2011 Corporate Social Responsibility and Sustainable Development Report

2

INTRODUCTION

In the framework of the **ALMA 2015** corporate program, Air Liquide has set itself the ambition of **"being the leader of its industry through performance and responsibility over the long term".** The Group has therefore placed **performance and responsibility at the heart of its strategy, with a focus on progress over the long term.**

Responsibility relates the way in which employees or the Group take into account the interests of all stakeholders to direct their actions and attain their results.

In the framework of this Responsibility approach, Air Liquide has therefore broadened its Sustainable Development approach by defining **commitments toward the four stakeholders of the Group:**

- shareholders;
- customers and patients;
- employees;
- communities,

and **three fields of action:**

- improve the environmental footprint;
- enhance business practices and governance;
- innovate relentlessly.

Each of these **commitments** corresponds to a part of this report. A certain number of the **responsibility objectives for 2015** and their corresponding **key indicators** are presented in it. Other objectives and key indicators will be gradually communicated.

This new approach results from reflection in-house with all the activities and areas concerned in the Company. It was presented to the Air Liquide Board of Directors at the end of 2011.

More broadly, the Corporate Social Responsibility and Sustainable Development Report, an integral part of the Air Liquide Responsibility approach, relies on **reporting** on over 170 indicators, presented in the following pages, to measure the Group's sustainable development performance. These indicators are **collected worldwide.**

Just like financial reporting, extra-financial reporting has been **reviewed each year since 2003 by the Statutory Auditors.** You will find, at the end of the Corporate Social Responsibility and Sustainable Development Report, the report of the Statutory Auditors who, each year, conduct a mission of verification on a selection of indicators not only on the corporate level but also in 2011 at 16 industrial sites or Human Resources Departments of subsidiaries.

Air Liquide was **one of the first CAC 40 companies to have this review done by the Statutory Auditors** and to include the Corporate Social Responsibility and Sustainable Development Report **in the Reference Document.** This review is not a legal obligation today. It is voluntary and reflects Air Liquide's commitment to give more value to these indicators.

SHAREHOLDERS

Commitment

Deliver long-term performance thanks to a steady increase of investment value, ensure respect and consideration in the relationship with shareholders.

Key Responsibility Indicator

Total Shareholder Return (TSR) [(a)].

In 2011, the increase in the Total Shareholder Return (TSR) was 11.5% per year over 20 years for a registered shareholder.

Responsibility and proximity

The respect and consideration of its shareholders are part of Air Liquide's Responsibility and Sustainable Development approach. The Group has instituted a relationship of confidence with its shareholders by associating them with its continuous growth and successful business model through a strong and steady distribution policy maintained over time.

Becoming an Air Liquide shareholder means backing a responsible actor that makes protecting life and the environment a priority and that demonstrates its commitment to human, social and societal issues.

The Shareholders' Charter

Air Liquide has formalized these privileged and long-term relationships with its shareholders in the "Shareholders' Charter", which is based on four commitments:

1. Consideration and respect for all shareholders;
2. Remuneration and increased value of their investments in the long term;
3. Listening to and informing shareholders;
4. Service provided to the shareholders, notably thanks to a dedicated service within the Company.

1. CONSIDERATION AND RESPECT FOR ALL SHAREHOLDERS

Financial performance is not enough to sum up the relationship between Air Liquide and its shareholders. Air Liquide maintains a dialogue of proximity with its shareholders to best meet their needs. To make sure that these expectations and their evolution are identified and understood, Air Liquide endeavors to get to know its shareholders in their diversity because they are genuine partners over the long term who have been with the Group since its creation and continue to accompany its growth.

Stable and balanced share ownership

It is important for Air Liquide to preserve the balance between individual shareholders and institutional investors. The Group's strategy, focused on the long term, and the soundness of its business model, offer shareholders a sustainable and regular return on their investment.

410,000 individual shareholders hold 37% of the capital. French and non-French institutional investors represent respectively 21% and 42% of the capital.

At the end of 2011, the share of capital held by the employees and former employees of the Group was estimated at 2.2% of which 1.6% (in the meaning of Article L. 225-102 of the French Commercial Code) corresponded to shares subscribed by the employees during employee-reserved capital increase operations or held through mutual fund.

(a) Total Shareholder Return (TSR) is the annualized return rate for a shareholder who buys his share at the beginning of a period and sells it at the end of the period. This calculation takes into account the change in the share price, dividends paid, including loyalty bonuses, considering that they are also reinvested in shares, as well as free share attributions.

	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Individual shareholders	40%	40%	39%	38%	38%	37%	38%	38%	36%	37%
French institutional investors	21%	23%	24%	25%	24%	30%	26%	26%	23%	21%
Non-French institutional investors	37%	35%	36%	36%	37%	32%	35%	36%	40%	42%
Treasury shares	2%	2%	1%	1%	1%	1%	1%	> 0%	< 1%	> 0%
Registered capital	27%	28%	30%	31%	32%	37% [(a)]	33%	32%	34%	35%
Capital eligible for the loyalty bonus	24%	24%	24%	25%	26%	26%	26%	25%	25%	28%

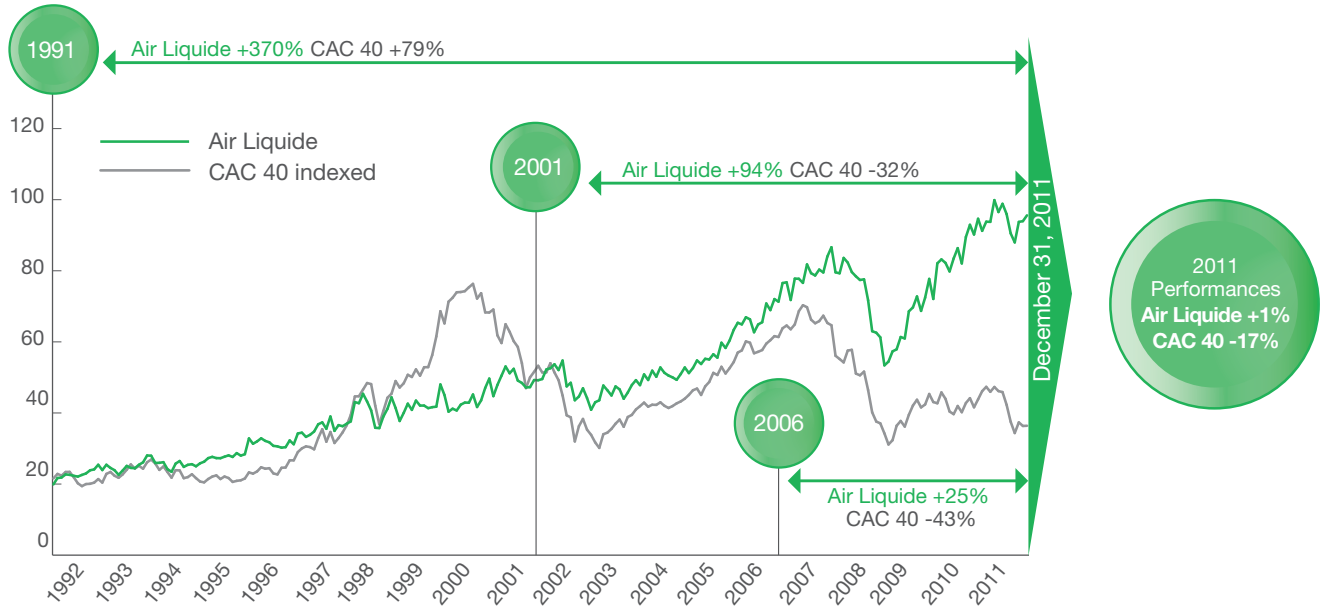
(a) In 2007, the share of capital owned by institutional investors holding direct registered shares increased notably due to one important institutional investor that sold its shares in 2008.

2. REMUNERATION AND INCREASED VALUE OF THE SHAREHOLDERS' INVESTMENTS IN THE LONG TERM_

Air Liquide, a continuous growth

The share's value is based on the rise in its stock market price over the long term and the distribution of dividends. Since its creation in 1902, Air Liquide has always shared the fruits of its growth and rewards its shareholders' confidence through a remuneration and loyalty policy that is based on regular dividend distribution, free share attribution and the loyalty bonus. Air Liquide strongly promotes the permanent increase in the shareholder's initial investment.

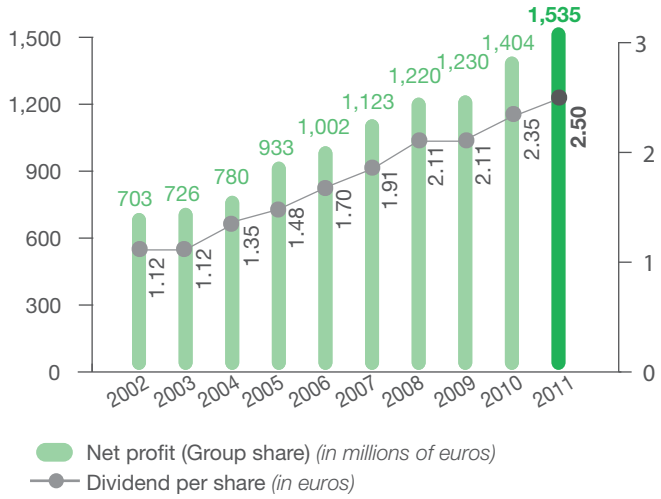
Evolution in the stock market price and the dividend



Since it was first listed on the French Stock Market in 1913, Air Liquide has always shown a profit. Air Liquide creates value by developing its activities and optimizing its performances over the long run. Over the last 20 years, Air Liquide's revenue has shown an average annual growth of 5.6%. This growth has been profitable: the Group's earnings have followed a similar trend, with an average annual growth of the net profit per share of 7.9%. Over the same period, the dividend has had an average annual growth of 9.6%.

During the last 10 years, nearly 50% of earnings have been distributed to shareholders.

Net profit and dividend



Return on an investment in Air Liquide shares for the shareholder

To further increase the investment value of Air Liquide shares, subscribing to registered shares permits shareholders who choose this option to benefit from a privileged relationship with Air Liquide and a loyalty bonus: +10% on the amount of the dividends received and +10% on the number of free shares granted. This loyalty bonus is granted to shareholders who have held direct registered or intermediary registered shares for two calendar years and who still hold them on the date of dividend payment and the attribution of free shares.

Total Shareholder Return (TSR) is the annualized rate of return for shareholders who purchased a share at the beginning of the period and sold it at the end of the period, including the contribution from both the share price performance and dividends paid (including loyalty bonus), assuming that the dividend is immediately reinvested in shares, as well as free share attributions.

Average annual growth of the portfolio as of December 31, 2011

For a capital invested	Air Liquide— Registered shareholder [a]	Air Liquide— Bearer shareholder [a]	CAC 40 index— Dividend reinvested [b]
• over 5 years (December 31, 2006)	+7.6%	+7.3%	-7.1%
• over 10 years (December 31, 2001)	+10.4%	+9.9%	-0.4%
• over 20 years (December 31, 1991)	+11.5%	+10.9%	+6.1%

(a) The TSR on shares for the registered shareholder is higher than the TSR on shares for the bearer shareholder because the registered shareholder benefits from loyalty bonuses.

(b) CAC 40 index with gross dividends reinvested.

During the last 10 years, the return rate for an Air Liquide shareholder has been on average +10.4% per year, with gross dividends reinvested in shares, attributions of free shares and loyalty bonuses to registered shareholders.

	2002	2003	2004 IFRS	2005	2006	2007	2008	2009	2010	2011
Net profit per share *(in euros)* [a]	2.47	2.57	2.78	3.34	3.54	3.99	4.40	4.40	4.99	5.43
Dividend per share *(in euros)* [a]	1.12	1.12	1.35	1.48	1.70	1.91	2.11	2.11	2.35	2.50 [b]

(a) Based on the average annual number of shares (excluding treasury shares) and adjusted to account for increases in capital performed via capitalization of reserves or additional paid-in capital, cash subscription and the two-for-one share split on June 13, 2007.

(b) Subject to the approval of the May 9, 2012 Shareholders' Meeting.

3. LISTENING TO AND INFORMING SHAREHOLDERS

Air Liquide provides its shareholders, through various communication supports, with coherent and transparent information on the Group's activities, strategy, performances and perspectives.

Pedagogy is one of the major concerns that takes priority in the design of information supports like the Annual Report, the Shareholder's Guide and the Invitation to Shareholders' Meeting, which didactically presents the resolutions the shareholders will vote on.

In addition, Air Liquide welcomes its shareholders in a dedicated venue, the Shareholders Lounge, at the Group's head office in Paris, so that they can obtain complete information on the Company's activities, the life of the share, and for those who hold direct registered shares, how to carry out operations on their accounts.

Since 2011, the Shareholders Lounge has also been proposing simple, didactic and interactive temporary exhibitions: an additional occasion for shareholders who wish to find out more about the Group's activities and initiatives and to strengthen the link of proximity.

4. SERVICE PROVIDED TO THE SHAREHOLDERS, NOTABLY THANKS TO A DEDICATED SERVICE WITHIN THE COMPANY

Specifically organized to provide answers to shareholders with direct registered shares, the Shareholder Services, composed of 26 people, offers its expertise in share account management: how to open an account, how to place orders on the stock market, how to determine taxation of securities and how to transmit a portfolio.

Air Liquide directly manages the accounts of its shareholders with direct registered shares. They pay no handling fees, and broker fees are reduced to 0.18% excluding tax of the gross amount of the transaction.

More information on Air Liquide and its shareholders is available in the Shareholder's Guide, which can be consulted on the website www.airliquide.com under the Shareholders section.

CUSTOMERS AND PATIENTS

Commitment

Deliver value to its customers and patients through safe, reliable and cost-effective solutions; proactively dialogue with customers and patients.

2015 objective

Increase customer and patient satisfaction by relying on regular surveys with them. By 2015, these surveys and the related action plans should concern units representing 85% of the Group's sales.

Key Responsibility Indicator

Percentage of the Group's sales concerning the units where a customer satisfaction survey has been conducted.

In 2011, the percentage of Group sales related to units where a customer satisfaction survey was conducted was 39% [(a)].

The relationship with large industrial customers and very diverse sectors, as well as that with patients, is at the heart of the Group teams' preoccupations and guides the Company's growth. The quality of this relationship with customers and patients involves each unit and each person in the Group. It is based on the definition of specific commitments that the Group and its teams undertake to respect in their daily actions, with a spirit of rigor, a sense of service and that of innovation.

A responsible company vis-à-vis its customers

The Air Liquide Group's different activities have a **very diverse customer profile.** There are **over a million customers,** from sectors ranging from steel mills to the food, electronics and pharmaceutical industries, as well as craftsmen. In more than a century of activity, their expectations have changed on a regular basis, have diversified and their requirements are ever more demanding. **Air Liquide works with customers at the heart of their respective businesses,** and therefore is in direct contact not only with their sales departments, but also with their industrial, logistics and research and development teams.

The Group is a **partner contributing to its customers' performance and directed to their service** by focusing on each customer's specific needs. The key to this relationship is **listening to the customer,** which creates a **close collaboration,** an **in-depth analysis of needs** and the **optimization of the services proposed.** Air Liquide pays particular attention to its customers' opinions on its products and services and regularly carries out **satisfaction surveys** that, after analysis, make it possible to tailor its offering as closely as possible to its customers' needs and to offer adapted and innovative solutions.

The **Group's decentralized structure** permits each unit in each geographic zone to meet the specific needs of local customers, creating **a close relationship of confidence** with each of them. More than just a product, the customers require **flexibility, rapidity, service, availability and a real partnership over the long term.**

The **reliability of Air Liquide's products** is a key element. Formal recognition of Air Liquide's commitment in this area is demonstrated by the ISO 9000 certification, a standard focused on service to the customer, which concerns over 76% of the Group's revenue. The customers' preoccupations are also increasingly focused on quality factors, apart from cost and productivity requirements. They know that **safety** has long been a priority for Air Liquide, which shares this safety culture with its customers, including through specific training programs for them. A close collaboration also makes it possible to **propose more respect for the environment to customers.** 42% [(b)] of the Group's revenue is dedicated to applications linked to sustainable development issues, that is, preserving life and the environment.

(a) Estimate.
(b) Percentage calculated on the basis of the Group's 2010 revenue.

CUSTOMER SATISFACTION SURVEYS

Customer satisfaction is one of Air Liquide's major priorities. In a context of increased competition, a change in its customers' expectations and a growing diversity of its customer portfolio, reaching the growth objectives that the Group has set itself for 2015 requires creating loyalty in current customers by ensuring their satisfaction and conquering new ones through the relevance and attractiveness of Air Liquide's offerings. Air Liquide wants to better understand its customers' priorities, perception and satisfaction criteria so that its product and service offerings effectively meet their needs and expectations.

