than 50% of earnings have been distributed to shareholders.

2.2. MADE-TO-MEASURE SERVICES

Shareholder Services, with more than thirty employees, is a unique service at Air Liquide.

Air Liquide provides its institutional and individual shareholders, who are bearer or registered shareholders, with information and support. In addition to its steady performance and remuneration policy, and to increase the investment value of shares and reward long-term shareholders, Air Liquide showcases registered shares.

In 2017, as part of the NEOS company program, Shareholder Services launched its "Shareholder experience" approach to continue to improve the quality of its services for shareholders. Similar to initiatives launched as part of the NEOS company program on the customer-centric strategy, the aim of this global approach of comprehensive active response to its shareholders and their expectations is to streamline administrative procedures by offering made-to-measure services, ensuring a better and wider circulation of strategy and financial information, for example with the live broadcasting of the Group shareholders' events. The latest digital tools are also at the heart of this initiative as they are an excellent source of leverage and customization.

2.2.1. Registered shareholder services

This form of shareholding provides access to a loyalty bonus for registered shares held for more than two full calendar years: +10% on the amount of the dividends received and on the number of free shares granted during attribution transactions. To benefit from the loyalty bonus, shareholders must continue to hold their shares in registered form on the day of the dividend payment or of the free share attribution.

Air Liquide is the only CAC 40 non-bank company which manages internally all aspects of its shares on behalf of its 100,000 direct registered shareholders: account administration-holding, record keeping, centralization of the Shareholders' Meeting. They pay no handling fees, and broker fees are 0.18% excluding tax of the gross amount of the transaction, and reduced to 0.10% (excluding tax) for stock market orders placed online and paid by bank card or account debit.

Different shareholding options

Direct registered shares

Direct registered shares are registered in the Air Liquide account and held in a securities account opened at Air Liquide. Air Liquide's Shareholder Services is shareholders' contact point.

Intermediary registered shares

Intermediary registered shares are registered in the Air Liquide account and held in a securities account or a personal equity plan at the shareholder's financial institution.

Bearer shares

Bearer shares are held in a securities account or a personal equity plan at a financial intermediary.

2.2.2. Innovation for the benefit of shareholders

Information documents and media for shareholders such as the Annual Report, the Shareholders' Guide, Shareholders' Newsletter "Interactions" and the Invitation to Shareholders' Meeting are drawn up with a particular focus on educating readers. Air Liquide also publishes, in the month after the event, a report of its Shareholders' Meeting that is sent to all shareholders who exercised their right to vote and presents all the discussions.

Direct registered shareholders have access to a personal secure space on the Internet, so that they can consult their share portfolio and useful documents for managing their account as well as modify their personal information. They can also place buy and sell orders on the stock market online and view, in real time, the operations conducted on their securities account.

Air Liquide was the first company to set up a Shareholders' Communication Committee (SCC). The SCC is composed of 12 shareholders and is regularly consulted on subjects relating to shareholder communication in addition to the three plenary meetings

with the Chairman and Chief Executive Officer. A Committee member is part of the Air Liquide Foundation's Project Selection Committee.

The Chairman and Chief Executive Officer is personally involved in Shareholders' Meetings, shareholders' conferences and Shareholders' Communication Committees.

2.2.3. The Shareholders' Meeting, the expression of shareholder democracy

Each year, all Air Liquide shareholders who hold at least one share are invited to the Shareholders' Meeting. They receive all the documentation relating to their vote either by mail or by email more than one month before the Shareholders' Meeting. In accordance with the principle of shareholder equality to which Air Liquide is very committed, each share entitles its owner to one vote. Air Liquide endeavors to make all this material available in English to its non-French shareholders in similar time frames. Air Liquide centralizes its Shareholders' Meeting by collecting the votes of its shareholders directly and offers voting by Internet.

Shareholder Services and Sustainable Development

Shareholders have had the option for many years of receiving their voting documents in digital form and voting by Internet. This measure saves some 4 tons of paper each year. Moreover, for all its mail shots, Shareholder Services uses a biosourced film, produced using a raw material that complies with the NF T51-800 standard.

2.3. RECOGNIZING AND PROMOTING THE SHAREHOLDER'S KEY ROLE

The accelerated decline in the number of individual shareholders in France is a major social challenge. Air Liquide is committed to defending individual shareholders' rights and promoting equity investments. The Group has supported, in particular, stock market initiatives such as those of the ANSA (Association Nationale des Sociétés par Actions), the Observatoire des Actionnaires d'Avenir and the F2iC (the French

Federation of Individual Investors and Investment Clubs) which contributed to the creation of the PEA Jeunes, young person's personal equity plan under the PACTE Act.

Finally, a study on "Millennials and Xennials and corporate investment" was carried out in partnership with the Actionaria Fair, as a follow-up to an initial study carried out in 2017. This study examined the motivation and saving habits of 25-40 year olds in greater depth, with a view to recruiting a new generation of shareholders.

3. The Group's commitment to its customers

Proximity and expertise

Air Liquide meets the needs of two million customers in 80 countries. These customers come from sectors ranging from steel, the food industry, electronics, pharmaceuticals and craftsmen. The Group aims to support its customers by acquiring a deep understanding of their business to provide them with innovative services and solutions.

The Group's organization enables each entity, in each geographic region, to meet the specific expectations of local customers, thus building a close relationship with individual customers. Customers demand flexibility, responsiveness, service, availability and a real partnership over the long term. In addition, some international customers require fully coordinated global management services. An organization dedicated to strategic key accounts helps support these customers and meet their specific needs. This program relies on a team of Key Account Managers whose task is to develop a thorough knowledge of these customers in order to better serve their needs and be strategically aligned with their growth priorities.

From listening to action

For more than 115 years, the Group has always listened to its customers. However, the traditional methods of collecting our customers' opinions does not allow us to properly understand their satisfaction or the best way to class their priorities in order of importance and follow up on what they tell us. In 2017, a major overhaul was implemented using a digital platform called "Voice of Customer" (VoC) to collect and analyze customer comments. This solution provides all entities with

the possibility to survey, once a year, an unlimited number of customers, analyze their comments in real time, identify unsatisfied customers immediately to close the loop, i.e., recontact them extremely quickly and do what is necessary to deal with the reasons for their dissatisfaction. Thanks to the Group's wide sharing of customers' comments at all levels, appropriate action plans are identified and implemented to improve the customer experience.

This VoC platform was launched in March 2017 and has already been rolled out in more than 45 countries. Feedback from tens of thousands of customers has been collected and analyzed, highlighting the key priorities for each subsidiary. In addition, in 2018 the Group decided to launch transactional surveys to measure satisfaction at key stages of the customer experience (order, delivery, invoicing). Thanks to this new approach, customer comments are collected and analyzed at the time. All this information allows local teams to identify problems and act on them rapidly, by implementing new processes and behavior.

Customer satisfaction and loyalty is measured using an indicator known as the NPS (Net Promoter Score). With NPS, Air Liquide's unsatisfied customers are instantly identified and the reasons for their non-satisfaction resolved.

With VoC, the Group is focusing on digital solutions to offer its customers the best experience in their sector. This program is the perfect example of the customer-centric transformation strategy which is part of the NEOS company program. VoC is an innovative means of connecting with customers and helps the Group better meet their expectations and improve its global performances.

4. Listening to our patients

1.6 million customers and patients worldwide currently place their trust in Air Liquide. They all live in changing environments. Energy and environmental transition, changes in healthcare, as well as digital transformation are giving rise to new usages and new challenges. Moreover, the industrial offering is gradually shifting towards a focus on the end user, transforming the traditional value chain.

Society is currently faced with numerous healthcare challenges, in a sector which is undergoing major change:

- an aging population: in the near future, almost a quarter of the population will be over 60 years old;
- the increase in chronic diseases, pandemics and nosocomial infections;
- changes at hospitals and their role in light of these challenges;
- the role of digital solutions in the continuum of care; and
- the role of patients which is becoming increasingly key in the healthcare sector.

With a long-term vision and as a benchmark healthcare player, Air Liquide provides solutions along the continuum of care in the following areas:

- home healthcare;
- hospital care;
- hygiene and healthcare specialty ingredients.

4.1. HOME HEALTHCARE

Air Liquide's Home Healthcare business cares for more than 1.6 million patients worldwide in their homes suffering from chronic diseases. These treatments require medical respiratory equipment or nutritional assistance and treatment through perfusion to be made available at the patient's home. The human dimension is extremely important in this field as it involves raising awareness of the challenges of treatment and correct monitoring and of having patients and their families accept a treatment which can be long-term and sometimes constraining.

Air Liquide's employees provide home support to patients suffering from chronic pathologies such as respiratory insufficiency, sleep apnea, diabetes or Parkinson's disease. These multi-disciplinary teams of pharmacists, nurses, nutritionists and technicians are dedicated to providing services as cost-effectively as possible. Innovative training and support programs therefore aim to improve the patients' quality of life by helping to reinforce treatment follow-up and increasing their autonomy.

