

# Sustainable development

## Indicators and objectives

The principles of sustainable development that have been at the heart of Air Liquide's corporate strategy are focused on four dimensions:

- **creating value for shareholders** by developing the Company's business and performance over the long term and with transparency;
- **developing the potential of the Company's men and women** in their commitment to a common objective;
- **preserving life and the environment** in the Group's operations and at its customers' sites;
- **innovating for tomorrow** to guarantee the growth of the Company and its customers.

**Benoît Potier**

*Chairman and Chief Executive Officer*

### SUSTAINABLE DEVELOPMENT REVENUE

About **one third of Air Liquide's revenue** is directly linked to applications or activities that help preserve life and the environment. There are the environmental applications of gases, of course, but also the Healthcare sector as well as solutions to reducing energy consumption.

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## METHODOLOGY FOR REPORTING HUMAN RESOURCES, SAFETY AND ENVIRONMENTAL INDICATORS

### Protocol and definitions

In the absence of a relevant and recognized benchmark for industrial gas activities, Air Liquide has created a protocol to define its reporting methods for human resources, safety and environmental indicators. This protocol includes in a single document 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 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 now also 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.

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

- Information on the impact of transportation (kilometers traveled by delivery trucks, CO<sub>2</sub> emitted) covers the entire world. Figures are 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<sub>2</sub> 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 are included in the reporting system as of their industrial service startup.
- Electricity consumption 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.

### Reporting and responsibility

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 dual responsibility of the Finance Department and the Human Resources Department.
- The indicator for the rollout of the Group's codes of conduct is tracked by the Sustainable Development Department.
- Safety indicators are based on the Group's accident reporting tool, which falls under the Safety and Industrial System Department.
- The energy consumption and carbon dioxide emissions indicators from the main air separation units, cogeneration, hydrogen and carbon monoxide units are tracked by the Large Industries division using a dedicated intranet tool.
- As a complement, the collection of environmental data is carried out by the Safety and Industrial System Department using a dedicated intranet tool, and includes:
  - for the units mentioned above, other environmental indicators (atmospheric emissions, water consumption, discharge into water, etc.),
  - for the smaller units (acetylene, nitrous oxide, carbon dioxide units, and hygiene and specialty products units), the welding units and the engineering and construction units, all indicators (energy use, atmospheric emissions, water consumption, discharge into water, etc.);
- Indicators on kilometers traveled are the responsibility of the Industrial Merchant division.
- Finally, the estimate of the Group's revenue percentage where the IMS project is being rolled out are indicators under the responsibility of the Safety and Industrial System Department.

## 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. For the fifth year, and in the spirit of continuous improvement, Air Liquide has asked the Environment and Sustainable Development Departments of its statutory auditors, Ernst & Young and Mazars & Guérard, to review the Group's procedures for human resources (excluding employee shareholders), safety and environmental indicators, and to check certain sites or units on the process of data collection. The review and its findings are presented below. This review process has also given rise to recommendations, communicated within the Group, in order to serve as a basis for improvement in the following year.

## Methodological limits

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

- the absence of nationally or internationally recognized definitions, in particular for indicators on engineers and managers and social performance indicators,
- how representative the measurements taken and necessary estimates are, in particular, concerning indicators on carbon dioxide emissions avoided, water consumption, kilometers avoided by on-site units and training indicators.

## Statutory auditors' report

### About human resources, safety and environmental reporting procedures\*

At the request of Air Liquide, as statutory auditors, we reviewed reporting procedures on human resources<sup>(1)</sup>, safety and environmental indicators published for the 2007 reporting period and presented in the tables on the following pages.

These indicators were prepared under the responsibility of Air Liquide's Executive Management in compliance with the Group's sustainable development reporting procedures applicable for the 2007 reporting period, summarized in the preceding pages. It is our responsibility to provide you with our findings following the review described below.

