HISTORY OF THE AIR LIQUIDE GROUP

1902

ORIGIN

Air Liquide was born of innovation and an 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 factor was one of the reasons 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). See "A Century of International Development".

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 hundred-year of the listing in 2013. Air Liquide has endeavored to forge a strong and privileged relationship with its shareholders based on an exceptional stock market performance, with an average annual increase in its share price over the 100 years to 2013 of +11.9%.

1946

NEW ADVENTURES, DIVING

New adventures shared with Captain Cousteau led to the creation of Spirotechnique (today known as Aqua Lung™), which designs, manufactures and sells diving regulators and other equipment used for professional and leisure diving.

A CENTURY OF INTERNATIONAL DEVELOPMENT

Air Liquide's development was rapid during the early part of the XXth century, with significant business growth between the two world wars. From 1945 to 1970, in an economy that was being rebuilt, the Group consolidated its positions and established itself in South America and South Africa (1946), then in Australia and North Africa (1956).

In the 1970s-80s, international growth was renewed with a major acquisition: Big Three in the United States in 1986. At the end of the 1980s, taking advantage of its long-time presence in Japan, Air Liquide set its sights on other Asian countries and played its part in the development of the Electronics market. The Group invested massively in China in the early 2000s; the country is a major growth market for industrial gases and Air Liquide entered into numerous air gas contracts.

In the 1990s, the Group began to develop in Central Europe. During a second phase, in the 2000s, it made inroads further east in Russia, Ukraine and Turkey, winning Large Industries contracts. The Middle East also became a new investment priority.

In the 2000s, there was a second major acquisition: certain businesses of Messer Griesheim in Germany, the United Kingdom and the United States. In 2007, the Group purchased minority interests in its joint ventures in Japan and Southeast Asia.

Today, Air Liquide continues to pursue its strategy of expanding its global presence, convinced that the geographical diversity will guarantee resilience and future growth. As a result, the Group is continuously strengthening its historical positions in the major economies worldwide and relentlessly seeking footholds in new markets.

Air Liquide is now present in 80 countries, its global dimension being a fundamental component of its identity.

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. In 1954, the first liquid oxygen plant was launched in the North of France.

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 through a pipeline network. The Group multiplied 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 9,200 km (≈ 5,700 miles) of pipelines worldwide, in particular in the US along the Gulf Coast of Mexico, in Northern Europe, in the Ruhr valley in Germany and in several Asian countries.

1962

SPACE INDUSTRY

Convinced of the industrial potential of cryogenics, Jean Delorme, Chairman & CEO, 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 and the Ariane program for 50 years. The Group's contribution has been as much in the production of the fluids essential for launch (oxygen, hydrogen, helium and nitrogen) and the supply of associated services, as in the design and production of the tanks and cryogenic equipment of the launchers.

1970

A TRADITION OF INVENTIONS

The Claude-Delorme Research Center, located in the Paris-Saclay innovation cluster and now called the Paris-Saclay Research Center, was created to enhance gas production techniques and their applications (combustion, welding, metalworking, chemicals, electronics, food, respiratory functions, and environmental treatment). It is evidence of the Group's desire to inherently understand the industrial processes of its customers and develop new gas applications to better satisfy their requirements (in terms of quality, productivity and the environment). The Center also develops partnerships with universities and industrial companies. The Group currently has 9 research centers around the world.

1976

A TECHNOLOGICAL BREAKTHROUGH

With the Sasol project in South Africa, transforming coal into 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.

1985

A NEW MARKET, ELECTRONICS

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

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 has used the business model, which is behind the success of its air gas activity, deploying from the beginning a basin strategy based on a pipeline network, providing customers with flexibility, distribution reliability and service quality at the best price.

PROTECTING LIFE

Originally an oxygen supplier to hospitals, Air Liquide has become a specialist in the Healthcare sector. The Group launched its Home Healthcare activity 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 developed in the Hygiene sector, an activity that naturally complemented the hospital services. Most recently, Air Liquide launched significant research programs in therapeutic gases, used for anesthesia, resuscitation, and pain relief.

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, financial 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 and 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 the gasification or CO_2 purification, adding to the Group's historical competencies in cryogenics. Thanks to this acquisition, the Group now has a complete technological offering and a greater engineering capacity.

2008

LAUNCH OF THE ALMA PROGRAM TO STEP UP GROWTH

The Group launches the ALMA corporate program. Driven by the ambition to be the recognized leader of its industry, the Group announces its mid-term objectives for an average annual revenue growth of +8% to +10%, 600 million euros in efficiencies over three years and a return on capital employed of between 11% and 12%.

2009

RESILIENCE IN AN UNPRECEDENTED CRISIS

Affected by a 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 shows itself to be an exception, posting a stable net profit while preserving the strength of its balance sheet.

2010-2012

UPDATED OBJECTIVES – NEW TERRITORIES, NEW ACQUISITIONS

Slowly emerging from a crisis that reshuffled global growth, Air Liquide announced at year end 2010 new objectives for its ALMA program in terms of performance and responsibility. These objectives were revised at year end 2013 to factor in a slower-than-expected recovery in growth, in particular in Western Europe and Japan.

The Group accelerated its presence in new territories, including Turkey, Ukraine and Mexico, and strengthened its presence in China. These developments contributed to the increase, in eight years, of the developing economies' share of Gas & Services revenue from 15% to 28% in 2015.

In a weaker growth environment in the advanced economies, and particularly in Western Europe, Air Liquide intensified its acquisitions. At the end of 2012, two major home healthcare players joined the Group: LVL Médical in France and Gasmedi in Spain. Other acquisitions were completed in 2013 to strengthen the Group's positions in Healthcare in Poland, Scandinavia and Canada and in Industrial Merchant in Brazil, Russia, the Middle East and China.

2013-2015

NEW INITIATIVES IN THE INNOVATION FIELD – HYDROGEN MOBILITY

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 investment subsidiary to make minority investments in innovative technology start-ups. In 2014, the Group decides on new investments with the modernization of the Paris-Saclay Research Center, the creation of a center for the development 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 CO_2 released during hydrogen production via a cryogenic process. After being purified, the captured CO_2 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 accompanying automotive manufacturers launching fuel cell electric vehicles on the market. Air Liquide has stepped up the construction of hydrogen charging stations (United States, Japan, France, Germany, Belgium, Denmark and the Netherlands), the majority of which are accessible to the general public.

On November 17, 2015, the Group announced the signing of a merger agreement under which Air Liquide will acquire the American company Airgas. See below.

PROPOSED ACQUISITION OF AIRGAS

Combining Air Liquide and Airgas will bring together two highly complementary businesses to deliver greater value, service and innovation to customers in North America and around the world. In the United States, Airgas' leadership in the packaged gases business and associated products and services and Air Liquide's strong footprint in complementary activities will increase the scope and competitiveness of the combined companies' product offering.

This acquisition gives Air Liquide a greater presence in the U.S. market, the largest for industrial gases worldwide, and will ideally position Air Liquide for future growth. In addition, there is potential for further growth using Airgas' footprint to accelerate the rollout of Air Liquide's technologies.

This game-changing combination will strengthen Air Liquide's global leadership and will ideally position the Group for future growth with a stronger presence in the U.S., the largest industrial gases market in the world.

Airgas shareholders will receive 143 U.S. dollars per share in cash for all outstanding shares of Airgas, representing a total enterprise value of 13.4 billion U.S. dollars on a fully diluted basis and including the assumption of Airgas debt.

Airgas shareholders, during a special shareholder meeting held on 23 February 2016, approved the acquisition of Airgas by Air Liquide (simple majority of the outstanding shares of Airgas was required). The transaction is subject to receipt of necessary antitrust and other regulatory approvals and other customary conditions and provisions. The two parties wish to proceed swiftly.

The combination builds on Air Liquide's longstanding track record of successfully operating in the U.S. and will benefit from Airgas' unmatched national presence and its more than 1 million customers in the U.S., as well as from its leading customer-facing platform including e-commerce and telesales capabilities. The combined entity will be able to better serve customers with the most advanced multi-distribution networks in the U.S. and more competitive product offerings thanks to an integrated upstream-downstream model.

The acquisition will reinforce Air Liquide's global leadership position, increasing Gas & Services sales by around +30%. Upon completion of the acquisition, the combined company will be the leader in North America, complementing number one positions in Europe, Africa/Middle East and Asia-Pacific. It will also be number one in Industrial Merchant and Large Industries, and co-number one in Electronics, worldwide.

The combined company will continue to implement an innovation strategy that combines scientific expertise, industry-leading technology and customer insight to bring new products and services to market. It will also improve existing offerings and open new markets, in particular by leveraging digital technologies. In addition, this combination will create new opportunities for employees as part of a leading global organization that is ideally positioned for growth.

Air Liquide plans to realize more than 300 million U.S. dollars of pre-tax cost, efficiency and volume synergies; the majority within two to three years. The transaction is expected to be accretive from year one. The company's objective is to maintain its S&P "A-" credit rating.

Air Liquide has committed bridge financing for the transaction and intends to refinance through a capital increase in the range of 3 billion to 4 billion euros, and a combination of U.S. dollar and euro long-term bonds.

At December 31, 2015, this transaction had no impact on the financial statements, except for acquisition costs.

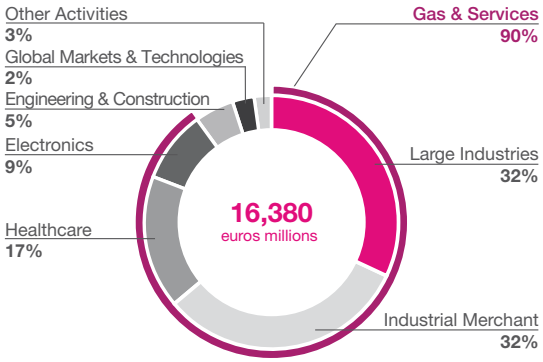
ACTIVITIES AND RISK FACTORS

Activities

The Group classifies its activities as follows: Gas & Services, Engineering & Construction (as previously defined till 2012, see page 24 for more details), a new activity from 2015, Global Markets & Technologies (see page 25 for more details), and Other activities.

Additional information is available in the 2015 Performance section of this report.

2015 Group revenue



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 several types of customers and industries, with the relevant volumes and services required. The operational management of the Gas & Services activity is organized into four geographic regions (Europe, Americas, Asia-Pacific and Middle-East & Africa) and is led by the World Business Lines to better adapt to changes in the different markets:

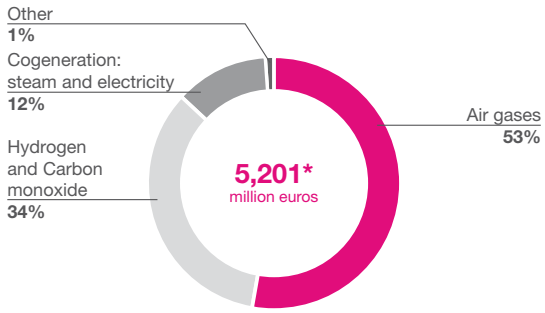
- **Large Industries** supply industrial gases by operating major production units. It serves customers in the metals, chemicals, refining and energy industries with high gas consumption, requiring delivery through a dedicated plant or pipeline. Large Industries also supply the Group's other business lines.
- **Industrial Merchant** supplies a wide range of different gases, application equipment and associated services. It serves industries of all sizes that require variable quantities. 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** supply gas and services for the production of semiconductors, flat panels and photovoltaic panels.

Depending on their end use, gases are distributed in different states and using various means: in gaseous form through a pipeline network, in liquid form in cryogenic trailers, and in gaseous form in high-pressure cylinders for small quantity orders or specialty gases. The Gas & Services activity represents 90% of the Group's total revenue.

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, which often include pipeline networks, reaching over several hundreds of kilometers.

2015 Large Industries revenue by activity



* *35% of Gas & Services revenue.*

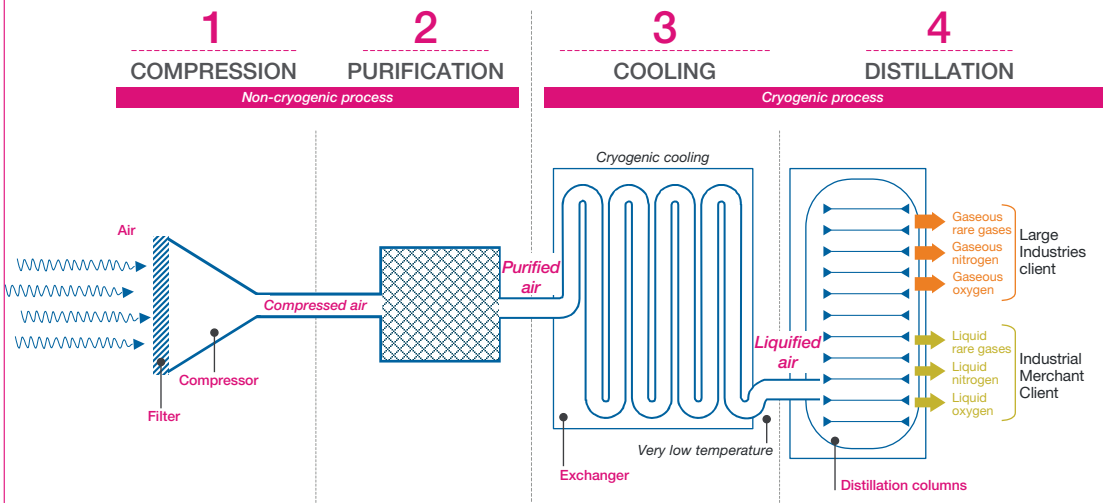
LARGE INDUSTRIES PROCESSES

Separation of air gases (ASU: Air Separation Unit)

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

AIR GASES PRODUCTION

Simplified diagram of an air separation unit's operation

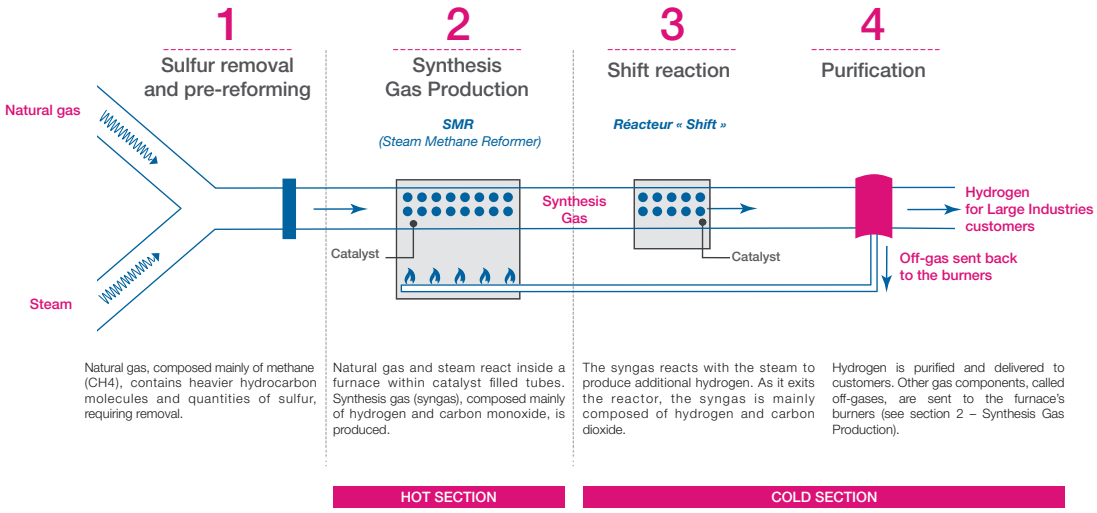


Hydrogen and carbon monoxide production unit (SMR: Steam Methane Reformer)

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.

HYDROGEN PRODUCTION

Simplified diagram of an 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 supplied to the local network while the steam is required for certain industrial processes.

This business line provides oxygen, nitrogen, argon, hydrogen and carbon monoxide through a network of plants and pipelines. At December 31, 2015, there were around the world: 355 large Air Separation Units (ASUs), 50 Steam Methane Reformers (SMRs) producing hydrogen and carbon monoxide and 17 cogeneration plants supplying customers with steam and electricity.

In the **metals** industry, oxygen is used in steel production to improve energy performance and reduce emissions. The majority of new projects are currently located in developing economies.

The **chemicals** industry uses mainly oxygen, hydrogen and carbon monoxide in its manufacturing processes, as well as nitrogen for the inerting of 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 use of heavier hydrocarbons.

Numerous industries linked to **energy** or **chemicals** use large quantities of oxygen to transform coal, natural gas and syngas hydrocarbons for the production of chemical products, synfuel or electricity. To meet customer requirements, the supply of large quantities of gas is indispensable. Air Liquide supplies its customers directly by pipelines from a dedicated plant or different plants linked by a network. Air Liquide has built its own pipeline networks progressively over the last 40 years. With a total length of more than 9,200 kilometers (≈ 5,700 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 indispensable 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 unit and the region. 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 specific projects this can be extended to 20 years and beyond. The signing of new contracts for new industrial customers' sites is a gage 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.

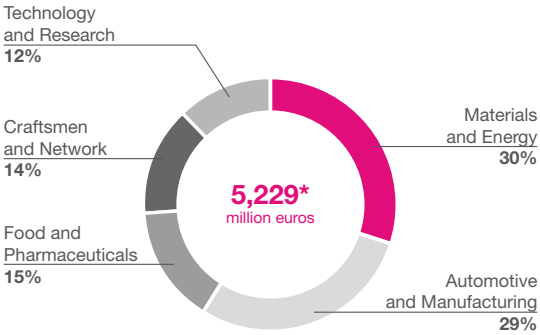
The Large Industries business line operates under long-term contracts, where costs are indexed, in particular, to energy costs. These contracts, which include take-or-pay clauses, offer considerable visibility of future revenue and protection in the event of a significant fall in customer volume consumption (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 gage of future growth.

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

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 1 million of its customers with innovative solutions including industrial gases, application equipment and related services.

2015 Industrial Merchant revenue by end-market



* *36% of Gas & Services revenue.*

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 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.
- **Automotive and Manufacturing**: Argon and argon mixtures are used for metal parts welding in manufacturing industries, hydrogen and nitrogen for thermal 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.

- **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 food or for freezing of food. Air Liquide ensures these products comply with prevailing market regulations and in particular the complete traceability of its gases.
- **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.
- **Craftsmen and Network:** 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.