The Home Healthcare business is one of the responses to the shift to outpatient care and sits at the heart of the healthcare system between the patient, hospital, doctors, nurses, health insurance organizations, pharmacists and others. Air Liquide supplies the services, products and/or medical equipment necessary to start treatment at the patient's home, following the medical prescription, and trains the patients and their families in the proper use of devices. Air Liquide, therefore, makes

a major contribution to the continuum of care by ensuring follow-up care at home for patients with chronic conditions. This business demands high quality service on a daily basis and is focused on the long term, with all the caregivers dedicated to improving the patient's quality of life at home.

4.2. HOSPITAL BUSINESSES

Air Liquide is one of the world leaders in medical gas production and distribution for hospitals and related services. The medical gases that Air Liquide provides, such as medical oxygen, are mainly used in emergency wards, operating theaters and intensive care units.

Air Liquide aims to help professionals to care for their patients while facing the constantly changing challenges in the healthcare environment, by supplying medical gases, related services and innovative solutions.

Air Liquide has developed a global solution bringing together gas, medical equipment, and services to provide care for pulmonary arterial hypertension. It also provides a medical gas for pain relief, used in some countries during childbirth and for procedures mainly carried out at dental surgeries. Air Liquide also offers services such as "Total Gas Management" (TGM) which remains permanently at the hospital in order to optimize the supply of medical gases and to monitor the different supply parameters so that the hospital can maintain efficiency. Air Liquide supports the transformation of hospital care and the development of outpatient care with a significant presence in the urban medical sector and care centers.

4.3. HYGIENE AND HEALTHCARE SPECIALTY INGREDIENTS

According to the World Health Organization (WHO), 5 to 10% of people hospitalized in advanced economies contract a nosocomial infection, and this proportion can exceed 25% in some developing economies^(a). This is a major public health issue, often caused by pathogenic multi-drug resistant bacteria. Prevention and hygiene help to reduce these risks. With its subsidiary Schülke, a specialist in hygiene and hospital disinfection, Air Liquide is developing an offering particularly dedicated to hospital hygiene, which will contribute to the fight against nosocomial infections and ensure the safety of patients and medical staff. The Group supplies disinfectants for hospitals, medical instruments and hand-cleansing for medical staff. It also supplies skin cleansers for pre-operative preparation for patients and antiseptics for wound-healing.

Air Liquide currently supplies more than 15,000 hospitals and clinics worldwide with these products and services.

As an Air Liquide Healthcare company, for over 70 years Seppic has created and supplied innovative specialty ingredients for the healthcare and beauty markets, in particular excipients and active ingredients for the cosmetics, pharmaceutical, and nutraceutical markets.

(a) WHO – Background to Clean Care is Safer Care. <http://www.who.int/gpsc/background/en/>

5. Sustainable procurement

Air Liquide strives to build long-lasting and balanced relationships with its suppliers, in an environment of mutual trust. The Group attaches great importance to the ability of its suppliers to offer long-term partnerships and to ensure a high level of safety, reliability, competitiveness and innovation, while guaranteeing that ethics and sustainable development are also taken into account. These principles are set out in the following documents:

- the Procurement Code of Conduct, translated into several languages, which applies to all Group employees engaged in Procurement activities;
- the Sustainable Procurement policy, updated in 2018, lays out the guidelines to be applied by the procurement departments to integrate ethical, social and environmental aspects in their procurement processes, and defines the prevention approach for the related supplier risks. A CSR commitment clause (covering compliance with the Supplier's Code of Conduct, safety, and the environment) is included in the contract templates used by the Procurement teams and signed by suppliers;

the Supplier's Code of Conduct is published in 13 languages and can be accessed from Air Liquide's homepage <https://www.airliquide.com/group/sustainable-procurement>. Its purpose is to promote and ensure all our suppliers respect practices relating to Human Rights, ethics, the protection of the environment and safety.

As part of its supplier monitoring approach, the Group classes its critical suppliers according to seven main criteria including, in particular, the supplier's business, the amount of average expenditure with the supplier, and the supplier's dependency ratio to Air Liquide.

Among its critical suppliers, 1,200 present a critical CSR risk for the Group. The aim is to assess their CSR performance through to 2020. Corrective action plans are regularly implemented for those with an unsatisfactory score. In 2018, more than 230 suppliers were assessed (indicator monitored under the Vigilance Plan – see chapter 1 – pages 50 and 51);

Several measures have been implemented to raise awareness and train buyers in the context of the Group's Sustainable Procurement policy, thus strengthening its application within the organization:

- a Sustainable Procurement e-learning module has been developed. It is aimed at everyone in the Group that is involved in Procurement and allows:
 - the presentation of consistency between the Sustainable Procurement approach and the Group's strategy,
 - the challenges of the Sustainable Procurement approach to be explained and positioned as a source of value creation for the Company,
 - for the presentation of various tools to facilitate the roll-out of this approach,

to date, the e-learning module has been taken by 700 Air Liquide employees and almost 80% of those who have completed it consider that they have become more efficient in their role as buyers (indicator monitored under the Vigilance Plan – see chapter 1 – pages 50 and 51),

- specific training sessions covering the methodology for the Sustainable Development evaluation of suppliers and the implementation of corrective action plans were organized for the Group's buyers and critical suppliers, in line with preceding years;
- since 2015, a Sustainable Procurement network of correspondents from the Group's main procurement organizations has been set up and is used as a local intermediary for the implementation of the Sustainable Procurement approach;
- since 2016, a Sustainable Procurement category has been introduced in our "Air Liquide Procurement Awards" to promote the best initiatives in this field and increase their visibility within the Group. Thirteen projects were submitted in this category in 2018.

6. The Air Liquide Foundation

Created in 2008, the Air Liquide Foundation represents the Group's commitment to being a responsible enterprise. The Air Liquide Foundation provides financial, material and Human Resources means to the projects which it supports in the countries where the Group is present.

Its action is in line with the Group's Sustainable Development strategy which aims to improve air quality, prevent global warming and strengthen its commitment to stakeholders. Its missions include:

- environment: supporting scientific research projects in the environmental protection field that contribute to preserving our planet's atmosphere, and in particular air quality;

- health/breathing: supporting scientific research projects aimed at improving respiratory function and gas metabolism in the human body in the healthcare and exploration fields (space, deep-sea diving, sport);
- scientific education: supporting scientific education in the above mentioned areas (in particular in museums);
- local development: supporting local development micro-initiatives which contribute to improving living conditions in communities in the following fields: access to water, energy and care, education and training, the environment, disability, micro-entrepreneurs, social.

A dedicated website enables projects to be directly submitted online, in French or English. The website address is: www.fondationairliquide.com.

How the project selection at the Air Liquide Foundation works

Project Selection Committee (PSC)



EXAMPLES OF PROJECTS IN 2018

Doctors of the world Japan



Japan

Medical and social assistance to homeless people



Social

Smile Operation



Paraguay

Care of children with labio-palatal cleft



Healthcare access

Fundación Gil Gayarre



Spain

Computer training for children and adults with mental disabilities



Handicap

Board of Directors (BoD)



EXAMPLES OF PROJECTS IN 2018

National Institute of Agronomic Research



France

Preventive treatment of bronchitis



Healthcare research on breath

6.1. LOCAL CORPORATE PHILANTHROPY INITIATIVES

In addition to the initiatives of the Air Liquide Foundation, subsidiaries are also directly involved with the communities throughout the world, supporting local corporate philanthropy initiatives. As well as financial support, these actions are successfully conducted with the enthusiastic involvement of employees.

In Turkey, Air Liquide employees support the Foundation's Local Development mission through the donation of equipment to a school for children with mental disabilities, tandem bike rides with the visually impaired and the collection of books for the "One book, one child; one child, fresh hope" project. In France, the i-Lab's *Inclusive Business* team dedicated its annual seminar to solidarity. They shared their day with refugees who are supported by the charity Français Langue d'Accueil. The day included speaking French and sharing experiences.

In the United States, Air Liquide entities and their employees are greatly involved in education and training. The Global Markets & Technologies business supports the education programs of the Delaware Foundation for Science and Mathematics Education. In Houston, the "Business Resource Groups", employees from the Americas hub helped sort more than 20,000 children's books for a literacy foundation. This support follows on from the 2017 donation by Air Liquide and its employees of 20,000 US dollars to finance local libraries under the "My Home Library" scheme.

ZOOM ON...

THE COMMITMENT OF AIR LIQUIDE IBERIA EMPLOYEES

Air Liquide Iberia has launched a volunteer program following a survey of employees in the industrial businesses. This survey showed that 30% of teams were keen to take part in educational, professional training and environmental protection activities. Portugal and Spain have experienced terrible forest fires in recent years. The program's first initiative were therefore related to these events, with the organization of onsite mobilization days dedicated to the control of invasive species, plantation forest conservation, and the sustainable planting of native tree species.

6.2. SUPPORT FROM THE FOUNDATION, IN PARTNERSHIP WITH OUR EMPLOYEES

In the framework of its local micro-initiatives support program, the Foundation favors actions aimed at developing local communities over the long term in countries in which the Air Liquide Group operates.

Air Liquide employees are actively involved in the work of the Foundation. Environmental and Healthcare/Breathing scientific projects are assessed and monitored by experts from Air Liquide's research centers.