In the framework of the **ALMA 2015 strategic corporate program,** the aim of the **"improving our customer approach" initiative** is to develop the customer mindset according to the following tracks:

- focusing efforts on solutions that contribute value to the customers apart from the products' technical component;
- promoting the development of the relationship with the customers in the long run;
- incorporating the customer's opinion in the Group's internal decision-making processes;
- introducing customer indicators into the Group's general indicators, key elements in management's decision-making.

In this initiative, the key project **"action-oriented customer satisfaction survey",** called "Survey for Action", is a tool intended to improve customer satisfaction. The "Surveys for Action" on customer satisfaction will be gradually rolled out in all the Group's Gas and Services subsidiaries. The main points of these surveys are:

- their simplicity of use,
- their Group "standardization" while respecting the specificities of the customers' different activities,
- their capacity to measure both customer satisfaction and loyalty,
- their strong focus on concrete actions designed to improve customer satisfaction.

In 2011, the "Survey for Action" project was tested in **three pilot subsidiaries, in Brazil, Italy and China.** 5,100 completed questionnaires were collected and have delivered their first findings. The results are positive with a majority of the customers "satisfied" or "very satisfied". They particularly appreciate the quality of Air Liquide products, the strict respect of safety rules, the behavior of the teams in contact with customers and their efficiency, notably in an emergency situation. The "Survey for Action" has also made local teams more aware of taking the customers' perception into account. The next step is setting up an action plan for the customers queried who are still unsatisfied.

At the end of this pilot phase, a **deployment kit** was prepared to extend the "Survey for Action" to other Group entities in 2012. In addition, on the basis of the customer interviews carried out as well as visits to unsatisfied or very satisfied customers, the entities concerned are **drawing up action plans for improvement.**

In 2011, the percentage of the Group's sales concerning the entities where customer satisfaction surveys were conducted was about 39%. This percentage, which is the Key Responsibility Indicator of this stakeholder—customers—, will be followed up annually from now on with greater precision.

A DIALOGUE WITH CUSTOMERS ON THE RESPONSIBILITY AND SUSTAINABLE DEVELOPMENT APPROACH

Air Liquide also answers its customers' questions on responsibility and sustainable development. The Group can in this way contribute to its customers' own responsibility and sustainable development approach. In 2010 and 2011, about 50 customers queried the Group on its Responsibility and Sustainable Development approach, notably through increasingly detailed questionnaires. The Group's Sustainable Development Department contributed its support to local units to respond to this new type of request from its customers. The data on the carbon content of Air Liquide products presented in the Environment part of this Report specifically meets customer expectations on this issue.

A responsible company vis-à-vis its patients

Attention to the individual, proximity and human relationships are particularly vital aspects with the growing presence of teams from Air Liquide's Homecare activity at the patients' home. Alongside the Group's activity in the hospital milieu, this homecare activity has taken on greater importance due to demographic evolution and budget constraints in the developed countries.

THE HUMAN AND SOCIAL DIMENSION OF AIR LIQUIDE'S HOMECARE ACTIVITY

Air Liquide's Homecare activity now concerns over 700,000 patients worldwide. It has a very strong human dimension because it focuses on improving the patients' quality of life while helping them to better follow their treatment and assisting them in increasing their autonomy when homecare has begun.

Air Liquide's employees go to the home of patients suffering from chronic pathologies. They are very involved and show great devotion to their tasks on a daily basis. The patient is therefore at the heart of this activity.

The Homecare activity is at the heart of the healthcare system. Air Liquide is a link between the hospital, doctors, nurses, medical insurance organizations and pharmacists. Air Liquide supplies products and medical equipment necessary to start treatment at the patient's home following the medical prescription, and trains the patient in the proper use of medical equipment. Air Liquide also makes a major contribution to the care chain by ensuring the patients' follow-up at home over the long run. It is an activity that demands a high level of quality of service and that is clearly long term, with all the caregivers to improve the patient's quality of life.

The Group's Homecare activity is an integral part of Air Liquide's **Responsibility and Sustainable Development approach,** in line with its preoccupations with the preservation of life, improvements in the quality of life, proximity, the deeply human dimension of this service, relationships built over time and a strong involvement in the social fabric.

EXAMPLES OF THE AIR LIQUIDE HOMECARE ACTIVITIES PARTNERSHIPS AND COMMITMENTS IN 2011

Partnership with the European Federation of Allergy and Airway Diseases Patients

The European leader of homecare, Air Liquide has taken in charge some 600,000 patients in Europe suffering from sleep apnea or insufficient respiration, notably those with severe chronic obstructive pulmonary disease (COPD), under long-term oxygen therapy.

In 2011, the Group's Worldwide Healthcare Activity Branch formed a partnership with the EFA (European Federation of Allergy and Airways Diseases Patients Associations). This Brussels-based organization brings together the national associations of patients (22 countries represented) with respiratory ailments. In the framework of this partnership, Air Liquide supports the actions on information and raising awareness initiated by the EFA in public opinion and the European authorities. COPD is an under-diagnosed pathology and a major public health issue. The World Health Organization forecast that in 2015, COPD would go from being the fourth to the third cause of mortality in the world. In Europe, the total cost of COPD is estimated at 45 billion euros.

Air Liquide has confirmed its commitment to patient safety in anesthesiology

Air Liquide, the world leader in medical gases, notably used in anesthesia and intensive care, places the safety of patients and professionals at the heart of its concerns. The **quality** and **safety of gases and medical devices** as well as the **Group's related services** illustrate Air Liquide's commitment to patient safety. In this respect, Air Liquide is one of the first companies in the healthcare sector to have signed the Helsinki Declaration on Patient Safety in Anesthesiology during the 2011 congress of the European Federation of Anesthesiology held in Amsterdam. The Helsinki Declaration plans to reduce complications following anesthesia for major surgery, by highlighting good clinical practices, the key role of the anesthesiologist in treatment safety and the importance of cooperation between companies in the healthcare sector and the medical community.

EMPLOYEES

Commitment

Be a great place to develop one's potential providing employees with a safe, performing and respectful work environment.

2015 objective

Continue to improve the safety of the Group's employees with a goal of reducing each year until 2015 the frequency rate of lost time accidents.

Key Responsibility Indicator

Frequency rate of lost time accidents of the Group's employees.

In 2011, the frequency rate of lost time accidents of the Group's employees was 1.7 *.

A complementary Key Responsibility Indicator was defined in 2011 and will be gradually rolled out. It will measure annually the progress of the development, diversity and loyalty of the Group's employees through a composite index integrating certain indicators presented in this Report.

* *Indicator verified by the Statutory Auditors.*

46,200 men and women in 80 countries compose multicultural teams with a host of skills. Air Liquide is involved in promoting diversity, facilitating and accelerating knowledge transfer, motivating and involving its employees and encouraging a social and human commitment, notably through the Air Liquide Foundation. Safety remains a top priority for the Group's management and employees.

Safety: the first priority

Continuously and durably improving the health and safety in the workplace of its employees and subcontractors is one of Air Liquide's major challenges, which is expressed by the keyword "zero accidents" on each site, in each region, in each unit. Employees are mobilized through active communication on this objective. In addition, safety objectives are part of the variable remuneration of the Group's senior managers.

In 2011, the Group's frequency rate of lost time accidents was 1.7, which, with 2009, was the lowest that the Group has had. These results show the capacity of the Group's teams to mobilize around safety.

The average number of days of lost time per accident, understood as the average number of calendar days of lost time per accident for Air Liquide employees, apart from deaths, was 19 days in 2011, compared to 16 days in 2010. This indicator takes into account the average seriousness of accidents with lost time.

The Group's focuses for safety in 2012 stress the understanding and prevention of major risks linked to the Group's activities.

Safety indicators for the Group as a whole

	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Number of lost time accidents of Group employees	194	136	135	131	153	147	137	131	153	144 [(a)]
Accident frequency of Group employees [(b)]	3.2	2.3	2.3	2.1	2.3	2.1	1.8	1.7	1.9	1.7 *
Number of accidents of subcontractors and temporary workers [(c)]							154	148	155	118 [(d)]

(a) Fatal accidents: one in 2011, one in 2010, none in 2009 and 2008.

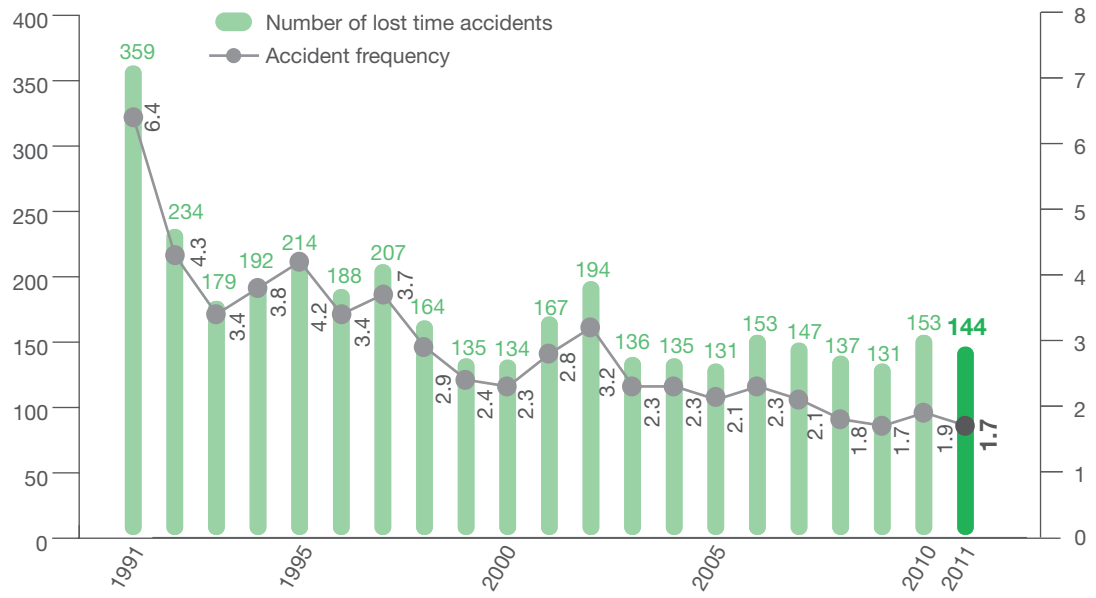
(b) Number of accidents involving lost time, of at least 1 day, per million hours worked by Group employees. Accidents defined as recommended by the International Labor Office.

(c) Personnel working in the framework of a contract with Air Liquide or on a Group site, or on a customer site or as a delivery vehicle driver.

(d) Including four fatal accidents, among them three traffic accidents.

* *Indicator verified by the Statutory Auditors.*

Number of lost time accidents and accident frequency since 1991



A social enterprise

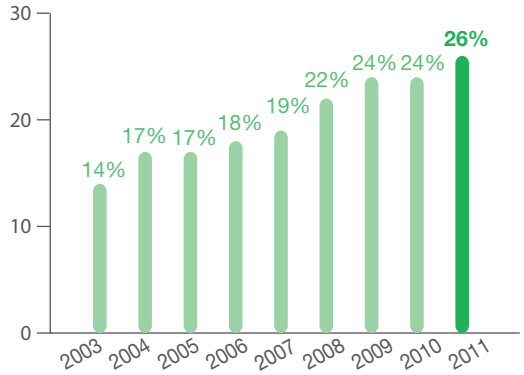
DIVERSITY / PARITY

Air Liquide is strongly committed to **fighting all forms of discrimination.** Diversity is a priority of the Air Liquide's Human Resources policy and considers it a source of dynamism, creativity and performance. The diversity of its employees makes it possible to better understand different viewpoints, renew mindset and broaden recruitment visions in order to attract the best talent. Air Liquide operates on diverse and complex markets. Diversity helps adapt to this complexity while increasing performance.

The Group's objectives are to continue to increase this diversity among its employees by notably seeking a better division of responsibilities between men and women while promoting the many cultures represented at Air Liquide. The five poles of the Group's Human Resources policy concerning diversity are: diversity of nationality, gender, educational background, age and the handicap. The international character of the Group's senior managers—28 different nationalities represented in 2011—is a considerable asset from this viewpoint and continues to be a strong growth track. In the Human Resources Division, a manager with his team is in charge of steering the Group's diversity projects. Another person is responsible for highlighting the knowledge and competencies of seniors in the Group.

Equality between men and women is an essential point in the expression of this diversity. For the last several years, Air Liquide has set up orientations by the implementation of a global action plan. For example, between 2003 and 2011, the percentage of women who were hired for Managers and Professionals positions rose from 14% to 26%, an increase of over 80%. This 26% figure for women Managers and Professionals in the Group corresponds to the global percentage of women in the Group (26%) and illustrates the good representation of women in Air Liquide's management. In addition, women now represent 39% of employees considered high potential. 17 executive management positions in the subsidiaries are held by women in the Group; the number of women in this type of position has increased sixfold since 2007. Moreover, three women are now members of the Group's Board of Directors, with the appointment in 2011 of Siân Herbert-Jones as a Director.

Percentage of women among Managers and Professionals since 2003



These results are the fruit of a concrete, rigorous and global Human Resources strategy based on four focuses:

1. **Recruiting:**

   Strengthening the place of women in the Group, in particular through hires of Managers and Professionals.

2. **Developing careers and increasing responsibilities for women in the Company:**

   – for every management position that becomes available, Human Resources examines the application of at least one woman among the applicants;

   – regular Human Resources reviews dedicated to women with high potential are conducted by the Group's Executive Committee;

   – a meeting before and after maternity leave has been organized in a certain number of units in France.

3. **Communicating with and involving all the managers:**

   In the framework of Air Liquide's policy on promoting parity, the hiring and career development of women, and strengthening their place and responsibilities in the Company, a program on aware-raising and exchanges on "men/women" differences and the benefits that parity induces has been organized in the Group since 2007, aimed at managers. More than 700 managers in the Group have followed this program, in Europe and Asia. The objective is to continue rolling out these awareness programs throughout the Group. In 2011, a deployment kit was prepared by the Group's Human Resources teams for the different Air Liquide units. They can use these communication tools and supports such as films or a video message from the Group's Chairman and CEO to implement these actions locally with their teams.

   In addition, each year, Air Liquide joins forces with the International Women's Day celebrated on March 8. Apart from the Group's many local initiatives, Air Liquide organized in 2011 the event "Women and Men at the Top", which brought together all the country and unit managers in Europe. The objective was to raise awareness on the challenges and benefits of parity.

4. **Better balancing professional and private life:**

   The **CESU** (Universal Service Employment Check), whose aim is to facilitate childcare in the home, has been implemented for certain units in France since 2007 for men and women in the Group who have young children.

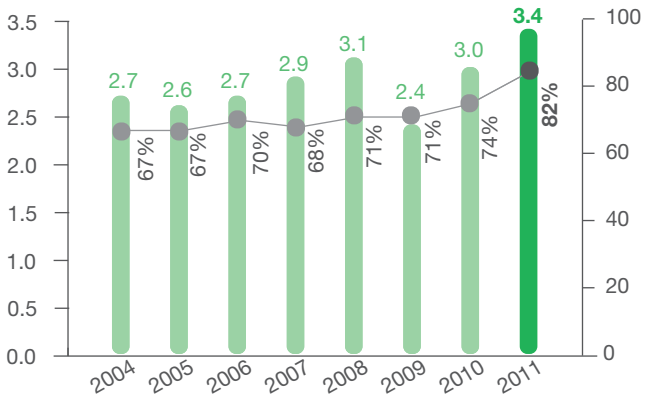
   The **Diversity Charter** that Air Liquide signed in France is available on this organization's website and is an illustration of the Group's commitment to diversity.

   Air Liquide's general ambition is to have employees who are representative of the environment in which they work.

TRAINING

Air Liquide is committed to training its employees on a regular basis. Training is an integral part of the Company's growth. It allows employees to work safely as well as improving their performance, contribution and employability. In 2011, 82% of the Group's employees had at least one training session during the year, compared to 74% in 2010. The average number of training days per employee and per year reached more than 3 days in 2011.

Average number of trainings sessions per employee and per year / percentage of employees having had at least one training session during the year since 2004



The Group has invested in better professional qualifications and training programs for young people to facilitate their integration into the business world. As a result, more than 400 young people have benefited from work-study contracts in France, combining theoretical learning in their university or school and a practical internship at Air Liquide.