Such gases can be supplied to the customer's site in gaseous form in high-pressure cylinders, in liquid form using dedicated cryogenic trailers, or are produced using on-site production equipment. Distribution remains traditionally local, with deliveries rarely exceeding 200 to 250 km from the production site. To support this local presence, the Industrial Merchant activity mainly relies on the gas production capacities of the Large Industries activity and then develops its own distribution logistics. Air Liquide ensures the reliability of the gas supply and quality of materials used (tanks and cylinders). The installation of telemeters and development of tracking systems is becoming more widespread in order to optimize distribution logistics.

The **Industrial Merchant** activity is characterized by a wide range of customers, markets, applications and solutions or services. Contract terms vary and may cover up to five years. Revenue comes from the sale of gas and related services. It is an expert service business with a high technology and innovation content, extremely local, with dense geographic coverage as a key factor. Competition can vary between areas.

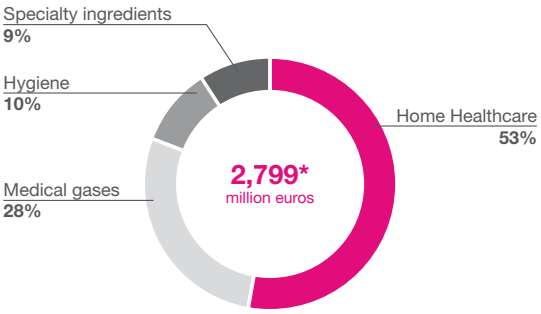
Innovation with regards to markets, products and applications is a major growth driver. Business growth is generally dependent on local industrial production growth.

HEALTHCARE

The Healthcare business line provides gases, services, medical devices, equipment and hygiene products to more than 7,500 hospitals and clinics and 1.3 million homecare patients around the world. The business line includes the specialty ingredients activities of its subsidiary Seppic, serving the cosmetics, pharmaceutical and vaccine markets.

Air Liquide is one of the world leaders in this business sector, which is subject to both stringent regulatory requirements relating to the drug designation status of several of its gases as well as to multiple stakeholders (patients, doctors and payers). Whereas the geographic breakdown of the Medical gases activity segment corresponds to that of the Industrial Merchant activity, the breakdown of the Home Healthcare business, Hygiene, and Specialty ingredients segments are more focused on Europe. As a result, more than 80% of the Healthcare business line's sales are in Europe.

2015 Healthcare revenue by activity



* *19% of Gas & Services revenue.*

In hospitals and in clinics, Air Liquide provides medical gases, such as oxygen and nitrous oxide, for operating theaters, intensive care, emergency care and, more generally, medical wards.

The Group also innovates and develops therapeutic gases used particularly for resuscitation in cases of acute pulmonary arterial hypertension (VasoKinox™), and pain relief (Kalinox™). Several therapeutic gases remain in the research and development phase and the Group is in the process of extending its existing market authorizations.

Air Liquide also supplies hospitals and clinics with a large range of medical hygiene products (for hands, skin, instruments, surfaces, etc.) to fight in particular nosocomial infections. In this way, Air Liquide contributes to patient safety, particularly in operating theaters and intensive care units. Some hygiene products are also supplied to manufacturers, whose processes require impeccable cleanliness.

In Home Healthcare, Air Liquide has extended its services beyond oxygen therapy. The Group looks after more than 1.3 million patients at home suffering from chronic obstructive pulmonary disease, sleep apnea, diabetes, or Parkinson's disease by providing them with long-term medico-technical services and follow-up care. Through close monitoring of patient prescriptions and by enhancing patient observance of treatments, Air Liquide, a Home Healthcare provider, has become a key player in patient/doctor/payer relations and contributes to improving patient health and quality of life on a daily basis, as well as enhancing efficiency of health systems.

The Healthcare activity has been growing worldwide, partially through the implementation of healthcare infrastructures and systems in many developing economies. The Home Healthcare activity, which allows a patient with a chronic disease to stay at home, is developing due to high prevalence of chronic diseases and an aging population. This activity also helps to meet the growing constraints on health spending in developed countries.

Through its subsidiary Seppic, Air Liquide produces and markets specialty ingredients such as excipients and active ingredients for cosmetology, adjuvants for vaccines, film-coating systems for medication, etc.

Over the last 20 years, Air Liquide has developed as a leading healthcare player in Europe (France, Germany, Italy, the United Kingdom, Scandinavia, Spain, and the Netherlands), Canada and Australia. In addition, the Group has businesses in the United States (Medical gases only), South America, Africa and Japan with recent expansion to Eastern Europe, South Korea and China as the local healthcare systems develop.

The Healthcare business line produces and distributes medical gases for hospitals and provides healthcare services for homecare patients. It operates in a strict regulatory framework. Density, quality of support services and efficiency are essential to provide resistance to pricing pressures of healthcare systems, particularly in advanced economies.

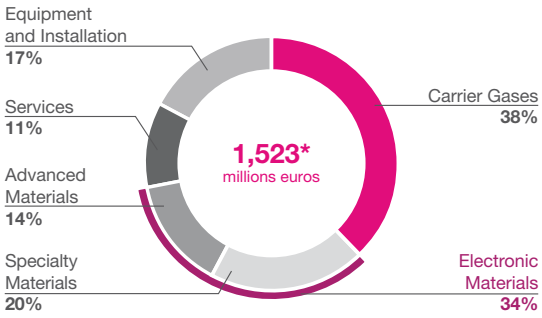
Air Liquide is present along the continuum of care: from treatment of acute diseases (with Medical gases in hospitals), to treatment of chronic diseases at home (with Home Healthcare), and prevention and well-being (with the activities in Hygiene and Specialty ingredients).

With aging populations and the escalating need for care with 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

Air Liquide serves major manufacturers of semiconductors, flat panel displays and solar cells, leveraging its expertise, global infrastructure and strategic proximity to manufacturers worldwide. Its innovative Electronic Materials respond to increasingly challenging customer demands for improved mobility, connectivity, computing power and energy consumption. The Group offers include ultra-pure carrier gases, a wide range of specialty gases and advanced precursor molecules, enabling equipment for safe distribution, purification and on-line purity control. The most sophisticated of these molecules are essential for the continuous miniaturization of the new microchips. On site, manufacturers can rely on the Group's expertise in the total management of these fluids and equipment as well as on its cutting-edge analytical services used to improve continuously their production processes.

2015 Electronics revenue by product



* *10% of Gas & Services revenue.*

The Electronics business line supplies customers with carrier gases (primarily ultra-pure nitrogen) from on-site facilities for the transport of molecules, inerting and protection of electronic systems, as well as purging of manufacturing tools. The need for a regular and constant supply of carrier gases requires long-term commitments from customers with the building of production units near their premises or even on the customer's site.

The Group also provides materials for electronics such as specialty gases and advanced precursor modules used in semiconductor, flat panel and solar cell manufacturing. The acquisition of Voltaix in 2013 has extended the Group's range of advanced materials. Within this range, grouped under the ALAM name, the Group develops and markets offers with strong added value to its offer, including ALOHA™ and Voltaix. It strengthens its relationships with key customers and creates new synergies in the research and industrialization of advanced molecules.

The Electronics business line also supplies equipment and installs ultra-pure chemicals products and gas distribution units and networks at its customer's new manufacturing facilities.

Finally, given its expertise and its desire to offer customers a comprehensive service, Air Liquide also provides just-in-time, on-site fluid management and quality control services under rigorous safety conditions.

The Electronics business model is based principally on long-term carrier gas supply agreements with continuous technological innovations to satisfy customer requirements by designing cutting-edge precursor molecules. The combination of carrier gas, specialty gases, and brand-new precursor molecule and equipment and installation activities enables Air Liquide to limit revenue volatility in this cyclical sector that offers strong growth potential.

The Electronics activities are based 63% in Asia, 25% in the Americas and 12% in Europe.

The Group's Electronics activity covers three different activities:

- **Carrier gases with a business model based on long-term contracts and take-or-pay-type clauses;**
- **Specialty gases and advanced molecules with a high level of technical expertise;**
- **Equipment and installation sales linked to the momentum of the Electronics sector investment cycle.**

In the Electronics sector, where long-term growth is accompanied by short cycles, the mix of activities specific to Air Liquide with its long-term contracts, offers a true competitive advantage.

PRODUCTION AND LOGISTICAL SYNERGIES

The four business lines comprising the Gas & Services activity are closely tied by a strong industrial philosophy where proximity is key. The following chart illustrates the sharing of both production and distribution assets for a given geographic area, between the different business lines. 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. This approach allows the Group to target a diverse range of activities and markets.

In its quest for improved performance, the Group favors synergies in a number of areas:

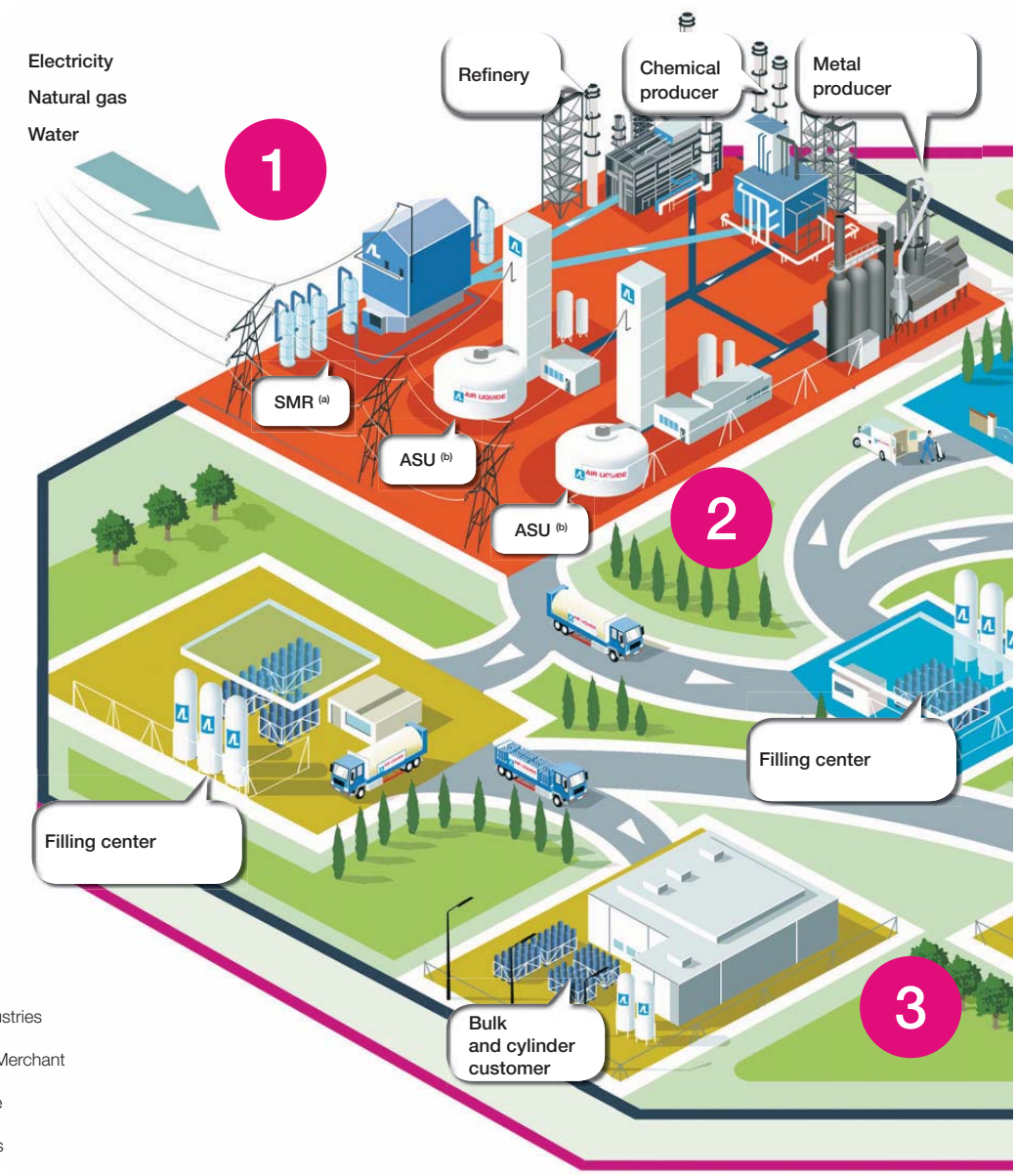
- Industry: local investment in new assets, followed by mutualization of these assets between the different business lines; globalization of energy supply and specifically energy (electricity and natural gas) purchasing;
- Engineering & Construction: sharing of global Group expertise, knowledge transfer, support to the geographic regions;
- Research and Development: constant efforts to develop new applications;
- Human Resources: common managerial culture across a range of regions and businesses, aimed at selecting, training and developing the potential of the Group's men and women and favoring a unique sharing of competencies.

The combination of all these synergies allows Air Liquide to become stronger and to grow and continue to create long-term value.

Production and Logistical Synergies

Standard development model

1
- Identification of industrial basins and their potential in terms of growth and mutualization
- Signing of various Large Industries contracts
- Mutualization of production assets (construction of a pipeline network) in order to strengthen guaranteed supply and optimize operating costs



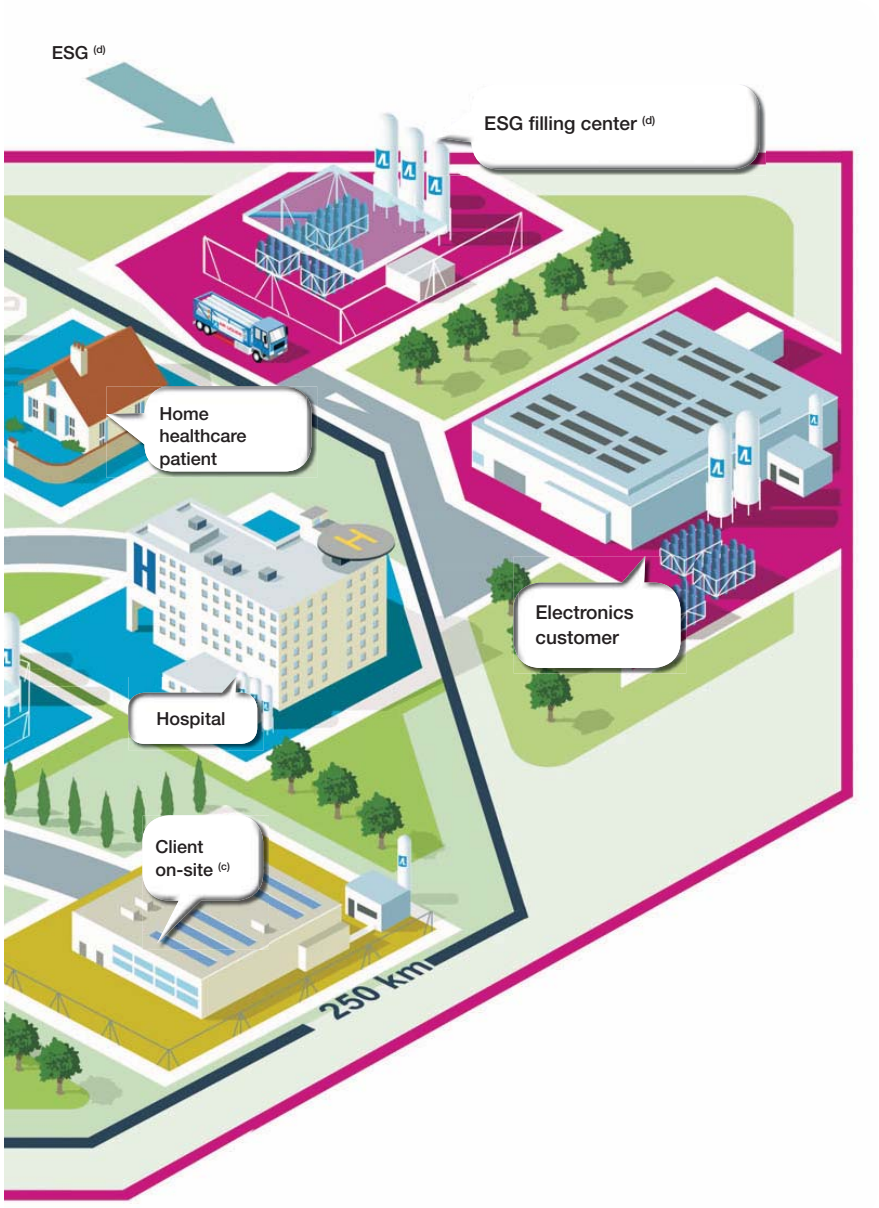
(a) SMR: Hydrogen and carbon monoxide production unit (Steam Methane Reformer).
(b) ASU: Air gases production unit (Air Separation Unit).
(c) On-site: Small local production unit.
(d) ESG: Electronic Specialty Gases

2

- Liquefaction of gas sourced from Large Industries to supply Industrial Merchant, Healthcare and Electronics (piggyback principle)

3

- Acquisition of local distributors to accelerate roll-out in the area



ENGINEERING & CONSTRUCTION

To provide customers with the gases required for their industrial production, Air Liquide engineers have developed proprietary technologies. For over a century, the Group has designed and constructed gas production units for its own use or for sale to customers who prefer to produce their gas requirements internally. Today, Air Liquide is recognized for its ability to constantly improve ASU productivity based on its mastery of its proprietary technologies.

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 coal and 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. Many of the customer processes (in varied stages of development) offer technical solutions which assist in the fight against climate change by enabling capture of a virtually pure CO_2 flow as emitted by the industrial sites.

The majority of Air Liquide's Engineering & Construction activity is geared toward industrial gas production technologies. Accordingly, in 2015, 67% of its orders in hand concerned the manufacture of either air gases, hydrogen and/or carbon monoxide production units.

To cover all of the primary markets of theindustrial customers, the Engineering & Construction business has extensive geographical coverage with 15 major engineering centers worldwide in North America, Europe and Asia. Positioned with this coverage, the Group is able to meet global demand while containing production costs.

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

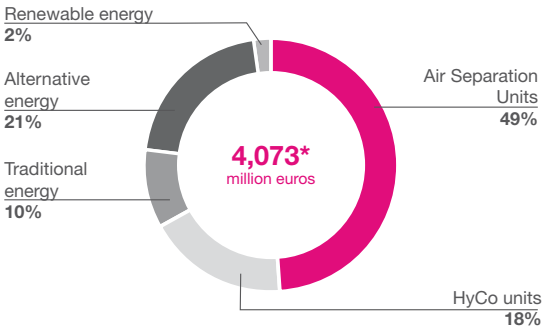
Internally, the Group benefits from the relevant engineering resources during the investment phase of project of its Gas & Services activity. It provides a high level of expertise, crucial to the design of efficient units which specifically respond to the needs of the Group's industrial gas customers.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

The Engineering & Construction activity also acts for third-party customers. Air Liquide designs and builds customized units which customers will own and operate. Also, this third-party customer activity 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 activity, the strategy consists of favoring research and equipment supply contracts and excluding construction risks in the contracts. Accordingly, the contribution to consolidated revenue can vary significantly from year to year.