Local development micro-initiatives are sponsored by employees who work near these projects. The Foundation thus provides employees with the opportunity to take part in community work and to express their social and human commitment. The role of a sponsor is broken down into three steps:

- making contact and project feasibility study;
- follow-up and support;
- final assessment.

Moreover, Group employees are encouraged to recommend projects in organizations close to their hearts.

Currently, hundreds of employees are involved in the Foundation's actions. Their contribution was showcased during the second Air Liquide Foundation Awards held to celebrate the Foundation's 10th anniversary.



Key points

SHAREHOLDERS REPRESENTED IN THE SELECTION OF PROJECTS

Air Liquide shareholders also contribute to the Foundation's missions. A shareholder is also a member of the Project Selection Committee. The representation of shareholders in this way is a special feature of the Air Liquide Foundation. Their presence is important: the shareholder provides an external perspective, while being familiar with the Group. The other seven members of the Project Selection Committee are Group employees. The Project Selection Committee examines the projects put forward by the Foundation's team three times a year.

7. Developing the local economy

Air Liquide's teams across the globe are wholeheartedly committed to playing their part in local economic life. This participation includes hiring employees in the area and developing close relations with training organizations and universities that can prepare people for the Group's core businesses.

Air Liquide supplies more than two million industrial customers, major companies, SMEs and craftsmen thanks to the large diversity of its industrial gas applications. The Group provides solutions which are adapted to the competitive or innovative needs of each customer and supports them in their development.

In healthcare, Air Liquide is present in the development of infrastructures by supplying medical gases and dedicated equipment to hospitals and by training their staff in their use. Air Liquide cares for more than 1.5 million patients suffering from chronic diseases.

In addition, the Group's businesses, as well as the means implemented in order to prevent and manage industrial risks, are regularly presented to the populations near Air Liquide's sites. In France, the industrial sites participate in two local committees, CLIC and CLIE. These committees provide information and regulatory consultations at the communes' initiative, with the aim of providing transparent information on their activities to representatives of the local populations.

Moreover, subsidiaries are also directly involved with the communities throughout the world, supporting local corporate philanthropy initiatives. As well as financial support, these actions are successfully conducted with the enthusiastic involvement of employees.

Local procurement

More than 80% of Air Liquide's procurement expenditures are made locally, limiting the environmental footprint relating to transportation and developing the local economy^(a). As an example in this area, Air Liquide is a partner and member of the Board of Directors of "Pacte PME", an association which puts innovative small and medium-sized enterprises (SMEs) in contact with major French groups. In 2018, on the 55 public and private corporate accounts, the association gave Air Liquide the score of A for its exemplary approach to the development of collaborative working relationships with SMEs.

The total amount of Group procurement in 2018 was 10.9 billion euros, including energy and transportation procurement.

In 2018, subcontracting for Air Liquide came to a total of 1.7 billion euros. Subcontracted activities are mainly those which are too far-removed from the Group's businesses or that require specific resources or that are linked to a concentrated workload at particular times.

(a) 2015 analysis based on 2013 data.

8. Relationships with the public sphere

Air Liquide has formalized a Public Affairs policy governing the Group's interactions with the national, regional and international public spheres to develop growth opportunities, reduce risks relating to regulatory changes, and involve Air Liquide in public debate.

This policy specifies that Air Liquide work with the public authorities of each country in which it does business in a constructive and transparent manner, following ethical rules and applying political neutrality. All the Group's actions respect the official lobbying regulations in force in the countries in which it is present. Air Liquide is therefore listed in the "Transparency Register" of European institutions and in France in the "Interest Representatives" register which was created in 2017 and is managed by the High Authority of Transparency in Public Life (Haute Autorité pour la Transparence de la Vie Publique – HATVP).

Managers specializing in Public Affairs have been appointed in the principal countries, comprising a network of around 20 people worldwide, coordinated by the European and International Affairs Division. The tasks of these managers are to follow public initiatives that may have an impact on the Group and to interact with the public authorities to defend or promote Air Liquide's interests.

This network allows the Group to work on the definition of joint positions on cross-divisional challenges such as the circular economy, energy transition and innovation, and to share information on changes to social challenges in different parts of the world.

Air Liquide's Public Affairs policy also aims to establish and develop constructive and sustainable relationships with:

- public authorities;
- professional bodies which represent the sectors in which the Group operates;

- other players such as non-governmental organizations and Think Tanks.

These interactions can take place either directly or through national or international associations of professional bodies such as the European Roundtable of Industrialists (ERT).

The Group also calls on outside consultants to support its actions. Public affairs cover all the Group's activities. The priorities in this area form part of a long-term process:

- the competitiveness of companies at the worldwide level;
- air quality as a key public health challenge;
- energy transition and the environment with the boom in alternative energies (hydrogen energy, biogases, photovoltaic, wind turbines, etc.), their applications in particular in terms of mobility and energy efficiency;
- the carbon market with changes in European regulations and the development of regional markets in North America and Asia Pacific;
- the opportunities and risks relating to the digitalization of the economy;
- the defense of Air Liquide's shareholding model;
- at the European level, space exploration;
- the defense of intellectual property and the launch of the European unitary patent and of the Unified Patent Court;
- environmental and societal reporting challenges.

In relation to fiscal matters, Air Liquide is particularly attentive to paying taxes in the countries where the Group is present and to the desire for good relations with the different local tax authorities.

Hydrogen Council

Launched during the Davos World Economic Forum at the beginning of 2017, the Hydrogen Council is the first global initiative of its kind which intends to show that hydrogen is a key solution in energy transition for transport. The Group is currently composed of more than 50 multinationals, including Air Liquide. The initiative is growing rapidly, with 11 new members joining the Hydrogen Council in March and 14 new members in September 2018.

If deployed on a large scale, hydrogen could represent almost one fifth of total energy consumed by 2050. This would help reduce annual CO₂ emissions by around 6 gigatons compared with current levels and account for 20% of the decrease required to limit global warming to 2°C.

Through its ambition to limit global warming, the Hydrogen Council is committed to providing 100% carbon-free hydrogen for mobility by 2030. This objective was presented by Benoît Potier and Dr. Woong-Chul Yang during the Global Climate Action Summit in San Francisco in September 2018.

Moreover, hydrogen has the potential to generate 2,500 billion US dollars in revenue and create more than 30 million jobs by 2050.

ANNUAL REPORTING

1. Safety indicators

SAFETY INDICATORS FOR THE GROUP AS A WHOLE

| | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 ^(f) | 2018 |
|---|------|------|-------|-------|-------|-------|-------|-------|---------------------|------|
| Number of Group employee lost-time accidents of at least one day ^(a) | 131 | 153 | 144 | 149 | 151 | 144 | 152 | 137 | 198 | 161 |
| Accident frequency of Group employees ^(b) | 1.7 | 1.9 | 1.7 | 1.7 | 1.6 | 1.6 | 1.6 | 1.4 | 1.6 | 1.3* |
| Accident severity rate ^(c) | | | < 0.1 | < 0.1 | < 0.1 | < 0.1 | < 0.1 | < 0.1 | < 0.1 | 0.17 |
| Number of accidents of subcontractors and temporary workers ^{(d) (e)} | 148 | 155 | 118 | 142 | 110 | 92 | 94 | 91 | 90 | 93 |
| Frequency of accidents of subcontractors and temporary workers | | | | | 2.2 | 2.3 | 2.2 | 2.0 | 2.1 | 2.2 |

(a) Fatal work accidents since 2011: three in 2018, none in 2017, one in 2016, none in 2015, none in 2014, three in 2013, one in 2012, one in 2011. Among these fatal accidents, the one in 2016 and one in 2013 were road accidents.

(b) Number of accidents involving lost time of at least one day, per million hours worked by Group employees. Accidents defined following the recommendation of the International Labour Office. Working hours are defined according to local employment laws.

(c) Average number of days of lost time per thousand hours worked. Accidents defined following the recommendation of the International Labour Office.

(d) Personnel working under an Air Liquide contract at a Group site, at a customer site, or as a delivery vehicle driver.

(e) Fatal work accidents since 2011: five in 2018, none in 2017, one road accident in 2016, one road accident in 2015, one road accident in 2014, one road accident in 2013, three fatal work accidents in 2012 including a road accident, four fatal work accidents in 2011 including three road accidents.

(f) With Airgas, data from previous years relate to Air Liquide alone.

* Indicator verified by the independent verifier.

QUALITY INDICATORS

| | 2018 |
|---|------|
| Estimate of Group revenue covered by an ISO9001 quality certification ^(a) | 51% |
| Estimate of Group revenue covered by an ISO14001 quality certification | 23% |
| Estimate of Group revenue covered by an OHSAS18001 occupational Health and Safety certification | 12% |

(a) Excluding Airgas.