### Nature and scope of review

As agreed, we carried out the following diligences:

- we reviewed the procedures and appreciated their relevance, completeness and precision with regard to the Air Liquide Group's activities;
- we conducted interviews at corporate headquarters with the departments in charge of the reporting systems (sustainable development, human resources, finance, safety and industrial system, Large Industries, Industrial Merchant) to review the consolidation and data control processes as well as their presentation in the Annual Report;
- we visited six entities and six production units in six countries in Europe, Asia and South America: the SEPPIC entity and the Engineering Division in France, Air Liquide Brazil, Air Liquide China and Air Liquide Hangzhou in China and Japan Air Gases for the human resources reporting; the air separation units in Dunkerque (France) and Himeji (Japan), the air separation and hydrogen production units in Antwerp (Belgium), the hydrogen production unit in Yeochon (South Korea) and the nitrous oxide unit in Fraix Marais (France) for safety and environmental reporting. In these areas, we selected the issues we considered priorities: for human resources, employees, parity for women, training, performance review and rollout of codes of conduct in the Group; for safety and environment, work-related accidents, energies consumptions, carbon dioxide emissions and water consumption. On these topics, we evaluated the proper understanding and implementation of data-collection procedures.

For this review, we called on our teams specialized in sustainable development.

Such a review does not include all the relevant controls for providing assurance on data, in accordance with ISAE (International Standard on Assurance Engagements) international audit standards, but it does allow us to describe findings on reporting procedures.

### Findings on procedures

Our reviews led us to the following findings:

- the Air Liquide Group presents the significant elements of its methodology on the preceding pages as well as notes and comments on the tables on the following pages;
- compared to the preceding year, we noticed the following improvements:
  - for the environment, data consolidation controls were strengthened and the Industrial Management System (IMS) indicator clarified,
  - for human resources, the entities' awareness-raising operations were carried out and data consolidation controls were strengthened;
- progress margins were also identified:
  - the water consumptions reporting procedure has not been sufficiently implemented by all the production units,
  - for human resources data, the entities' implementation of data-collecting procedures concerning training as well as the taking into account of observations made during preceding reporting periods remain perfectible.

Courbevoie, Paris-La Défense, March 25, 2008

The statutory auditors

MAZARS & GUERARD  
Philippe Moutenet

ERNST & YOUNG Audit  
Olivier Breillot

\* This is a free translation into English of a report issued in the French language and is provided solely for the convenience of English speaking readers.

(1) Excluding share capital held by Group employees.

## SHAREHOLDERS

### Growth of net profit and basic earnings per share

Air Liquide offers its shareholders a winning combination of financial profitability and a rigorous practice of corporate governance. By being Air Liquide shareholders, they not only choose an innovative company but also a responsible actor that helps preserve the environment.

For over 100 years, Air Liquide has had a close relationship with its shareholders based on four commitments:

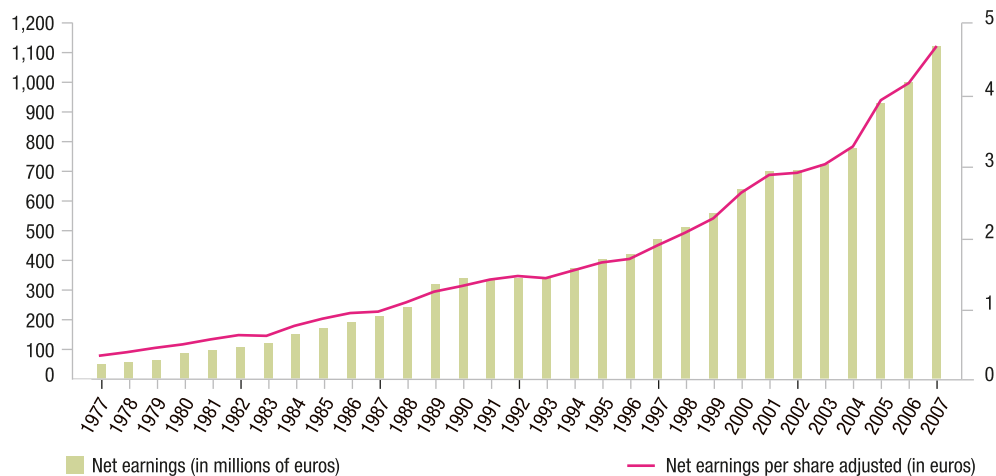
- consideration and respect for all the shareholders;
- remuneration and increased investment value in the long run;
- availability and information for the shareholders;
- services provided for the shareholders.

The quality of this relationship ensures Air Liquide stable financing resources to accompany its activities' growth over the long term.