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

In 2015, consolidated third-party Engineering & Technology sales totaled 775 million euros and orders in hand amounted to 4.1 billion euros.

Engineering & Technology orders in hand [(a)] as at end-2015



* *Including 2.3 billion euros from third-party orders.*

(a) Orders in hand represent the contractual value of all Group and third-party contracts managed by the Engineering & Construction entity, excluding projects under warranty, from the signature date.

GLOBAL MARKETS & TECHNOLOGIES

Leveraging science, technologies, business models and digital usages, the new Business Unit "Global Markets & Technologies" focuses on new markets requiring a global approach.

It is composed of:

- advanced Business & Technologies (aB&T), in charge of opening new markets relating to the energy transition: hydrogen energy; clean transportation with the use of Bio-NGV and mobile refrigeration with nitrogen, processing and injection of biogas into the natural gas network, and of developing Space, Aerospace, extreme cryogenics businesses, based on its core technologies;
- Air Liquide Maritime, in charge of developing the gas usages by the actors in the maritime sector, namely, offshore oil and gas platforms (construction and maintenance, inerting, support to drilling, analytical services, diving gases), offshore wind turbines, and cryogenic transportation by sea of high value-added molecules, such as helium.

The new activity has 1,400 employees and generated revenue of 292 million euros in 2015.

OTHER ACTIVITIES

Over time, Air Liquide has developed other activities in addition to the sale of gas and equipment. The 2015 consolidated revenue of Other activities amounted to 561 million euros, representing 3% of Group revenue.

Welding

Air Liquide is a significant player in the development of welding and cutting technologies, offering a complete range of related equipment, consumables and services to the market, through renowned brands. Established primarily in Europe, Air Liquide Welding covers a wide range of markets: shipyards, automotive, transport equipment, infrastructures, boilers, distributors, machinery and equipment, energy, etc. Air Liquide Welding pursues continuous innovation, constantly striving to improve the performance, productivity, safety and comfort of operators.

Diving

Aqua Lung™ provides deep-sea diving and swimming equipment to professionals and private individuals.

Competition

On a worldwide scale, the **Industrial Gases** sector comprises four global companies: Air Liquide, Linde (Germany), Praxair (United States) and Air Products (United States).

There are also a number of regional players, such as Taiyo Nippon Sanso (Japan), Messer (Germany), Yingde (China) and Hangzhou Oxygen Plant Group (China).

Finally, numerous medium-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 65% of oxygen production globally, although with significant geographical disparities. Companies self-producing gas thus remain the Group's greatest competition. However, the potential to convert self-production into over-the-fence supply represents a major growth opportunity for the Large Industries business line. The level of self-production varies strongly depending upon the region, sector and local culture. In advanced economies, the supply of oxygen is largely over-the-fence, while the supply of hydrogen for refining remains essentially in-house. In developing economies, while relatively new, over-the-fence supply is accelerating significantly. Air Liquide, the world leader in over-the-fence industrial gases supply, is in competition with the three other major global players and the local players.

Industrial Merchant is a local business: transport costs limit the operating area to within 200 to 250 km of the production unit except for high value added gases. 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 simply playing the role of a gas distributor.

In **Electronics,** four companies play a major role: Air Liquide, Linde, Air Products and Taiyo Nippon Sanso. Air Liquide is particularly present in molecules with high value-added.

Finally, in **Healthcare,** most of the gas industry players also provide hospitals with oxygen, but few are present on the promising therapeutic gas market. The Home Healthcare segment became more consolidated in 2012, with the ramp-up of Linde following the purchases of activities in Europe and the United States. Air Liquide maintains its number one position in Europe. Nevertheless, the market remains fragmented in all regions with a multitude of small companies and associations. This fragmentation provides acquisition opportunities. Finally, Air Liquide is the only industrial and medical gases producer to have developed a Hygiene and Specialty Ingredients activity. Air Liquide is positioned as a fully-fledged player in the Healthcare sector, which represents a significant differentiating factor.

In **Engineering & Construction,** Air Liquide also competes with industrial gas players. In the "cold" technologies used for air separation, the competitors are Linde, Air Products and Praxair. In the "hot" technologies used for producing hydrogen, in coal gasification and the chemical conversion of syngas, the most important competitors are Haldor Topsoe (Denmark) or Technip (France). Competition from developing economies is also growing: for example, Hangzhou Oxygen Plant Group, Yingde and Kaifeng (China) in air gases.

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 of which the Group considers that the occurrence may have a significant negative impact on its business, results, or outlook; in addition, the occurrence of some of these risks could expose the Group to civil, criminal and/or administrative sanctions and have a negative effect on its image and reputation. 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 formalized and specific action plans.

The Report from the Chairman of the Board page 140 presents the main underlying internal control and management procedures put in place for the main risks that contribute specifically to limiting the probability of them occurring or their impact.

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 customers, industries served, applications, and countries in which the Group operates, as well as the significant share of business that is subject to specific contracts, a strict investment project authorization and management process, and a tailored energy policy.

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 20 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 of detection have been defined to ensure 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 as well as other high temperature techniques (used in particular in the production of hydrogen) require specific means of control and protection. 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 risks of accidents. Preventive measures are regularly implemented, such as awareness campaigns. In addition, industrial sites use a lot of motorized lifting gears. Training in the use of such equipment and user permits are required;

- engineering and construction: industrial risks are factored in from 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 contribute to 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 delivered 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.

The Group has an Industrial Management System (IMS), which defines the management processes covering the above points. It is described in greater depth in the Chairman's Report on page 142.

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 and the competitiveness of the site, as well as to design, cost estimates and the construction of gas production units.

The investment authorization process is led by Resources and Investment Committees, which apply extremely strict appraisal criteria to projects. These Committees comprise regional, technical and financial managers that vary depending on the nature of the project considered, and are chaired by an Executive Committee member. The investment decision-making process is explained in the "Investment cycle and financing strategy" section on page 45.

Engineering & Construction-related risks

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

Measures to limit commitments on the most complex projects are described in the "Control Activities" section of the Chairman's Report on page 142.

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 one hand, and costs 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 that may be a source of political risks. Constant monitoring of such projects helps better manage such risks.

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

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 one million worldwide) in a broad range of industries: chemicals, steel, refining, food, pharmaceuticals, metals, 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 12% of revenue and the top 50 customers represent around 28% 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 10-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 Home 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, some Group clients' business may be interrupted for climatic or major 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 reduced 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 provisions for doubtful receivables are shown in note 17 – Trade receivables to the consolidated financial statements on page 236.

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 the objective of achieving the most reliable and competitive energy costs available in any particular market. The Group passes on cost variations to its customers via indexed invoicing integrated into medium and long-term contracts.

Commodity risk is described in note 25.1 to the consolidated financial statements on page 260.

Innovation and intellectual property-related risks

The Group's activity is not dependent on third-party patents. It is mainly based on technology, processes and designs which are mostly protected by patents, drawings and models as well as by brands ; these technologies, processes and designs are developed internally, notably by its Research and Development, Marketing, and Engineering teams, as well as through partnerships with third parties. There is, nonetheless, 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.

Measures aimed at ensuring the respect of intellectual property are set out in the Chairman's Report on page 143.

ENVIRONMENTAL AND CLIMATIC RISKS

The industrial and medical gas business presents few environmental risks. Around 85% of the Group's large production units separate the components of atmospheric air, that is 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 CO_2, sulfur oxides or nitrogen oxides.

Nonetheless, electricity consumption generates CO_2 emissions by the suppliers of this energy, known as indirect emissions. Besides, 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 CO_2 and nitrogen oxides, as well as low quantities of sulfur oxides.

Water is a resource necessary to these three main Group processes. Air gas 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.

Environmental risks primarily comprise the following components:

- the Environmental Footprint, involving the Group's activities worldwide, is closely monitored: sites under the European Seveso directive and equivalent sites worldwide, electrical and thermal energy consumption, annual water supply, emissions into water and the atmosphere, waste and by-products, the distance covered by delivery trucks and progress made toward quality (ISO9001) and environmental (ISO14001) certifications;
- Group direct and indirect greenhouse gas emissions are measured at all production sites.

The Group analyzes and monitors the environmental risk factors at the main stages of its product life cycles as well as when key investment decisions are taken. In addition, a mapping of sites located in hydric stress areas enables the identification of water supply risks. Finally, the Group is in constant dialogue with stakeholders to assess the risk to its image associated with environmental issues.

Climatic risks notably comprise the following elements:

- risks associated with changes in environmental protection legislation. In this regard, the Group continuously monitors the European Trading Scheme and other CO_2 allocation exchange systems existing or under development around the world, in order to assess the impact of any regulatory changes on the Group's activities;
- weather and climatic disasters which may disrupt the smooth running of operations in particular on the main sites in the regions at risk. Adaptation measures covering risks relating to extreme weather-related phenomena exist at the main sites located in high-risk areas.

A detailed energy and environment report is presented in the Sustainable Development report in this Reference Document on page 70.

FINANCIAL AND TAX RISKS

Financial risk management is a priority for the Group.

The financial risk management processes are detailed in the Chairman's Report on page 144, 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.

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 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).

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).

Note 25.1 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.

Interest rate risk

The interest rate risk is mainly linked to the fluctuation of future cash flows on debt when the rate is variable, 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 activities 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.

Note 25.1 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 hedging instruments.

Financial counterparty and liquidity risk

Financial counterparty risk primarily relates to outstanding amounts on short-term investments and derivative instruments for hedging, 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 25.1 to the consolidated financial statements describes financial counterparty and liquidity risk for the year ended December 31, 2015. Notes 17.1 and 17.2 to the consolidated financial statements provide a breakdown of trade and other operating receivables and allowances for doubtful receivables.

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.

DIGITAL RISKS

The Group's activities, expertise and, more generally, its relations with all the players in its social and economic environment depend on increasingly dematerialized and digitalized operations. These operations depend on interdependent information systems and communication networks on both a human level and in functional and technical terms.

This digital dependency accentuates the risks of data confidentiality, data processing integrity and information systems availability that may have financial, operational or corporate image impacts for the Group.

A long-term operational program aims to continue to strengthen the Group's prevention and monitoring mechanisms in a context of ever-changing cyber-threats and digital risks. This program will enable the application of the digital security policy described on page 143 of the Chairman's Report in priority fields and activities.

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 motivation.

The Group may be faced with difficulties in finding 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.

The Group ensures the building of a performance-focused, motivating and involved professional environment, through a human resources policy aiming to identify, attract, retain and develop competent employees from all walks of life. The objectives of this policy are set out in the Chairman's Report on page 143.

Moreover, considering the changing international climate and its presence in a large number of countries, the Group (its employees, sites and assets) may be exposed locally to a higher security risk, for which additional measures are being taken.

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 adapted reinforced means implemented.

More generally, the Group is faced with the risks relating to contracts and competition law, as well as anticorruption issues. These risks are specifically monitored as indicated in the Report from the Chairman of the Board of Directors on the internal control and risk management procedures instituted by the Company (page 143).

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 22 and 30 to the consolidated financial statements.

INSURANCE MANAGEMENT

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

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.

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). Furthermore, with certain limitations, these policies cover "pollution" risk and product recall costs.

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 of North America. Under this umbrella, each foreign subsidiary has its own policy covering damages to third parties incurred through its activities 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.

The main exclusions are deliberate acts, war, nuclear incidents and repair of defective products.

Captive reinsurance

A portion of risks of damage and operating losses is kept by the Group via a captive reinsurance company located in Luxembourg, which also participates, since July 1, 2015, in the coverage of the Group's civil liabilities excluding the North American zone.

This company covers losses of up to a maximum of 5 million euros per loss over and above the deductibles to a maximum of 19.5 million euros per year. Beyond these amounts, risks are transferred to insurers. Their management is entrusted to a captive manager approved by the Luxembourg Insurance Commission.

This captive reinsurance company is fully consolidated. Its balance sheet as of December 31, 2015 totaled 60 million euros.

2015 PERFORMANCE

The Group achieved a solid performance, delivering once again an increase in revenue, operating margin and net profit, in the context of slower global growth in 2015. The Group sales for 2015 reached 16,380 million euros, demonstrating a published growth of +6.7% in comparison to 2014, benefiting from a positive +6.0% currency impact, particularly strong in the beginning of the year, and penalized by a negative energy effect of -2.6%. On a comparable basis, the progress was +3.3%, superior to the growth of the market.

The growth of the activity in 2015 was principally sustained by dynamic Healthcare, the strong development of Electronics, the ramp-ups of production units in Large Industries notably during the 2nd half of the year, the developing economies and a progressive resumption of growth in Europe.

The accrued efforts on costs and efficiencies, which reached a total of 298 million euros, contributed to the increase in the operating margin at 17.6%, representing +10 basis points excluding the energy effect. Net profit (Group level) rose to 1,756 million euros, an increase of +5.5%. Cash flow from operating activities before changes in working capital requirements increased by +7.0% in comparison to 2014 and reached 19.2% of sales.

At the same time, the Group pursued its growth initiatives with investment decisions of 2.4 billion euros, a reinforced innovation strategy materialized by the creation of the activity Global Markets & Technologies and the signature of the merger agreement to acquire Airgas in the United States. Once complete, this acquisition will constitute a major step in the development of the Group.

The Board of Directors proposes a nominal dividend to be submitted to the combined Annual General Meeting of May 12, 2016 at 2.60 euros per share. This dividend represents an increase of +2.0% for the shareholder and the pay-out ratio is estimated at 52.4%.

2015 key figures

(in millions of euros)	2014	2015	2015/2014 published change	2015/2014 comparable change [a]
Group revenue	15,358	16,380	+6.7%	+3.3%
of which Gas & Services[b]	*13,800*	*14,752*	*+6.9%*	*+3.8%*
Operating income recurring	2,634	2,891	+9.8%	+3.9%
Operating income recurring *(as % of revenue)*	17.1%	17.6%	+50bps	–
Net profit (Group share)	1,665	1,756	+5.5%	+0.1%
Adjusted earnings per share *(in euros)*	4.85	5.12	+5.6%	+0.2%
Adjusted dividend per share *(in euros)*	2.55	2.60 [c]	+2.0%	–
Net cash flows from operating activities [d]	2,830	2,832	+0.1%	–
Net capital expenditure [e]	1,931	2,292		–
Net debt	6,306	7,238		–
Debt-to-equity ratio	53.3%	56.7%		–
Return On Capital Employed – ROCE after tax [f]	10.8%	10.3%	–	–

(a) Excluding energy, currency and significant scope impacts.

(b) New activity: first three quarters of 2015 and full year 2014 data concerning Gas & Services sales growth have been restated to factor in the impact relating to the creation of the new Global Markets & Technologies (GM&T) activity.

(c) Subject to the approval of the May 12, 2016 Shareholders' Meeting.

(d) Cash flow from operating activities after change in working capital requirement and other elements.

(e) Including transactions with minority shareholders.

(f) Return On Capital Employed – ROCE after tax: (net profit after tax before deduction of minority interests - net cost of debt after taxes)/((shareholders' equity + minority interests + net indebtedness) average over the fiscal year).

Highlights of 2015

DEVELOPMENT OF INDUSTRIAL ACTIVITY

During the course of 2015, new contracts were signed in **Large Industries**, in developing economies as well as in advanced economies.

- In the United States, in Louisiana, Air Liquide launched the construction of a new Air Separation Unit (ASU) for Yuhuang Chemical. Representing an investment of 170 million US dollars, the unit will be able to produce 2,400 tons of oxygen per day. This ASU will be connected to the Group's extensive pipeline system, providing enhanced reliability of supply. Air Liquide will also license its leading MegaMethanol® technology. This agreement illustrates the value for the customer of a complementary offer combining Group proprietary technologies with long-term oxygen supply.
- Air Liquide signed a long-term contract with Sasol, an international integrated energy and chemicals company, for the supply of industrial gases to the Secunda site in South Africa. Air Liquide will invest around 200 million euros for the construction of the largest Air Separation Unit (ASU) ever built, with a total capacity of 5,000 tons of oxygen per day, a milestone in the history of industrial gas production. The start-up is expected for the end of 2017. It is the first time Sasol will outsource its oxygen needs to a specialist of industrial gas production at its Secunda site.
- In Australia, Air Liquide has launched the construction of an Air Separation Unit (ASU) for Nyrstar, an integrated mining and metals recyling company. Representing an investment of 60 million euros, the unit will produce 1,400 tons of gas per day and its start-up is expected in 2016. The gases supplied will enable Nyrstar to increase its production capabilities, enhance efficiency and reduce the environmental footprint of the site.
- In China, Air Liquide signed new long-term contracts in various industrial sectors:
  - with Shandong Fangyuan, China's leading privately-owned copper smelter and one of the world's largest copper producers. The Group will invest approximately 60 million euros in an Air Separation Unit (ASU) with a capacity of 2,000 tons of oxygen per day, expected to be commissioned in 2017. The oxygen supplied will boost productivity of the smelter while reducing overall CO_2 emissions and maintenance costs;
  - with Yan'an Energy and Chemical Co., a subsidiary of Yanchang Petroleum Group, one of the four largest Chinese companies for oil and natural gas exploration and production. The Group will invest approximately 80 million euros in two state-of-the-art Air Separation Units (ASU) with a total capacity of 2,800 tons of oxygen per day, expected to begin operations at the beginning of 2018.

Air Liquide saw some major start-ups in **Large Industries** during 2015:

- in Saudi Arabia, in Yanbu, its largest industrial site ever. The site has two large-scale hydrogen production units (SMR) and one purification unit for a total hydrogen capacity of 340,000 nm^3/hour. This investment of more than 350 million euros supplies hydrogen to the new YASREF refinery (a joint venture between Saudi Aramco and Sinopec) under a long-term contract. Hydrogen is used to reduce the sulfur content of the fuel production; and
- in Germany, in Dormagen near Cologne, a new hydrogen and carbon monoxide production unit (SMR). The Group invested approximately 100 million euros in this state-of-the-art production unit with an annual production capacity of 22,000 tons of hydrogen and 120,000 tons of carbon monoxide. It will supply Covestro's new TDI (toluene diisocyanate) production plant. It will also provide other customers on the Rhine-Ruhr pipeline network with hydrogen.