2. Environmental indicators

2.1. LIST OF PRODUCTION UNITS AND THEIR ENVIRONMENTAL FOOTPRINT

The environmental elements that are most representative of the Group's activities and part of Air Liquide's Sustainable Development reporting are described below. They cover a total of 565 Air Liquide production units worldwide.

| Type of production unit | Number of production units | Applications and environmental footprint |
|--|----------------------------|--|
| Large Air Separation Units (ASUs) | 332 | <p>Large Air Separation Units produce oxygen, nitrogen and argon, with some sites also producing rare gases such as krypton and xenon.</p> <p>These plants "without chimneys" do not use any combustion processes. They are particularly environmentally-friendly as they emit no CO₂, sulfur oxide (SO_x) or nitrogen oxide (NO_x).</p> <p>They use almost exclusively electricity: worldwide they use about 3,600 MW at any given moment. The electricity purchased from our energy suppliers and consumed by the Air Separation Units is the source of indirect emissions. The cooling systems of these units require back-up water.</p> |
| Hydrogen and carbon monoxide units (HyCO) | 46 | <p>Large hydrogen and carbon monoxide units also produce steam for some customers. They primarily use natural gas as raw material and some water, required for the reaction that produces hydrogen. Carbon monoxide is an essential raw material in the chemical industry for producing plastics. The desulfurization of hydrocarbons in order to produce fuels with reduced sulfur content is one of the main applications of hydrogen. These units emit CO₂ and nitrogen oxides (NO_x), but practically no sulfur oxide (SO_x). They also consume electricity and their cooling systems require back-up water.</p> |
| Cogeneration units | 19 | <p>Cogeneration units produce steam and electricity simultaneously. They consume natural gas and water, mostly converted into steam and supplied to customers. The steam can be condensed at these customers' facilities and then reused in the cogeneration unit. In most cases, the electricity produced is supplied to the local electricity distribution network, which in some countries can be used to power the Group's other units. Combustion of natural gas produces CO₂ and leads to low nitrogen oxide (NO_x) emissions, but practically no sulfur oxide (SO_x) emissions.</p> |
| Acetylene units | 60 | <p>These units produce acetylene, a gas primarily used in metal welding and cutting. 50 of these units produce this gas through the decomposition of a solid (calcium carbide) using water. Two units fill cylinders with this gas, which is supplied by another industrial company. This process produces lime, at least 90% of which tends to be recycled in industrial and agricultural applications.</p> |
| Nitrous oxide units | 7 | <p>Nitrous oxide is used primarily as an anesthetic gas in the healthcare sector and as a sweetening agent in the food industry. It is produced from ammonium nitrate in solid form or as a water-based solution.</p> |
| Carbon dioxide liquefaction and purification units | 72 | <p>These units liquefy and purify carbon dioxide, which has many industrial applications, especially in the food industry where it is used to deep-freeze foods or to produce carbonated beverages.</p> <p>Carbon dioxide is most often a by-product of chemical units operated by other manufacturers. In certain cases, it is found naturally in underground deposits.</p> <p>While in others, it comes from the Group's hydrogen and carbon monoxide units. It is purified and liquefied in Air Liquide units consuming electricity and cooling water. Carbon dioxide is thus reused for other industrial applications instead of being emitted directly into the atmosphere.</p> |
| Units for the Hygiene and Specialty Ingredients business | 8 | <p>These production units for the Hygiene and Specialty Ingredients business are located in France, Germany and China and belong to the subsidiaries Schülke (Hygiene business) and Seppic (Specialty Ingredients business). Air Liquide experts work closely with hospitals to help them reduce the risk of nosocomial infection and contamination, thanks to the products the Group has developed. These units consume natural gas, electricity and water. Combustion of natural gas produces small amounts of CO₂.</p> |
| Engineering & Construction units | 6 | <p>Units for the Engineering & Construction business taken into account in this reporting are located at five sites in France, China and the United Arab Emirates. They are mainly used for the construction of air separation columns and cryogenic tanks.</p> |
| Biogas units | 15 | <p>These units process waste to produce biogas, a renewable energy source. Biogas is produced during the methanization of biomass: household waste, industrial and agricultural waste and sewage sludge. Air Liquide is aware of the potential of this process in terms of the energy transition and is thus working on global solutions dedicated to the valorization of biogas and which meet the needs of farmers, waste treatment managers and the agro-industry.</p> |

2.2. ENVIRONMENTAL FOOTPRINT OF TRANSPORTATION

TRANSPORTATION: INDUSTRIAL MERCHANT BUSINESS

| | 2014 | 2015 | 2016 | 2017 | 2018 |
|--|------|------|------|------|--------|
| Kilometers traveled by all vehicles delivering gas in liquid or cylinder form <i>(in millions of km)</i> | 428 | 426 | 540 | 588 | 601 * |
| Estimate of CO ₂ emissions generated by these vehicles in the Industrial Merchant business <i>(in thousands of tons)</i> | 471 | 468 | 600 | 653 | 666 * |
| Evolution of the distance traveled per ton of liquid industrial gas delivered (oxygen, nitrogen, argon, carbon dioxide) ^(a) <i>(truck delivery)</i> | 94.8 | 92.2 | 90.3 | 93.3 | 94.6 * |
| Estimate of truck transport kilometers avoided through on-site customer units <i>(in millions of km)</i> | (72) | (74) | (63) | (57) | (58) |
| Estimate of avoided CO ₂ emissions by these on-site units <i>(in thousands of tons)</i> | (72) | (74) | (63) | (58) | (59) |
| Percentage of deliveries of air gases and hydrogen via pipeline or on-site | 86% | 87% | 85% | 85% | 85% |

(a) In kilometers per ton delivered for the Industrial Merchant business. 2008 base of 100.

* Indicator verified by the independent verifier.

TRANSPORTATION: HEALTHCARE BUSINESS

| | 2014 | 2015 | 2016 | 2017 | 2018 |
|--|------------|------------|------------|------------|------------|
| Transportation: Home Healthcare business | | | | | |
| Kilometers traveled <i>(in millions of km)</i> | 149 | 161 | 173 | 184 | 181 |
| Associated CO ₂ emissions <i>(in thousands of tons)</i> | 35 | 39 | 38 | 35 | 35 |
| Transportation: Medical Gases business | | | | | |
| Kilometers traveled <i>(in millions of km)</i> | 26 | 28 | 27 | 33 | 33 |
| Associated CO ₂ emissions <i>(in thousands of tons)</i> | 23 | 25 | 24 | 29 | 30 |
| TOTAL KILOMETERS TRAVELED HEALTHCARE BUSINESS <i>(in millions of km)</i> | 175 | 189 | 200 | 217 | 214 |
| TOTAL ASSOCIATED CO₂ EMISSIONS <i>(in thousands of tons)</i> | 58 | 64 | 62 | 64 | 65 |

2.3. SUMMARY OF THE GROUP'S GREENHOUSE GAS EMISSIONS

2.3.1. The various Scopes

Companies' greenhouse gas emissions are usually broken down into three "scopes", depending on their origin.

- Scope 1 includes direct emissions generated by all possible emission sources owned or controlled by Air Liquide.

This scope includes:

- the Group's production units;
- the transport of products to customers or patients.

94% of the direct emissions are related to the nature of the thermal energy used as a raw material by the Group's large hydrogen and carbon monoxide production units, and cogeneration units (for steam and electricity production). The vast majority of these units use natural gas.

- Scope 2 corresponds to all indirect emissions related to the production of electricity or steam purchased outside the Group in the various countries where it operates. These emissions therefore have a close link with the carbon content of the electricity of countries where Air Liquide operates.

Direct and indirect emissions (Scope 1 and 2) represent 99% of the Group's total reported emissions in 2018.

- Scope 3 corresponds to other indirect emissions generated, for example, by Group employees' business travel or emissions linked to home-office commuting.

2.3.2. Group Scope 1 and Scope 2 emissions

| | 2014 | 2015 | 2016 | 2017 | 2018 |
|--|---------------|---------------|---------------|---------------|-----------------|
| Scope 1: total direct greenhouse gas emissions (GHG) (in thousands of tons of CO ₂ eq.) ^(a) | 11,569 | 13,552 | 14,062 | 14,476 | 15,390 * |
| Scope 2: total indirect GHG emissions (in thousands of tons of CO ₂) ^(b) | 11,405 | 11,716 | 11,174 | 11,679 | 12,422 * |
| TOTAL DIRECT AND INDIRECT GHG EMISSIONS (in thousands of tons of CO ₂ eq.) | 22,974 | 25,268 | 25,236 | 26,155 | 27,812 * |

(a) Includes CO₂ emissions and nitrous oxide emissions.

(b) Total of indirect GHG emissions generated by the production of electricity purchased outside the Group. The indirect emissions only concern CO₂ emissions. The calculation takes into account the various primary energy sources that each country uses to produce electricity (source: International Energy Agency).

* Indicator verified by the independent verifier.

The Group's direct emissions increased from 14.5 million tons of CO₂ equivalent in 2017 to 15.4 million tons in 2018, i.e., an increase of 6.3%. This growth is mainly due to the start up of new units, as well as overall increase in sold hydrogen volumes.

The Group's indirect emissions decreased from 11.7 million tons of CO₂ equivalent in 2017 to 12.4 million tons in 2018, i.e., an increase of 6.4%. This increase is related to the start-up of several large units including worlds largest ASU in South Africa. This growth is counteracted by improvement of overall efficiency of the ASU production units.

2.3.3. Scope 3 emissions related to business travel

Business travel by plane, road or train is the source of reported Scope 3 CO₂ emissions.