Air Liquide's implementation of these four commitments is explained in the Shareholders guide.

	1998	1999	2000	2001	2002	2003	2004 IFRS	2005	2006	2007
Net earnings (in millions of euros)	516	563	652	702	703	726	780	933	1,002	1,123
Net earnings per share (in euros) <sup>(a)</sup>	2.07	2.27	2.63	2.88	2.91	3.03	3.28	3.93	4.17	4.69

(a) Based on the average annual number of shares (excluding treasury shares) and adjusted to account for increases in capital and share subscriptions and taking into account the division of the par value of the stock by two on June 13, 2007.



## Growth in overall distribution to shareholders

Year	Overall distribution (In millions of euros)
1998	205.1
1999	221.7
2000	281.8
2001	298.1
2002	330.5
2003	327.5
2004	391.2
2005	432.1
2006	497.0
<b>2007</b>	<b>550.9</b>

## Evolution of percentage of registered capital and percentage of capital eligible for bonus dividends

Year	Registered capital (in %)	Capital eligible for bonus dividends
1998	35%	31%
1999	32%	29%
2000	30%	27%
2001	29%	26%
2002	27%	24%
2003	28%	24%
2004	30%	24%
2005	31%	25%
2006	32%	26%
<b>2007</b>	<b>37%</b>	<b>26%</b>

## Evolution of share ownership

In %	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Individual shareholders	48	50	45	42	40	40	39	38	38	37
Institutional investors	52	50	53	55	58	58	60	61	61	62
Treasury shares			2	3	2	2	1	1	1	1

### OBJECTIVE

In the last 10 years, the growth in value of a portfolio of Air Liquide shares has been +12,7% a year, including reinvested dividends, bonus shares and loyalty bonuses granted to registered shareholders. The Group's objective is to follow this long-term and transparent policy of comprehensive remuneration for shareholders in order to ensure regular growth in the value of their investment.

## HUMAN RESOURCES, SOCIAL AND SOCIETAL

A certain number of Human Resources indicators appears below. The Group has also been increasingly involved in the social and societal sectors.

The expansion of the European Union and the Group's recent acquisitions are taken into account in the composition of the European Group Committee, which now has 26 employee representatives from 14 countries. It meets once a year under the chairmanship of a Senior Executive Vice-President.

The Group is a member of the Observatoire sur la Responsabilité Sociale des Entreprises (ORSE) in France.

### Principles of Action Codes of Conduct

In 2006, Air Liquide formalized the action principles that have always guided its operation. These principles were brought together in a document that spells out the Group's ambition and each employee's behavior with all the stakeholders, customers, personnel, suppliers, partners and local communities. This document also details the Group's approach to respect for the environment, innovation and performance, Air Liquide's fundamental values. This document is available in 16 languages and was distributed to all the Group's units in 2007. It is also on the Group's Internet site [airliquide.com](http://airliquide.com) in French and English.

Moreover, Air Liquide has launched an approach to encourage its subsidiaries to establish local codes of conduct that are in line with the Group's Principles of Actions and that incorporate local customs and regulations. At the end of 2007, 43% of the Group's employees belong to subsidiaries on five continents that had documented their code of conduct.

In addition, certain functions (purchasing, sales, legal, human resources, etc.) have detailed the Principles of Action related to their activity in more specific codes. As for purchasing in particular, suppliers must be openly and fairly evaluated and are bound to comply with Air Liquide commitments on sustainable development, especially on the preservation of the environment, safety, working conditions, respect for men and women and rejection of all forms of discrimination.

### Corporate philanthropy

Air Liquide has been carrying out sponsorship operations for many years, especially in healthcare, the environment and medical emergencies. In healthcare, it supports teams doing medical research on respiratory illnesses as well as a hospital train that crisscrosses South Africa. As for the environment, for the last several years it has contributed to doctor and explorer Jean-Louis Étienne's expeditions. The Group's sponsorship actions, including direct expenditures and the donation of equipment, total about a million euros a year.

In the 72 countries in which the Group is present, its subsidiaries directly support many charitable, humanitarian and educational operations. In Africa, for example, Air Liquide is very involved in the fight against AIDS through the Sida-Entreprises association.