In 2009, Air Liquide founded its Corporate University, which has considerably developed since, to meet the employees' challenges and needs in training including the Group's values. Based on a decentralized model that permits a very large number of employees to be trained, with modern pedagogic techniques like e-learning, it has a dual objective:

- formalizing and rolling out the training processes and disseminating good practices that go hand in hand with the Group's training dynamic. In 2011, a new tool was created to more efficiently deploy the training modules and to have better follow-up of the training activities;
- proposing about 20 specific programs, ranging from integrating new employees to developing leadership capacities, as well as "business" training programs given by the different business lines. The Group's values, principles of action and key challenges are systematically included in the different modules: safety, innovation, ethics, etc. In 2011, the managerial training program was also broadened to other management levels, including, for example, supervisors of production sites.

Moreover, a new e-learning module, "Discover", was rolled out in 2011 for new arrivals: the Group's history and key messages, safety, principles of action, core businesses, markets and key figures. This module is already available in six languages (French, English, Spanish, Italian, Russian and Chinese). Others are planned for 2012. 2,000 people were trained in 2011 in the Group through this module in different geographies where the Group is represented. **Air Liquide received the E-learning Excellence Award from the CEGOS training organization in 2011.**

Training in ethics and in particular in anti-corruption was also strengthened in 2011. A dedicated module launched in 2011 is planned first for sales, procurement and legal teams as well as for the Executive Committee and senior managers in the Group's units. 400 employees were trained in 2011 in the Group's different geographies, mostly in Asia (China, India, South Korea…) and Europe (Russian, Ukraine, Greece, Bulgaria…). This dedicated module was developed with an external specialized consultant and the involvement of the Group's Ethics Officer. It will be reinforced in 2012 by e-learning.

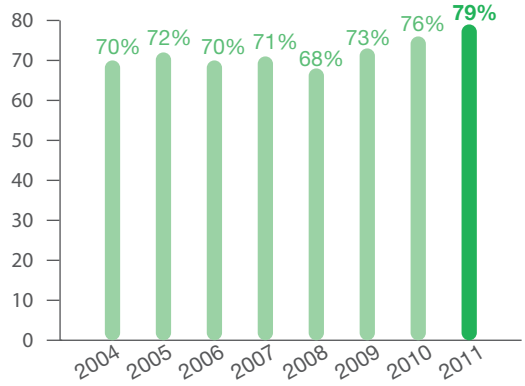
Since its creation in 2009, **the Air Liquide University has already trained over 7,000 Group employees.**

FOLLOW-UP OF EMPLOYEE PERFORMANCE

It is through the commitment and contribution of its employees that Air Liquide gives more value to its customers and shareholders. This performance is followed and measured during interviews that each employee has every year with his or her immediate supervisor but also during career development interviews that permit each employee to talk about more long-term prospects with the local Human Resources Department. The Group's Human Resources departments particularly encourage these meetings as they are the keystone of the Company's Human Resources policy.

In 2011, 79% of the employees had a performance evaluation interview with their immediate supervisor, which is the highest rate in the last nine years. In addition, 18% of the employees had a career interview with their entity's Human Resources Department.

Percentage of employees having had an annual interview with their immediate superior during the year since 2004



REMUNERATION

Employee remuneration is based on local market conditions, internal equity, applicable legislation and their performance. It is generally made up of a base salary plus complementary compensation elements. In 2011, 53% of the employees received an individual variable share in their remuneration. For some of the employees, this individual variable share includes sustainable development objectives: they focus on subjects such as safety, energy efficiency or diversity.

In addition, remuneration can also include benefits such as profit-sharing and medical expenses. In 2011, 98% of the employees benefited from some sort of social coverage through the Group.

HEALTH IN THE WORKPLACE

Air Liquide is particularly concerned with improving its employees' working conditions. This is notably demonstrated through preventive actions after risk analyses at work stations and the implementation of specific rules of the Group's Industrial Management System (IMS). In addition, studies on work station ergonomics are conducted in the framework of the preventive

approach. In Italy, for example, an ergonomic study was carried out on the transportation of cylinders in forklifts in a gas filling center. This study led to the improvement of material handling and comfort of use of lifts as well as to a better prevention of professional illnesses such as muscular-skeletal disorders (MSD). What is more, Air Liquide Canada has a program called JHA (Job Hazard Analysis) to make sure that the physical requirements of work stations fit the employees' capacities.

As for pandemics, there is a specific crisis management procedure integrating local legal obligations and the Group's recommendations. This procedure was implemented during the influenza A(H1N1) epidemic in 2009.

In addition, part of Air Liquide's activities is focused on disinfection, through the Group's subsidiaries that are specialized in this area, Schulke and Anios, that make their products available to the Group's units.

Concerning AIDS, local initiatives, notably in the South African and Senegalese subsidiaries, help raise the awareness of employees on this subject.

Finally, there are training programs in Air Liquide's training catalogue to promote the Group's rules and good practices on health, safety and risk management at work stations.

WELL-BEING

After a large number of measures taken these last few years to increase well-being at work (continuous improvement of the environment at the work station, organization of work, training and personal development, social relations, etc.), Air Liquide made three decisions in 2011 for France to promote the personal life/professional life balance of its employees, whatever their age or position.

First, in 2012, places in inter-company crèches will be proposed to employees in several subsidiaries in the Paris and Grenoble regions under the same financial conditions as the municipal crèches.

During 2012, in France, an e-portal, a tool for accessing practical, administrative and legal information, will be made available to employees and their families to facilitate their daily life. It can be used from the office or home via a personal access code.

Last, an agreement with the Mondial Assistance company will permit employees to call, from their office or home, experts (doctors, legal specialists, social workers, orientation counselors) who can answer their questions with complete confidentiality on areas as varied as the family, housing, well-being and healthcare, unforeseen events, budget management, taxation and retirement.

In addition, employees can be put in touch with childcare providers, tutors or household help.

HANDICAP

For Air Liquide, diversity and equal opportunity also mean better insertion of handicapped employees into its teams, but also through subcontracting to firms in the protected sector [(a)], particularly in France. In 2011, handicapped employees represented 1.3% of the Group's personnel.

In France, all the operations concerning the handicapped are coordinated by the Air Liquide Mission Handicap according to the terms of a company agreement signed with social partners in 2010. At the end of 2010, the percentage of handicapped workers for all the French subsidiaries was 4%. Through this company agreement, Air Liquide has an employment policy with objectives in recruitment, integration into the Company, training, job maintenance, awareness-raising and subcontracting from the protected sector.

To carry out these operations favoring the handicapped in the field, Air Liquide's Mission Handicap calls on 14 employees who are "handicap advisors" divided among the main French subsidiaries. They are accompanied by multidisciplinary working groups that meet three times a year to work on different subjects connected to handicaps.

Among the new operations implemented in 2011, collaboration with companies in the protected sector was strengthened in France. A Protected Sector Steering Committee was created to develop procurement from different firms in the protected sector. In addition, a framework contract of reference was signed by the Group with a printer in this sector, as well as in the industrial cleaning of garments. Awareness-raising operations were conducted with the Group's communication, shareholders and procurement departments to encourage them to consult protected sector firms on invitations to tender.

(a) Sector from the economic activity employing in priority handicapped workers.

Mission Handicap regularly conducts awareness-raising operations in-house. So, each year in November, on the occasion of the national week for the employment of the handicapped in France, Air Liquide mobilizes all its employees through awareness-raising operations. In 2011, Air Liquide devoted a full month to these communication operations that permit employees to acquire a better understanding of handicaps and to look at differences in a new way.

SOCIAL DIALOGUE

The European Works Council has 28 employee representatives from 15 countries [(a)]. The composition of the Council evolves with the Group's acquisitions, the expansion of the European Union and according to the rules established by the Council's constitutional agreement. The Council meets once a year chaired by a member of the Executive Committee. The main themes discussed during this meeting are: safety, the Group's current activities, the annual financial statements and Air Liquide's strategy.

The Group is particularly concerned about encouraging and respecting social dialogue, and today 77% of Air Liquide's employees have access to a representation, dialogue or consultation structure.

PARTICIPATION OF EMPLOYEES IN THE CAPITAL OF AIR LIQUIDE S.A.

The Group has had the wish to have its employees worldwide more broadly participate in the capital of Air Liquide S.A. So, since 1986, 11 capital increase operations have been especially reserved for the Group's employees so that they can take advantage of preferential conditions.

At the end of 2011, the share of capital held by the Group's current and former employees was estimated at 2.2% of which 1.6% (in the meaning of Article L. 225-102 of the French Code of Commerce) corresponded to the shares subscribed by the employees in the framework of capital increases that are reserved for them or that are held in the framework of collective management.

EMPLOYEE AWARENESS-RAISING ON SUSTAINABLE DEVELOPMENT

Many initiatives are created at Air Liquide to raise employee awareness on sustainable development issues and encourage them to promote them in their daily activities. The "Better and Cleaner" Olympiads between research centers, the "Better and Cleaner" initiative of the Group's head office and "Carfree Day" are a few examples.

The "Better and Cleaner" Olympiads, launched at the end of 2009 between all of Air Liquide's research centers, had strong participation throughout 2011. The purpose of this challenge is to raise awareness at the research centers on environmental questions by bringing them together around a common project whose goal is to reduce the consumption of utilities and greenhouse gas emissions. This competition should make it possible to decrease the carbon footprint of each unit, while finding the best environmental practices developed by researchers worldwide. The best overall performance and the greatest improvement compared to the preceding year are both rewarded. Three local initiatives that were remarkable because of their contribution to a decrease in environmental impact, to sustainable development or to social benefits were also selected.

The "Better and Cleaner" initiative of the research centers was extended with the launch in 2011 of the "Better and Cleaner Head Office" project, at the Group's head office in Paris. The project was created by employees who wanted to get involved in sustainable development on a daily basis at Air Liquide. The objective was to decrease the environmental impact of the head office and to optimize resources, taking the environment into account in everyday professional life, and to raise employee awareness of sustainable development issues.

In addition, in the framework of the "World Carfree Day" on September 22, 2011, Air Liquide rolled out actions at many units around the world to improve awareness of global warming and give bicycles, walking and public transportation priority over cars. For example, Air Liquide Oman initiated a carpooling campaign that was a great success, launching a call to companies, schools and universities to share this initiative. All the Group's geographic zones and activities were represented, showing everyone's commitment on these environmental themes.

(a) Austria, Belgium, Denmark, France, Germany, Great Britain, Greece, Italy, the Netherlands, Poland, Portugal, Romania, Slovakia, Spain, Sweden.

Human resources indicators concerning the Group as a whole

Employees [a]	2007	2008	2009	2010	2011
Group employees	40,300	43,000	42,300	43,600	46,200 *
• Women	9,630	10,300	10,300	11,100	12,100
in %	24%	24%	24%	25%	26%
• Men	30,670	32,700	32,000	32,500	34,100
in %	76%	76%	76%	75%	74%
Joining the Group [b]		19.2%	10.5%	15.1%	20.4%
Leaving the Group [c]		12.5%	12.2%	11.9%	14.3%
% of employees having resigned during the year [d]	5.0%	5.0%	3.2%	4.0%	5.3%

(a) Employees under contract, excluding temporary employees.

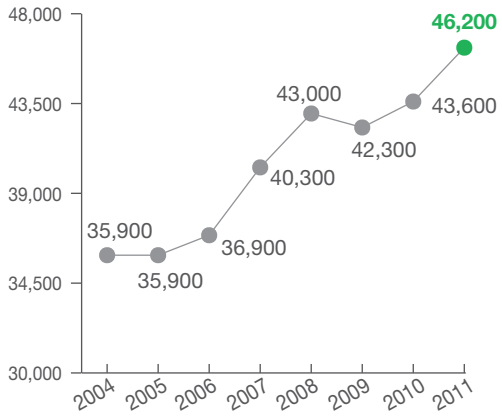
(b) Hiring or integration due to acquisitions. The percentage is based on the number of employees as of December 31 of the preceding year.

(c) Retirement, resignations, lay-offs, departures due to disposals… The percentage is calculated based on the number of employees as of December 31 of the preceding year.

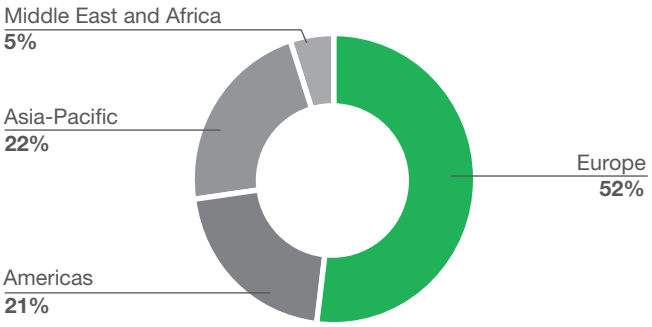
(d) Since 2009, calculated on the number of employees as of December 31 of the preceding year.

* *Indicator verified by the Statutory Auditors.*

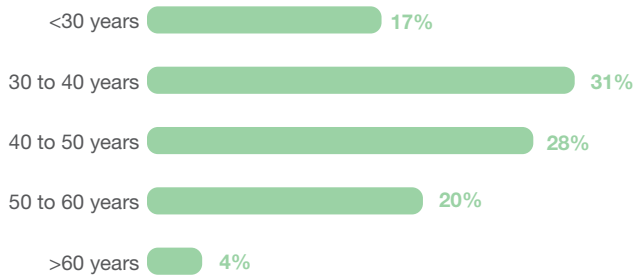
Evolution of employees since 2004



Distribution of employees by zone



Distribution of employees by age



Parity and diversity	2007	2008	2009	2010	2011
Parity					
% women among Managers and Professionals	19%	22%	24%	24%	26% *
% women among Managers and Professionals hired during the year	30%	29%	29%	29%	29% *
% women among employees considered high potential	32%	32%	36%	40%	39%
Number of nationalities					
Among expatriates	40	48	46	53	48
Among senior managers	22	22	25	27	28
Among employees considered high potential	44	42	47	46	46
Number of nationalities among senior managers / Number of countries where the Group is present					35%

* *Indicator verified by the Statutory Auditors.*

	2007	2008	2009	2010	2011
Training					
% total payroll allocated to training	About 3%	About 3%	About 2%	About 2%	About 2%
Average number of days of training per employee and per year (a)	2.9 days	3.1 days	2.4 days	3.0 days	3.4 days * (b)
% employees who attended a training program at least once during the year	68%	71%	71%	74%	82%
Remuneration					
% employees with an individual variable share as part of their remuneration	49%	51%	50%	51%	53%
Performance review					
% employees who have had a performance review meeting with their direct supervisor during the year	71%	68%	73%	76%	79% * (c)
% employees who have had a career development meeting with the HR Department during the year	20%	16%	14%	15%	18% (c)
Ethics					
% employees belonging to a unit with a local Code of conduct		55%	67%	71%	90%
Employee loyalty					
Average seniority in the Group	11 years	10 years	11 years	10 years	10 years
Retention rate of managers and professionals over a year					94.5%
Social performance					
% handicapped employees (d)	1.2%	1.2%	1.2%	1.2%	1.3%
% employees having access to a representation / dialogue / consultation structure	83%	81%	82%	79%	77%
% employees belonging to a unit at which an internal satisfaction survey was conducted within the last three years (e)	64%	58%	37%	43%	48%
% employees with benefits coverage through the Group (f)	98%	98%	97%	98%	98%
Employee shareholders					
% capital held by Group employees (h)	1.1%	1.0%	1.4%	1.6%	1.6%
% Group employees that are shareholders of L'Air Liquide S.A.	About 50%	> 40%	> 60%	> 60%	> 50%

(a) Calculated in average number of employees during the year.
(b) 25.5 hours a year according to the new calculation method in hours (base: 1 day = 7 hr. 30 min).
(c) Since 2010, calculated on the basis of employees with "long-term contracts".
(d) For the countries where regulations allow this data to be made available.
(e) Indicator for units of over 300 employees.
(f) Includes notably retirement benefits.
(g) In the meaning of article L. 225-102 of the French Commercial Code.
* *Indicator verified by the Statutory Auditors.*

Apart from all these indicators, the Group is working on their enrichment, in particular given the possibilities of changes in French legislation with the "Grenelle 2" law.

COMMUNITIES

Commitment

Act as a good citizen in the countries where the Group operates, by participating in the development of local economies, the protection of life and the environment and through a proactive dialogue with communities.

2015 objective

Put the expertise of the Group's teams at the service of communities by carrying out at least one philanthropic project per country by 2015. In this framework, the Group commits to supporting, over the long term, the Air Liquide Foundation so that it can help reach this objective through the projects.

Key Responsibility Indicator

Number of countries having carried out at least one philanthropic project directly or through the Air Liquide Foundation by 2015.