Emissions from business travel represented around 210,000 tons of CO₂ in 2018 for all subsidiaries, representing less than 1% of the Group's total emissions.

2.4. ENERGY AND EFFICIENCY INDICATORS FOR THE GROUP AS A WHOLE

| | 2014 | 2015 | 2016 | 2017 | 2018 |
|--|---------|---------|---------|---------|--------------------------|
| Annual electricity consumption (in GWh) ^(a) | 30,341 | 31,650 | 32,834 | 34,062 | 36,265 * |
| Annual thermal energy consumption (in LHV terajoules) ^(b) | 226,036 | 266,153 | 281,043 | 290,285 | 306,111 * ^(c) |
| Evolution of energy consumption per m ³ of air gas produced ^{(d) (e)} | 99.3 | 98.7 | 100.3 | 98.1 | 97.7 * |
| Evolution of energy consumption per m ³ of hydrogen produced ^{(d) (f)} | 97.5 | 99.3 | 99.5 | 98.6 | 99.4 * |

(a) Includes a share of steam and compressed air purchased by the Group.

(b) LHV: Lower Heat Value, which includes the fact that energy from water vaporizing in fuel is not recovered.

(c) Approximately 85,000 GWh LHV.

(d) Calculated using a base of 100 in 2007.

(e) Gases produced (oxygen, nitrogen, argon) calculated in m³ of equivalent gaseous oxygen.

(f) Hydrogen and carbon monoxide.

* Indicator verified by the independent verifier.

The hydrogen unit energy efficiency indicator was down in 2018 mainly due to the increase in large production units that have not yet reached maximum efficiency.

2.5. DISCHARGES INTO AIR AND WATER

DISCHARGES INTO AIR AND WATER (IN TONS)

| | 2014 | 2015 | 2016 | 2017 | 2018 |
|--|---------|---------|---------|---------|--------------------|
| Discharges into air: NOx (nitrogen oxide) | 3,200 | 3,270 | 3,563 | 3,542 | 3,974 |
| Discharges into air: SOx (sulfur oxide) | < 200 | < 250 | < 250 | < 250 | <100 |
| Volatile organic compounds (VOCs) discharged into the atmosphere (<i>estimate</i>) | 110 | 99 | 76 | 146 | 246 ^(a) |
| Discharge to water: oxidizable matter | < 1,000 | < 1,000 | < 1,000 | < 1,000 | <1,500 |
| Discharge to water: suspended solids | < 1,500 | < 1,500 | < 1,500 | < 1,500 | <1,000 |

(a) This increase of VOC in 2018 is a result of the start-up of new units and the significant production increase of the site in Pau, France.

2.6. WASTE AND BY-PRODUCTS

WASTE AND BY-PRODUCTS

| | 2014 | 2015 | 2016 | 2017 | 2018 |
|--|---------------|---------------|---------------|---------------|--------------------|
| Non-hazardous waste and by-products | | | | | |
| Annual quantity of lime produced (extracted dry equivalent) by the acetylene production units (<i>in tons</i>) | 32,000 | 29,000 | 26,000 | 25,000 | 25,380 |
| % recycled | > 90% | > 80% | > 80% | > 90% | >90% |
| Metal waste (<i>in tons</i>) ^(a) | 9,000 | 7,600 | 5,700 | 61,513 | 61,680 |
| % recycled | > 99% | > 99% | > 99% | > 99% | > 99% |
| Total non-hazardous waste and by-products (<i>estimate in tons</i>) | 41,000 | 36,600 | 31,700 | 86,513 | 87,060 |
| Hazardous waste | | | | | |
| Paints and solvents (<i>in tons</i>) | 100 | 104 | 106 | 79 | 72 |
| % recycled | 63% | 59% | 63% | 31% | 45% ^(b) |
| Oils (<i>in tons</i>) | 600 | 650 | 696 | 821 | 815 |
| % recycled | 83% | 92% | 91% | 93% | 93% ^(c) |
| Total hazardous waste and by-products (<i>estimate in tons</i>) | 700 | 754 | 802 | 899 | 887 |
| TOTAL WASTE AND BY-PRODUCTS | 41,700 | 37,354 | 32,502 | 87,412 | 87,947 |

(a) Non-hazardous metal waste.

(b) In addition, 39% is incinerated.

(c) In addition, 7% is incinerated.

2.7. REGULATIONS

2.7.1. Market authorization regulations

The distribution of substances, products and articles is part of the product stewardship approach developed by the chemicals industry.

In terms of market authorizations, Air Liquide is mainly affected by four regulations: chemical substances (REACH), Biocidal products (BPR), Plant protection products (PPP) and Fluorinated gases (F-gas).

INDUSTRIAL MANAGEMENT SYSTEM AND CERTIFICATIONS (GLOBAL SCOPE)

| | 2014 | 2015 | 2016 | 2017 | 2018 |
|--|------|------|------|------|------|
| Estimate of revenue of Group entities covered by an ISO9001 quality certification | 70% | 72% | 66% | 73% | 51% |
| Estimate of revenue of Group entities covered by an ISO14001 environmental certification | 27% | 27% | 26% | 30% | 23% |
| Estimate of revenue of Group entities covered by the OHSAS18001 occupational Health and Safety certification | 16% | 15% | 14% | 16% | 12% |

European REACH regulation – 2007

REACH (Registration, Evaluation, Authorisation and restriction of CHemicals) is a European Union regulation that governs the registration, restriction and authorization of chemical substances produced in or imported to the European Union. Air Liquide also ensures that the raw materials in use and authorized for use on the market are in compliance with the REACH regulation.

REACH restrictions

Air Liquide is mainly impacted by restrictions relating to the use of solvents used to distribute acetylene. The restriction dossier for the solvent DMF was finalized in October 2018. Its substitution will require that cylinder filling processes are reviewed. Potential substitute NMP will also be subject to restricted use as of May 2020.

REACH authorizations

Transitional authorizations before the permanent interruption of use in Europe apply to substances on the list of substances subject to authorization. These SVHCs (substances of very high concern) are mainly contained in articles distributed for the commissioning of gases.

Registration with REACH

Any chemical substance imported or manufactured in Europe of over one ton a year must be registered with the European chemicals agency, ECHA. Each manufacturer or importer must have its own registration.

The European REACH regulation came into effect in 2007 and authorization procedures for products manufactured or imported at a rate of more than one ton per year were spread from this period until May 31, 2018. After this date, requirements in terms of substances will continue to apply in the event of production in a higher tonnage band or when registration files are reviewed by the authorities. The same requirement will apply to all new products as of the first ton produced.

Air Liquide's main products such as oxygen, nitrogen, hydrogen, CO₂, helium and rare gases are not subject to REACH registration.

Air Liquide is the lead registrant for several molecules, in particular Specialty Gases in the Electronics business (NF₃, CF₄, C₄F₈, SiF₄, etc.). Until now, several other products (carbon monoxide, acetylene, methanol, lime, nitrous oxide, ultra-pure fuels) have been, or will be, registered in compliance with the schedule established by this Regulation.

In addition, Seppic, which produces healthcare and beauty specialty ingredients, falls under the REACH regulation for some of its products. Seppic anticipated the introduction of the European REACH regulation and has complied with the various deadlines imposed by this regulation since it came into effect. As well as the European cases submitted under the REACH regulation, Seppic also complies with similar non-European regulations.

In 2018, Group sales subject to REACH registration represented less than 3% of Group revenue.

Regulations governing Biocidal products (BPR – 2012) and Plant protection products (PPP – 2009)

These long-standing regulations (BPR 2012 and PPP 2009) are often stated in national decrees governing crop protection products. The purpose of using gases such as CO₂ is often as an insecticide, substituting chemical products which are banned in Europe.

These two regulations require approval of the substance at the European level, before national authorization can be requested.

Since 2016, Air Liquide has been investing in a renewal file, under PPP, of the approval of CO₂ and ethylene, which are up for renewal in 2020 and 2022 respectively.

Under BPR, the review of the Ozone approval file is still underway and requests for the appropriate authorization for use both in our industrial facilities and for the market authorization of its precursor, oxygen, will then be made. Applications relating to the drinkability of water, the disinfection of containers and the treatment of industrial water are affected by this review.

F-Gas regulation (2014)

Following the marked reduction in the import quotas for these gases which have high global warming potential, Air Liquide will, from now on, limit its business to the electronics sector alone as this application is exempt.

2.7.2. Globally Harmonized System of Classification and Labelling of Chemicals

The Globally Harmonized System of Classification and Labelling of Chemicals, better known as GHS, was created by the United Nations. This system sets out the classification of chemical products according to the type of danger that they represent and provides standardized hazard information, including labeling and safety data sheets.

This labeling must provide key information concerning health, safety and environmental protection to everyone who handles a hazardous product or who could be exposed to one.

In the countries in which GHS is applicable, Air Liquide subsidiaries have already implemented the principles of GHS in terms of product compliance with local and regional regulations.