To better structure these sponsorship operations and increase their visibility, Air Liquide has been examining the creation of a corporate foundation that should be officially recognized in 2008.

### STOREBRAND

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

### ETHIBEL SUSTAINABILITY INDEX

Since 2005, Air Liquide has been included in this indicator, which encompasses 280 companies worldwide, and was selected by VIGEO, the European extra-financial rating agency, because they are the leaders in sustainable development.

## Indicators for the Group as a whole

EMPLOYEES <sup>(a)</sup>	2003	2004	2005	2006	2007
Group employees	31,900	35,900	35,900	36,900	40,300
■ Women			8,310	8,670	9,630
■ Men			25,590	28,230	30,670

BREAKDOWN OF EMPLOYEES BY GEOGRAPHIC ZONE (2007)	Europe	Americas	Asia-Pacific	Middle East and Africa
	57%	22%	18%	3%

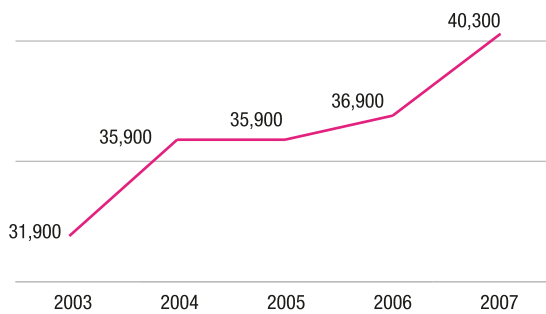
AGE DISTRIBUTION (2007)	Under 30 years	30 to 40 years	40 to 50 years	50 to 60 years	+60 years
	16%	32%	29%	20%	3%

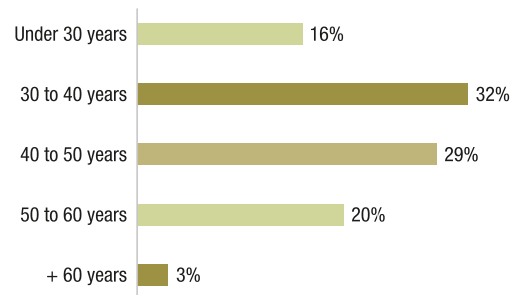
% OF EMPLOYEES RESIGNING IN THE YEAR	2004	2005	2006	2007
	3.4%	3.7%	4.8%	5.0%

(a) Employees under contract, excluding temporary employees.

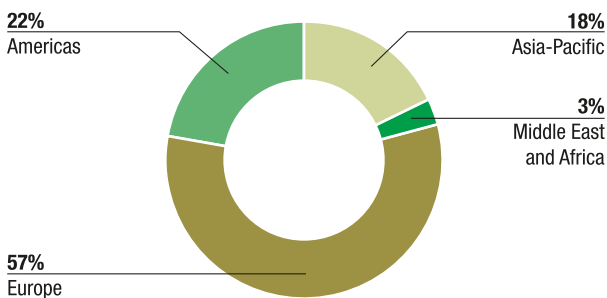
## Group Employees



## Age distribution



## Distribution of employees by geographic zone





	2003	2004	2005	2006	2007
<b>Parity and Diversity</b>					
<b>Women</b>					
% women among engineers and managers	14%	17%	17%	18%	19%
% women among engineers and managers hired during the year	24%	31%	28%	29%	30%
% women among employees considered high potential	20%	21%	24%	27%	32%
<b>Number of nationalities</b>					
Among expatriates	36	36	36	40	40
Among senior managers	25	21	20	23	22
Among employees considered high potential	35	37	40	43	44
	<b>2003</b>	<b>2004</b>	<b>2005</b>	<b>2006</b>	<b>2007</b>
<b>Training</b>					
% total payroll allocated to training (approximate)	3%	3%	3%	3%	3%
Average number of days of training per employee and per year <sup>(a)</sup>	2.5 days	2.7 days	2.6 days	2.7 days	2.9 days
% employees who attended a training program at least once during the year		67%	67%	70%	68%
<b>Remuneration</b>					
% employees with an individual variable share as part of their remuneration	36%	40%	41%	43%	49%
<b>Performance review</b>					
% employees who have had a performance review meeting with their direct supervisor during the year	60%	70%	72%	70%	71%
% of employees who have had a career development meeting during the year with HR department				13%	20%
<b>Social performance</b>					
Average seniority in the Group			12 years	12 years	11 years
% of handicapped employees <sup>(b)</sup>			1.3%	1.3%	1.2%
% of employees having access to organized representation/dialogue/consultation			74%	77%	83%
% of employees belonging to a unit at which an internal satisfaction survey was conducted within the last three years <sup>(c)</sup>			56%	71%	64%
% of employees with benefits coverage through the Group <sup>(d)</sup>			98%	97%	98%
<b>Investment equity</b>					
% capital held by Group employees	0.9%	0.9%	1.2%	1.1%	1%
% Group employees shareholders of L'Air Liquide S.A. (approximate).		Over 40%	60%	50%	50%