During 2015, new offers were developed by the **Industrial Merchant** teams:

- For example, a digital portal was put into service in the Nordic countries, dedicated to the small ALbee™ cylinders for the "Craftsmen and Network" market. This on-line sales platform facilitates the everyday life of the end-clients who can consult the pricing offer and order their cylinders from the closest distributor.
- Another example in the glass industry, integrated in the "Materials and Energy" market where the use of pure oxygen in place of air in the glass melting furnaces allows for the reduction in energy consumption and reduces polluting emissions. During COP21 in 2015, the Group won the Innovative Product Award of the France-China Committee for its high temperature oxy-combustion technology. Compared to air combustion, this new process "Heatox" provides up to 50% energy savings and up to 50% CO_2 emissions reduction.

In 2015, in **Electronics**, Air Liquide signed several long-term contracts with major semi conductor manufacturers in Japan, Singapore and Taiwan. The Group will invest more than 100 million euros to supply ultra-pure carrier gases to customer plants (fabs) which manufacture integrated circuits and memory for consumer electronics and mobile devices. This market continues to expand, driven notably by the rise of the Internet of Things and "Big Data".

ACQUISITIONS AND INITIATIVES IN HEALTHCARE

In 2015, Air Liquide continued with its strategy of densification in geographic zones where the Group is already present with additional acquisitions in Home Healthcare.

- In Germany, the Group strengthened its position with the acquisition of Optimal Medical Therapies (OMT). This company provides home healthcare services for around 5,000 patients and is recognized for its expertise in home infusion services which include immunotherapy, pain management, and treatment of pulmonary arterial hypertension and Parkinson's disease.
- Air Liquide expanded its activity in Ireland with the acquisition of Baywater Healthcare Ireland Limited, a major player specializing in treating and monitoring of respiratory diseases in patients' homes (oxygen therapy, continuous positive airway pressure and non-invasive ventilation).

Schülke, the Group's Healthcare entity specializing in Hygiene, expanded its presence through two acquisitions this year:

- in the Asia-Pacific zone, Healthcare Antisepsis Solutions (HAS), the skin disinfection and hygiene business unit of Advanced Sterilization Products, a Division of Ethicon, Inc.;
- in the Czech Republic, the hygiene division of Bochemie, extending Schülke's presence in Eastern Europe and widening its offer with a range of additional products.

Air Liquide also launched several new Healthcare initiatives in 2015.

- On the occasion of the Annual International Seminar of ERS (European Respiratory Society), Air Liquide Healthcare launched a website entirely dedicated to sleep apnea. As an important player in the treatment of sleep apnea disorder, the Group seeks to better inform patients and help them understand the proposed solutions.
- VitalAire, a Home Healthcare subsidiary of Air Liquide, opened Vital'City, a new patient center, in Paris. With Vital'City, VitalAire is emphasizing its close connections with its patients by offering a new approach to caring for patients, who will now have the option of meeting with VitalAire healthcare workers on site.

NEW PROJECTS IN INNOVATION AND TECHNOLOGY

The Group continued its developments in **Hydrogen mobility**.

- Air Liquide was chosen by FM Logistic, an international logistics and supply chain group, to provide support for its projected deployment of hydrogen-powered forklift trucks at their sites. At its logistics platform near Orléans in France, the Group installed a hydrogen-charging station which will service forklifts equipped with hydrogen fuel cell batteries.
- In addition, various investment projects were launched to install new hydrogen charging stations in Belgium, Denmark, France, Germany, the United States and Japan. On the occasion of COP21, Air Liquide installed the first hydrogen-charging station in Paris. This station will enable the deployment of "hype" in Paris, the first fleet of hydrogen-powered electric taxis.

Air Liquide, a major player in energy transition, announced that it had acquired a 5% stake in the capital of Fonroche Biogaz, a subsidiary of the Fonroche Group, a key player in the production of renewable energies. In connection with this acquisition, the two groups plan to pool their skills to develop projects involving the purification and valorization of **biogas** for the French market.

Strengthening Air Liquide's leadership in extreme cryogenics for major scientific projects, the Group announced the signing of a new contract with ITER-India for the design and manufacture of 19 **cryogenic lines**. This signature completes two contracts already signed in 2012 and 2013, bringing the total amount signed by Air Liquide for the **ITER project** to roughly 250 million euros. The latter targets development of an experimental reactor to demonstrate the scientific and technological feasibility of fusion as a new source of energy.

Air Liquide inaugurated Cryocap™ in France, a unique industrial installation which enables the capture of **CO_2 released during hydrogen production via a cryogenic process**. After being purified, the captured CO_2 can be used to meet a variety of industrial needs for carbonic gas supply. This innovation is part of Air Liquide's Blue Hydrogen [1] approach which targets gradual decarbonization of the Group's production of hydrogen dedicated to energy applications related to mobility.

* *See Blue Hydrogen initiative on p. 55 of Chapter 1.*

BOND ISSUE

To refinance the bonds reaching maturity and fund its development while benefiting from very attractive market conditions, Air Liquide issued bonds for a total amount of 988 million euros as of the date of the issues. Two fixed-rate issues cover maturities between 7 and 10 years and two variable-rates ones between 2 to 3 years. The major issue was made under the EMTN program for an amount of 500 million euros with a 10-year maturity and a coupon of 1.25% p.a.

In addition, one of the issues allowed Air Liquide Finance to innovate again with the issue of its first Chinese renminbi-denominated bond on the Taiwanese market ("Formosa Bond") for a total of 500 million Chinese renminbi, equivalent to 68 million euros at the date of the issue. Thus, Air Liquide is the first non-Taiwanese corporate to issue bonds in Chinese renminbi on this market.

MAJOR ACQUISITION PROJECT AND GEOGRAPHIC DEVELOPMENTS

On November 17, 2015, the Group announced the signing of a merger agreement under which Air Liquide will acquire the American company Airgas. This game-changing combination will strengthen Air Liquide's global leadership, offer new opportunities to Airgas customers and will ideally position the Group for future growth with a stronger presence in the American market, the largest industrial gases market in the world.

Airgas shareholders, during a special shareholder meeting held on 23 February 2016, approved the acquisition of Airgas by Air Liquide (simple majority of the outstanding shares of Airgas was required). The transaction is subject to receipt of necessary antitrust and other regulatory approvals and other customary conditions and provisions. The two parties wish to proceed swiftly.

In addition, during the course of 2015, Air Liquide continued to expand in new regions:

- in Turkey, Air Liquide completed the acquisition of the local subsidiary of the Messer Group. The company, which provides industrial, medical and specialty gases to various industries, counts close to 70 employees. It owns and operates an Air Separation Unit (ASU) for the production of liquid oxygen, nitrogen, and argon, and 3 cylinder-filling centers. Air Liquide is now present in the three most important industrial areas of the country: Ankara, Istanbul and Izmir;
- Air Liquide has expanded its business to Colombia. Through a contract with Coca-Cola FEMSA, the largest bottler of Coca-Cola products in the world and the largest beverage company in Latin America, Air Liquide will build and operate a new facility consisting of a carbon dioxide production unit and a cogeneration unit. This investment of around 40 million euros marks Air Liquide's entry into the Colombian industrial gas market.

2015 Income Statement

CURRENCY, ENERGY AND SIGNIFICANT SCOPE IMPACTS

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

- 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.
- In addition, the Group passes on variations in the cost of energy (electricity and natural gas) to its customers via indexed invoicing integrated into 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 indexed to energy year (N-1) × (Price of energy year (N) - Price of energy year (N-1))

Offsetting the impact of variations in energy prices against sales allows the Group to analyze changes in revenue on a comparable basis.

- The significant scope effect corresponds to the impact on sales of all acquisitions or disposals of a significant size for the Group.

The main impact on revenue in 2015 was:

(in millions of euros)	Group	Gas & Services
2015 revenue	**16,380**	**14,752**
2015/2014 published change (in %)	+6.7%	+6.9%
Currency impact	915	830
Natural gas impact	(362)	(362)
Electricity impact	(44)	(44)
Significant scope impact	0	0
2015/2014 comparable change [(a)] (in %)	**+3.3%**	**+3.8%**

(a) Excluding currency, energy, and significant scope impacts.
New activity: *Over the full year 2014 and the first three quarters of 2015, data concerning Gas & Services sales growth has been restated to factor in the impact relating to the creation of the new Global Markets & Technologies (GM&T) activity.*
Geography: *Middle-East and Africa now includes India, previously part of Asia-Pacific. Data over the full year 2014 and the first three quarters of 2015 has been restated accordingly.*

REVENUE

Revenue *(in millions of euros)*	2014	2015	2015/2014 change	2015/2014 comparable change [a]
Gas & Services	13,800	14,752	+6.9%	+3.8%
Engineering & Construction	723	775	+7.1%	-0.7%
Global Markets & Technologies	256	292	+14.0%	+11.4%
Other activities	579	561	-3.1%	-6.7%
TOTAL REVENUE	**15,358**	**16,380**	**+6.7%**	**+3.3%**

(a) Excluding currency, energy and significant scope impacts.
***New activity:** Over the full year 2014 and the first three quarters of 2015, data concerning Gas & Services and Engineering & Construction sales growth has been restated to factor in the impact relating to the creation of the new Global Markets & Technologies (GM&T) activity.*

Group

In 2015, Group revenue totaled **16,380 million euros**, up **+6.7%** as published compared to 2014, boosted by a +6.0% positive currency impact, which was particularly strong at the beginning of the year, but penalized by a negative -2.6% energy impact. Revenue, **on a comparable basis** (excluding currency, energy prices and significant scope impacts), increased by **+3.3%**. There was no significant scope impact in 2015.

The Group created a new activity, **"Global Markets & Technologies"** (GM&T) at the end of 2015. It includes innovative activities which leverage from the Group's technologies and require a global approach. Some aim at developing existing markets (aerospace, aeronautics, extreme cryogen, etc.) and others at opening new markets relating to the energy transition (hydrogen energy, clean transport through Bio-NGVs, etc.). GM&T will initially serve as an incubator for these new global activities, on the borders of Air Liquide's current business. In a second step, GM&T will support the sales development of these activities, with the support of the Group's global presence.

Revenue by quarter *(in millions of euros)*	Q1 2015	Q2 2015	Q3 2015	Q4 2015
Gas & Services	3,614	3,688	3,682	3,768
Engineering & Construction	177	205	219	174
Global Markets & Technologies	58	74	67	93
Other activities	144	154	129	134
TOTAL REVENUE	**3,993**	**4,121**	**4,097**	**4,169**
2015/2014 published change	**+7.0%**	**+9.3%**	**+7.8%**	**+2.9%**
2015/2014 comparable change [a]	**+3.0%**	**+3.4%**	**+4.6%**	**+2.4%**
2015/2014 Gas & Services comparable change [a]	**+2.4%**	**+3.5%**	**+4.5%**	**+4.8%**

(a) Excluding currency, energy and significant scope impacts.
***New activity:** Over the full year 2014 and the first three quarters of 2015, data concerning Gas & Services and Engineering & Construction sales growth has been restated to factor in the impact relating to the creation of the new Global Markets & Technologies (GM&T) activity.*

Gas and Services

Unless otherwise stated, all the changes in revenue outlined below are on a comparable basis: excluding currency, energy (natural gas and electricity) and significant scope impacts.

Gas & Services revenue totaled **14,752 million euros, up +3.8% on a comparable basis**. Quarterly sales growth improved during the year. Revenue was up **+6.9%** in published data, supported by a positive currency impact of +6.0%, but penalized by a negative energy impact of -2.9%.

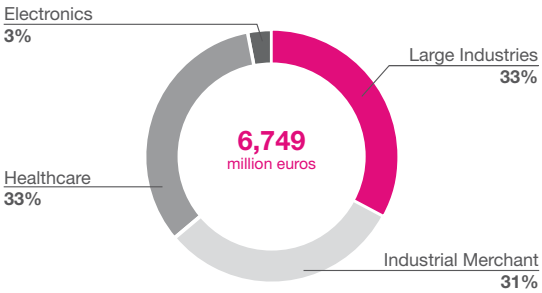
Revenue *(in millions of euros)*	**2014**	**2015**	**2015/2014 change**	**2015/2014 comparable change** [(a)]
Europe	6,604	6,749	+2.2%	+3.4%
Americas	3,384	3,595	+6.2%	+0.3%
Asia-Pacific	3,402	3,850	+13.2%	+5.7%
Middle-East & Africa	410	558	+36.1%	+24.2%
GAS & SERVICES	**13,800**	**14,752**	**+6.9%**	**+3.8%**
Large Industries	4,980	5,201	+4.4%	+5.2%
Industrial Merchant	5,016	5,229	+4.3%	-1.3%
Healthcare	2,570	2,799	+8.9%	+7.5%
Electronics	1,234	1,523	+23.5%	+11.5%

(a) Excluding currency, energy and significant scope impacts.
***New activity:** Over the full year 2014 and the first three quarters of 2015, data concerning Gas & Services, Industrial Merchant sales growth has been restated to factor in the impact relating to the creation of the new Global Markets & Technologies (GM&T) activity.*
***Geography:** Middle-East and Africa now includes India, previously part of Asia-Pacific. Data for full year 2014 and first three quarters of 2015 has been restated accordingly.*

Europe

Revenue in Europe totaled **6,749 million euros**, progressing **+3.4%** year-on-year. This growth increased in the 2nd half at +4.8%, in particular driven by Large Industries which benefited from new start-ups. The Industrial Merchant activity posted positive growth in the 2nd half with a slight increase in liquid gas volumes, but a slight decrease in cylinder activity. Healthcare posted dynamic growth.

Europe Gas & Services 2015 Revenue



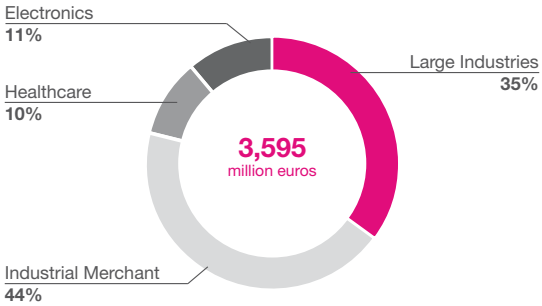
- **Large Industries** sales were up **+1.9%** year-on-year. Growth in the 2nd half was stronger, close to +5%, driven by the ramp-up of the Dormagen CO unit in Germany and new hydrogen units in Benelux. Eastern Europe continued to expand, particularly in Russia and Poland.
- **Industrial Merchant** revenue, down **-0.4%** year-on-year, improved steadily and posted positive growth during the 2nd half. Performance remained contrasted, with sales up in Iberia, Benelux and the Nordic countries, and activity down slightly in France and Germany in particular where liquid volumes were up but the cylinder activity remained challenging. Sales continued to improve in developing economies driven by strong growth in liquid volumes, notably in Russia and Poland. The price impact was -0.6% for the year against a backdrop of weak inflation and a drop in prices for clients whose contracts were indexed to energy costs.

- **Healthcare** continued its dynamic growth, up **+8.4%**, driven by an increase in the number of patients treated in Home Healthcare and by acquisitions carried out during the year in Germany, France, Ireland and the Czech Republic. Pricing pressure continued to affect sales in the Medical gases for hospitals and Home Healthcare. The Hygiene activity progressed by +17.1%, the strong organic growth being assisted by acquisitions.
- **Electronics** revenue increased by **+11.5%** year-on-year, resulting from sales of equipment and installation, specialty gases and advanced materials.

Americas

Gas & Services revenue in the Americas amounted to **3,595 million euros**, an increase of **+0.3%**. While sales declined slightly in advanced economies, they continued to grow in South America +11.7%. Large Industries sales were up +2.6%. This growth accelerated in the 2nd half reaching +4.7%. This increase was partially offset by a weak Industrial Merchant business, impacted by the slowdown in the oil well services sector and related industries. Electronics sales growth was not as strong as in 2014 (high comparable basis, particularly in equipment and installation). Healthcare sales posted dynamic growth, in particular in Home Healthcare.

Americas Gas & Services 2015 Revenue

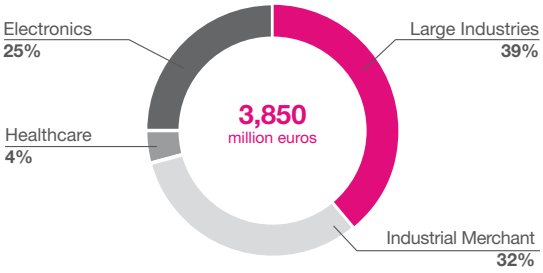


- Despite temporary turnarounds at customer sites during the first quarter, **Large Industries** sales improved by **+2.6%** over the year. In South America, activity continued to grow with the ramp-ups of units which started-up in 2014, notably in Brazil.
- **Industrial Merchant** activity declined **-3.6%**. In North America, liquid volumes, nitrogen in particular, continued to be affected by the slowdown in the oil well services sector and related industries. Cylinder activity, serving mainly craftsmen and small customers, was also impacted, notably in Canada. Business slowed in Brazil, where the environment was challenging. The price impact in the zone was +4.0% year-on-year.
- **Healthcare** revenue increased by **+7.1%**. The activity was particularly strong in Canada which benefited from the integration of several acquisitions in Home Healthcare. In South America, the number of Home Healthcare patients and volumes for Medical gases for hospitals rose sharply.
- **Electronics** sales were up **+2.6%** in 2015. Growth was strong in carrier gases, specialty gases and services and remained very dynamic in advanced materials. Equipment and installation sales were fairly weak compared with the very high level seen in 2014.

Asia-Pacific

Revenue in the Asia-Pacific zone increased **+5.7%** and reached **3,850 million euros**, with contrasted growth evolution varying by country. Electronics continued to improve with sales up +15.1%. Sales in China increased +11.4% year-on-year. Japanese sales improved, driven by Electronics.

Asia-Pacific Gas & Services 2015 Revenue



- **Large Industries** sales increased by **+6.0%**, driven by the ramp-ups that started-up in 2014 in China, with the effect easing toward the end of the year.
- **Industrial Merchant** revenue was flat at **+0.2%** with varied evolution by country. Sales were down in Australia again, impacted by the weak mining sector, in Singapore, penalized by the slowdown in the oil business, and in Japan. China continued to grow with higher volumes but with pricing pressure. Sales in South-East Asia excluding Singapore progressed strongly at +7.4%. The price impact was negative in the zone at -2.0% over the year.
- **Electronics** sales increased by **+15.1%** in 2015, with growth in sales in all countries in the zone. Sales in Japan were up by more than +18%, benefiting notably from dynamic growth in advanced materials. China also posted growth of close to + 20% and continued to load its carrier gases units.