2.7.3. Seveso 3 Directive

This European directive focuses on preventing major industrial risks. It applies to any facility where hazardous substances exceed certain quantities. These facilities are divided into two categories according to the quantity of such substances: Seveso 3 "upper tier" and "lower tier". In Europe, 101 "lower tier" and 27 "upper tier" Air Liquide sites are affected, mainly because of their stocks of oxygen.

Seveso regulations apply only in Europe, but if the Seveso "upper tier" criteria were to be applied worldwide, 42 other Group sites would be covered.

2.7.4. CO₂ emission quotas

Air Liquide is present in a number of regions that have implemented, or are in the process of implementing, a quota system for greenhouse gas emissions. Air Liquide's Corporate teams and dedicated teams based in these regions monitor and follow these regulatory developments, in order to ensure that their operations are fully compliant with the objectives and obligations related to these quota systems. Thanks to the energy efficiency of its production systems, Air Liquide is able to naturally minimize the energy footprint, and therefore the carbon footprint of its products and services.

In the European Union, the European directive ETS (Emission Trading Scheme) established a quota system for greenhouse gas emissions in 2005, in compliance with the Kyoto Protocol and EU targets on climate change. Following an initial phase from 2005 to 2007, and a second phase from 2008 to 2012, a third phase, covering the period from 2013 to 2020, has expanded the scope of industrial facilities subject to the ETS. For Air Liquide, seven cogeneration sites in Germany, France and the Netherlands, along with all of the Group's large hydrogen production sites in Europe were affected by this directive in 2018. With regard to hydrogen production units, CO₂ emission quotas are mostly allocated for free, according to a benchmark set for the top performing European facilities. Air Liquide obtains CO₂ quotas from the market or its customers in order to cover the emissions from hydrogen production sites not covered by the free allocations and for all emissions from the cogeneration sites.

China announced ambitious targets for reducing the carbon intensity of its economy by 2030. In 2013 and 2014, the Chinese government launched pilot ETS programs in seven regions (the provinces of Guangdong and Hubei, and the cities of Beijing, Tianjin, Shanghai, Chongqing and Shenzhen). These programs relate to four Group production sites located in these regions (Air Separation Units and hydrogen units). At the end of 2017, the Chinese government implemented a national emissions trading scheme. China's national

ETS only covers the electricity production sector for the moment. Other regions such as Kazakhstan, Korea and California, have also introduced a national emissions trading scheme. In 2018, a CO₂ taxation system was introduced in Singapore.

2.8. ENVIRONMENTAL INCIDENTS AND RISKS RELATED TO CLIMATE CHANGE

An Air Liquide procedure, available for all Group employees and fully integrated into Air Liquide's Industrial Management System (IMS), defines environmental incidents based on three levels of severity. All incidents reported at Group level are subject to a systematic, in-depth analysis, depending on the nature of the incident, so that preventative measures can be stepped up. Environmental risks related to industrial processes and risks related to climate change are taken into account by the Group and are presented in the "Risk factors" section of the Reference Document.

Most of the time, environmental incidents in the Industrial and Medical Gas business have a very low impact on the environment compared to the traditional chemicals industry. For example, in air gas production, any possible leak of these gases does not represent any danger for the atmosphere. Likewise, the water used in Air Liquide's processes is primarily used in cooling and steam production. The risk of possible pollution of the water used is therefore very low. In 2018, there were a total of 15 environmental incidents in the Group, mainly involving air gas and oil leaks.

Climate risks are reviewed at both Group and site level. Weather-related and climatic disasters, water stress and the increased frequency of cyclones constitute a risk that could disrupt the smooth running of operations. Preventive measures targeting extreme weather-related phenomena exist at the main sites located in high-risk areas.

The amount of financial provision and guarantees earmarked for environmental risks is 11.2 million euros.

3. Specific indicators for the Home Healthcare business linked to the issue of socially responsible bonds

In 2012, Air Liquide issued its first SRI-labeled bond^(a) under its Euro Medium Term Notes (EMTN) program, for a total amount of 500 million euros. This bond was mostly placed with investors having SRI management mandates and permitted the Group to diversify its financing sources. After numerous public authorities and supranational issuers, Air Liquide became the first company in the world to issue bonds meeting the criteria of SRI investors. Obtaining a rating from the extra-financial rating agency Vigeo for the Home Healthcare business

led to this issue being given an SRI label. This evaluation is based on the social, environmental and governance criteria of the Home Healthcare business that concerns more than 1.5 million patients worldwide.

In the framework of this SRI bond issue, Air Liquide made a commitment to publishing during the life of these bonds, i.e. nine years, indicators specific to the Home Healthcare business relating to the environment, safety and employee diversity.

(a) Socially Responsible Investment: application of sustainable development principles to investment. Approach consisting in systematically considering the three dimensions – environment, social / societal, and governance – in addition to the usual financial criteria.

| Number of patients treated | 2014 | 2015 | 2016 | 2017 | 2018 |
|---|-------------------|-------------------|-------------------|-------------------|--------------------|
| Total number of patients treated by the Air Liquide Home Healthcare Division | 1,200,000 | 1,300,000 | 1,400,000 | 1,550,000 | 1,630,000 |
| Group employees | | | | | |
| Home Healthcare employees ^(a) | 8,183 | 9,112 | 9,492 | 10,015 | 10,143 |
| Safety | | | | | |
| Number of lost-time accidents of at least one day among employees | 62 ^(b) | 79 ^(b) | 63 ^(b) | 66 ^(b) | 63 |
| Number of accidents of subcontractors and temporary workers ^(c) | 9 ^(b) | 16 ^(b) | 21 ^(d) | 8 ^(b) | 16 ^(b) |
| Equality | | | | | |
| % of women among managers and professionals | 58% | 58% | 57% | 58% | 56% |
| % of women among managers and professionals hired during the year | 56% | 58% | 62% | 59% | 60% |
| Training | | | | | |
| Average number of days of training per employee, per year | 2 | 1.6 | 2.1 | 1.9 | 2.1 ^(e) |
| Kilometers driven and CO₂ emissions related to transportation | | | | | |
| Kilometers driven per patient monitored per year | 124 | 123 | 131 | 118 | 111 |
| CO ₂ emissions related to transportation per patient (kgCO ₂ /patient) per year | 29 | 30 | 29 | 23 | 21 |

(a) Employees under contract, excluding temporary employees.

(b) No fatal work accidents.

(c) Personnel working under an Air Liquide contract at a Group site, at a customer site, or as a delivery vehicle driver.

(d) One fatal accident (road accident).

(e) 16 hours a year when counted in hours (base: 1 day = 7.5 hrs).

4. Human Resources indicators

GROUP EMPLOYEES ^(a)

| Employees ^(a) | 2014 | 2015 | 2016 | 2017 | 2018 |
|---|--------|--------|-----------------------|--------|----------|
| Group employees | 50,300 | 51,500 | 66,700 | 65,200 | 66,000 * |
| Women | 13,600 | 14,200 | 17,000 ^(e) | 16,900 | 17,300 |
| as a % | 27% | 28% | 25% | 26% | 26% |
| Men | 36,700 | 37,300 | 49,700 | 48,300 | 48,700 |
| as a % | 73% | 72% | 75% | 74% | 74% |
| Joining the Group ^(b) | 14.8% | 16.5% | 17.1% | 16.7% | 16.5% |
| Leaving the Group ^(c) | 14.7% | 14.0% | 15.1% | 18.0% | 15.2% |
| % of employees having resigned during the year ^(d) | 5.8% | 5.3% | 5.4% | 7.5% | 8.0% |

(a) Employees under contract, excluding temporary employees.

(b) Hiring or integration due to acquisitions. The percentage is based on the number of employees as of December 31 of the preceding year.

(c) Retirement, resignations, layoffs (around 20% of the departures), departures due to disposals, etc. The percentage is calculated based on the number of employees as of December 31 of the preceding year.

(d) Calculated on the number of employees as of December 31 of the preceding year.

(e) Estimate.

* Indicator verified by the independent verifier.