In 2011, the Air Liquide Foundation supported projects in 19 countries.

Each Air Liquide unit is located in communities respect for which is at the heart of the concerns of the Group's employees. They are aware that each decision, each action commits them vis-à-vis customers and partners but also vis-à-vis those individuals or firms that are affected by the Group's activities. The consideration of these communities' needs is necessary to guarantee the sustainability of the environment where the Group carries out its action.

Corporate philanthropy and the Air Liquide Foundation

Social and human commitment is an ongoing concern for Air Liquide. Since its very beginning, the Group has carried out philanthropic actions, especially in the preservation of life and the environment.

Whether they are directly carried out by the Group's subsidiaries or initiated by the Air Liquide Foundation, these corporate philanthropy actions represented nearly **2 million euros in 2011.**

For example, Air Liquide's subsidiary in **Canada** and its employees gave nearly 100,000 euros to an organization that fights against all forms of poverty in the country and over 15,000 euros to an organization that helps leukemia patients. In the **United States,** the Group's subsidiaries and their employees collected 300,000 euros for charitable organizations working in the education and healthcare fields. In **Thailand,** Air Liquide and its employees also mobilized to assist people affected by the flooding in August 2011. Over 60,000 euros were collected to restore homes and provide food aid to the victims.

Following the tsunami that struck **Japan** in March 2011, the Group and the Air Liquide Foundation mobilized to aid the populations affected by this disaster. This solidarity movement raised over 400,000 euros, half from the donations of Group employees in 33 countries.

The calling of the Air Liquide Foundation, created in 2008, is to encourage and develop these initiatives. It has a worldwide scope and supports projects in the 80 countries where the Group operates. With a budget of nearly **3 million euros over five years,** the Foundation has three missions:

- **the Environment:** support for **scientific research** on the **preservation of our planet's atmosphere;**
- **Healthcare:** support for **scientific research** on improving the human respiratory function;
- **Micro-Initiatives on local development:** the Foundation supports **proximity** actions (education, access to treatment, energy and water, micro-entrepreneurship, handicaps, etc.) in the regions of the world where the Group is present. **Each Micro-Initiative is followed by a sponsor, an Air Liquide employee who is a volunteer.** The Group's employees who wish to get involved can sponsor a project that arouses their interest and personally get involved in the field. Today, over 120 Group employees are involved alongside the Foundation.

Headed by Benoît Potier and composed of senior managers of the Group, a personnel representative and outside experts, the **Foundation's Board of Directors** meets twice a year to determine corporate philanthropy focuses and to examine scientific research projects. It is assisted in its functions by a **Project Selection Committee,** which about four times a year studies the projects submitted to it. This Committee is composed of seven members including a representative of the Shareholders Communication Committee.

Projects can be submitted on line, in French or in English, on the Foundation's site, www.fondationairliquide.com.

In 2011, the Air Liquide foundation supported 38 new projects, including six scientific research projects in the environment and healthcare fields and 32 Micro-Initiatives. In 2011, these projects were located in **19 different countries.**

Among the **environmental research** projects, the Foundation has supported the Research Institute for Development over a two-year period for its work on the carbon budget of the mangrove in La Foa, a commune in **New Caledonia.** In **Germany,** it is working with the Bergakademie of Freiberg on a study on greenhouse gas emissions from the soil. Better knowledge of the factors influencing these emissions will make it possible to create a series of measure to limit them. The Foundation has also renewed its support for the Carnegie Institution for Science, a research organization in the **United States,** which is carrying out a study to evaluate trace gas exchanges between the atmosphere and the biosphere. Understanding the phenomena causing variations in concentrations of these molecules will permit the current climate simulation models to be refined.

In **medical research,** the Air Liquide Foundation is once again supporting the Fondation Premup, in Paris, for its work on understanding the mechanisms responsible for pulmonary alveolar development anomalies in premature infants. It is also taking part in a sleep study initiated by the Henri Mondor University Hospital in Créteil on adults suffering from sickle-cell anemia, a hereditary disease that alters hemoglobin.

In **Micro-Initiatives,** the Foundation financed the renovation of electrical equipment in a free hospital in Halligudi, in the state of Karnataka in **India.** In **Vietnam,** it is helping to set up a water purification system in Tan Do, a village near Hanoi. In **Indonesia,** it supported a housing reconstruction program for refugees who were victims of the eruption of the Merapi volcano in 2010. In **Thailand,** it contributed to the development of a specific coverage operation for Burmese refugees with tuberculosis.

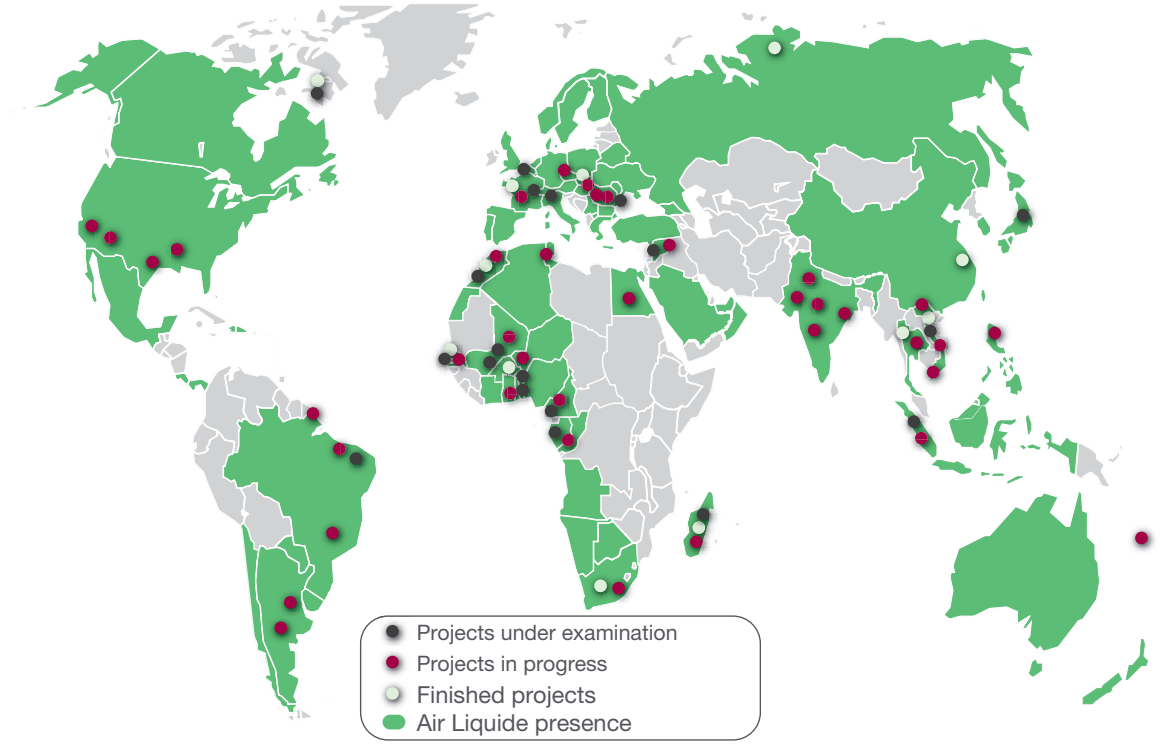
In **Argentina,** in Neuquèn province, the Air Liquide Foundation's support helped create reading spaces in seven schools permitting over 2,000 children to improve their reading and writing level. In **Brazil,** it backed the computer equipment project in a reception center for adolescents in Santo Amoro, a suburb of São Paulo. In the **United States,** it participated in the rollout of a literacy program that will benefit a thousand children from modest backgrounds in Louisiana.

In **Cameroon,** the Foundation contributed to renovating the water distribution system of a bush hospital south of Yaoundé. In **Senegal,** it took part in a school reconstruction project in the village of Siwo in the Siné Saloum region. In **Madagascar,** it financed the construction of a social crèche in Antananarivo. In **Togo,** it supported a project to supply drinking water to several villages 250 km north of Lomé. In **Egypt,** it permitted the renovation of part of a primary school in Luxor.

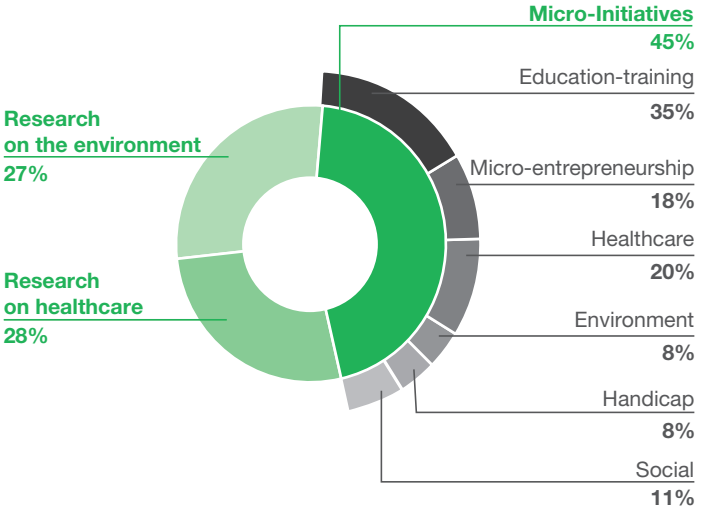
In **France,** the Foundation contributed its support to a program providing educational support at home for autistic children. In professional insertion, it helped in the creation of a multimedia studio for young job-seekers. The aim of this initiative is to train young people in presentation and communication techniques as well as introducing them to the journalism professions.

The Air Liquide Foundation received a trophy for corporate philanthropy for the environment and sustainable development awarded by the Ministry of the Environment and Sustainable Development. This trophy honored the Air Liquide Foundation's support in 2011 of the Institute of Research for Development (IRD) concerning research on the carbon dynamic in the mangrove.

Breakdown of the Air Liquide Foundation projects worldwide in 2011



Breakdown of the Air Liquide Foundation's actions per mission since its creation in 2008



IMPROVE THE ENVIRONMENTAL FOOTPRINT

Commitment

Contribute to continuously improve the environmental footprint of the Group operations, products, customers, suppliers and communities.

2015 objective

Improve by at least 2% from 2011 to 2015 the energy efficiency of each of its activities: air separation units, hydrogen units and product deliveries.

Key Responsibility Indicators

- **Energy efficiency of air separation units**
- **Energy efficiency of hydrogen units**
- **Efficiency of liquefied gas deliveries (Industrial Merchant activity)**

Between 2007 and 2011, energy efficiency improved 1% for air separation units, 1.5% for hydrogen units and 2.9% for liquefied gas deliveries in the Industrial Merchant activity.

Created from an invention that considerably reduced the energy used to separate air gases, Air Liquide has always been involved in preserving the environment and natural resources. The Group has initiated an approach to steadily reduce the environmental footprint of its activities and contributes to improving that of its partners and customers. The objective of improving by at least 2% from 2010 to 2015 the energy efficiency of its air separation units, its hydrogen units and the efficiency of liquefied gas deliveries **corresponds to over 300,000 tons a year of direct and indirect CO_2 emissions avoided** [(a)].

Revenue linked to life and the environment

Over 40 applications of industrial and medical gases preserve life and the environment at the Group's customers: these applications **represent 42% of sales** [(b)].

Starting in 2003, Air Liquide consolidated these "blue" [(c)] sales every other year and in 2010, the Group decided to communicate on this indicator every year. "Blue sales" are calculated **for each of the Group's activity branches: Healthcare, Industrial Merchant, Large Industries, Electronics, Engineering and Construction and Specialty Chemicals.**

A few examples of applications that preserve the environment:

- filling under modified atmosphere to protect foods and reduce chemical additives;
- inerting nitrogen to avoid the emission of volatile organic compounds (VOC);
- fusing glass by using pure oxygen, which considerably reduces emissions of nitrogen oxides, gases that cause acid rain;
- treating water in purification stations;
- using rare gases like krypton to improve the insulation of double-glazed windows;
- using hydrogen in refineries to remove sulfur from hydrocarbons, reducing the emissions of sulfur oxide, which also contribute to acid rain;
- using oxygen in blast furnaces to reduce the consumption of coke whose production is very polluting.

(a) Estimate on the basis of CO_2 emissions in 2011.

(b) Percentage calculated on the basis of the Group's 2010 revenue.

(c) Air Liquide describes this specific revenue as "blue" to evoke the color of the sky since air is the main raw material in the Group's production units and it is the blue of the atmosphere that we must preserve.

The percentage of Air Liquide's "blue revenue" noticeably increased between 2005 and 2010, going from 33% to 42% of the Group's total revenue. This growth illustrates the development of the applications linked to preserving life and the environment in Air Liquide's global revenue. In addition, **over 60% of the Group's Research and Development budget is earmarked for work on preserving life and the environment** and is a "blue revenue" growth driver for the future.

Evolution in the percentage of applications that preserve life and the environment in the Group's revenue for the years 2005, 2007, 2009 and 2010

The environmental footprint of the Group

ENVIRONMENTAL INDICATORS CONCERNING THE GROUP AS A WHOLE

In its **production** activities, the main trends concerning environmental data in 2011 are the following:

- Volumes of air gas products rose considerably compared to 2010. As a result, electrical energy consumption, which is mainly used in air separation units increased, as did indirect CO_2 emissions, which are connected to it. The energy consumption per m^3 of air gas produced, that is, the energy efficiency of these units, is **the best level reached** since 1998.
- **Thermal energy consumption and direct CO_2 emissions increased** mainly due to a sustained rise in volumes of hydrogen production notably due to the startup of new units in Singapore and the Netherlands. **The energy efficiency of hydrogen units slightly declined** because these two units were in the ramping up phase in 2011 and still not producing at full capacity and therefore not at their optimum efficiency level.

In order to distinguish the differentiated growth dynamics between advanced economies and developing economies, Air Liquide decided, in 2010, to segment its direct and indirect CO_2 emissions between these economies.

Presented here are the environmental elements most representative of the Group's businesses. They cover a total of 517 Air Liquide production units or sites and concern:

- large air separation units;
- hydrogen and carbon monoxide units;
- cogeneration units;
- acetylene units;
- nitrous oxide units;
- carbon dioxide liquefaction and purification units;
- units in the Hygiene and Specialty Chemicals sectors;
- units for Welding equipment and products;
- Engineering and Construction units;
- Research and Development centers and technical centers.

The indicators concerning the environmental impact of the **transport** of products of the Group's Industrial Merchant activity as well as those on the main **waste and byproducts** are also presented.

The most relevant environmental indicators for the total of the 10 types of production units and transportation (517 units) on a worldwide scope

	2007	2008	2009	2010	2011
Evolution of energy consumption per m^3 of air gas produced [a]	100.0	101.3	103.3	99.0	99.0 *
Evolution of energy consumption per m^3 of hydrogen produced [b]	100.0	98.8	98.7	98.3	98.5 *
Evolution of the efficiency of industrial liquefied gas (oxygen, nitrogen, argon, carbon monoxide) deliveries by truck [c]	100.0	99.2	97.4	96.3	97.1
Total annual electricity consumption *(in GWh)*	23,232	23,223	21,139	24,924	26,661 *
Total annual thermal energy consumption *(in LHV Terajoules)* [d]	160,033	177,395	183,381	204,434	213,198 * [e]
Total annual water consumption *(in millions of m^3)*	57.4	59.7	59.9	66.1	67.2 * [f]
Annual amount of CO_2 emissions avoided by cogeneration and on-site units *(in thousands of tonnes)* [g]	-637	-625	-819	-870	-863
Total direct greenhouse gas (GHG) emissions *(in thousands of tonnes CO_2 eq.)* [h]	8,100	9,014	9,386	10,181	10,549 *
Total indirect GHG emissions *(in thousands of tonnes CO_2)* [i]	7,995	7,952	7,447	9,294	9,994 *
Total direct and indirect GHG emissions *(in thousands of tonnes CO_2 eq.)*	16,095	16,966	16,833	19,475	20,543 *

(a) Gases produced (oxygen, nitrogen, argon) calculated in m^3 of equivalent gaseous oxygen.

(b) Hydrogen and carbon monoxide.

(c) In kilometers per tonne delivered.

(d) LHV: Lower Heat Value, which includes the fact that energy from water vaporizing in fuel is not recovered.

(e) Or approximately 59,200 GWh LHV.

(f) Representing less than 0.5 one-thousandth of the industrial water consumption of the economies under review.

(g) Value revised during the 2011 reporting.