Middle-East and Africa

Revenue in the Middle-East and Africa zone reached **558 million euros**, up **+24.2%**, notably due to the start-up of two large hydrogen production units in Yanbu in Saudi Arabia during the second quarter. In South Africa, the Industrial Merchant activity increased in a more difficult environment toward the end of the year. Healthcare continued to grow, with an increase in the number of patients treated.

Engineering & Construction

Engineering & Construction revenue totaled **775 million euros,** rather stable at **-0.7%** compared with 2014.

Total order intake was 0.9 billion euros, a slight decrease as compared to 2014 and notably as compared with a very high level in the 4th quarter 2014. The vast majority of projects concerned air gas production units. The breakdown between Group projects and those for third-party customers is balanced and reflects a greater selectivity in projects.

Total orders in hand reached 4.1 billion euros at the end of December 2015, a decrease compared with the level at the end of December 2014 (4.8 billion euros).

Global Markets & Technologies

Global Markets & Technologies revenue was up **+11.4%** at **292 million euros**. In particular, the sales developed in 2015 with the integration of the Swedish company FordonGas, acquired in 2014, a company which distributes Bio- and Natural Gas for Vehicles (Bio-NGVs). The ITER-project in extreme cryogenics also contributed to the sales growth increase.

Other Activities

Other Activities revenue declined by **-6.7%** to **561 million euros** in 2015.

Welding revenue decreased by -8.5%, still impacted by a difficult environment.

Diving (Aqua Lung™), with strong growth on a published basis, recorded a drop of -2.9% in sales on a comparable basis due to the disposal of a non-strategic activity at the end of 2014. Excluding this disposal, sales were up.

Revenue *(in millions of euros)*	**2014**	**2015**	**2015/2014 change**	**2015/2014 comparable change** [(a)]
Welding	392	363	-7.5%	-8.5%
Diving	187	198	+6.3%	-2.9%
TOTAL	**579**	**561**	**-3.1%**	**-6.7%**

(a) Excluding currency, energy and significant scope impacts.

RECURRING OPERATING INCOME

Operating income recurring before depreciation and amortization totaled **4,262 million euros**, up **+10.1%** compared to 2014 as published and up **+4.0%** excluding the currency impact. The pricing effect was globally positive over the period at +0.3% and resulted from a high level of efficiencies.

For the year, **efficiencies** amounted to **298 million euros,** exceeding the annual target of more than 250 million euros. These efficiencies represent a cost savings of 2.4%. Half of this amount corresponds to the logistics and industrial gains: particularly in terms of optimization of the operation of production units connected to the pipeline networks, improvement of plant reliability, and review of the supply deliveries within the context of lower consumption for Industrial Merchant customers. Purchasing efficiencies represent a third of the overall total efficiencies. For example, the start-up of the hydrogen/CO production unit in Dormagen allowed for the pipeline network to be supplied with hydrogen, replacing external purchases. The valuation of the gains on energy purchasing was weaker in 2015 due to low energy prices. The remaining efficiencies include the effects of the realignment plans decided in 2013 and 2014 and which contributed 43 million euros of additional gains in 2015 and 181 million euros of cumulative gains, thus a return on investment of approximately two years.

Depreciation and amortization totaled **1,372 million euros**, up **+4.1%** excluding the currency impact (+10.7% published), reflecting the additional growth of the start-up of major production units during the year.

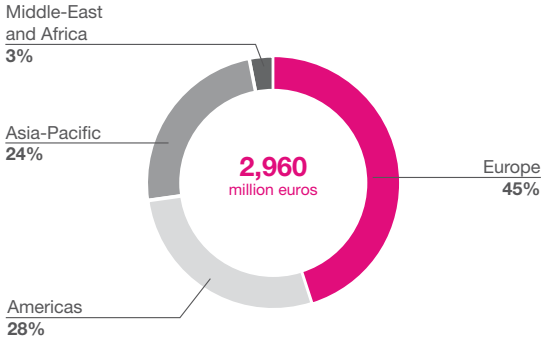
Group operating income recurring (OIR) reached **2,890 million euros** in 2015, an increase of **+9.8%** over 2014, or **+3.9%** excluding the currency impact, showing a positive leverage to revenues. Operating margin (OIR to revenue) was up +50 basis points to **17.6%** benefiting from a high level of efficiencies and a positive energy impact. Excluding the energy impact, the operating margin was up **+10 basis points**.

Gas & Services

Operating income recurring in the Gas & Services activity amounted to **2,960 million** euros, an increase of **+9.7%** compared with the 2014 Gas & Services results restated for the creation of the new activity GM&T. The OIR margin stood at 20.1%, compared to 19.5% in 2014. Excluding the energy impact, the operating margin remained **stable**.

Increase in costs, excluding energy, was **+3.1%** in 2015. **Prices** continue to rise by **+0.3%** in a context of low inflation, due to continuing efforts in Industrial Merchant (+0.6%) and despite continuing pricing pressure in Healthcare (-1.3%). Furthermore, efficiencies totaled 266 million euros. A portion was absorbed to offset the difference between cost inflation and rising prices. The remaining efficiencies, i.e. retention, helped improve the margin. The retention rate was 11% for the year.

Gas & Services 2015 recurring operating income



Gas & Services Operating margin [a]	2014	2015
Europe	19.9%	19.6%
Americas	22.6%	23.5%
Asia-Pacific	16.3%	18.2%
Middle-East and Africa	15.0%	15.9%
TOTAL	**19.5%**	**20.1%**

(a) Operating income recurring/revenue, as published.
New activity: *Data over the full year 2014 and the first three quarters of 2015 concerning Gas & Services sales growth has been restated to factor in the impact relating to the creation of the new Global Markets & Technologies (GM&T) activity.*
Geography: *Middle-East and Africa now includes India, previously part of Asia-Pacific. Data over the full year 2014 and the first three quarters of 2015 has been restated accordingly.*

Operating income recurring in **Europe** reached **1,326 million euros**, an increase of **+0.8%** compared with 2014. Excluding the energy impact, the operating margin was **down -50 basis points** at 19.4%. It benefited from efficiencies generated from all the activities and also from the contribution of the realignment plans decided in 2013. However, it was negatively impacted by the Healthcare pricing pressures and by the impact of an unfavorable comparison linked to the reduction in exceptional charges in 2014 following regulatory changes in pension plans in France and the Netherlands.

Operating income recurring in the **Americas** amounted to **843 million euros**, up **+10.1%**. The operating margin, excluding the energy impact and despite a decrease of **-50 basis points**, remained nonetheless at a high level of 22.1%. It was affected by the low volumes in Industrial Merchant, and only partially offset by the increase in price and the realized efficiencies.

Operating income recurring in the **Asia-Pacific zone** of **702 million euros** increased a significant **+26.6%**. The operating margin, excluding the energy effect, was up **+130 basis points**. In particular, it benefited from ramp-ups, the development of the Industrial Merchant business in China and from the Electronics business in the zone, as well as from the realized efficiencies.

Operating income recurring for **Middle-East and Africa** amounted to **89 million euros**, a significant growth of **+44.2%**. The operating margin, excluding the energy impact, was up **+90 basis points**, driven by the start-up of two major hydrogen production units in Yanbu, Saudi Arabia during the 2nd quarter.

Engineering & Construction

Operating income recurring for **Engineering & Construction** was **68 million euros** and **8.7%** as a percentage of revenue, remaining in line with the Group's target range of between 5% and 10%.

Global Markets & Technologies

Operating income recurring for **Global Markets & Technologies** was **36 million euros** and the operating margin was **12.5%**, down from previous year as 2014 had included an exceptional gain.

Other activities

The Group's **Other activities** posted operating income recurring of **34 million euros,** a decrease of **-3.4%,** and the operating margin remained stable at **6.1%**. The negative impact on the margin from the volume reductions in the Welding business was offset by the efficiencies generated, particularly by the contribution of the realignment plans over the last three years.

Research & Development and corporate costs

Research & Development (R&D) and **corporate costs** included the consolidation adjustments and reached a total of **207 million euros**, a decrease of **-13.8%.** The expenses of R&D and corporate costs are globally stable; the consolidation adjustments explain the 2015 variation. The development costs of the GM&T and E&C activities have been integrated in the R&D expenses in 2015 and the retreated amounts for 2014.

NET PROFIT

Other operating income and expenses showed a **negative balance of -132 million euros** compared to a positive balance of +16 million euros in 2014. This amount includes -124 million euros of exceptional impact from an Engineering & Construction project in Canada and -13 million euros of Airgas acquisition costs.

The **financial expenses of -268 million euros** were +6.9% higher than the expenses of -251 million euros in 2014.

The **cost of net indebtedness**, down slightly by -0.8%, reflects a combination of the average cost of net debt down 30 basis points at 3.7% and an increased level of average net debt over the year, notably due to an acceleration in bolt-on acquisitions.

Other financial income and expenses increased to **-40.9 million euros** compared with -21.7 million euros in 2014. The amount for 2014 includes the impact of an exceptional item relating to the partial disposal of a financial stake in a start-up.

Taxes totaled 666 million euros, down -1.8%. The **effective tax rate** was **26.8%**, lower than the 2014 rate (28.3%). This rate is due notably to a tax gain resulting from the favorable evolution of tax audits.

The **share of profit of associates** contributed **14.7 million euros**, a sharp increase compared with 4.0 million euros in 2014. The progression of the results was due to the increase in profit at several entities. **Minority interests** also rose by **+37.6%** to reach **82.3 million euros**, mainly due to the ramp-up of the large hydrogen units in Yanbu, Saudi Arabia.

Overall, **net profit (Group share)** amounted to **1,756 million euros** in 2015, up **+5.5%,** and **+10.7%** restated with the exceptional impact on an Engineering & Construction project in Canada.

Net earnings per share were 5.12 euros, up **+5.6%** compared with 4.85 euros per share in 2014. The average number of outstanding shares used for the calculation of net earnings per share as of December 31, 2015 was 342,816,961.

Change in the number of shares

	2014	2015
Average number of outstanding shares [(a)]	343,214,086	342,816,961

(a) Used to calculate earnings per share, 2013 adjusted for free share attribution on June 2, 2014.

Number of shares as of December 31, 2014	344,872,883
Options exercised during the year, prior to the free share attribution	790,118
Cancelation of treasury shares	(1,500,000)
NUMBER OF SHARES AS OF DECEMBER 31, 2015	**344,163,001**

DIVIDEND

At the Annual General Meeting on May 12, 2016, the payment of a dividend of 2.60 euros per share will be proposed to shareholders for fiscal year 2015, which represents an increase of +2.0%. Total estimated pay-out will amount to 920 million euros representing a pay-out ratio of 52.4%.

The ex-dividend date is scheduled for May 23, 2016 and the payment is scheduled from May 25, 2016.

2015 Cash Flow and Balance Sheet

(in millions of euros)	2014	2015
Cash flow from operating activities before change in working capital	**2,943**	**3,149**
Change in working capital requirement	74	(259)
Other items	(187)	(59)
Net cash flow from operating activities	**2,830**	**2,832**
Dividends	(885)	(975)
Purchases of property, plant and equipment and intangible assets, net of disposals [(a)]	(1,931)	(2,292)
Increase in share capital	60	86
Purchase of treasury shares	(116)	(178)
Other	(202)	(405)
Change in net indebtedness	**(244)**	**(932)**
Net indebtedness as of December 31	(6,306)	(7,239)
Debt-to-equity ratio as of December 31	**53%**	**57%**

(a) Including transactions with minority shareholders.

NET CASH FLOW FROM OPERATING ACTIVITIES

Cash flow from operating activities before changes in working capital requirements amounted to 3,149 million euros, **up +7.0%** compared with the previous year.

Net cash from operating activities after changes in working capital requirements amounted to 2,832 million euros, and was **stable** (+0.1%) as compared with 2,830 million in 2014.

CHANGES IN WORKING CAPITAL REQUIREMENT

The **working capital requirements (WCR)** increased by **258 million euros** in 2015. This performance was penalized by a currency impact of 39 million euros. The majority of the increase of the WCR is due to higher tax receivables of 138 million euros. The progression of operating WCR was limited to 120 million euros, primarily due to the temporary increase in receivables in North America due to the implementation of a new ERP.

The **working capital requirements** stood at **7.7%** of revenue, 7.5% excluding the currency impact, an increase compared with the ratio of 6.8% in 2014.

CAPITAL EXPENDITURE

In 2015, gross capital expenditure totaled **2,423 million euros**, including transactions with minority shareholders. This amount represented **14.8%** of sales compared with 14.4% in 2014.

Group gross capital expenditure

(in millions of euros)	Industrial investments	Financial investments [(a)]	Total capex
2010	1,450	332	1,782
2011	1,755	103	1,858
2012	2,008	890	2,898
2013	2,156	401	2,557
2014	1,902	273	2,175
2015	**2,028**	**395**	**2,423**

(a) Including transactions with minority shareholders.

Assets disposals, for a total of 131 million euros, included non-strategic assets of a limited size.

Net capital expenditures, including the buyout of minority shareholders, amounted to 2,292 million euros.

Industrial capital expenditure

Industrial investments amounted to 2,028 million euros in 2015, up +6.6% as compared to 2014. Excluding currency impact, they remained stable. Investment decisions are based on a rigorous assessment of individual projects.

Gross industrial investments by geographical region

	Gas and Services				
(in millions of euros)	**Europe**	**Americas**	**Asia-Pacific**	**Middle-East and Africa**	**Total**
2014	698	608	372	90	1,768
2015	**549**	**731**	**475**	**129**	**1,884**

New activity: *Data over the full year 2014 and the first three quarters of 2015 concerning Gas & Services sales growth has been restated to factor in the impact relating to the creation of the new Global Markets & Technologies (GM&T) activity.*
Geography: *Middle-East and Africa now includes India, previously part of Asia-Pacific. Data for full year 2014 and first three quarters of 2015 has been restated accordingly.*

Financial investments

Financial investments amounted to 384 million euros, and 395 million euros including transactions with minority shareholders. These investments included the acquisitions of OMT and Baywater Healthcare Ireland Limited in Home Healthcare, of Healthcare Antisepsis Solutions in Hygiene, a cryogenic marine transport company in Global Markets & Technologies, as well as several bolt-on acquisitions of distributors in Industrial Merchant, in particular, in developing countries. Disposals of financial investments totaled 1 million euros.

NET INDEBTEDNESS

Net indebtedness at December 31, 2015 stood at **7,239 million euros**, up 933 million euros compared with the end of 2014, penalized by a negative currency impact of 306 million euros. The variation compared with 2014 is also due to an increase in change in working capital requirements, higher financial acquisitions net of disposals and an exceptional impact linked to an Engineering & Construction project in Canada.

The **debt-to-equity ratio remained moderate at 57%.**

ROCE

The return on capital employed after tax was **10.3%** versus 10.8% at the end of 2014, negatively affected by the exceptional impact on an Engineering & Construction project in Canada. **Excluding this impact, adjusted ROCE was stable at 10.8%.**

In addition, **value creation**, reflected by the difference between return on capital employed and the average cost of capital, reached **500 basis points at the end of 2015**.

INVESTMENT CYCLE AND FINANCING STRATEGY

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, particularly for Large Industries. Air Liquide has thus tailored its financing strategy to the nature of its projects, based on the diversification of funding sources, the prudent management of the balance sheet and innovative finance sourcing. This financing strategy is fundamental for the Group's continued development.

Investments

OVERVIEW

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 acquisition of existing companies or assets already in operation.

The nature of the industrial investment differs from one World Business Line to the next: from gas production units for Large Industries, to filling centers, logistics equipment, storage facilities and management systems for Industrial Merchant, Electronics and Healthcare. Capital intensity varies greatly from one activity to another.

Capital intensity

Capital intensity is the ratio of capital required to generate one euro of supplementary revenue, when projects or activities 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 line to another:

- In **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 lower capital intensity of **between 1 and 1.5,** due to a relatively high proportion of natural gas in the cost of sales. This capital intensity varies with the trend in natural gas prices;
- **Industrial Merchant** capital intensity to launch the activity 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.

Whatever the capital intensity, any project must enable the Group to achieve its return on capital employed (ROCE) objective over the long term.

Because of the differences in capital intensity among the various Group activities, **OIR margins will vary accordingly.**

The Group's capital intensity varies depending on the activity mix, project type and the price of raw materials.

The theoretical lifespan of a contract in Large Industries

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. **Monitoring this cycle is essential to anticipating the Group's future growth**. The following chart sets out each stage in this process.

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, fully ramped-up.

- **Identification and Negotiation** phase: The project is registered 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. Contracts 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 the business entity's commitment to an investment decision, once validated by the internal governance bodies. The project is removed from the portfolio of investment opportunities and is registered in current investments.

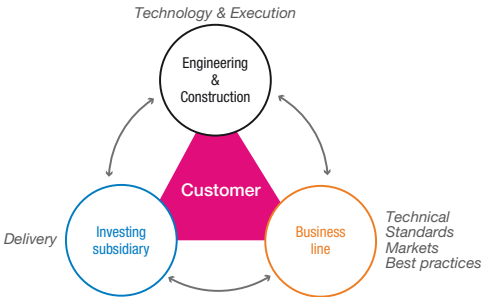
- **Construction** phase: The construction of the unit generally takes between 12 and 24 months and sometimes up to 36 months depending on the size of the project. This is the capital expenditure period The project remains in current investments.

- **Revenue** phase:

  1. **Commissioning**: the unit starts up. Sales begin according to the needs of the customer and 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 at the end of this phase.

Governance for a Large Industries project

Three Air Liquide **entities** are at the heart of a Large Industries customer project, from development through to its execution.



The Large Industries World Business Line ensures the global customer relationship, 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 development 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 and Investment Committee – see below), and the ERC (Engineering Risk Committee) which is responsible for assessing technical and execution risk.

Once the project has been validated through the decision process, approved 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 region.

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.