(a) Calculated in average number of employees during the year.

(b) For the countries where regulations allow this data to be made available.

(c) Indicator includes units with over 300 employees.

(d) Includes retirement benefits.

Detailed Human Resources information for L'Air Liquide S.A. is in the "Social Report" on the Internet site [www.airliquide.com](http://www.airliquide.com) and is available on request.

## Parity

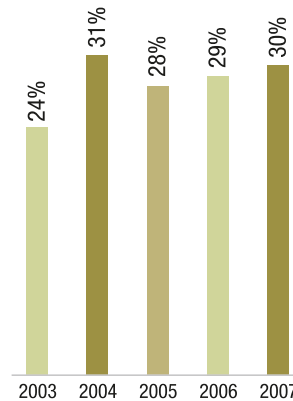
### % women among engineers and managers

#### OBJECTIVE

To strengthen the position of women in the Group, in particular through recruitment of engineers and managers. The Group's objective is to increase the hiring of women in this category, from nearly one out of three new hires to more than two out of five within five years (2005-2009).

#### MONITORING THE OBJECTIVE

In five years (2003 to 2007) the percentage of women engineers and managers hired in the Group went from 24 to 30%. In 2007, France reached 39% and several countries have already passed the Group's objective of 40%. Finally, the percentage of women among junior engineers and managers was 46% for the Group. In the framework of Air Liquide's policy to encourage the hiring and promotion of women, and to strengthen their place and responsibilities in the company, awareness-raising and exchange days were organized in France and Japan in 2007 with 350 managers.



## Training

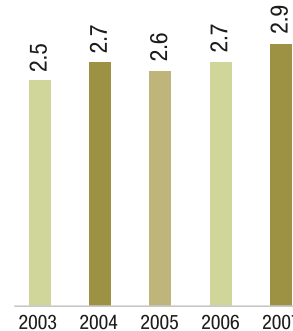
### Average number of days of training per employee

#### OBJECTIVE

To increase training opportunities so that by 2009, all employees have the chance to enhance their skills and facilitate their advancement through, on average, at least three training days a year.

#### MONITORING THE OBJECTIVE

The number of training days per person per year continued to increase in 2007 (2.9 days) and the objective of three days by 2009 seems accessible. The Group is continuing to work on training programs specific to core businesses and geographic zones.



## Monitoring performance

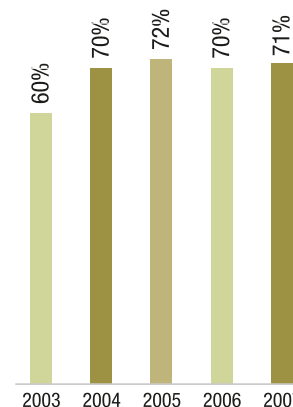
### % employees who have had a performance review meeting with their direct supervisor during the year

#### OBJECTIVE

On every site, in every region, in every unit, the Group's objective is that 100% of all employees meet their direct supervisor once a year for a performance evaluation interview and meet a manager from the Human Resources Department about every three years for a career development interview.

#### MONITORING THE OBJECTIVE

In 2007, the percentage of employees who had a meeting with their immediate supervisor was 71%. The percentage of employees who had a career meeting with the Human Resources Department increased and reached 20%. The Group's Human Resources Department continues to stress these meetings, which are the "keystone" of the company's human resources policy.