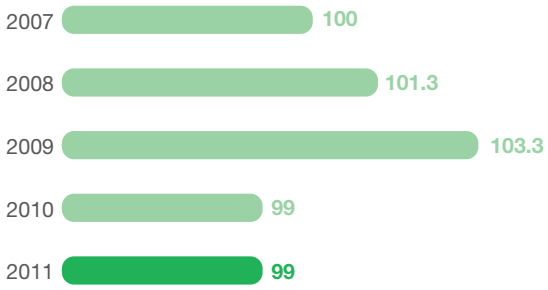
(h) Includes CO_2 emissions and nitrous oxide emissions.

(i) Total indirect GHG emissions generated by the production of electricity purchased outside the Group. The indirect emissions only concern CO_2 emissions. Calculation takes into account the primary energy source each country uses to produce electricity (source: International Energy Agency).

* *Indicator verified by the Statutory Auditors.*

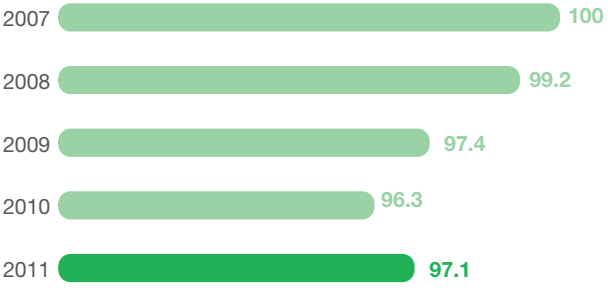
ENERGY EFFICIENCIES, THE ORIGIN OF THE ELECTRICITY USED AND DIRECT AND INDIRECT EMISSIONS_

Evolution of energy consumption per m^3 of gas produced, air separation units, since 2007



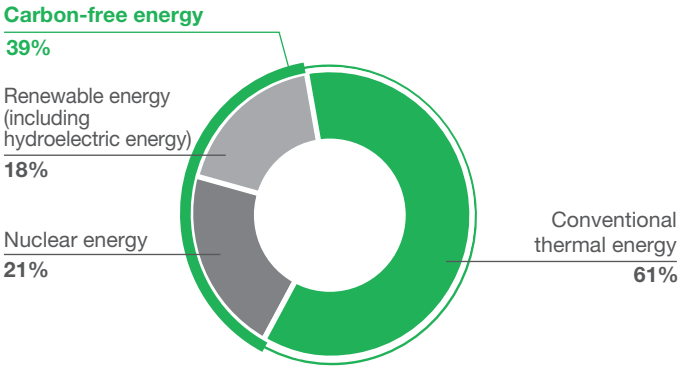
Evolution of energy consumption per m^3 of gas produced, in hydrogen and carbon monoxide units since 2007

Evolution of the efficiency of liquefied gas delivered since 2007 (oxygen, nitrogen, argon, carbon dioxide)

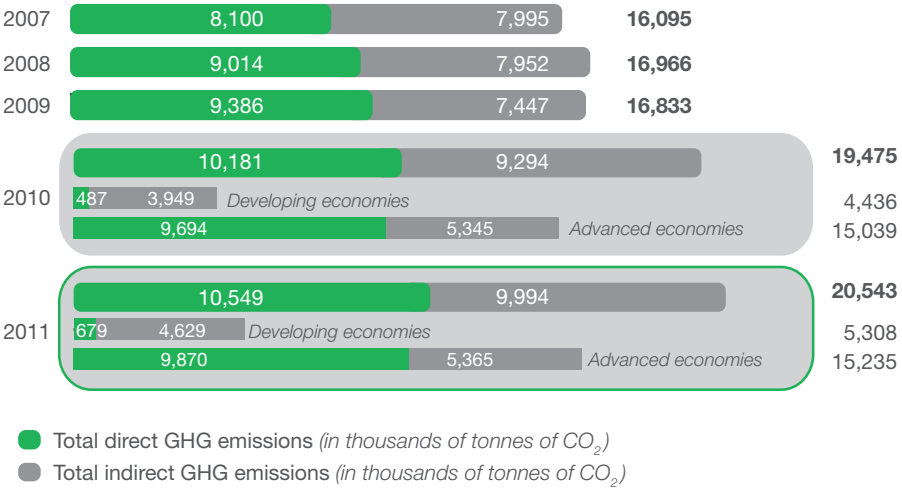


Origin of electricity used in 2011 (a)

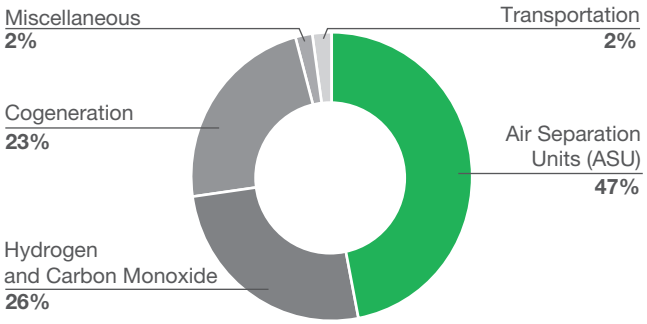
Taking into account the different natures of primary energy of the countries where the Group is present, it is possible to present the breakdown of the origin of the electricity used worldwide.



Direct and indirect greenhouse gas emissions of the Group



Breakdown of direct and indirect greenhouse gas emissions of the Group



In this Report, the advanced economies are defined in accordance with the financial reporting: Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Great Britain, Greece, Italy, Japan, the Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, United States.

The developing economies refer to the other countries in which Air Liquide operates.

(a) The calculation takes into account the different natures of primary energy that each country uses to produce electricity (source: International Energy Agency).

DETAILS ON INDICATORS FOR EACH OF THE 10 UNIT TYPES, TRANSPORTATION AND WASTE AND BYPRODUCTS

1. Air separation units

Worldwide, Air Liquide operates **298 large air separation units.** These units produce oxygen, nitrogen and argon, with some sites producing rare gases like krypton and xenon.

Environment: These **factories "without chimneys"** do not use any combustion processes. Since **they discharge almost no CO_2,** sulfur oxide (SOx) or nitrogen oxide (NOx) emissions, they are particularly environmentally friendly. They consume electricity almost exclusively: worldwide, they use about **2,900 MW** each instant, the equivalent of the production of two nuclear power plant units. Their cooling systems require back-up water.

Air separation units	**2007**	**2008**	**2009**	**2010**	**2011**
Number of production units	250	257	265	287	298
Annual electricity consumption *(in GWh)* [(a)]	22,296	22,235	20,141	23,774	25,398
Evolution of energy consumption per m^3 of gas produced [(b)]	**100.0**	**101.3**	**103.3**	**99.0**	**99.0 ***
Annual back-up water consumption *(in millions of m^3)* [(c)]	36.2	34.6	33.2	36.7	37.7
Evolution of back-up water consumption per m^3 of gas produced [(c)]	**100.0**	**97.6**	**104.1**	**102.0**	**97.2**

(a) Also including small volumes of purchased steam.

(b) Gases produced (oxygen, nitrogen, argon) calculated in m^3 of equivalent gaseous oxygen.

(c) Excluding the energy consumption of units with an open and closed cycle water cooling system.

* *Indicator verified by the Statutory Auditors.*

2. Hydrogen and carbon monoxide production units

Worldwide, Air Liquide operates **41 large hydrogen and carbon monoxide production units.** These units also produce steam for certain customers. They primarily use natural gas as a raw material and certain amounts of water required for the reaction that produces hydrogen. Carbon monoxide is an indispensable raw material in the chemical industry for producing plastic materials.

Environment: The **desulfurization of hydrocarbons** to produce sulfur-free fuels is one of the main applications for hydrogen. In 2011, the hydrogen Air Liquide supplied to refineries throughout the world resulted in **avoiding about 760,000 tonnes of sulfur oxide emissions being discharged into the atmosphere,** which is more than twice as high as all the sulfur oxide emissions from a country like France. These units emit CO_2 and nitrogen oxides (NOx) but produce practically no sulfur oxide (SOx). They also consume electricity and their cooling systems require back-up water.

Hydrogen and carbon monoxide units	**2007**	**2008**	**2009**	**2010**	**2011**
Number of production units	38	38	36	39	41
Annual thermal energy consumption *(in LHV Terajoules)* [(a)]	94,880	102,717	95,306	119,205	128,075
Annual electricity consumption *(in GWh)*	512	518	478	620	700
Evolution of energy consumption per m^3 of gas produced [(b)]	**100.0**	**98.8**	**98.7**	**98.3**	**98.5 ***
Emissions into the air: CO_2 *(in thousands of tonnes)*	3,795	4,226	3,923	4,875	5,202
Annual consumption of process and back-up water *(in millions of m^3)*	9.8	10.6	10.2	13.0	11.8
Emissions into the air: NOx (nitrogen oxide) *(in tonnes)*	950	860	750	850	800
Emissions into the air: SOx (sulfur oxide) *(in tonnes)*	< 250	< 250	< 250	< 250	< 250

(a) LHV: Lower Heat Value, which includes the fact that energy from water vaporizing in fuel is not recovered.

(b) Hydrogen and carbon monoxide.

* *Indicator verified by the Statutory Auditors.*

3. Cogeneration units

Worldwide, Air Liquide operates **17 cogeneration units.** These units produce steam and electricity simultaneously. They consume natural gas and water, most of which is converted into steam for customers. The steam can be condensed by these customers and then reused in the cogeneration unit. In most cases, the electricity produced is supplied to the local electricity distribution network.

Environment: Combustion of natural gas produces CO_2 and leads to nitrogen oxide (NOx) emissions, but practically no sulfur oxide (SOx) emissions. The cogeneration units are more energy efficient concerning CO_2 emissions than separate production units for electricity and steam. They therefore help reduce CO_2 emissions in the industrial basins they supply. In 2011, the Group's cogeneration units **avoided 793,000 tonnes of CO_2 emissions being discharged into the atmosphere,** so they were about **14% more efficient** than the separate production of electricity and steam.

Cogeneration units	**2007**	**2008**	**2009**	**2010**	**2011**
Number of production units worldwide	16	18	18	17	17
Annual natural gas consumption (or thermal energy) *(in LHV Terajoules)* [(a)]	64,685	74,168	87,642	84,763	84,654
Annual amount of CO_2 emissions into the atmosphere prevented through cogeneration units [(b)] [(c)] *(in thousands of tonnes)*	**-574**	**-562**	**-761**	**-804**	**-793**
Emissions into the air: CO_2 *(in thousands of tonnes)*	3,629	4,161	4,917	4,755	4,749
Annual water consumption *(in millions of m^3)*	7.9	11.5	13.5	13.1	14.6
Emissions into the air: NOx (nitrogen oxide) *(in tonnes)*	2,300	2,700	3,160	2,650	2,910
Emissions into the air: SOx (sulfur oxide) *(in tonnes)*	< 50	< 50	< 50	< 50	< 50

(a) LHV: Lower Heat Value, which includes the fact that energy from water vaporizing in fuel is not recovered.

(b) Calculation takes into account the primary energy source that each country uses to produce electricity (source: International Energy Agency).

(c) Values revised during the 2011 reporting.

4. Acetylene production units

Worldwide, Air Liquide operates **54 acetylene production units** (a gas used mainly in welding and metal cutting). 52 of them produce this gas through the decomposition of a solid—calcium carbide—using water. Two units fill cylinders with this gas, which is supplied by another industrial company.

Environment: This process produces lime, which is generally recycled (at over 90%) in industrial and agricultural applications (cf. paragraph on waste and byproducts).

Acetylene units	**2007**	**2008**	**2009**	**2010**	**2011**
Annual electricity consumption *(in GWh)*	11	10	10	10	11
Annual water consumption *(in millions of m^3)*	0.4	0.4	0.3	0.3	0.2
Annual calcium carbide consumption *(in thousands of tonnes)*	38	41	34	32	31
Estimate of emissions of volatile organic compounds (VOC) into the air *(in tonnes)* [(a)]	170	140	150	140	130

(a) Losses of acetylene and acetone into the atmosphere.

5. Nitrous oxide production units

Worldwide, Air Liquide operates **nine** nitrous oxide production units. Nitrous oxide is used primarily as an anesthetic gas in the healthcare sector and as a sweetening agent in the food industry. It is produced from ammonium nitrate in solid form or as a solution in water. The Group's policy on reducing greenhouse gases emitted into the atmosphere has seen results, with a decrease of almost 50% of these emissions in five years.

Nitrogen oxide units	2007	2008	2009	2010	2011
Annual electricity consumption *(in GWh)*	6	6	5	6	6
Annual water consumption *(in millions of m^3)*	0.1	0.1	0.1	0.1	0.1
Annual ammonium nitrate consumption *(in thousands of tonnes)*	22	20	19	21	21
Emissions of nitrous oxide into the air *(in tonnes)*	780	550	410	430	340 [(a)]

(a) Which corresponds to the equivalent of 105,000 tonnes of CO_2.

6. Carbon dioxide liquefaction and purification units

Worldwide, Air Liquide operates **65 carbon dioxide liquefaction and purification units.** Carbon dioxide has many industrial applications but is used mainly in the food industry to deep-freeze foods or to produce carbonated beverages.

Environment: Carbon dioxide is most often a byproduct of chemical units operated by other manufacturers. In some cases, it is found naturally in underground deposits. It is purified and liquefied in Air Liquide units, which consume electricity and cooling water. In this way, carbon dioxide is reused for other industrial applications instead of being directly emitted into the atmosphere.

Carbon dioxide liquefaction and purification units	2007	2008	2009	2010	2011
Annual electricity consumption *(in GWh)*	340	375	411	420	450
Annual water consumption *(in millions of m^3)*	1.2	1.3	1.7	1.8	1.8

7. Hygiene and specialty chemicals production units

Hygiene and specialty chemicals production units are located at **eight sites** in France, Belgium, Germany and China and belong to the subsidiaries Seppic (specialty chemicals) and Anios and Schülke (disinfection). These units consume natural gas, electricity and water. Combustion of natural gas produces small quantities of CO_2.

Air Liquide contributes to the patients' health at the hospital with disinfectant and antiseptic products and related services. The Group's experts work closely with hospitals to help them reduce the risk of nosocomial infections and contamination.

Hygiene and specialty chemicals units	2007	2008	2009	2010	2011
Annual electricity consumption *(in GWh)*	20	22	21	22	24
Annual thermal energy consumption *(in LHV Terajoules)* [(a)]	245	274	234	272	266
Air emissions: CO_2 *(in thousands of tonnes)*	9	10	9	10	10
Air emissions of volatile organic compounds (VOC) *(in tonnes)*	320	250	150	190	190
Annual water consumption *(in millions of m^3)*	0.5	0.6	0.4	0.5	0.5
Discharge to water: oxidizable matter *(in tonnes)*	< 1,000	< 1,000	< 800	< 1,000	< 1,000
Discharge to water: suspended solids *(in tonnes)*	< 100	< 100	< 100	< 100	< 100

(a) Including thermal energy corresponding to steam purchases.

LHV: Lower Heat Value, which includes the fact that energy from water vaporizing in fuel is not recovered.

SPECIALTY CHEMICALS ACTIVITY

Seppic is a recognized supplier of specialty ingredients for the healthcare and beauty markets whose expertise serves its customers by offering them innovative product ranges made from plant-based raw materials.

Quality, safety and the environment are constant focuses in the management of its industrial sites certified by the international standards ISO 9000, 14000 and 18000.

Concerned with improving the environmental impact of its operations, Seppic drew up, in 2011, a global carbon budget of all the activities it generates, from obtaining its raw materials to making its products available to its customers worldwide. This study will serve as a basis for a long-term improvement plan for its environmental performances.

This approach is part of a strategic framework for responsibility and sustainable development that will, among others, lead Seppic to initiate, in 2012, a systematic eco-design approach and a life-cycle analysis (LCA) of its products, in this way meeting its customers' expectations for greener and safer products.

8. Welding equipment and products production units

The **welding equipment and products production units** are mainly located on **13 sites** in the world. They are welding equipment assembly (electric welding units, torches, regulators) or welding consumables (electrodes, solid and flux-cored welding wire) production units.

Welding equipment and products production units	2007	2008	2009	2010	2011
Annual electricity consumption *(in GWh)*	67	68	49	52	54
Annual thermal energy consumption *(in LHV Terajoules)* [a]	223	218	166	160	177
Emissions of CO_2 into the air *(in thousands of tonnes)*	13	12	9	9	10
Annual water consumption *(in millions of m^3)*	1.2	0.5	0.4	0.5	0.4
Annual consumption of raw materials *(in thousands of tonnes)* [b]	150	170	116	130	136

(a) LHV: Lower Heat Value, which includes the fact that energy from water vaporizing in fuel is not recovered.

(b) Metals and materials for the production of welding products.

9. Engineering and Construction units

The **Engineering and Construction units** taken into account in this reporting are located at **six sites,** in France, China, Japan and India. They are mainly units for the construction of air separation columns and cryogenic tanks.