THE RESOURCES AND INVESTMENT COMMITTEE

An investment decision amounting to over 5 million euros is subject to a precise evaluation and authorization process, undertaken at Group level by the Resources and Investment Committee (RIC). Each meeting is chaired by the Executive Committee member in charge of the World Business Line concerned and brings together the Director of the activity and regions affected by the investment, the Chief Financial Officer or the Finance and Operations Control Director, as well as the Group Human Resources Director (when HR subjects are examined).

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 process, cost of raw materials and access to markets;
- **Customer risk**;
- **Contract clauses**;
- **End products and the stability of future demand** for these products;
- **Quality of the technical solution**;
- **Country risk:** evaluated on a case-by-case basis and can lead to changes in the financing policy and supplementary insurance cover;
- **Corporate Social 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.

During the start-up of a unit, responsibility for the project is transferred to the local operational teams, under strict standards to ensure the site's security and integrity. The local subsidiary manages the unit, and the financial performance review is undertaken by the Group and Regions Operations Control.

INVESTMENT OPPORTUNITIES

As of December 31, 2015, the 12-month portfolio of opportunities totaled **2.6 billion euros**, down 600 million euros compared to year end 2014. This evolution is due to a high level of new investment decisions in 2015 which exited the portfolio of opportunities. Other exits, such as abandoned or delayed projects, are currently in line with the usual changes observed. The number of new opportunities is slightly down.

Developing economies represented 54% of the portfolio, a decline compared with the breakdown as of December 31, 2014. The projects were spread over the Group's four geographic zones. The share of projects in Asia remained the highest, even if it declined notably following decisions taken in the 4th quarter. The share of projects in North America and Europe were equal.

The portfolio of opportunities now includes a majority of investments inferior to 50 million euros.

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 >5 million euros for Large Industries and >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).

Current investments at the end of the period [(a)]

Cumulative value of investments for G&S projects that have been decided but not yet started up. Gas & Services industrial projects of >10 million euros, including replacement assets and efficiency projects, excluding maintenance and security, alone.

Future revenue

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 12.1 to the consolidated financial statements on page 232) without threshold or activity criteria.

INVESTMENT DECISIONS AND INVESTMENT BACKLOG

In 2015, industrial and financial investment decisions taken by the Group reached 2.4 billion euros. Three-quarters of these decisions relate to growth projects.

Industrial investment decisions in 2015 were stable compared with 2014. Large Industries represented approximately one-third of investment decisions, with Industrial Merchant accounting for a quarter and Healthcare for approximately one-fifth. Electronics, Global Markets & Technologies and Other activities accounted for the remainder.

Industrial decisions were spread across all zones. The share of decisions in Middle-East and Africa increased, in particular due to the signing of the Sasol project in South Africa.

Financial investment decisions reached some 500 million euros in 2015, an increase of 300 million euros as compared with 2014. These are in line with financial capital expenditure and include the acquisitions of OMT and Baywater Healthcare Ireland Limited in Home Healthcare, of Healthcare Antisepsis Solutions in Hygiene, a cryogenic marine transport company in Global Markets & Technologies, as well as several bolt-on acquisitions of distributors in Industrial Merchant, in particular in developing countries.

The total investment backlog amounted to 2.3 billion euros, a decrease compared with the end of 2014. This reduction is due, in part, to the impact of major start-ups during the year with the large hydrogen production units in Yanbu, Saudi Arabia and Dormagen, Germany. The investment backlog should lead to a future contribution to revenue of approximately 1 billion euros per year after full ramp-ups.

Investment decisions

(in billions of euros)	Industrial investment decisions	Financial investment decisions (acquisitions)	Total investment decisions
2011	1.9	0.1	2.0
2012	2.0	0.9	2.9
2013	2.2	0.5	2.7
2014	1.9	0.2	2.1
2015	**1.9**	**0.5**	**2.4**

START-UPS

In 2015, 19 units were commissioned, a similar level to that seen in 2014. The year saw, in particular, the start-up of the largest hydrogen production site in Yanbu, Saudi Arabia, increasing the Group's hydrogen production capacity by +25%.

The start-ups of 2015 were mainly located in developing economies (Saudi Arabia, China). Many of the start-ups were air gas production units for the chemicals and energy conversion markets. Several of the start-ups in the Asia-Pacific zone were units for the Electronics activity.

Financing strategy

The Group's financing strategy is regularly reviewed to provide support to the Group's development and take into account changes in financial market conditions, while respecting a credit profile aligned with Standard & Poor's long-term minimum "A" rating and two short-term "A2/P2" ratings. This credit profile depends on key ratios such as net debt to equity and cash flow from operations before change in working capital requirements to net debt.

Air Liquide's "A+" rating was placed on negative watch by Standard & Poor's on November 20, 2015, following the announcement of the signing of the merger agreement with U.S. company Airgas. In its press release, Standard & Poor's expects, as the most likely scenario, to downgrade the long-term rating to "A-".

In 2015, the existing principles of prudence were maintained:

- diversifying financing sources and debt maturities in order to minimize refinancing risk;
- backing commercial paper issues with confirmed credit facilities;
- hedging interest rate risk to ensure visibility of funding 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.

DIVERSIFYING FUNDING SOURCES

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

Air Liquide uses the short-term commercial paper market: in France, through two French Commercial Paper programs allowing up to an outstanding maximum of 3 billion euros; and in the United States through a US Commercial Paper program (USCP) allowing up to an outstanding maximum of 1.5 billion US dollars.

Air Liquide also has a Euro Medium Term Notes (EMTN) program to issue long-term bonds of up to an outstanding maximum amount of 9 billion euros. At the end of 2015, outstanding bonds issued under this program amounted to 5.1 billion euros (nominal amount). The Group's EMTN program allows, in particular, for bonds to be issued in the primary currencies (euro, US dollar, Japanese yen) as well as in other currencies (Chinese renminbi, Swiss franc, pound sterling and ruble).

Thus, in 2015, the Group conducted four bond issues under its EMTN program – two public issues for a total amount of 571 million euros and two through private placement for a total of 420 million euros, in order to finance its investments.

As of December 31, 2015, the funding via capital markets accounts for more than 80% of the Group's total gross debt, with an amount of bonds outstanding of 6.1 billion euros across all programs and 0.9 billion euros of commercial paper.

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

To avoid liquidity risk relating to the renewal of funding at maturity, and in accordance with the Group's internal policy, the Group aims to limit its short-term debt maturities to 2.6 billion euros, an amount which is covered by committed credit facilities. At December 31, 2015, the amount of debt maturing in 2016 was equal to 1.9 billion euros.

In addition, the Group has a 1.3 billion euro syndicated credit facility reaching maturity in November 2020 after the exercise of both one-year extension options.

At December 31, 2015 the total amount of undrawn committed syndicated and bilateral credit facilities was 2.57 billion euros.

In December 2015, following the merger agreement with Airgas, Air Liquide signed a bridge loan of 12 billion US dollars, and intends to refinance through a capital increase of between 3 and 4 billion euros, with retention of preferential subscription rights, and long-term bond issues in US dollars and euros.

Net indebtedness by currency

	2014	2015
Euro	25%	24%
US dollar	40%	44%
Japanese yen	11%	9%
Chinese renminbi	14%	12%
Other	10%	11%
TOTAL	**100%**	**100%**

Investments are essentially funded in the currency in which the cash flows are generated, creating a natural currency hedge. Thus, Air Liquide's debt is thus mainly in euro, US dollar, Japanese yen and Chinese renminbi, which reflects the significant weight of these currencies in the Group's investments and cash flow.

The breakdown of debt by currency was impacted by the depreciation of the euro, at the end of the year, and the increase in debt. The share of the Group net indebtedness denominated in US dollars increased markedly due to the combined effect of the currency impact and the funding of industrial investments in the dollar area. Indebtedness denominated in Japanese yen and Chinese renminbi was stable, and the share denominated in euro decreased.

CENTRALIZATION OF FUNDING AND EXCESS CASH

To benefit from economies of scale and facilitate capital markets financing (bonds and commercial paper), the Group uses a dedicated subsidiary, Air Liquide Finance. At December 31, 2015, this subsidiary centralized the vast majority of the Group's financing transactions. This centralization continued in 2015, notably for the financing of investments in Asia-Pacific and the Americas zones. It also 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 it is permitted by law, Air Liquide Finance also centralizes cash flow balances through direct or indirect daily cashpooling of these outstandings or through term loans. When this is not possible, there are nonetheless domestic cashpoolings, allowing periodic intercompany loans to Air Liquide Finance. In 2015, Air Liquide became the first French company to include the Chinese renminbi in its daily cashpooling in Europe.

As of December 31, 2015, Air Liquide Finance had granted, directly or indirectly, the equivalent of 10.2 billion euros in loans and received 4.2 billion euros in excess cash as deposits. These transactions were denominated in 24 currencies (primarily the euro, US dollar, Japanese yen, Chinese renminbi, pound sterling, Swiss franc, Singaporean dollar and Brazilian real) and extended to approximately 240 subsidiaries.

The matching by currency within Air Liquide Finance, resulting from the currency hedging of intra-group loans and borrowings, does not generate foreign exchange risk for the Group.

Furthermore, the purpose of the European Market Infrastructure Regulation (EMIR) covering OTC ("Over the Counter") derivatives is to improve the transparency of OTC markets and reduce the systemic risk of financial markets. It applies to all derivative transactions carried out by European Union entities.

Pursuant to this regulation which came into force in August 2012, Air Liquide Finance S.A., the Group's centralizing entity for financial transactions continues to be classified as a non-financial counterparty (NFC-), since the transactions were still below the clearing thresholds at the year-end 2015. Its obligations consist thus to apply risk mitigation measures and report all its derivative transactions to the chosen trade repository, "DTCC", in accordance with the technical standards published by ESMA. The mandatory reporting arising from the 2010 Dodd-Frank Act of the U.S. is also centralized via the "DTCC".

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

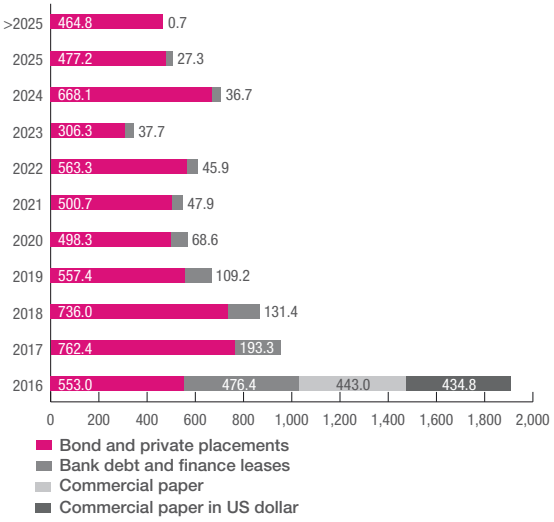
DEBT MATURITY AND SCHEDULE

To minimize the refinancing risk related to debt maturity schedules, the Group diversifies financing sources and spreads maturities over several years. This refinancing risk is also reduced by the regularity of the cash flow generated from Group activities.

The average of the Group's debt maturity is 5.0 years, at December 31, 2015.

The following chart represents the Group's debt maturity schedule. The single largest annual maturity represents approximately 23% of gross debt.

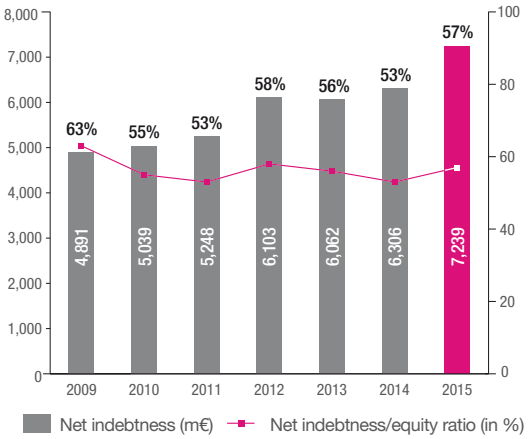
Debt maturity schedule *(in millions of euros)*



CHANGE IN NET INDEBTEDNESS

Net indebtedness at December 31, 2015 stood at **7,239 million euros**, up 933 million euros compared with the end of 2014, affected by a negative currency impact of 306 million euros. The variation compared with 2014 is also due to an increase in change in working capital requirements, higher financial acquisitions net of disposals and an exceptional impact on an Engineering & Construction project in Canada.

Net indebtedness as of December 31



The **net debt-to-equity** ratio remained moderate at **57%** at the end of 2015 (compared with 53% at the end of 2014). This evolution is due to continued Group investments to ensure its future growth, the increase in working capital requirements generated by a temporary rise in taxes and receivables in North America following the implementation of a new ERP. Finally, the currency impact was also unfavorable. The equivalent ratio calculated using the US method: net indebtedness/(net indebtedness + shareholders' equity) reached 36% at the end of 2015, compared to 35% at the end of 2014. The financial expenses coverage ratio (operating income + share of profit of associates)/(net finance costs) stood at 12.2 in 2015 compared with 11.6 in 2014.

The average cost of gross indebtedness was down, in 2015, due to the reduction in financial expenses on long-term bond issues and the increasing use of funding by commercial paper.

The average cost of net indebtedness was **3.7%** in 2015, also down compared with 2014 (4.0%). Cost of net indebtedness is calculated by dividing net finance costs for the fiscal year (290.0 million euros in 2015, excluding capitalized interest) by the year's average outstanding net indebtedness.

BANK GUARANTEES

In connection with its Engineering & Construction activity, the subsidiaries of the Group sometimes grant bank guarantees to customers, during the tender period (bid bond), and 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 extended to customers to secure the contractual performance are advance payment guarantees and performance guarantees.

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

INNOVATION

Innovation is one of the pillars of the Group's strategy. Innovating enables Air Liquide to ensure its competitiveness, open up new markets and to create new growth opportunities.

Innovation to support competitiveness and growth

The Group's innovation expenses amounted to **282 million euros** in 2015. This amount is slightly 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 offers and products.

The number of patented new inventions reflects in particular the Group's innovation capacity. In 2015, **over 270 new inventions** were protected.

Air Liquide has a portfolio of **3,200 invention**s protected by **10,600 patents.**

Almost 6,200 employees contribute to the Group's innovation process; these employees belong to the following entities:

- technology: nine Research & Development sites in Europe, the United States, and Asia, advanced Business & Technologies in 12 countries, and 15 centers for Engineering & Construction;
- marketing and market launch: the World Business Lines and in particular the new Global Markets & Technologies business unit, 11 ALTEC technical centers, which develop gas application technologies for numerous industrial and customer processes, two centers of excellence – one dedicated to gas packaging for Industry and Health, the other to cryogenic production technologies – as well as centers of excellence in Hygiene, Specialty Ingredients, Advanced materials in Electronics, etc.

The operational teams in the 80 countries where the Group operates are responsible for rolling out innovations on a local basis as soon as they come on to the market. They also contribute to incremental innovation on the ground.

Air Liquide's innovation approach is based on three elements: in-depth scientific knowledge of around twelve **molecules** (including oxygen, nitrogen, hydrogen, and carbon dioxide) which define the Group's scientific territory, the capacity to develop and implement new **technologies**, and a strong understanding of its customers' and patients' new **usages.** It combines **science and technology** expertise with the **entrepreneurial spirit** of its employees.

The Group innovates in three areas:

- its **core business,** based on team expertise. This means that the Group improves its oxygen or hydrogen production technologies every year, in order to reduce energy consumption and polluting emissions. In the healthcare and industry sectors, it includes digital and additive manufacturing tools (3D printing) to bring higher value-added offers to the market;
- in **adjacent businesses:** the teams require audacity in order to go beyond the traditional frontiers. They are opening up new markets such as biogas and Bio-Natural Gas Vehicle (Bio-NGV), mobile refrigeration with nitrogen for fresh produce, or are rolling out a new product and services offering for offshore oil platforms and vessels;
- the **transformational businesses**: the intuition of employees enables the Group to explore these markets, which have the potential to transform people's lives. For instance, Air Liquide is one of the most active players in the hydrogen energy market, which is currently seeing the first infrastructure roll-outs following a decade of effort.

In 2015, Air Liquide continued to strengthen its innovation approach, relying on **science and technology** (role of Research & Development, of the Engineering & Construction activity and the centers of expertise), on **Global Markets & Technologies** and the **World Business Lines** to develop **entrepreneurial spirit and new markets,** on its **i-Lab** (innovation Lab) to boost **open innovation** and on **ALIAD,** its investment vehicle in technology start-ups.

- R&D has created **m-Lab** (molecule-Lab) an open scientific community dedicated to "Essential Small Molecules", such as oxygen, nitrogen, hydrogen and carbon dioxide, which embody Air Liquide's scientific territory. They have an extremely wide variety of physical and chemical properties which make them essential to life, matter and energy. Reinforcing its focus on science to accelerate innovation, the Group launched the **"Air Liquide Essential Molecules Challenge"**, open to academic teams, private Research & Development departments, start-ups, and private or public institutes who are invited to submit scientific research projects on three topics related to societal and environmental challenges. An Air Liquide Scientific Award of 50,000 euros will be granted to each winner in September 2016. Air Liquide will further fund up to 1.5 million euros in joint collaborations with the winners to transform their scientific proposals into market technologies.

- The new **Global Markets & Technologies** business unit focuses on **new markets requiring a global approach,** leveraging science, technologies, business models, and digital usages. It includes: i) **advanced Business & Technologies – aB&T**, in charge of opening new markets relating to the energy transition and developing **the Space, Aerospace and extreme cryogenics businesses** based on its core technologies; and ii) **Air Liquide Maritime**, in charge of **developing gas usages by the actors in the maritime sector,** such as offshore oil and gas platforms, offshore wind turbines, and the cryogenic transportation by sea of high value-added molecules.

  In 2015, the **advanced Business & Technologies** teams continued the roll-out of **new hydrogen charging stations** in Europe and Japan, contributed to **major scientific projects** (ITER, JT 60) and continued to develop the **new energies** activity, in particular in biogas.

  The **maritime sector** is a new market for Air Liquide, adjacent to its core business. In 2015, Air Liquide launched **Quad+,** innovative gas cylinder equipment used in particular for construction and maintenance work on offshore oil platforms.

- The **Healthcare World Business Line** identifies and analyzes the latest trends in order to adapt and develop its business model and ensure its implementation. Together with its medical R&D team, it has continued with its pre-clinical and clinical trials so as to identify new applications for certain medical gases. Faced with the challenges relating to the management and cost control of chronic diseases, the Healthcare World Business Line has continued to innovate in **e-healthcare.** In order to facilitate the implementation and monitoring of patients' treatment, it has developed digital tools for assisting doctors with prescriptions and information for patients, in particular those suffering from sleep apnea.