HUMAN RESOURCES INDICATORS FOR THE GROUP

| | 2014 | 2015 | 2016 | 2017 | 2018 |
|--|---------------|------------|---------------|----------|--------------------------|
| Parity and diversity | | | | | |
| Equality | | | | | |
| % of women among managers and professionals | 28% | 29% | 30% | 29% | 29% * |
| % of women among managers and professionals hired during the year | 31% | 34% | 39% | 37% | 36% * |
| % of women among employees considered as high potential | 41% | 38% | 40% | 40% | 41% |
| Number of nationalities | | | | | |
| Among expatriates | 44 | 50 | 44 | 53 | 49 |
| Among senior executives | 31 | 33 | 30 | 33 | 30 |
| Among employees considered as high potential | 44 | 48 | 49 | 52 | 53 |
| Number of nationalities among senior executives / Number of countries where the Group is present | 39% | 41% | 38% | 41% | 38% |
| Training | | | | | |
| % of total payroll allocated to training | About 2% | About 2% | About 2% | About 2% | About 1.5% |
| Average number of days of training per employee, per year (order of magnitude) | 3.5 days | 3.5 days | 3.1 days | 3.0 days | 2.7 days ^{*(a)} |
| % of employees having received training at least once during the year (order of magnitude) | 78% | 77% | 72% | 73% | 63% * |
| Performance review | | | | | |
| % of employees who have had an annual performance review meeting with their direct supervisor during the year | 79% | 80% | 76% | 81% | 80% * |
| % of employees who have had a career development meeting with the HR Department during the year | 16% | 15% | 17% | 12% | 13% |
| Remuneration | | | | | |
| % of employees with an individual variable component as part of their remuneration | 58% | 60% | 63% | 57% | 53% |
| Absenteeism | | | | | |
| Absence rate of Air Liquide employees (estimate) | 2.4% | 2.7% | 2.7% | 2.5% | 2.3% |
| Ethics | | | | | |
| % of employees belonging to an entity with a local Code of Conduct | 94% | 97% | 96% | 97% | 97% |
| Employee loyalty | | | | | |
| Average seniority in the Group | 10 years | 10 years | 10 years | 10 years | 10 years |
| Retention rate of managers and professionals over a year ^(b) | 93% | 95% | 95% | 93% | 93% |
| Social performance | | | | | |
| % of employees with disabilities ^(c) | 1.3% | 1.4% | 1.4% | 1.1% | 1.1% |
| % of employees having access to a representation/dialog/consultation structure | 76% | 79% | 82% | 85% | 86% |
| % of employees belonging to an entity at which an internal commitment survey was conducted within the last three years | > 55% | 68% | 65% | 45% | 36% |
| Employee shareholders | | | | | |
| % of capital held by Group employees ^(d) | 1.5% | 1.5% | 1.5% | 1.5% | 1.7% |
| % of Group employees that are shareholders of L'Air Liquide S.A. | More than 50% | Almost 50% | More than 50% | 36% | 43% |

(a) 23 hours a year when counted in hours (base: 1 day = 7.5 hrs).

(b) This rate takes only resignations into account.

(c) For the countries where regulations allow this data to be made available.

(d) Within the meaning of article L. 225-102 of the French Commercial Code.

* Indicator verified by the independent verifier.

5. Reporting methodology

5.1. PROTOCOL AND DEFINITIONS

In the absence of a relevant and recognized protocol for industrial gas operations, Air Liquide has created its own protocol to define its reporting methods for Human Resources, safety and environmental indicators. This protocol includes all the definitions, measurement procedures and collection methods for this information. In line with the Group's commitment to continuous improvement, Air Liquide is progressively completing the work of adjusting to its Sustainable Development indicators protocol to reflect changes in the Group.

This protocol is based on the general principles defined by the Group with regard to scope, responsibilities, controls and limits, and establishes definitions, the departmental responsibilities, tools and data-tracing methods for each indicator. This document is regularly updated. Moreover, this protocol takes into account all the Group's formalized procedures in the framework of the Industrial Management System (IMS) and the global protocol for Group Policies, Codes and Procedures called the BLUEBOOK. This reporting framework makes it possible to cover the information listed in articles L. 225-102-1 and R. 225-105 of the French Commercial Code, except for the fight against food waste, food insecurity, respect for the animal well-being and commitments to responsible food, fair and sustainable. Due to its industrial activity, these subjects are not considered as a priority by Air Liquide.

5.2. SCOPE AND CONSOLIDATION METHODS

Human Resources and environmental indicators are consolidated worldwide for all companies integrated within the financial consolidation scope. Entities accounted for by the equity method are excluded from the reporting scope. Safety indicators are consolidated worldwide for all companies in which Air Liquide has operational control or is responsible for safety management. Apart from these general rules, there are some specific ones:

- information on the impact of transportation (kilometers traveled, CO₂ emitted) is calculated on the basis of data collected in the main countries where the Group is established around the world;
- information on kilometers and avoided CO₂ emissions through on-site Air Separation Units and efficiency measures pertains to fully-consolidated subsidiaries;
- environmental and energy indicators for the main types of production units operated by the Group cover about 99% of the Group's Gas & Services revenue, and 98% of the Group's total revenue;
- for environmental and energy indicators, production units are included in the reporting system from the effective date of their industrial commissioning;
- electricity consumption, and the indirect CO₂ emissions related to it, are only taken into account when Air Liquide pays for this electricity. Energy consumption of on-site units, as well as water consumption specific to the sale of treated water (which is not part

of the Group's core business) are excluded from the consolidation scope of the data. When the Group has cogeneration units in a country where ASUs are available, the indirect emissions from the electricity of these units are not taken into account;

- the segmentation between advanced economies and developing economies used for direct and indirect greenhouse gas emissions is the same as that used by the Finance Department.

5.3. DATA COLLECTION AND RESPONSIBILITIES

The Human Resources, safety and environmental indicators are produced by several data-collection systems in the Group, each under the responsibility of a specific department:

- Human Resources indicators, included in the Group's general accounting consolidation tool, fall under the responsibility of the Human Resources Department;
- the energy consumption and CO₂ emissions indicators for the main Air Separation Units, and cogeneration, hydrogen and carbon monoxide units are tracked by the Large Industries business line using a dedicated Intranet tool;
- as a complement, environmental and safety reporting is carried out by the Safety and Industrial System Department using a dedicated Intranet tool, and includes:
 - for all entities, the data of the Group's accident reporting,
 - for the units of the Large Industries business line, other environmental indicators (atmospheric emissions, water consumption, discharge to water, etc.),
 - for the smaller units (acetylene, nitrous oxide, carbon dioxide units and Hygiene and Specialty Ingredients businesses), the Engineering & Construction business units, the Research & Development sites and the Technical Centers, all indicators (energy, atmospheric emissions, water consumption, discharge to water, etc.);
- indicators on Industrial Merchant transportation are the responsibility of this business line;
- indicators on transportation for Medical Gases and Home Healthcare are the responsibility of the Healthcare business line;
- the estimate of the percentage of the Group's revenue with respect to the implementation of the Industrial Management System (IMS), as well as ISO9001, ISO14001 and OHSAS18001 are indicators which fall under the responsibility of the Safety and Industrial System Department;
- among the subjects covered by the French "Grenelle 2" law, soil pollution and the consideration of noise pollution are not relevant for the Industrial Gas business, given the size of the Group's sites and the noise levels generated. They are therefore not mentioned in this report.

5.4. CONTROLS

Each department in charge of collecting data is responsible for the indicators provided. Control occurs at the time of consolidation (review of changes, inter-entity comparisons).

Safety and energy indicators are tracked monthly. In addition, audits of environmental data are carried out by the Safety and Industrial System Department on a sample of sites representative of the various types of units monitored. Where the data reported are inconsistent or missing, an estimated value may be used by default.

5.5. METHODOLOGICAL LIMITS

The methodologies used for certain Human Resources, safety and environmental indicators can have certain limits due to:

- the absence of nationally or internationally recognized definitions, in particular for indicators on managers and professionals and social performance indicators;
- the representativeness of the measurements taken and required estimates. This is particularly the case for indicators regarding avoided CO₂ emissions, water consumption, kilometers avoided per on-site unit, and training.

6. Independent verifier's report

This is a free translation into English of the Statutory Auditor's report issued in French and is provided solely for the convenience of English speaking readers. This report should be read in conjunction with, and construed in accordance with, French law and professional standards applicable in France.

REPORT BY ONE OF THE STATUTORY AUDITORS, APPOINTED AS AN INDEPENDENT THIRD PARTY, ON THE NON-FINANCIAL INFORMATION STATEMENT INCLUDED IN THE MANAGEMENT REPORT.

For the year ended 31 December 2018

To the Shareholders,

In our capacity as Statutory Auditor of L'Air Liquide appointed as an independent third party and certified by COFRAC under number 3-1060 rév.2 (whose scope is available at www.cofrac.fr), we hereby report to you on the non-financial information statement for the year ended December 31, 2018 (hereinafter the "Statement"), included in the Management Report pursuant to the legal and regulatory provisions of articles L. 225 102-1, R. 225-105 and R. 225-105-1 of the French Commercial Code (*Code de commerce*).

The entity's responsibility

Pursuant to legal and regulatory requirements, the Board of Directors is responsible for preparing the Statement, which must include a presentation of the business model, a description of the principal non financial risks, a presentation of the policies implemented in light of those risks and the outcome of said policies, including key performance indicators.

The Statement has been prepared in accordance with the entity's procedures (hereinafter the "Guidelines"), the main elements of which are presented in the Statement.

Independence and quality control

Our independence is defined by the provisions of article L. 822-11-3 of the French Commercial Code and the French Code of Ethics (*Code de déontologie*) of our profession. In addition, we have implemented a system of quality control including documented policies and procedures regarding compliance with the ethical requirements, French professional standards and applicable legal and regulatory requirements.

Responsibility of the Statutory Auditor, appointed as an independent third party

On the basis of our work, our responsibility is to provide a reasoned opinion expressing a limited assurance conclusion on:

- the consistency of the Statement with the provisions of article R. 225-105 of the French Commercial Code;
- the fairness of the information provided in accordance with article R. 225-105 I, 3 and II of the French Commercial Code, i.e., the outcome of the policies, including key performance indicators, and the measures implemented in light of the principal risks (hereinafter the "Information").