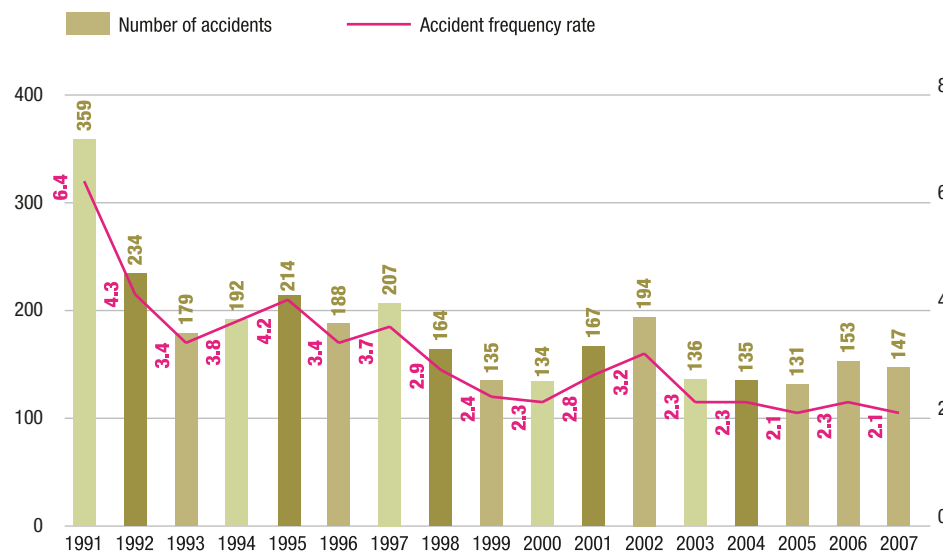
## SAFETY AND THE ENVIRONMENT

### Safety indicators for Group as a whole

Safety	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Number of accidents <sup>(1)</sup>	359	234	179	192	214	188	207	164	135	134	167	194	136	135	131	153	147
Accident frequency rate <sup>(2)</sup>	6.4	4.3	3.4	3.8	4.2	3.4	3.7	2.9	2.4	2.3	2.8	3.2	2.3	2.3	2.1	2.3	2.1

(1) One fatal accident in 2007, one fatal accident in 2006, no fatal accidents in 2005, one fatal traffic accident in 2004 and two fatal accidents in 2003.

(2) Number of accidents involving lost time per million hours worked by Group employees. Accidents defined as recommended by the International Labor Office.



#### OBJECTIVE

The Group's objective is zero accidents, on every site, in every region, in every unit.

### Environmental indicators for the Group as a whole

Presented here are the environmental elements most representative of the Group's businesses:

- large air separation units;
- cogeneration units;
- hydrogen and carbon monoxide units;
- acetylene units;
- nitrous oxide units;
- carbon dioxide liquefaction units;
- units in the hygiene and specialty sectors;
- units for welding equipment and products;
- engineering and construction units;
- transportation.

## Most relevant environmental indicators for the total of the nine unit types (446 production units) and transportation included in the worldwide scope

	Scope	2003	2004	2005	2006	2007
Total annual electricity consumption (GWh)	World		17,636	20,991	22,281	23,227
Total annual thermal energy consumption (LHV Terajoules)	World		124,702	143,082	155,725	160,033
<b>Evolution of energy consumption per m<sup>3</sup> of air gas produced</b>	<b>World</b>	<b>100.0</b>	<b>99.2</b>	<b>100.6</b>	<b>100.3</b>	<b>99.4</b>
<b>Evolution of energy consumption per m<sup>3</sup> of hydrogen produced <sup>(a)</sup></b>	<b>World</b>	<b>100.0</b>	<b>97.1</b>	<b>96.4</b>	<b>95.7</b>	<b>95.7</b>
<b>Evolution of efficiency of deliveries of liquefied gases (oxygen, nitrogen, argon, carbon dioxide) <sup>(b)</sup></b>	<b>World</b>	<b>100.0</b>	<b>96.1</b>	<b>98.0</b>	<b>96.3</b>	<b>95.1</b>
Total annual water consumption (in millions of m <sup>3</sup> )	World		44	49	55.6	57.4 <sup>(c)</sup>
Annual amount of CO <sub>2</sub> emissions avoided by cogeneration and on-site units (in thousands of tonnes)	World	-856	-647	-723	-757	-636
Total direct CO <sub>2</sub> emissions into the atmosphere (in thousands of tonnes)	World		5,795	7,093	7,668	7,859 <sup>(d) (e)</sup>
Total indirect emissions of CO <sub>2</sub> generated by the production of electricity purchased externally consumed by the 8 types of production units presented (the cogeneration units are not taken into account because they produce electricity) <sup>(f)</sup> (in thousands of tonnes)	World				7,631	7,995

(a) Also includes the quantities of carbon monoxide produced in these units.