- The **Group's other World Business Lines** also contribute to innovation to strengthen the competitiveness of the Group's offers (reliability in Large Industries, services in Electronics and Industrial Merchant, etc.) or open new markets.

- The **i-lab,** innovation lab, helps accelerate the pace of the Group's innovation and explore new markets. It develops new offers, products and technologies in partnership with the Group's innovation entities and World Business Lines. Based in Paris, France, the i-lab is both a think-tank and a venue for experimentation in new ideas for Air Liquide. It investigates new usages, tests new offers and validates their economic viability. It is permanently connected to the global innovation ecosystem, to boost open innovation. In 2015, the i-Lab focused on the "Breathe in the City" theme, identified as a growth opportunity for Air Liquide. Enjoying good air quality both indoors and outdoors will become a major social challenge. This is already the case in certain megacities in Asia, Latin America and Europe.

- **ALIAD**'s role is to invest in **minority stakes in start-ups**, in order to promote the **Group's access to technological innovations** developed outside the Group. It encourages the setting up of **R&D and/or business agreements** between the start-ups in its portfolio and the Group's entities. The target sectors for these investments are energy transition, management of natural resources, healthcare technologies, digital technologies and electronics.

  In 2015, ALIAD invested in: **Avenisense,** which has developed embedded and intelligent micro-sensors for measuring the density and viscosity of gases and liquids; **Ergosup,** which is developing an innovative technology to store and convert electricity into high-pressure hydrogen; **Orcan,** a start-up based in Munich's innovation ecosystem in Germany, specialized in the generation of electricity from industrial waste heat; **Sigfox,** which is rolling out its narrowband/low consumption cellular networks in Europe, contributing to the growth of the Internet of Things and machine-to-machine communications; **Apix,** which is developing a nanotechnology for gas analysis; and **Cellnovo,** which has developed and marketed a new generation of insulin pumps that help make life easier for patients with type 1 diabetes.

- **Digital transformation** presents innovation and growth opportunities for the Group. New infrastructures, technologies and Internet of Things allow the Group to offer products and services to its customers and patients that will transform their user experience, by making it unique. Air Liquide has more than **180,000 connected devices:** in healthcare (observance of treatments from patients with sleep apnea), in industrial gases (storage) and in new markets (hydrogen charging stations); the Group permanently monitors 450,000 points in 400 gas production units.

  To accelerate its digital transformation, Air Liquide created a **"Digital Transformation" project** in 2015, driven by the Head of R&D in close collaboration with the Group's Industrial IT and Information Systems teams. It identified over 200 digital initiatives within the Group (Big data, the Internet of Things, communities, customer service portals, mobility and continuous connectivity, augmented reality, additive manufacturing, etc.) and defined the Group's digital transformation strategy.

In 2015, Air Liquide continued to **invest in new innovation centers.** Following the decision to invest **almost 100 million euros** in France to boost innovation, the Group created two new innovation centers in 2015:

- the **Gas Packaging Center**, based in the Paris-Saclay Research Center, aims to develop and industrialize new cylinders for industry and healthcare that are easy to use, easily traceable, safe and integrate digital technologies and new materials. The objective is to launch new offers with a faster time-to-market;
- the **Cryogenic Technologies Center,** located at Vitry-sur-Seine, France, hosted by the Engineering & Construction activity, is responsible for incubating innovative oxygen and air gas production technologies, testing and industrializing innovative prototypes and "First-of-Its-Kind".

The Group completed the construction of a **new Research & Technology Center in Shanghai,** located in the Xinzhuang industrial park, **China**, and completed studies relating to the modernization of its **Paris-Saclay Research Center,** near **Versailles,** France. These investments in infrastructures dedicated to innovation are not included in innovation expenses (282 million euros).

Within Engineering & Construction, the **manufacturing center** for the Group's Air Separation Units in **Ras-al-Khaimah, United Arab Emirates,** opened in December 2014, started its activities. This center complements, in terms of both geography and technology, the Group's other two manufacturing centers in France and China.

In addition, to coincide with COP21 which took place in France, Air Liquide launched **Cryocap™,** which enables the capture of CO_2 released during hydrogen production via a cryogenic process. Located at Air Liquide's largest hydrogen production unit in France, in Port-Jérôme, Normandy, Cryocap™ represents an investment of around 30 million euros, decided on by the Group in 2012.

Innovation for society

Almost 60% of the Group's innovation expenses in 2015 are related to protecting life and the environment.

Innovation expenses correspond to the OECD definition, namely research and development, market launch and marketing expenses for new offers and products.

Work related to **preserving the environment** mainly included:

- new technology research and development programs which improve the **energy efficiency of the Group's production units,** thus reducing the environmental footprint of the Group's activities and improving that of its customers and partners;
- research into the **efficiency of oxy-combustion** for both Air Liquide and its customers;
- all hydrogen **production and distribution** processes, from desulfurizing hydrocarbons in refineries to accompanying the deployment of hydrogen energy;
- **capturing and recovering CO_2;**
- **second generation biofuels;**
- **biomass valorization** and purification of **biogas** for sale in the form of Bio-Natural Gas injected into natural gas networks for consumers' domestic needs or as Bio-NGV for clean transformation;
- the production and implementation of **gas for photovoltaic cells;**
- work on **mobile refrigeration with liquid nitrogen** to transport fresh produce;
- recycling gases in the industrial processes of the Group and its customers.

Innovation in **healthcare and hygiene** included:

- research in medical gases, in particular into anesthesia, analgesia and respiratory diseases;
- work on hygiene and sterilization products to combat nosocomial infections;
- the development of adjuvants for vaccines.

THE BLUE HYDROGEN® INITIATIVE

Blue Hydrogen is an Air Liquide initiative that aims to gradually lower the carbon content of its hydrogen production dedicated to energy applications. 95% of the hydrogen that the Group produces is currently from natural gas. Air Liquide is committing to increasing by 2020 the percentage of hydrogen produced for these applications from carbon-free processes, i.e. sources that emit no CO_2. The Group's objective is to produce at least 50% of the hydrogen required by hydrogen energy applications from carbon-free energy sources, by combining:

- the reforming of biogas;
- the use of renewable energies in water electrolysis;
- the technologies to capture and re-use carbon from the CO_2 emitted during the production of hydrogen from natural gas.

Recognizing the teams that contribute to innovation

The inventiveness of the teams that interact with customers and patients on a day-to-day basis enables the Air Liquide Group to constantly reinvent its business, and to anticipate the challenges of its markets. The Group has not only implemented internal programs to encourage and recognize the talent and expertise of its experts that contribute to innovation, but also, since 2014, the talent of its internal entrepreneurs.

The **recognition of technical expertise** is a key factor for innovation. In 2003, Air Liquide launched ***Technical Community Leaders*** (TCL), a promotion and recognition program for the technical field and for the expertise of Group employees. Since TCL was created, **more than 3,000 experts** have been recognized, thus playing a key role in sharing expertise, knowledge and technical excellence. In 2015, two International Fellows, 17 International Senior Experts and 75 International Experts from very diverse regions of the world (Europe, Asia-Pacific, North and South America) received recognition. An event to celebrate these new experts was organized in 2015, in Paris, Houston, Frankfurt and Shanghai.

This community of the Group's technology experts contributes to the transfer of technical know-how, to the sharing of best practices, and to the long-term development of the skills that Air Liquide will need in the future. This is carried out in close collaboration with the World Business Lines and R&D which run the communities of experts.

The Group's **Inventors** Recognition Program, ***#invent***, rewards the inventors who are responsible for patents that are successfully marketed, or that give Air Liquide a competitive advantage. A trophy is awarded for the best invention of the year, selected among the patent registrations filed within each World Business Line in the past two years, and a bonus to inventors as soon as a patent is delivered. This program ensures greater responsiveness for rewarding inventors, and better monitoring of inventions. **Almost 3,000 rewards** have been awarded to inventors employed by Air Liquide since 1997. Air Liquide's portfolio contains over 10,000 patents, and the Group applies for the registration of around 300 new patents every year.

These patents are not only from inventions by the Group's R&D employees, but also by the Engineering & Construction teams, the advanced Business & Technologies network and the operations.

More than 50% of the new patents registered by the Group protect **inventions relating to its core business** (gas production and separation technologies, and its Healthcare business). The patents keep pace with the Group's development in different regions. The new patents registered in 2015 have a geographical breakdown as follows: 36% in Europe, 26% in the Americas, 28% in Asia-Pacific and 10% in Africa-Middle-East.

The Group encourages and helps develop the potential of **its employee entrepreneurs** who contribute to innovation. In 2015, **the Vision'Air internal challenge** on the theme "Breathe in the City", tackled the issue of **air quality in the city.** This edition of Vision'Air, in which almost 300 employees took part, demonstrates the entrepreneurship of Air Liquide's teams, which have worked for almost eight months on the usage, feasibility and viability of a new offer. The chosen projects will be incubated in the i-Lab. By providing its support (technical resources, methodological support, mentorship), the i-Lab intends to transform these ideas into new offers, providing sources of growth for the Group.

Strengthening integration within innovation ecosystems

In a constantly changing world, the dynamic management of interactions with the innovation system, which is known as "open innovation", has become a key innovation factor.

Thanks to the development of a large number of collaborative processes between its operating and Innovation entities and customers, scientific partners and technology institutes, SMEs, suppliers, young innovative companies and institutional and private partners, this "open innovation" has enabled Air Liquide to explore new growth opportunities.

More than 60% of Research & Development projects were conducted as part of public-private academic partnerships in 2015. Air Liquide continued its scientific cooperation agreement on processes for producing hydrogen with low CO_2 emissions with **King Abdullah University of Science and Technology (KAUST)**, in Saudi Arabia, and took part in its industrial collaboration program (KICP). In France, a year following the signing of a five-year strategic agreement, Air Liquide and the **CEA, *Commissariat à l'énergie atomique et aux énergies alternatives*** (French atomic energy and alternative energy commission), launched 10 collaborative projects, in particular within the Paris-Saclay and Grenoble ecosystems. In Germany, progress was made on the design of a production process as part of the partnership with the **Friedrich-Alexander University** in Erlangen.

In the United States, Air Liquide is part of the consortium led by the **Carnegie-Mellon University** working on decision-making tools for the optimized management of production units.

In Healthcare, Air Liquide draws on its partnerships with the ***Institut du cerveau et de la moelle épinière – Maladies neurodégénératives*** (Brain and Spine Institute – Neuronal Degeneration), and with the **University of Montreal** on the treatment and monitoring of patients suffering from Chronic Obstructive Pulmonary Disease (COPD).

Air Liquide collaborates with **125 scientific academic partners and technology institutes** worldwide, and supports **four research chairs.** The "Air Liquide Essential Molecules Challenge" will help feed scientific advances that lead to new ways of producing, packaging and using "Essential Small Molecules" and thus accelerate innovation and growth.

The Group also works with a **number of start-ups.** In Healthcare, the partnership agreement with **Cellnovo,** based in France and the United Kingdom, which sells a new generation of insulin pumps, has helped accelerate the development of this medical equipment. This unique system allows optimal management of insulin administration while also providing patients with great freedom in terms of movement and peace of mind.

In 2015, i-Lab was a partner of the **Hello Tomorrow Challenge,** an international competition for technology start-ups. Open to researchers and entrepreneurs, this competition aimed to promote projects that combine science and technology.

Air Liquide, who sponsored the Energy and Environment category, helped select 30 semi-finalist start-ups (chosen from the 3,500 applications received). The winning start-up in the Energy and Environment category, BioCarbon Engineering, was also awarded the Hello Tomorrow Grand Prize across all categories. BioCarbon Engineering, an English start-up, developed a "grain planting" drone to tackle the deforestation issue: this technology, which is quicker and more competitive than current techniques, allows more trees to be planted simultaneously. As part of the Hello Tomorrow mentoring program, **30 start-ups benefited from support from around 10 Air Liquide employees** (scientists, engineers, entrepreneurs). A masterclass was held by Group experts on the themes of intellectual and industrial property.

The i-Lab relies on **30 active partnerships** with start-ups (Diotasoft, NanoSence, Avenisence, Tech Viz, etc.) in France and abroad (prototyping, testing, piloting, feasibility studies, etc.).

These partnerships also provide the Group with access to the **third-party intellectual property rights.** They enable Air Liquide to explore new growth opportunities, in adjacent businesses and transformational businesses, beyond the Group's core business.

The innovation ecosystem is global. The Group's network-based organizational structure, which includes its base in France and its hubs notably in Frankfurt, Houston and Shanghai, provides it with better connections to trends in local markets, enables it to improve the way in which it anticipates its customers' and patients' requirements, and to imagine new ideas and solutions to improve the customer and patient experience.

Some initiatives launched in 2015

Air Liquide is exploring new areas by developing technologies, services and by building new business models, in order to meet its customers' and patients' needs and new usages, and pursue its profitable growth over the long term. The Group innovates for the benefit of society.

HEALTHCARE: INNOVATION FOR THE BENEFIT OF PATIENTS AND HEALTHCARE PROFESSIONALS

Air Liquide has developed **new digital services** to better meet the needs of healthcare professionals and provide improved support to patients. The Group in particular launched a website entirely dedicated to sleep apnea: www.all-about-sleep-apnea.com. **Sleep apnea syndrome** is a pathology characterized by short and repetitive pauses of breathing during sleep. Around 1-6% of the global population is affected. The syndrome has a direct impact on quality of life and health, and may also trigger serious cardiovascular disorders, such as heart attacks or Cerebrovascular accidents (CVA). This website aims to raise awareness of this condition among the general public (80% of sufferers are unaware of their condition) and encourage discussions between patients and healthcare professionals. An app and a Twitter account providing information have also been created.

Dinno Santé, a subsidiary of Air Liquide specializing in the overall care of diabetics, has launched the **first educational mobile app aimed at diabetic children** (GlucoZor), in partnership with the French charity Aide aux Jeunes Diabétiques (Support for Young Diabetics). The application helps children aged between 8 and 12 to better understand diabetes in a fun way.

Digital tools for assisting healthcare professionals **with prescriptions**, helping them gain time, have been developed as a mobile app which allows the user to choose the most appropriate form of medical oxygen for the patient.

VitalAire, Air Liquide's Home Healthcare subsidiary, has opened **Vital'City, a new center** for patients in the Ile-de-France region who have chronic health conditions (Chronic Obstructive Pulmonary Disease, sleep apnea and diabetes). Located in Paris, staff at the center meet with patients and advise them on equipment and how to use it. Vital'City highlights VitalAire's commitment to proximity and meets the need of certain patients.

NOWAPI™ is a medical telemonitoring device which registers data from the monitoring of sleep apnea patients. NOWAPI™ is Air Liquide's first connected device to be launched. Air Liquide continued to roll out its system in 2015: 150,000 NOWAPI™ devices are currently used by patients.

In 2015, Air Liquide continued to roll out its new **TAKEO™ medical gases cylinder** in various countries. This cylinder has an "intelligent" digital display which allows users to visualize the remaining consumption time and emits a warning sound when gas levels are low. This cylinder is therefore safer to use, and enables medical staff to optimize gas consumption. The cylinder has also been designed to be easier to handle for medical staff thanks to its new ergonomic design. This innovation is now available to healthcare professionals in 15 countries, including China and Poland since 2015.

ELECTRONICS: INVESTMENTS IN GENERATION SYSTEMS FOR ULTRA-PURE NITROGEN

In 2015, Air Liquide decided to invest more than 100 million euros to **supply ultra-pure carrier gases** to customer fabs that manufacture integrated circuits and memory for consumer electronics and mobile devices. These investments in **high-performance on-site generation systems for ultra-pure nitrogen** represent a total production capacity of over 100,000 nm^3/h of nitrogen. This technology allows energy savings of around 30%, for higher production. The Group has signed several long-term contracts with major semi-conductor manufacturers in Japan, Singapore and Taiwan. Carrier gases such as ultra-pure nitrogen are essential to the semi-conductor high-tech industry. These gases are used directly in the production process of semi-conductor chips as well as to ensure ultra-clean atmospheres to protect manufacturing tools. Increasing global demand from the general public for smartphones and other mobile devices has heightened demand for more efficient semi-conductor components such as mobile application processors, wireless communication chips and memory. This market continues to expand, driven in particular by the rise of the Internet of Things and Big Data.

The Group has also continued its development strategy in **Advanced materials** for electronics, supported by its dedicated structure which combines the expertise of Voltaix and ALOHA™ in the **research and industrialization process for innovative molecules** for semi-conductor manufacturers worldwide. Air Liquide provides a recognized offering in innovative thin film advanced materials and has filed numerous patents.

INNOVATIVE OFFERS FOR INDUSTRIES AND CRAFTSMEN

In 2015, Air Liquide continued to **roll out ALbee™**, its innovative **small gas cylinder** for craftsmen and occasional users, with its launch in new countries and through new distribution channels, to facilitate the daily life of customers. Following its success on the European market, the ALbee™ brand is now available in Argentina, North America and Japan. An online ALbee™ sales platform was launched in Nordic countries. Users can order and exchange cylinders in a few clicks, which can be delivered at home or to a distributor. In the United States, in the Houston region,

Air Liquide is currently testing ALbee™ Kiosk where customers can buy or exchange a gas cylinder through a self-service system 24 hours a day, seven days a week, using a dedicated app that geolocates the nearest Kiosk.

The heat oxy-combustion glass fusion technology developed by Air Liquide's R&D teams won the Innovative Products award at the France-China Committee **Climate Solutions 2015 Innovation Awards,** which recognizes Franco-Chinese cooperation.

This innovative technology **reduces the environmental impact** of the glass fusion process. It makes oxy-combustion – which consists of enriching air with pure oxygen – even more efficient, as it extracts heat from the combustion fumes and uses it to heat oxygen and fuel. Compared to air combustion, this technology provides up to 50% energy savings and up to 50% CO_2 emission reduction. It also reduces nitrogen oxide by 80%. So far, this technology has been implemented in several glass factories in Europe. It is of particular interest to the Chinese market which represents about 50% of worldwide glass production. The Group has substantial R&D resources and strong experience in glass making thanks to its extensive network of field experts and dedicated testing platforms in France, the United States and China. For more than 20 years, they have been mastering oxy-combustion technologies, including patented burners and furnace heat modeling.