Environment: Lurgi, in the Group, enabled the Air Liquide to have portfolio of engineering technologies, in particular in production processes for hydrogen and syngas, biofuels (bioethanol, biodiesel) and methanol. In addition, Lurgi is one of the world leaders in sulfur recovery processes.

Engineering and Construction units	2007	2008	2009	2010	2011
Annual electricity consumption *(in GWh)*	11	10	11	11	10
Annual water consumption *(in millions of m^3)*	0.1	0.1	0.1	0.1	0.1
Annual consumption of raw materials *(in thousands of tonnes)* [a]	7.2	7.7	4.5	4.5	4.0

(a) Mainly metals.

10. Principal Research and Development centers and technical centers

The **principal Research and Development centers and technical centers** [a] are located at **six sites** in France, Germany, the USA and Japan. Although these centers' environmental impact is very low compared to other Group units, it was nevertheless decided to present their environmental impact.

Environment: **Over 60% of the Research and Development budget** is directly earmarked for **protecting life** and **environmental issues:** saving energy, producing in a cleaner way, developing energies of the future.

Research and Development centers and Technical Centers	2008	2009	2010	2011
Annual electricity consumption *(in GWh)*	8	13	9	8
Annual thermal energy consumption *(in LHV Terajoules)* [b]	18	33	34	26
Emissions of CO_2 into the air *(in thousands of tonnes)*	1	2	2	2
Annual water consumption *(in millions of m^3)*	0.02	0.02	0.01	0.01

(a) Apart from the research centers of the Hygiene and Specialty Chemicals activity, which are included in paragraph 7.

(b) LHV: Lower Heat Value, which includes the fact that energy from water vaporizing in fuel is not recovered.

11. Transportation

In 2011, trucks delivering Air Liquide liquid gases or gas cylinders traveled **428 million kilometers** throughout the world and emitted about **471,000 tonnes of CO_2**. On-site nitrogen, oxygen and hydrogen units reduced truck deliveries, a source of CO_2 emissions. These on-site units were able to **save the 70 million extra kilometers** traveled by trucks and therefore the emission of **70,000 tonnes of CO_2**.

Environment: Supplying large customers via pipeline from the Group's production units also considerably limits truck transportation. These pipeline systems, which are environmentally friendly and safe, total over **8,800 kilometers worldwide.** For air gases and hydrogen, which represent most of the volumes the Group delivers, **86% of deliveries are made *via* pipeline or through on-site units. As a result, only 14% of all air gases or hydrogen are delivered by trucks.**

	2007	2008	2009	2010	2011
Kilometers traveled by all vehicles delivering gas in liquid or cylinder form *(in millions of km)*	377	395	363	361	428
Estimate of CO_2 emissions generated by these vehicles in the Industrial Merchant activity *(in thousands of tonnes)*	413	433	399	396	471
Evolution of the efficiency of deliveries for liquefied gases (oxygen, nitrogen, argon, carbon dioxide) [a]	**100.0**	**99.2**	**97.4**	**96.3**	**97.1**
Estimate of truck transport kilometers avoided through on-site customer units *(in millions of km)*	-59	-58	-54	-61	-70
Estimate of CO_2 emissions avoided by these on-site units *(in thousands of tonnes)*	-63	-63	-58	-66	-70
Percentage of deliveries of air gases and hydrogen via pipeline or on-site	84%	84%	85%	86%	86%

(a) In kilometers per tonne delivered for the Industrial Merchant activity.

12. Waste and byproducts

Although the quantity of waste and byproducts produced in the Group's industrial and medical gases activity is small, with a concern for the exhaustiveness of the reporting, Air Liquide nonetheless decided to publish the following estimated figures.

The main waste and byproducts produced by the Group's production units are lime from the acetylene production units (byproduct), metal waste, oils, paints and solvents.

Environment: The average recycling ratio of waste [a] is over 90%.

Waste and byproducts	**2008**	**2009**	**2010**	**2011**
Waste and byproducts that are not dangerous				
• Annual quantity of lime produced (extracted dry equivalent) by the acetylene production units *(in tonnes)*	47,000	39,400	36,900	36,800
% recycled	> 90%	> 90%	> 90%	> 90%
• Metal waste *(in tonnes)* [b]	9,500	6,000	9,200	8,200
% recycled	> 99%	99%	> 99%	> 99%
• Oils *(in tonnes)*	700	600	750	750
% recycled	88%	89%	90%	84% [c]
TOTAL NON-DANGEROUS WASTE AND BYPRODUCTS *(estimate in tonnes)*	**57,200**	**46,000**	**46,850**	**45,750**
Dangerous waste				
• Paints and solvents *(in tonnes)*	200	200	200	150
% recycled	8%	30%	45%	54% [d]
TOTAL WASTE AND BYPRODUCTS *(estimate in tonnes)*	**57,400**	**46,200**	**47,050**	**45,900**

(a) Calculation is based on the weight of the waste.
(b) Metal waste that is not dangerous.
(c) In addition, 15% is incinerated.
(d) In addition, 34% is incinerated.

SECONDARY ENVIRONMENTAL INDICATORS

As a complement of the main environmental indicators presented at the beginning of the environment chapter, there are other environmental indicators for the Group but that are of lesser importance and relevance for Air Liquide's business. Among them and with a concern for transparency and exhaustiveness in reporting, Air Liquide presents below the synthesis table of emissions into the atmosphere of nitrogen oxide (NOx), sulfur oxide (SOx), volatile organic compounds (VOC) as well as discharge to water of oxidizable matter and suspended solids.

	2007	2008	2009	2010	2011
Total emissions into the air: NOx (nitrogen oxide) *(in tonnes)*	3,250	3,560	3,910	3,500	3,710
Total emissions into the air: SOx (sulfur oxide) *(in tonnes)*	< 300	< 300	< 300	< 300	< 300
Total volatile organic compounds (VOC) emitted into the atmosphere *(estimate, in tonnes)*	490	390	300	330	320
Total discharge to water: oxidizable matter *(in tonnes)*	< 1,650	< 1,500	< 1,400	< 1,600	< 1,700
Total discharge to water: suspended solids *(in tonnes)*	< 1,200	< 1,400	< 1,400	< 1 400	< 1,500

BIODIVERSITY

As for biodiversity, the impact of Air Liquide's activities is limited because the Group's production units are generally located on small sites in industrial zones.

Moreover, **Air Liquide supports biodiversity through its Foundation,** which finances projects favoring biodiversity throughout the world. This approach is part of the framework of corporate philanthropy for Micro-Initiatives focused on local development.

Two projects are a good illustration of this commitment. The first is an **environmental research project on the mangrove in New Caledonia** with the Research Institute for Development and the University of New Caledonia: "The mangrove: a sink of atmospheric CO_2?" The mangrove is a coastal forest, an interface between land and sea. Its very diversified flora shelters innumerable animals, a genuine source of wealth for the local populations. This **ecosystem rich in biodiversity is threatened:** the mangrove is disappearing at a rate of 1 to 2% a year. The recent, rapid and continuous increase in the concentration of CO_2 in the atmosphere and its effect on climate change on a worldwide scale has attracted the attention of many researchers on the quantification of CO_2 emissions in the atmosphere as well as on the identification of ecosystems capable of fixing then storing carbon. The focus of the research project is the mangrove's role in the carbon cycle, which is essential because of its high capacity to transform carbon into organic matter. The project's objective over two years is to study the carbon budget in depth in the mangrove and to determine its capacity to capture CO_2.

The goal of the second Air Liquide Foundation project illustrating support for the preservation of biodiversity is to develop and structure an apiculture activity to benefit the Apodi community in the state of Rio Grande do Norte in Brazil whose local vegetation is very sensitive to desertification. The Agronomes et Vétérinaires Sans Frontières (AVSF) association works on developing agriculture and livestock farming in peasant communities threatened by poverty, hunger and exclusion. By making their expertise available, the association provides them with technical and financial aid, trains them in the sustainable management of natural resources and in the development of livestock farming. It also permits them to have access to fair trade. The Air Liquide Foundation has joined forces with the AVSF to develop apiculture in this region. Profitable very rapidly, this activity enables local natural resources to be developed and helps **preserve biodiversity through pollination by bees.**

"CARBON CONTENT" OF AIR LIQUIDE'S MAIN PRODUCTS

Taking into account the characteristics of electricity supplied to Air Liquide, the Group has built a model [(a)] calculating the "carbon content" of its main products in certain countries where the Group is located. These figures include both direct and indirect [(b)] emissions, those connected to production, cylinder filling and also transportation. These data are increasingly requested by the Group's customers to integrate the carbon content of industrial gases into the global life-cycle analysis of their products.

"Carbon content" of Air Liquide's main products in 2011 (gCO_2/Nm^3 [(c)])

		France	Germany	Italy	Spain	Sweden	United States	Canada	Japan	China
Oxygen	Oxygen in pipelines [(d)]	69	277	249	249	30	170	138	313	433
	Liquid oxygen	147	499	460	456	94	322	270	578	760
	Oxygen in cylinders [(e)]	452	828	757	761	299	550	616	898	1,101
Nitrogen	Nitrogen in pipelines [(d)]	23	91	82	82	10	56	45	103	143
	Liquid nitrogen	105	329	308	304	76	218	186	386	496
	Nitrogen in cylinders [(e)]	408	651	598	601	280	441	528	667	823
Argon	Argon in cylinders [(e)]	553	1,237	1,124	1,128	344	801	820	1,330	1,739
CO_2	Liquid CO_2 [(f)]	59	115	122	116	37	71	65	[(g)]	[(g)]

(a) The methodology and calculations for the model of these figures were validated in 2008 by Ecofys, a consulting firm specialized in sustainable development. These calculations take into account in each country the different energy sources used to produce electricity (source: International Energy Agency). In the USA, the calculation of indirect emissions for air gases takes into account the data from the main electricity production units that supply Air Liquide.

(b) Concerning the CO_2 emissions from electricity production consumed by Air Liquide.

(c) $Nm^3 = m^3$ of gas at atmospheric pressure at 0°C.

(d) At 40 bar, pressure standard for these pipelines.

(e) At 200 bar, pressure standard for cylinders.

(f) Exceptionally, the data on liquid CO_2 are expressed in gCO_2/kg.

(g) Product not distributed by Air Liquide in this country.

The average carbon content of **the hydrogen supplied by the Group's units in Europe** was **783 gCO_2/Nm^3**. With a concern for simplification, this calculation was made solely on the units producing hydrogen but not carbon monoxide (CO) or syngas, and the CO_2 emissions related to the steam production of these units were deducted by considering a factor of 176 tCO_2/ktonnes.

PRINCIPAL EUROPEAN DIRECTIVES AND REGULATIONS APPLICABLE TO AIR LIQUIDE IN THE ENVIRONMENTAL FIELD

SEVESO 2 DIRECTIVE

This European directive focuses on preventing major industrial risks. It applies to any facility where dangerous substances exceed certain quantities. These facilities are divided into two categories according to this quantity: Seveso 2 "high threshold" and "low threshold". In Europe, mainly because of their stocks of oxygen, 91 "low threshold" and 26 "high threshold" Air Liquide sites are involved. Seveso regulations apply only to Europe but if the Seveso "high threshold" criteria were applied worldwide, 21 other Group sites could be included.

CO_2 DIRECTIVE IN EUROPE

The objective of the European directive, which establishes a quota system for greenhouse gas emissions in Europe, is to decrease these emissions, respecting the Kyoto Protocol. Implementation for CO_2 in the industrial sector began on January 1, 2005. As air separation units emit practically no CO_2, this directive only applied, for the 2005-2007 period, to Air Liquide's five cogeneration sites and two hydrogen production sites in France, the Netherlands and Spain. Air Liquide's quotas (about 1.2 million tonnes of CO_2 per year) for this period covered the emissions observed.

For the second period (2008 to 2012), the directive will only apply to seven cogeneration sites in France, Germany, the Netherlands and Spain and a single hydrogen production site in Belgium. Air Liquide's quotas (about 3.3 million tonnes of CO_2 per year) should cover the anticipated emissions [(a)].

For the third period (2013-2020), in addition to the sites mentioned, the directive will propose to encompass the Group's other large hydrogen production sites in Europe. The allocation plan for emission allowances was spelled out in detail by the European Union on the basis of the revision of the ETS (Emissions Trading Scheme) directive in December 2008, and the quota volumes per site are in the process of being calculated.

EUROPEAN REACH REGULATION

REACH (Registration, Evaluation, Authorisation and Restriction of Chemicals) is a European Union regulation (therefore directly applicable in the Union's member states) that governs the registration, evaluation and authorization of chemical products produced in or imported to the Union.

Air Liquide's main products such as oxygen, nitrogen, rare gases, CO_2, hydrogen and helium are excluded from the scope of REACH. Nevertheless, four products (carbon monoxide, acetylene, methanol [(b)] and lime [(c)]) and a few specialty gases in the Electronics business such as silane fall under this regulation. In addition, about one quarter of the revenue of the Specialty Chemicals business is concerned by REACH.

This regulation went into effect on June 1, 2007, and the registration and authorization procedures are be spread out over about 12 years. In accordance with REACH's calendar, Air Liquide registered the four products mentioned above on November 30, 2010, corresponding to annual quantities produced in or imported to Europe of 1,000 or more tonnes. The other products, for annual quantities from 100 to 999 tonnes, must be registered by June 1, 2013.

In total, less than 6% of the Group's revenue is concerned by REACH.

(a) The amount of the allocated quotas is calculated following the same consolidation rules as the environment and energy indicator reporting.
(b) Methanol is the raw material used to produce hydrogen in one of the Group's units.
(c) Lime is a byproduct of the acetylene activity (cf. paragraph of the Report on the acetylene units).

Industrial Management System and certifications

In 2004, the Group launched a new Industrial Management System (IMS) to strengthen safety, reliability, the preservation of the environment and industrial risk management. **This system is now rolled out in nearly all the Group's operations (over 99% of the Group's revenue).** An indicator makes it possible to track the percentage of revenue covered by the Group's IMS internal audits. **Between 2007 and 2011, 92 units were audited, representing 94% of the Group's activities** in terms of revenue. In five years, almost the entire Group was audited for the implementation of its Industrial Management System (IMS).

The Group considers that the IMS industrial management system that it specifically created is the best adapted to its activity. Nevertheless, notably to meet the request of certain customers, other initiatives in the Group are a matter of a quality approach such as the ISO certifications.

The **ISO 9001** quality certifications cover about 76% of the Group's revenue. Likewise, the **ISO 14001** certifications, an international reference in environmental management, **cover about 27% of the Group's revenue.**

A few years ago, the Group undertook a certification approach concerning healthcare and safety in the workplace called "**OHSAS 18001** certification", which now covers 15% of the Group's revenue.

Likewise, **environmental incidents,** like **accidents involving personnel safety,** are reported by Air Liquide subsidiaries worldwide. They are analyzed in depth depending on their nature so that prevention measures can be strengthened.

The worldwide **"Responsible Care"** Charter is an initiative of the International Council of Chemical Associations. It formalizes the commitment of the signatories to improve the global performances of the chemical industry in health, safety and protection of the environment. Many Air Liquide subsidiaries had already signed this charter locally. Air Liquide signed it in 2010 on the Group level, confirming many principles that the Company already very largely follows.

	Scope	2007	2008	2009	2010	2011
Estimate of revenue of the Group's units covered by an ISO 9001 quality certification	World	73%	75%	74%	71%	76%
Estimate of Group entity's revenue covered by an ISO 14001 environmental certification	World	24%	24%	25%	25%	27%
Estimate of Group entity's revenue covered by an OHSAS 18001 occupational health and safety management system	World			14%	12%	15%

ENHANCE BUSINESS PRACTICES AND GOVERNANCE

Commitment

Maintain a well-designed organization and effective decision processes, committed to ethical behavior, appropriate risk management and proactive compliance with internal and external regulations.

2015 objective

- **Maintain, on an operational level in the Group, the risk management process**
- **Incorporate ethics and/or respect for competition law into training sessions for those whose activity justifies it.**

Key Responsibility Indicators will be established to measure progress on this subject.

The Group endeavors to take into account the interests of its different stakeholders through its decision-making processes as well as in carrying out each of its actions. This approach, inspired by the Group's executive management, guides the action of each unit and employee to ensure the Company's responsible growth.

A corporate citizen

PRINCIPLES OF ACTION

In 2006, the Group formalized its Principles of Action, driving the Group strategy and development, in a document that explains its approach to all its key stakeholders. Available in 16 languages, this document was distributed to all the Group's units and can be consulted on the website www.airliquide.com in French and English.