However, it is not our responsibility to comment on:

- The entity's compliance with other applicable legal and regulatory provisions, in particular the French duty of care law and anti-corruption and tax evasion legislation;
- The consistency of products and services with the applicable regulations.

Nature and scope of our work

The work described below was performed in accordance with the provisions of articles A. 225-1 et seq. of the French Commercial Code determining the conditions in which the independent third party performs its engagement and with the professional standards applicable in France to such engagements, as well as with ISAE 3000 – Assurance engagements other than audits or reviews of historical financial information;

Our procedures allowed us to assess the consistency of the Statement with regulatory provisions and the fairness of the Information:

- we obtained an understanding of all the consolidated entities' activities, the description of the labour and environmental risks associated with their activities and, where applicable, the impact of those risks on compliance with human rights and anti corruption and tax evasion legislation, as well as the resulting policies and their outcomes;
- we assessed the appropriateness of the Guidelines with respect to their relevance, completeness, reliability, objectivity and understandability, with due consideration of industry best practices, where appropriate;

- we verified that the Statement includes each category of labour and environmental information set out in article L. 225-102 1 III as well as information regarding compliance with human rights and anti corruption and tax evasion legislation;
- we verified that the Statement includes an explanation for the absence of the information required under article L. 225-102-1 III, 2;
- we verified that the Statement presents the business model and the principal risks associated with all the consolidated entities' activities, including where relevant and proportionate, the risks associated with their business relationships and products or services, as well as their policies, measures and the outcomes thereof, including key performance indicators;
- we verified, where relevant with respect to the principal risks or the policies presented, that the Statement provides the information required under article R. 225-105 II;
- we assessed the process used to identify and confirm the principal risks;
- we asked what internal control and risk management procedures the entity has put in place;
- we assessed the consistency of the outcomes and the key performance indicators used with respect to the principal risks and the policies presented;
- we verified that the Statement covers the scope of consolidation, i.e., all the companies included in the scope of consolidation in accordance with article L. 233-16 within the limitations set out in the Statement;
- we assessed the data collection process implemented by the entity to ensure the completeness and fairness of the Information;
- for the key performance indicators and other quantitative results that we considered to be the most important, we implemented:
 - analytical procedures to verify the proper consolidation of the data collected and the consistency of any changes in those data,
 - tests of details, using sampling techniques, in order to verify the proper application of the definitions and procedures and reconcile the data with the supporting documents, were undertaken. This work was carried out on a selection of contributing entities – Airgas, Gasmedi, Seppic, Air Liquide Germany Industry, and Air Liquide Italia entities for social indicators and for the Fos-sur-Mer ASU, Sarroch ASU, Sarlux ASU, Jurong Island ASU 8 & ASU 9, Pernis Cogen, El Segundo HyCo, Rodeo HyCo, and ALFI Bagneux sites for the environmental indicators – and covers 30% of the workforce and between 14% and 26% of the environmental information related to the consolidated data relating to the key performance indicators and outcomes selected for these tests;
- we referred to documentary sources and conducted interviews to corroborate the qualitative information (measures and outcomes) that we considered to be the most important;
- we assessed the overall consistency of the Statement based on our knowledge of the all the consolidated entities

We believe that the work carried out, based on our professional judgement, is sufficient to provide a basis for our limited assurance conclusion; a higher level of assurance would have required us to carry out more extensive procedures.

Means and resources

Our work was carried out by a team of eight people between September 2018 and March 2019 and took a total of 20 weeks.

We were assisted in our work by our specialists in sustainable development and corporate social responsibility. We conducted some ten interviews with the people responsible for preparing the Statement, representatives namely of the Sustainable Development, Risks, Purchasing, Ethics, Human Resources, Safety & Industrial Systems, and Large Industries teams.

Conclusion

Based on our work, nothing has come to our attention that causes us to believe that the non-financial information statement is not in accordance with the applicable regulatory provisions and that the Information, taken as a whole, is not presented fairly and in accordance with the Guidelines.

Neuilly-sur-Seine, March 1, 2019

One of the Statutory Auditors

PricewaterhouseCoopers Audit

Olivier Lotz
Partner

Sylvain Lambert
Sustainable Development Partner

Appendix: List of the information we considered most important**Environmental - Key Performance Indicators and Other Quantitative Results:**

- Direct and indirect emissions of greenhouse gases;
- Avoided greenhouse gas emissions;
- Evolution of energy consumption per m³ of gas produced;
- Evolution of energy consumption per m³ of hydrogen produced;
- Releases to air: NOx (nitrogen oxides);
- Releases to air: SOx (sulfur oxides);
- Releases into the water of oxidizable materials;
- Releases into the water of suspended matter;
- Share of water consumption at Air Liquide sites located in probable areas of very high water stress versus the Group's annual water consumption;
- Volume of renewable energy purchased by Air Liquide;
- Share of low-carbon or renewable electricity consumed by the Group;
- Distance traveled per tonne of industrial gas delivered.

Social - Key performance indicators and other quantitative results:

- Accident frequency rate (with at least one day off) for Group employees;
- Accident severity rate;
- Percentage of women among engineers and managers;
- Percentage of women among the top 10% positions of society;
- Percentage of women among employees considered as high potential;
- Percentage of recent graduates among hiring engineers and executives;
- Percentage of employees belonging to an entity with a local Code of Conduct;
- Percentage of employees with disabilities;
- Percentage of Group employees who have received at least one training during the year.

Qualitative information (actions and results):

- Inclusion of energy mix in supplier selection criteria;
- Inauguration in 2018 of a new "Smart Innovative Operations Center" (SIO) Center for the South-East Asia-Pacific region;
- Establishment of a working group on water to better manage water on production sites;
- Development of solutions to improve the quality of the air, in particular by the use of cryogenic molecules for the refrigerated transport of products;
- EcoVadis Award in the category "Responsible Purchasing: Stakeholder Engagement";
- Desulfurization by hydrogen of petroleum fuels;
- Safety "leadership" training and regular training at the workplace;
- Signature of the Responsible Care® Charter of the International Council of Chemical Associations (ICCA) with the aim of improving the overall performance of the chemical industry in terms of health, safety and environmental protection;
- Road safety program;
- Launch of a digital campus in collaboration with digital transformation teams in 2018;
- Involvement of employees in the Air Liquide Foundation through support for local sponsorship initiatives;
- Update of the Group's Responsible Purchasing policy in 2018;
- Operation the "Ethical" system.

7. Appendix

Link between Air Liquide's Sustainable Development indicators and the indicators of the Global Reporting Initiative (GRI)

| Page | Air Liquide indicators | GRI indicators |
|-------------------------------|--|----------------|
| Human Resources | | |
| 299 | Group employees | 102-8 |
| 281 | Breakdown of employees by geographic region | 102-8 |
| 299 | Turnover of employees (leaving the Group) | 401-1 |
| 281 | Distribution of employees by age bracket | 405-1 |
| 300 | Retention rate of managers and professionals | 401-1 |
| 299 | Percentage of women in the Group | 405-1 |
| 300 | Percentage of women among managers and professionals | 405-1 |
| 300 | Average number of days of training per employee, per year | 404-1 |
| 300 | Percentage of employees who have had an annual performance review meeting with their direct supervisor | 404-3 |
| 300 | Diversity indicator (number of nationalities) | 405-1 |
| Safety | | |
| 292 | Number of lost-time accidents of Group employees | 403-9 |
| 292 | Frequency of lost-time accidents of Group employees | 403-9 |
| 292 | Number of lost-time accidents of subcontractors and temporary workers | 403-9 |
| Energy and environment | | |
| 295 | Total annual electricity consumption | 302-1 |
| 295 | Total annual thermal energy consumption | 302-1 |
| 295 | Evolution of energy consumption per m ³ of air gas produced (ASU) | 302-3 |
| 295 | Evolution of energy consumption per m ³ of hydrogen produced (HyCO) | 302-3 |
| 294 | Evolution of the distance traveled per ton of gas delivered | 302-5 |
| 276 | Total annual water consumption | 303-5 |
| 276 | Total annual water withdrawal | 303-3 |
| 276 | Total annual water discharge | 303-4 |
| 295 | Total direct greenhouse gas emissions | 305-1 |
| 295 | Total indirect greenhouse gas emissions | 305-2 |
| 295 | Total direct and indirect greenhouse gas emissions | 305-1/2 |
| 296 | Discharge into the atmosphere (NOx) | 305-7 |
| 296 | Discharge into the atmosphere (SOx) | 305-7 |
| 76 | Avoided CO ₂ emissions in Air Liquide operations and at customers' facilities | 305-5 |
| 296 | Estimate of discharge into the atmosphere (VOCs) | 305-7 |
| 296 | Discharge to water (oxidizable matter, suspended solids) | 306-1 |
| 296 | Total mass of waste by type and waste treatment | 306-2 |
| Transportation | | |
| 294 | Estimate of CO ₂ emissions generated by truck delivery | 305-1 |
| 294 | Estimate of avoided CO ₂ emissions through on-site units | 305-5 |
| Social | | |
| 300 | % of employees belonging to an entity with a local Code of Conduct | 205-1 |



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Annual Report, Reference Document,
Shareholder's Guide, Interactions and more.
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