QUAD+: A BREAKTHROUGH INNOVATION IN THE OIL & GAS MARKET

Quad+ is an innovative solution, launched by Air Liquide's teams for offshore oil platforms and aimed at **construction and maintenance** work, **hyperbaric diving** and **subsea work**, as well as **offshore oil and gas** exploration and **extraction** services. It is compact equipment used to store interconnected gas cylinders, that offers maximum efficiency: the 450 bar pressure brings +40% gas capacity compared to the highest market standards, and its **compact size** reduces its footprint on the ground in an environment where each square meter counts. The ergonomics, the design that includes corrosion-resistant materials, and the choice of composite materials for the gas cylinder to ensure their robustness while limiting their weight provide security, solidity and ease of use in the extreme conditions found on offshore platforms or vessels: snow, heavy rain, swells, storms, etc. Quad+ complies with the highest industry standards. The markets targeted by this major innovation include the main offshore oil and gas extraction fields located in the North Sea, then the Middle-East, the Gulf of Mexico, South-East Asia, West Africa and off the coasts of Brazil.

I-LAB: THE "BREATHE IN THE CITY" INITIATIVE

With its "Breathe in the City" initiative, Air Liquide's i-Lab intends to develop new offerings with the Group's employees joining forces with young companies and design schools, to meet the numerous challenges arising in terms of air quality: reducing polluting emissions, helping patients with respiratory difficulties, providing clean air on the move, measuring, mapping and treating air quality.

The i-Lab launched the **"Breathe in the City" Design competition,** in which 110 students from 10 industrial design schools from eight different countries took part. Students were asked to come up with a product, service or application to directly or indirectly combat air pollution indoors, outdoors or on the move. A team from the i-Lab worked with the candidates to help them understand the subject of air pollution and its effects on city-dwellers and then to focus their ideas. Several promising suggestions by the students are currently being studied with a view to transforming them into prototypes. This competition allowed Air Liquide to **provide input on innovative solutions relating to air quality**.

In 2015, the i-Lab developed **"Caring for my Air"** a service designed for professionals and organizations looking to provide their employees and customers with a healthier working environment. Based on a network of connected devices, "Caring for my Air" measures air quality continuously, and provides access to real-time data through an online dashboard. Using the analysis of the collected data, the offer includes a diagnosis and then an action plan for the company or organization to help it continuously improve the quality of indoor air. "Caring for my Air", developed and based on an entrepreneurial approach, is currently being tested at several companies and local authorities in France and China.

NEW TECHNOLOGIES AIMED AT THE PERFORMANCE OF OUR PRODUCTION UNITS

In 2015, Air Liquide started up its **new, state-of-the-art Steam Methane Reformer (SMR)** unit located at the Chempark Dormagen site near Cologne, Germany. Air Liquide invested around 100 million euros in this highly flexible production unit, which will supply Bayer MaterialScience's (now Covestro) new large-scale TDI (toluene diisocyanate) plant, one of the polymer company's most important investments in recent years. The unit was designed and built by the Air Liquide Engineering & Construction teams using state-of-the-art technologies that ensure the highest standards of efficiency, flexibility and safety while increasing production capacities.

Air Liquide has also opened **Cryocap™ in France, a unique industrial installation that enables the capture of CO_2** released during hydrogen production, via a cryogenic process. The unit captures 100,000 tonnes of CO_2 per year which it develops, in particular for its agrifood customers.

CONTRIBUTION TO MAJOR INTERNATIONAL SCIENTIFIC PROJECTS

To obtain the very powerful electromagnetic fields required to confine and stabilize the particle beams which provide the required energy for nuclear fusion, as part of the **international ITER project,** it is necessary to use superconducting magnets that only work at extremely low temperatures. This temperature requirement is met **through the cryogenic equipment supplied by Air Liquide,** which is based on the properties of liquefied helium whose temperature is just 4.5°C above absolute zero, i.e. -273.15°C.

In 2015, Air Liquide announced the signature of a **new contract with ITER-India** for the design and manufacturing of 19 cryogenic lines for the ITER project. This latest contract comes after two earlier ones, signed in 2012 and in 2013, bringing to around **250 million euros** the total amount signed by Air Liquide for the ITER project.

The purpose of the **JT-60SA project,** a Tokamak-style infrastructure, based in Naka in **Japan**, is to support the ITER project's research activities on fusion by working on the capacity to control and maintain the plasma for several hours. JT-60SA is led by the Japanese Atomic Energy Agency (JAEA) in collaboration with the French organization CEA. For this project, Air Liquide delivered a helium refrigeration system, intended to cool the Tokamak. This equipment was developed and built in France, shipped to Japan in 2015 and will be commissioned in 2016. It highlights the Group's ability to meet **major scientific challenges by supplying very high tech systems.**

DEVELOPMENT IN BIOGAS

In 2015, Air Liquide acquired a 5% stake in the capital of Fonroche Biogaz, a subsidiary of the Fonroche Group, a key player in the production of renewable energies. Through this investment, both groups have pooled their skills in order to develop, in partnership, projects involving the purification and upgrading of biogas for the French market. In 2015, Fonroche Biogaz commissioned the **largest plant in France for the injection of biomethane into natural gas networks.** With an annual production capacity of 34,500 MWh of gas (equivalent to the annual consumption of around 11,000 residents), this plant transforms 71,000 tonnes of organic matter from local farming and agro-industrial players.

Air Liquide is working on solutions for the valorization of biogas using a process that extracts methane from biogas, via a patented gas separation technology that uses membranes. Air Liquide is the global leader in the biogas purification, with a capacity of 100,000 m3 per hour. Air Liquide has continued to roll out this offer and now has more than 35 customers in this market.

In 2015, the Group **acquired US company Porogen,** a leading manufacturer of porous polymeric membranes, thus expanding its membrane technology offering for the space, refining and petrochemical markets.

ROLL-OUT OF A HYDROGEN CHARGING STATION INFRASTRUCTURE

The Air Liquide Group actively contributes to the development of the **hydrogen energy industry on a worldwide scale,** in particular through initiatives aimed at deploying hydrogen charging stations in Europe, the United States and Asia. The Group has already developed and supplied more than 75 hydrogen stations worldwide. The first charging station for the general public was opened in 2012 in Düsseldorf, Germany. The stations developed by Air Liquide allow Fuel Cell Electric Vehicles (FCEVs) to re-charge in less than five minutes, and FCEVs themselves offer an autonomy that can reach up to 500 kilometers in range without emitting greenhouse gases.

2015 marked **an acceleration in the development of hydrogen energy** and the **roll-out of hydrogen charging stations.**

In **France,** Air Liquide opened a hydrogen charging station in Saint-Lô, in the Manche department. The Manche department is the first local authority in France to be equipped with a hydrogen station for its vehicles. Air Liquide has been chosen by FM Logistic to provide support for its projected roll-out of hydrogen-powered forklift trucks on its sites: at the Neuville-aux-Bois logistics platform, located near the city of Orléans (France), Air Liquide has installed a hydrogen charging station that will initially service ten forklifts equipped with hydrogen fuel cells. Air Liquide has also installed the first hydrogen charging station in Paris, in partnership with the Paris-based electric taxi start-up STEP (Société du Taxi Électrique Parisien), and the support of the Paris City Council. Located in the heart of the capital, it has enabled the launch in Paris of "Hype", the first fleet of hydrogen-powered electric taxis.

In **Germany,** Air Liquide is the founding partner of the **H_2 Mobility** initiative, a German consortium in which German industrial players and the German government intend to invest around 400 million euros in the construction of hydrogen charging stations. The roll-out of 100 hydrogen charging stations is already planned in the coming years, and the project is aiming for a total of 400 stations across the country, making Germany the first country to own an inter-regional network of hydrogen charging stations for private passenger cars.

In **Japan,** Air Liquide has installed two new hydrogen stations in Nagoya and Toyota, located in the Aichi prefecture. These new stations were developed through a partnership between Air Liquide Japan and Toyota Tsusho. The Group has announced the opening of a new hydrogen station in Saga, on the Island of Kyushu in Japan. This new hydrogen station, installed by Air Liquide with the support of METI (Japan's Ministry of Economy, Trade and Industry) and the Saga prefecture, will be the first hydrogen charging station in the town open to the general public.

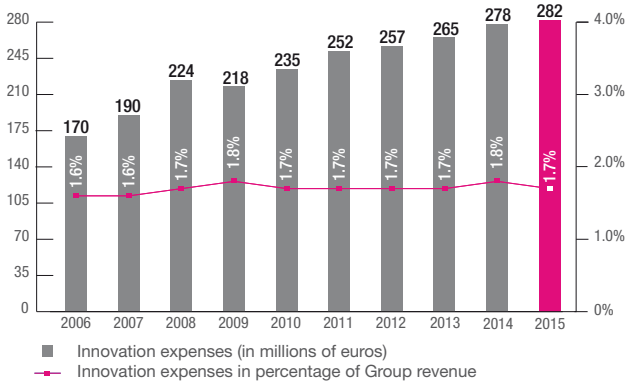
In the **United States,** Air Liquide is developing a network of new hydrogen charging stations, in collaboration with Toyota Motor Sales USA, Inc. (Toyota). This initiative is part of the US sales launch of the constructor's new hydrogen fuel cell electric vehicle, the "Mirai". Air Liquide's hydrogen infrastructure in the North-Eastern United States initially consists of 12 charging stations across a number of states: New York, New Jersey, Massachusetts, Connecticut and Rhode Island.

Innovation indicators concerning the Group as a whole

	As at December 31, 2015
Number of employees working in entities contributing to innovation	6,200
Number of researchers	1,000 researchers with 35 nationalities
Number of R&D sites	9
R&D industrial partners	100
R&D scientific partners (academic and technology institutes)	125
Number of Global Markets & Technologies employees [(a)]	1,400
Number of Engineering & Construction employees [(b)]	3,100
Engineering centers	15
Number of employees in other entities contributing to innovation	700

(a) aB&T employees are now included in the Global Markets & Technologies Business unit.
(b) Figures restated for the transfer of entities to the Global Markets & Technologies Business unit.

Innovation expenses



Patents	2011	2012	2013	2014	2015
Number of patented inventions	3,109	3,215	3,288	3,369	3,200
New patent applications filed during the year	332	316	321	287	271
Percentage of new patents protecting the core business (within the portfolio) [(a)]	46%	47%	54%	59%	51%

(a) Gas production and separation technologies and Healthcare activity.

STRATEGY AND OUTLOOK

Strategy

For many years, Air Liquide's growth strategy has been founded on creating long-term value. To do so, the Group relies on its operational competitiveness, its targeted investments in growth markets, and innovation to open new markets and create new opportunities.

The Group is committed to delivering a regular and sustainable performance for its shareholders and maintaining its strong dividend pay-out policy year after year. This long-term performance is based on continuous growth of the industrial gases market worldwide, a solid business model and a managerial culture founded on consistent performance.

COMPOUND ANNUAL GROWTH RATE (CAGR) OVER 30 YEARS

- Revenue: +5.8%
- Cash flow from operating activities before changes in working capital: +6.9%
- Net profit: +8.0%
- Earnings per share [(a)]: +7.4%
- Dividend per share [(a) (b)]: +8.7%

(a) Adjusted for previous two-for-one share splits and free share attributions.
(b) Subject to the approval of the Shareholders' Meeting on May 12, 2016.

The industrial gases industry has enjoyed steady growth over the last 100 years due to the ever increasing needs of new and growing economies, the emergence of new applications supported by innovation and technological research, and increased customer outsourcing of gas production. The demand for industrial gas, therefore, has risen faster historically than industrial production.

The growth rates during the rebound from the 2008-2009 financial crisis varied greatly between advanced and developing economies. The gap between the growth rates in these economies has varied from 9 points in 2005 to 18 points in 2010 and is now below 5 points.

Against this backdrop, the Group's strategic approach has shifted from a geographical viewpoint, where industrial growth came mainly from increased capacity in developing economies, to **a market viewpoint,** where each country aims to attract new investments in growth sectors.

As a result of this new approach, the Group has outlined three major trends which shape its markets.

THREE MAJOR TRENDS, SOURCES OF GROWTH

The energy and ecological transition

Climate change

+

Mounting environmental concerns

+

Constraints linked to availability of natural and energy resources

+

Necessary adaptation to these challenges

↓

OPPORTUNITIES FOR AIR LIQUIDE

- Propose more energy efficient solutions to help our customers improve their competitiveness and reduce their environmental footprint.
- Also put these solutions at the service of the Group activities in order to make efficiency gains.
- Develop clean transport solutions that contribute to reducing the environmental footprint.

Developments in the world of Healthcare

Longer life expectancy and changes in lifestyles

+

Increase in chronic illnesses

+

Growing need for hygiene products

+

Rise in care requirements in developing countries

+

Adaptation of healthcare systems

+

Growing importance of healthcare and well-being

↓

OPPORTUNITIES FOR AIR LIQUIDE ALONG THE CONTINUUM OF CARE WITH HEALTHCARE IN HOSPITAL AND AT HOME

- Develop new product and service offers for healthcare professionals and patients.

The digital transformation

Appetite for innovation

+

Rapid technological developments, combining miniaturization and greater power (micro-processors, memory, flat screens, photovoltaic cells)

+

Adoption of ever more sophisticated tools

+

New needs and usages

(ways of living, working, moving, communicating, etc.)

+

Creation of new economic models

↓

OPPORTUNITIES FOR AIR LIQUIDE

- Opportunities for all our activities: for example, connected cylinders, products and services for Electronics, remote monitoring of treatment observation by the patient.
- More efficient and competitive operations: plant of the future, more reliability, predictive analysis using Big Data.
- Propose a new customer experience through new products and services in order to increase customer loyalty and to win new customers.

A SOLID BUSINESS MODEL

The Large Industries activity, which benefits from long-term contracts with take-or-pay clauses, and the Healthcare activity, which is enjoying steady growth independently of the economic cycle, provide security. The Industrial Merchant activity offers technological solutions adapted to the multiple applications of customers in various industries and provides greater resilience. In addition, through its four World Business Lines, the Group serves a wide range of customers and industries, with an extensive regional diversity and a growing market share in developing economies, another guarantee of solidity.

Air Liquide confirmed the resilience of its business model in 2009. In an economic crisis of exceptional scale, Air Liquide, the global sector leader, reported a slight decline in sales and stable net profit.

In 2015, amidst an unstable environment and moderate world growth, Air Liquide relied on the solidity of its model and continued to improve its performance. The Group's debt-to-equity ratio remained moderate at 57%.

On 17 November, 2015, the Group announced the signing of a merger agreement under which Air Liquide will acquire the American company Airgas. Airgas shareholders, during a special shareholder meeting held on 23 February 2016, approved the acquisition of Airgas by Air Liquide (simple majority of the outstanding shares of Airgas was required). The transaction is subject to receipt of necessary antitrust and other regulatory approvals and other customary conditions and provisions. Once the transaction is finalized, Air Liquide will be ideally positioned for future growth.

PERFORMANCE AND RESPONSIBILITY

The search for economic performance and the attention paid to society's major issues, notably the protection of the environment, are closely linked. Companies are no longer evaluated on their financial performance alone. They are also judged on their commitment to and efforts in terms of Responsibility. The Group has confirmed its ambition to be the leader in its industry, by demonstrating its long-term performance and behaving responsibly. The Group thus creates a virtuous dynamic where Responsibility is an integral part of Performance.

Performance

The Group's sales growth targets formulated in 2010, were based on estimated growth in the industrial gases market of between +7% and +8% per year between 2010 and 2015. The global economic recovery having been slower than expected, these estimates were updated in 2013. The new forecasts expect market growth of between +4% and +5% annually between 2010 and 2015. As a result, Air Liquide's average annual sales growth target, which had been +8% to +10% in a normal context, was rephrased at the end of 2013 as revenue growth relative to the market of +1% to +2%.

The initial 12 billion euros investment budget for the 2011-2015 period has been confirmed and net capital expenditure between 2011 and 2015 is in line at 11.3 billion euros.

The operational efficiencies target, initially set at more than 200 million euros per annum for the five-year period, has been increased by 30% to a total target of 1.3 billion euros for the 2011-2015 period. For the fifth consecutive year, efficiency exceeded the annual target and reached 298 million euros in 2015. This result brings cumulated efficiency to 1,476 million euros for the 2011-2015 period, highly above the communicated target.

Finally, the ROCE target initially established at 12-13% was revised in 2013 to 11%-13%, taking into account the longer investment cycle for big projects. The 2015 ROCE stood at 10.3%, negatively affected by the exceptionnal impact on an Engineering & Construction project in Canada. Without this impact, the adjusted ROCE would be at 10.8%, stable with 2014 level.

The main outlines of the company's medium-term strategic plan will be finalized after the realization of the Airgas acquisition. As per usual, once the company's medium-term strategic plan has been validated, it will be communicated to the markets.

Responsibility

As an integral part of Air Liquide's strategy, Responsibility creates new opportunities and constitutes a sustainable performance driver while at the same time providing solutions that respond to society's major issues.

At year-end 2013, the Group confirmed its ambition to be the leader in its industry, delivering long-term performance and acting responsibly. The objective of embedding Responsibility in the way we act and manage our operations and initiatives represents another step in ensuring that Responsibility is at the heart of the way the Group runs its operations and initiatives, to ensure that the Group fulfills its ambition.

This Responsibility approach is widely adopted within the Group and is presented in chapter 2 of this document.

Outlook

The Group achieved a solid performance, delivering once again an increase in revenue, operating margin and net profit, in the context of slower global growth in 2015. Growth in Gas & Services sales improved quarter after quarter.

Business growth was driven by momentum in Healthcare and Electronics, and in Large Industries by higher volumes from new contracts. From a geographic perspective, it was driven by Europe's progressive recovery and by the developing economies.

Europe benefited from the good development in Healthcare and an improvement in certain industrial sectors in the 2nd half of the year. In North America, the year was marked by a slowdown in sectors related to oil and gas production and metal fabrication. The progression in activity observed in Asia-Pacific was driven by Japan's resilience and the persistence of sustained growth in China.

Globally, the Group delivered growth above that of its market, in a context of favorable exchange rates, which positive effect slowed down during the year, and decreased energy prices.

Over the year, as a result of efficiencies close to € 300 million and investment decisions totaling € 2.4 billion, the Group improved its competitiveness and sustained its future growth. At the same time, the signature of the merger agreement to acquire Airgas in the United States and the rollout of an innovation strategy, reinforced by the creation of the Global Markets & Technologies activity, mark major steps in the Group's development and transformation.

Excluding the impact of Airgas acquisition and financing, and assuming a comparable environment, Air Liquide is confident in its ability to deliver another year of net profit growth in 2016.