SOCIAL AND ENVIRONMENTAL RESPONSIBILITY POLICY

As a complement to the Principles of Action, the Group's policies were completed and regrouped in 2009 in a global reference guide called the BLUEBOOK. This reference guide is accessible to all the Group's employees and concerns the internal information systems that they usually use. These policies are in the form of procedures, codes and reference guides.

In the BLUEBOOK, the Social and Environmental Responsibility policy defines the commitments made by the Group in the framework of its activities to promote the respect for and safety of men and women, the protection of the environment, ethics and participation in the economic and social development of the regions in which it operates. In particular, it is specified that **Air Liquide respects human rights and the dignity of its employees, subcontractors, temporary workers and suppliers.** In this framework, **the Group's entities exclude any form of discrimination, notably harassment, the use of forced labor or child labor.**

This Social and Environmental Responsibility policy has implemented a coherent Responsibility and Sustainable Development approach on every level of the Company and defines the orientations on this subject for the subsidiaries and departments. It is available on the website www.airliquide.com in French and English.

EMPLOYEE CODES OF CONDUCT

The Group's subsidiaries are encouraged to implement a local Code of conduct. This decentralized approach combines respect for local customs and regulations and Air Liquide's ethical commitment. It also helps the subsidiaries to embrace the Group's ethical principles by writing their own Codes of conduct themselves in their working language. As a result, at the end of 2011, 90% of the Group's employees belonged to subsidiaries that have a local Code of conduct, compared to 71% at the end of 2010.

The implementation of these Codes of conduct is supported by the Group Guidelines, which are a reference guide to Air Liquide's Social and Environmental Responsibility policy. These Group Guidelines are based on 10 fundamental principles:

- respect for laws and regulations;
- respect for human beings: health and safety conditions in the workplace, prevention of discriminatory actions, respect for third parties;
- respect for the environment;
- respect for competition law;
- respect for rules on insider trading;
- prevention of conflicts of interest: ties with a competitor, customer or supplier, respect for rules on corruption;
- protection of Air Liquide's activities: protection of information, property and resources;
- transparency and integrity of information;
- internal controls and audits;
- implementation of Codes of conduct.

Details on these 10 fundamental principles are available on the Group's website.

These Codes of conduct demonstrate the Group's commitment to respect the regulations concerning its economic activity but also ethical principles such as social rights and the fight against discrimination and harassment.

In addition, since 2007, a Group Ethics Officer has been responsible for providing advice and assistance to the units in applying their Codes of conduct. He also handles all the questions submitted by employees on implementing these Codes of conduct.

RESPECT FOR COMPETITION LAW

Instructions and Codes on the central level were established as to proper behavior concerning respect for competition law, especially in Europe and the United States. The most important rules on competition law are also included in the employees' local Codes of conduct. For some of the Group's activities, Healthcare in particular, specific Codes of conduct have been developed on competition law as well.

Finally, awareness-raising meetings on compliance with competition law are regularly held throughout the Group.

ANTI-CORRUPTION CODE OF CONDUCT

In 2009, the Group formalized an anti-corruption Code of conduct that was made available to all the subsidiaries. This Code, which is linked to the Social and Environmental Responsibility policy of the BLUEBOOK, provides a reminder of the laws on the fight against corruption and deals with relations with intermediaries, particular cases such as mergers, acquisitions and partnerships, types of payments requiring particular attention, as well as administrative and accounting traceability requirements.

To strengthen the rollout of this anti-corruption Code of conduct throughout the Group, Air Liquide launched a training program in 2010 dedicated to disseminating knowledge of the anti-corruption Code of conduct and its good practices to the Group's employees. This training course is now an integral part of the Air Liquide University program and is specifically aimed at sales and procurement teams as well as managers. It has been gradually rolled out throughout the Group.

Responsible procurement in the Group

The Company is not only responsible from the economic viewpoint. It also has an environmental, social, societal and ethical role. Air Liquide's responsible procurement approach is in line with this logic. It is an integral part of the Group's Responsibility and Sustainable Development approach.

The Group's responsible procurement policy makes use of several tools:

- First, the **buyers' Code of conduct,** which is a code that is integrated into the Group's procurement policy (one out of the 12 policies of the BLUEBOOK, presented in the Social and Environmental Policy paragraph of this Report) spells out the ethical principles of responsibility and sustainable development on which procurement is based. This BLUEBOOK procurement procedure was updated in 2011. Translated into 13 languages, this code specifies that suppliers must be transparently and fairly evaluated and that they are bound to respect Air Liquide's responsibility and sustainable development commitments.
- In addition, sustainable development clauses are being gradually included in certain Group **framework contracts.** These clauses allow for the possibility of conducting external audits at the suppliers and subcontractors concerned. They also include compulsory reporting elements from the supplier, in particular on safety and energy and water consumption. In 2011, these responsibility and sustainable development clauses were systematically including in the new contracts with the Group's critical suppliers.
- Since 2009, the responsible procurement policy has been strengthened by the distribution of a **responsibility and sustainable development questionnaire,** now accessible to all the Group's buyers who are required to present it to the new major suppliers. Certain answers are considered eliminatory: for instance, the absence of a commitment on health and safety, of regular inspections of high-risk tools, of respect for local legislation on minimum wage and of the measurement of energy consumption.

Air Liquide is developing, with all its subsidiaries, this evaluation approach concerning its suppliers, with the support of a partner specialized in responsible procurement. After a first campaign that started in 2009 and was rolled-out in 2010 with 50 suppliers, a second evaluation campaign covering nearly 200 suppliers was rolled out in 2011. The evaluation includes the following themes: the environment, social issues, the ethics of business and these suppliers' own procurement policy. In 2011, this supplier evaluation policy was formalized in the collection of Group policies called the BLUEBOOK.

Risk mapping on procurement has been carried out and followed up since 2010 to target critical suppliers and determine specific at these suppliers.

In addition, training sessions on responsible procurement for the Group's buyers were held in 2011.

The total amount of **subcontracting** for the Air Liquide Group was 1,446 million euros in 2011. Subcontracted activities are mainly those that are not core businesses of the Group, that require specific resources or that can be called on to handle production overload.

Since 2008, Air Liquide has published the number of accidents of its subcontractors and temporary workers. In 2011, there were 118 lost time accidents of this type.

A recognized responsibility and sustainable development approach

STOREBRAND

This Norwegian major investment fund has positioned Air Liquide among the best companies for its environmental and social performances.

ETHIBEL SUSTAINABILITY INDEX

Ethibel, a European extra-financial rating agency that is part of the VIGEO group, selected Air Liquide as one of the leaders in sustainable development for the sixth consecutive year, including it in its "Ethibel Excellence" index.

MSCI

Air Liquide was awarded an "A" and was named the best company in the industrial gas sector by MSCI (Morgan Stanley Capital International), one of the main international extra-financial rating agencies.

CARBON DISCLOSURE PROJECT

The Carbon Disclosure Project (CDP), a not-for-profit organization based in the United-Kingdom that evaluates companies on their carbon performance and transparency on this issue, ranked Air Liquide 10th among 47 companies in the materials sector.

INNOVATE RELENTLESSLY

Commitment

Innovate relentlessly in order to bring sustainable and cost-effective solutions to society, leveraging partnerships with customers, suppliers, academics and communities.

An objective will be determined in 2012 to illustrate the Group's strong involvement in this area.

This objective will be linked to a Key Responsibility Indicator that will reflect the Group's vitality in innovation with its customers. It will especially take into account the share of sales generated by the products or solutions introduced on the market over the last 10 years.

Air Liquide was founded in 1902 on an innovation, a new technology for liquefying and separating air gases, particularly efficient in terms of energy performance. Oxygen, nitrogen, hydrogen, rare gases… the molecules Air Liquide produces have not changed since the Group's creation. It is innovation that has made the difference and that is responsible for new applications.

Innovating enables Air Liquide to open new markets, expand its business by creating new solutions for its customers and fully play its role vis-à-vis society. Anticipating its markets' challenges and innovating permit the Group to progress and ensure competitiveness, in a way that increasingly respects life and the environment.

Innovation remains an essential value for the Company and is an integral part of Air Liquide's culture. It is one of the fundamental components of the Group's Responsibility and Sustainable Development approach.

Recognition of the spirit of innovation

Air Liquide files about 300 patents a year. Certain patented innovations significantly contribute to the Group's development. The Inventors Recognition Program rewards inventors who are responsible for successfully marketing patents. The recognition of technical expertise in the Group is also shown through the Technical Career Ladder (TCL), which has designated 1,500 experts since it was launched in 2003. In 2011, the TCL appointed 97 new international experts. Technical expertise, the spirit of innovation and the creative talent of Air Liquide's men and women are key factors in the Company's growth. At the Human Capital Trophy in 2011, awarded by the Michael Page International company and Le Monde French newspaper, Air Liquide was honored and received the "Sharing Knowledge" prize for creating the Technical Career Ladder.

In a world where innovation is rapidly accelerating, where scientific knowledge is more and more widely disseminated, the response to major global issues (healthcare, the environment, resource availability, mobility, urbanization, etc.) is found by pooling the efforts of all the actors in the innovation ecosystem.

More than ever, the dynamic management of interactions with this innovation ecosystem—called "open innovation"—has become an essential component of innovation. Air Liquide's open innovation program makes it possible to dynamize the innovation portfolio through a proactive, systematic and simultaneous exploration of technological opportunities and market evolutions. This is shown by the development of new collaborations with academic partners as well as the launch of co-development programs with small and medium-size enterprises and young innovative firms or the creation of initiatives to accelerate the innovation projects developed by operational units in contact with customers. In 2011, 60% of our research and development projects were carried out in cooperation with public-private partnerships.

Innovation and sustainable development

The traditional fossil resources like coal, oil and natural gas are gradually being exhausted while energy needs are constantly increasing. It is therefore indispensable to use energy more efficiently and to development cleaner and renewable alternative energies. Moreover, greenhouse gas emissions damage our environment and have a harmful impact on climate change. **Air Liquide develops, with its partners, solutions that help limit these emissions and produce the energies of tomorrow.**

Over 60% of the Group's Research and Development budget is earmarked for work connected to life, the environment and sustainable development, focused on the following tracks:

- **Environment:**
  - energy efficiency;
  - hydrogen, clean energy carrier;
  - carbon capture and storage;
  - use of industrial gases in the photovoltaic industry;
  - second-generation biofuels.
- **Healthcare and hydrogen:**
  - new medical gases to relieve pain and for anesthesia;
  - avoiding nosocomial illnesses;
  - homecare for patients suffering from chronic ailments.

Among the Group's different innovation tracks, three subjects on the environment are more specifically developed and illustrated below.

1. HYDROGEN, CLEAN ENERGY CARRIER

The growth in the worldwide demand for energy as well as increased environmental awareness has gradually led to a radical transformation in the world of energy. Air Liquide is accompanying this mutation by proposing new solutions, notably in alternative or renewable energies. Hydrogen as a clean energy carrier is one of the solutions for meeting these challenges.

Air Liquide is capitalizing on the Group's technologies and know-how to develop and roll out competitive solutions for the hydrogen energy market.

In this field, **Air Liquide is already marketing solutions** such as:

- supplying stationary silent energy with zero emissions at the point of use for facilities far from the electricity distribution network, like mobile phone relay antennas;
- supplying captive fleets with their hydrogen filling infrastructure to increase productivity while decreasing emissions at the point of use. The main applications are for captive fleets of logistics warehouse forklifts and baggage transport vehicle fleets in airports.

These different experiences in hydrogen energy and fuel cell applications confirm this technology's development potential and its competitiveness. Among all the hydrogen energy markets, that of forklifts using a fuel cell is now showing the strongest growth. In 2010 and 2011, Air Liquide signed several **contracts** with customers to supply hydrogen to forklifts. A contract was signed in June 2010 with **Walmart** in Canada, and in February 2011 with **Coca-Cola** in California. At the end of 2011, through its subsidiary Axane, Air Liquide and **Plug Power,** the world leader in hydrogen fuel cells for forklifts, announced their intention to cooperate to ensure this market's development, industrialization and marketing in Europe. In Whistler in **Canada,** Air Liquide signed a 10-year contract to develop **the largest hydrogen bus fleet in the world.**

As for mobility, **Fuel Cell Electric Vehicles** (FCEV) and fuel cell technology, although they cannot claim to meet all mobility needs, are particularly efficient for long-distance itineraries that now represent 75% of CO_2 emissions in the transportation sector. Hydrogen is a particularly efficient energy carrier. Even with the current natural gas-based hydrogen production, that is the raw material of the large hydrogen production units of Air Liquide, this gas is a particularly efficient energy carrier, because the assessment of "from well to wheel" shows a **decrease of about 20 to 30% in greenhouse gas emissions compared to the most efficient traditional vehicles** that run on hydrocarbons. Furthermore, hydrogen can fill a vehicle's tank in less than five minutes and **offers an autonomy of 500 kilometers**, and soon 700 kilometers, entirely comparable to the autonomy of vehicles powered by gasoline or diesel fuel.

Blue Hydrogen, an Air Liquide initiative promoting carbon-free hydrogen production

Hydrogen can be produced from various energy sources, keeping in mind that today 95% of all hydrogen produced comes from natural gas. It can also, however, be produced from renewable energy sources. With Blue Hydrogen, Air Liquide is resolutely focusing on a gradually decarbonation of its **hydrogen production dedicated to energy applications.** Concretely, Air Liquide has committed to producing by 2020, **without any CO_2 emissions,** at least 50% of the hydrogen required for these applications by combining:

- the use of renewable energies, the electrolysis of water and the reforming of biogas;
- the use of capture and storage techniques for CO_2 emitted during hydrogen production from natural gas in its units.

Horizon Hydrogène Énergie (H2E) program

The Horizon Hydrogène Énergie (H2E) program, initiated and coordinated by Air Liquide, was launched in 2008.

This **program relies on both the Group's expertise and that of the project's partners (large-scale manufacturers, small and medium-size firms and public research laboratories):**

- a **7-year** program;
- a consortium of 19 **partners, coordinated by Air Liquide;**
- a **global research and development** investment of **190 million euros,** including a 67-million contribution from OSEO, the French agency for innovation support.

With the aim of creating a sustainable and competitive hydrogen energy sector with the H2E program, Air Liquide is developing a complete offering on the hydrogen energy chain:

- hydrogen production **without CO_2 emissions;**
- hydrogen distribution logistics;
- hydrogen distribution **service stations** with 55 stations already installed worldwide;
- hydrogen fuel cells developed by the Group's subsidiary **Axane;**
- complete supply of hydrogen and distribution systems for captive fleets.

With a budget of €940 million for the 2008-2013 period, the European technological platform **Fuel Cells & Hydrogen Joint Undertaking** is an **innovative form of a public-private partnership,** jointly run by the European Commission and industrial companies in Europe active in this sector. Since July 2011, Air Liquide has headed this platform dedicated to the research and marketing of hydrogen fuel cell technologies.

These projects foreshadow the future development of the hydrogen car market. **Hydrogen is one of the solutions for meeting sustainable mobility challenges: reduction of greenhouse gases, zero local pollution and less dependence on fossil fuels, in this way helping to preserve the environment.**

2. CARBON CAPTURE AND STORAGE OR CCS

The Group's teams are taking part in developing CO_2 storage and capture processes. This means creating technologies, in particular, oxycombustion, to efficiently capture CO_2 to store it in the subsoil. Oxycombustion enables the CO_2 in fumes from combustion to be highly concentrated and therefore to make its underground storage less expensive. These technologies are tested in pilot projects to produce electricity from natural gas or coal, or to limit emissions produced in the steel industry. Three projects are currently underway. In partnership with the Total group, a CCS project is in operation in **Lacq in France** with CO_2 storage in a former natural gas field. In **Australia,** a CCS project with the **Callide Oxyfuel Services** company in Queensland concerns an installation that is three times as large as the one in Lacq for an electric power plant using coal. Last, in the framework of the **ULCOS project,** Air Liquide is part of a **consortium of 48 European companies** that has launched a research and development program to reduce CO_2 emissions by more than 50% in steel production. Other projects are currently being developed in the United States.

3. PHOTOVOLTAICS

Photovoltaics, an energy of the future

Based on the photovoltaic effect, or the conversion of different components of sunlight into electricity, solar energy took off at the beginning of the 2000s, in a context of a growing worldwide demand for electricity. Photovoltaic technologies are therefore increasingly becoming an essential solution to meet the energy needs of tomorrow. They use an abundant and inexhaustible resource—solar energy. They also fit into a global energy context of dependence on limited quantities of fossil fuels, the fight against climate change and the questions raised on nuclear power.

Air Liquide, a key partner in the photovoltaics industry

Industrial gases are used at every stage of the manufacturing process for photovoltaic cells. Present in over 20 countries with 3,500 dedicated employees, Air Liquide Electronics World Business Line's offering covers all the gas needs of its customers in the photovoltaics industry. The historic partner of this industry, the Group has worked with its customers both on their technological development contributing to research and development by broadening its product offering, but also by investing production and filling centers in China, Taiwan, Southeast Asia and the Middle East. Air Liquide is therefore positioned as the **world leader** in this rapidly expanding sector.

- **50% of solar cell manufacturers** in the world are Air Liquide customers.
- Most of Air Liquide's sales in this activity are to the **20 leading companies** in the sector.
- Many **research and development** programs are focused on adapting the Air Liquide offering to changes in photovoltaic technologies. In 2011, Air Liquide invested in a research and development pilot line for manufacturing photovoltaic cells in its main research center in France.

Photovoltaic energies, the carbon footprint champion

From the environmental viewpoint, the different electricity production techniques are often compared on the basis of their carbon footprint per unit of electricity produced. The comparison of the carbon footprints of the different electricity production techniques uses life-cycle analysis (LCA), the evaluation of the environmental impact resulting from the manufacturing, use and end of life of the products concerned. The life-cycle analysis of photovoltaic electricity production has a **carbon footprint that is 10 to 20 times lower that that of fossil-based energies.** The carbon content of photovoltaic electricity is comparable to that of hydraulic, nuclear or wind turbine electricity production, without certain drawbacks of these technologies.

Air Liquide's impact on photovoltaics' carbon footprint

In the framework of its Responsibility and Sustainable Development approach, and as a key supplier to the photovoltaics industry, Air Liquide decided to evaluate the percentage linked to industrial gases in the total carbon footprint of the electricity produced by photovoltaic cells. **The percentage of the carbon footprint linked to industrial gases is very low,** around 1% for the dominant technology, crystalline silicon, whereas in the thin-film technology, which uses cadmium telluride, industrial gases represent about 15% of the carbon footprint [(a)] because a larger quantity of industrial gases is used in this technology.

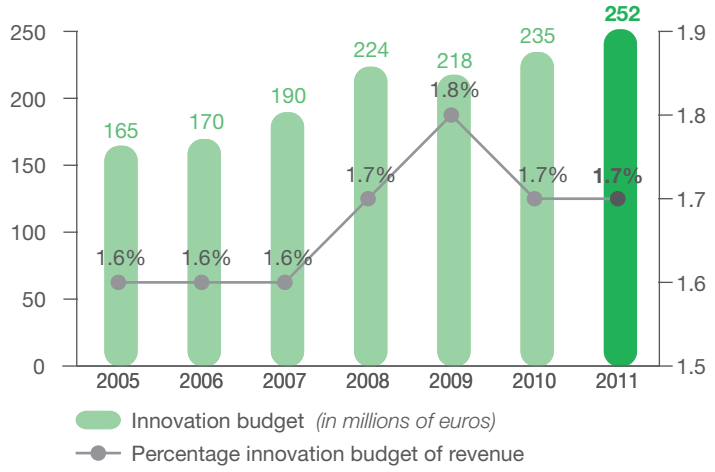
Indicators concerning the Group as a whole

	2011
Number of researchers	1,000 researchers of 35 nationalities
Number of research centers	8
Industrial partnerships	Over 100
Academic collaborations with universities and research institutes	Over 120

Innovation budget	**2007**	**2008**	**2009**	**2010**	**2011**
Innovation budget *(in millions of euros)*	190	224	218	235	252
Revenue of the Group *(in millions of euros)*	11,801	13,103	11,976	13,488	14,457
% innovation budget of revenue	**1.6%**	**1.7%**	**1.8%**	**1.7%**	**1.7%**

(a) In the case of a system manufactured in Germany and installed in southern Europe.

Evolution of the innovation budget and the percentage of this innovation budget vis-à-vis the Group's revenue



Patents	2007	2008	2009	2010	2011
Number of inventions patented	2,847	2,640	2,508	2,830	3,109
New inventions patented during the year	263	257	280	301	332
Patents filed directly in the Group's four main zones of operation [(a)]	152	129	156	145	144

(a) Europe, United States, Japan, China.

REPORTING METHODOLOGY

Protocol and definitions

In the absence of a relevant and recognized benchmark for industrial gas activities, Air Liquide has created its own protocol to define its reporting methods for human resources, safety and environmental indicators. This protocol includes all the definitions, measurement procedures and collection methods for this information. In line with the Group's commitment to continuous improvement, Air Liquide is gradually making adjustments to its responsible and sustainable development indicators protocol to reflect changes in the Group.

This protocol is based on the general principles defined by the Group with regard to scope, responsibilities, controls and limits, and establishes definitions, responsibilities, tools and data-tracing methods for each indicator. This document is regularly updated. Moreover, this protocol takes into account all the Group's formalized procedures in the framework of the IMS (Industrial Management System).

Scope and consolidation methods

Human resources and environmental indicators are consolidated worldwide for all companies globally and proportionally integrated within the financial consolidation scope pro rata according to the integration percentage.

Safety indicators are consolidated worldwide for all companies in which Air Liquide has operational control or is responsible for safety management.

Apart from these general rules, there are certain specific ones:

- information on the impact of transportation (kilometers traveled by delivery truck, CO_2 emitted) is calculated on the basis of data collected in the main countries where the Group is established around the world;
- information on kilometers saved and CO_2 emissions avoided through on-site air gas production units concerns the subsidiaries globally integrated within the financial consolidation scope;
- environmental and energy indicators for the main types of production units operated by the Group cover about 99% of the Group's revenue in Gas and Services, and 98% of the Group's total revenue;
- production units, concerning environmental and energy indicators, are included in the reporting system as of their industrial service start-up;
- electricity consumption, and the indirect CO_2 emissions related to it, is only taken into account when Air Liquide pays for this electricity. Energy consumption of on-site units, as well as water consumption specific to the sale of treated water (which is not part of the Group's core business) are excluded from the data consolidation scope;
- the segmentation between advanced economies and developing economies for direct and indirect greenhouse gas emissions is established by the Finance Division.

Reporting and responsibilities

The human resources, safety and environmental indicators are produced by several data-collection systems in the Group, each under the responsibility of a specific department:

- human resources indicators included in the Group's general accounting consolidation tool are under the responsibility of the Human Resources Department;
- the energy consumption and CO_2 emissions indicators from the main air separation units, cogeneration, hydrogen and carbon monoxide units are tracked by the Large Industry business line using a dedicated intranet tool;
- as a complement, the collection of environmental and safety data is carried out by the Safety and Industrial Management System Department using a dedicated intranet tool, and includes accident reporting:
  - for all entities the data of the Group's accident reporting,
  - for the units mentioned above, other environmental indicators (atmospheric emissions, water consumption, discharge to water, etc.),
  - for the smaller units (acetylene, nitrous oxide, carbon dioxide units and hygiene and specialty chemical products units), the welding units and the Engineering and Construction units, the Research and Development centers and the technical centers all indicators (energy use, atmospheric emissions, water consumption, discharge to water, etc.);

- indicators on kilometers traveled are the responsibility of the Industrial Merchant business line;
- the estimate of the percentage of the Group's revenue where the Industrial Management System (IMS), the ISO standards 9001 and 14001 and the OHSAS 18001 are being rolled out are indicators under the responsibility of the Safety and Industrial System Department;
- finally, indicators for the "carbon content" of the Group's main products are established by the Industrial Merchant Division and the Energy Services Group Department from energy and transportation indicators.

Controls

Each department in charge of collecting data is responsible for the indicators provided. Control occurs at the time of consolidation (review of changes, intersite comparisons).

Safety and energy indicators are tracked monthly. In addition, audits of environmental data are carried out by the Safety and Industrial System Department on a sample of sites representative of the various types of units monitored. Where the data reported is incoherent or missing, an estimated value may be used by default.

Methodological limits

The methodologies used for certain human resources, safety and environmental indicators can have certain limits:

- the absence of nationally or internationally recognized definitions, in particular for indicators on Managers and Professionals and social performance indicators;
- how representative the measurements taken and necessary estimates are, in particular, concerning indicators on CO_2 emissions avoided, water consumption, kilometers avoided per on-site units and training.

STATUTORY AUDITORS' LIMITED ASSURANCE REPORT ON A SELECTION OF HUMAN RESOURCES, SAFETY AND ENVIRONMENT INDICATORS

This is a free translation into English of the original report issued in French and is solely provided for the convenience of English speaking readers. This report should be read in conjunction with, and construed in accordance with French law and professional auditing standards applicable in France.

Further to L'Air Liquide's request and in our capacity as Statutory Auditors of L'Air Liquide, we have performed a review in order to express a limited assurance on a selection of Human Resources, Safety and Environment indicators for the financial year 2011. These specific Indicators, published and identified by the "*" symbol (the "Indicators") in the Corporate Social Responsibility and Sustainable Development Report included in the Reference Document (the "Corporate Social Responsibility and Sustainable Development Report"), have been prepared in accordance with the Group's sustainable development reporting procedures applicable in 2011 (the "Reporting Criteria").

Air Liquide's management was responsible for preparing the Indicators as shown in the "Reporting and responsibilities" section of the Corporate Social Responsibility and Sustainable Development Report. The Reporting Criteria, a summary of which is included in the "Reporting methodology" section of the Corporate Social Responsibility and Sustainable Development Report, comprises procedures and methodological sheets defined by the Group. It is Air Liquide's Sustainable Development Department's responsibility to establish the Reporting Criteria and to ensure its accessibility.

It is our responsibility to express a conclusion on these Indicators on the basis of our review. Our assurance engagement has been planned and performed in accordance with the ISAE 3000 international standard of IFAC [(a)]. Our independence is defined by legal and regulatory texts as well as our professional code of ethics. A higher level of assurance would have required more extensive work.

NATURE AND SCOPE OF OUR REVIEW

We conducted the following review to be able to express our conclusion:

- We have assessed the Reporting Criteria with respect to its accuracy, its completeness, its neutrality, its understandability and its relevance.
- At the Group level, we have conducted the following tasks:
  - within the appropriate Departments (Sustainable Development Department, Human Resources Department, Safety and Industrial System Department, Large Industries business line), we have interviewed the persons in charge of collecting the data upon which the Indicators are calculated;
  - we have assessed the application of the Reporting Criteria, implemented analytical procedures and, on a sampling basis, we have verified the calculation and consolidation of the Indicators.
- We have selected a sample of six entities [(b)] for Human Resources Indicators, seven entities [(c)] for Safety Indicators and ten production units or networks [(d)] for Environment Indicators. This selection was made on the basis of their activity, their contribution to the Indicators, their location, and the results of the review performed during prior financial years. At these entities and units level, we have verified the understanding and application of the Reporting Criteria and probed the data in order to verify calculations and compare inputs with supporting documents.
- We have reviewed the presentation of the Indicators of the Corporate Social Responsibility and Sustainable Development Report.

(a) ISAE 3000: "Assurance Engagement other than reviews of historical data", International Federation of Accountants, International Audit and Assurance Board, December 2003.
(b) Air Liquide Egypt, Air Liquide Welding, Air Liquide Far Eastern, Air Liquide Engineering India, Air Liquide España and ANIOS.
(c) Air Liquide Egypt, Air Liquide España, Air Liquide Welding, Air Liquide Deutschland, Air Liquide France Industrie-Large Industries , Singapore Oxygen Air Liquide and Shuaiba Oxygen.
(d) The air gases networks of the Gulf Coast in the USA and in Germany, the air separation units of ALSGIG (China) and Shuaiba (Kuweit), the hydrogen production units of J10 Hermes (Singapore), of Oberhausen (Germany) and Bayport (USA), the cogeneration units of Lavéra Energies (France) and Bayport (USA) and the filling center of Oberhausen (Germany).

On average, the selected entities and units account for 20% of the consolidated value of Environment Indicators [e], 11% of the consolidated value of Human Resources Indicators [f], and 10% of the consolidated worked hours upon which Safety Indicators are calculated.

To conduct the aforementioned scope of work, we called on members of our teams specialized in sustainable development. Taking into account the review performed during the previous nine financial years in various activities and countries, we consider that our work provide a sufficient basis for the conclusion expressed below.

INFORMATION ABOUT THE REPORTING CRITERIA

The Group presents the main methodologies used for data reporting in the "Reporting methodology" section of the Corporate Social Responsibility and Sustainable Development Report, as well as in the comments and footnotes associated with the Indicators published in tables within the Corporate Social Responsibility and Sustainable Development Report.

The different reporting perimeters for the Indicators related to Human Resources, Safety and the Environment are detailed in the "Scope and consolidation methods" part of the Corporate Social Responsibility and Sustainable Development Report.

Air Liquide's commitments on Human Resources, Safety and the Environment have been restated in the framework of ALMA 2015 Responsibility approach. In 2011, objectives have been set for some indicators related to Safety or to the energy efficiency of the main units (air separation unit and hydrogen production unit).

The Reporting Criteria calls for the following remarks from our part:

- compared with the review of the previous financial year, we have noticed the following improvements as part of the continuous effort of the Group to strengthen the reliability of its reporting:
  - for Environment Indicators, some complementary internal controls have been implemented on the water consumption, in particular by the Safety and Industrial System Department. The definition of "water consumption" could however been modified to integrate some unit's specificities (*e.g.* condensate return for cogeneration);
- we have also identified the following areas for improvement:
  - for Safety Indicators, the definition of "worked hours" should be clarified to ensure a more consistent implementation between audited business units, in particular integrating more frequently overtime and the realization of a reconciliation with Human Resources data,
  - for Human Resources Indicators, the controls undertaken by business units which consolidate multiple subsidiaries should be strengthened. Besides, calculation methodology for the annual interview indicator should be clarified to integrate only interviews realized and not interviews planned.

CONCLUSION

Based on our review, nothing has come to our attention that causes us to believe that the Indicators were not established, in all material aspects, in accordance with the Reporting Criteria.

Courbevoie and Paris-La Défense, March 1, 2011

The Statutory Auditors

MAZARS		ERNST & YOUNG et Autres	
Lionel Gotlib	Daniel Escudeiro	Jean-Yves Jégourel	Emmanuelle Mossé

(e) On average 24% of the produced air volumes from the air separation units, 18% of the produced volumes from hydrogen production units, 13% of water consumption, 21% of electricity consumption, 24% of thermal energy consumption and 22 % of direct CO_2 emissions.

(f) On average 11% of headcount, 9% of women among engineers and managers, 7% of women hired during the year among engineers and managers, 11% of training time, 8% of employees who had an annual performance review with their supervisor, 6% of recently graduates among engineers and managers, 7% of leave before 3 years and 10% of employees covered by a code of conduct.

APPENDIX

Correspondence between Air Liquide's responsible and sustainable development indicators and the indicators of the "Global Reporting Initiative" (GRI) [(a)]

Air Liquide indicators	GRI indicators
Human Resources	
Group employees	LA1
Distribution of employees by geographic zone	LA1
Turnover of employees (leaving the Group)	LA2
% of women	LA13
% of women among Managers and Professionals	LA13
Average number of days of training per employee and per year	LA10
% of employees who have had a performance review meeting with their direct supervisor during the year	LA12
Diversity (number of nationalities)	LA13
% employees with benefits coverage through the Group	LA3
Safety	
Number of lost time accidents of Group employees	LA7
Accident frequency of Group employees	LA7
Number of lost time accidents of subcontractors and temporary workers	LA7
Energy and environment	
Total annual electricity consumption	EN3/EN4
Total annual thermal energy consumption	EN3/EN4
Evolution of energy consumption per m^3 of air gas produced (ASU)	EN6
Evolution of energy consumption per m^3 of hydrogen produced (HyCO)	EN6
Total annual water consumption	EN8
Total direct greenhouse gas emissions	EN16
Total indirect greenhouse gas emissions	EN16
Total direct and indirect greenhouse gas emissions	EN16
Consumption of materials (calcium carbide, ammonium nitrate, materials for welding)	EN1
Emissions into the atmosphere (NOx)	EN20
Emissions into the atmosphere (SOx)	EN20
Emissions into the atmosphere (VOC)	EN20
Discharge to water (oxidizable matter, suspended solids)	EN21
Total mass of waste by type and waste treatment	EN22
Transportation	
Estimate of CO_2 emissions by truck delivery	EN29
Estimate of CO_2 emissions avoided through on-site units.	EN29

(a) Global Reporting Initiative (GRI): network-based organization that sets out principles and indicators that can be used to measure and report economic, environmental and social performances.