(b) In km per ton delivered. Base 100 in 2003.

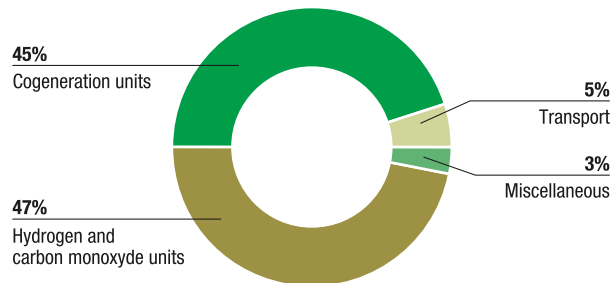
(c) Representing less than 0.5 one-thousandth of the industrial water consumption of the countries under review.

(d) Representing less than 1 one-thousandth of the CO<sub>2</sub> emissions in the countries under review.

(e) When adding nitrous oxide emissions, the total direct emissions of Greenhouses Gases (GHG) of the Group is 8,100 thousand tonnes of CO<sub>2</sub> equivalent.

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

## Distribution of total direct emissions of Greenhouse Gases (GHG)



## DETAILS ON INDICATORS FOR EACH OF THE NINE UNIT TYPES

### 1. Air separation units

Worldwide, Air Liquide operates **250 large air separation units**. They produce oxygen, nitrogen and argon, with some sites producing rare gases. These factories “without chimneys” do not use any combustion process. Since they produce almost no carbon dioxide (CO<sub>2</sub>), sulfur oxides (SO<sub>x</sub>) or nitrogen

oxides (NO<sub>x</sub>) emissions, they are particularly environmentally friendly. They consume electricity almost exclusively: worldwide, they use about **2,500 MW** each instant, the equivalent of the production of two nuclear power plants. Their cooling systems require back-up water.

By improving energy efficiency, these units use less and less energy per m<sup>3</sup> of gas produced: **a reduction of about 12% over the last ten years in total.**

Air separation units	Scope	2003	2004	2005	2006	2007
Annual electricity consumption (GWh) <sup>(a)</sup>	World	16,134	16,931	20,179	21,379	22,296
<b>Evolution of energy consumption per m<sup>3</sup> of air gas produced <sup>(b)</sup></b>	<b>World</b>	<b>100.0</b>	<b>99.2</b>	<b>100.6</b>	<b>100.3</b>	<b>99.4</b>
Annual back-up water consumption (in millions of m <sup>3</sup> )	World		28	32	34.2	36.2
<b>Evolution of water consumption per m<sup>2</sup> of air gas produced <sup>(c)</sup></b>	<b>World</b>		<b>100.0</b>	<b>103.7</b>	<b>100.4</b>	<b>98.9</b>
Discharge to water: oxidizable matter (tonnes/year)	World		Below 2,000	Below 1,000	Below 500	Below 500
Discharge to water: suspended solids (tonnes/year)	World		Below 2,000	Below 1,000	Below 500	Below 500

(a) Including small volumes of purchased steam.

(b) Gases produced (oxygen, nitrogen, argon) calculated in m<sup>3</sup> of equivalent gaseous oxygen. Base 100 in 2003.

(c) Excluding the energy consumption of units with open cycle water cooling system. Base 100 in 2004.

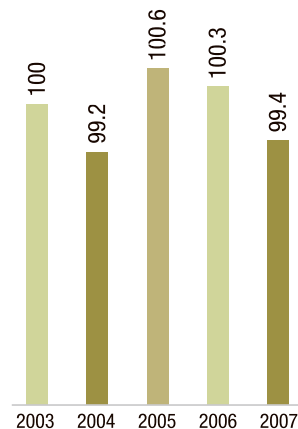
## Evolution of energy consumption per m<sup>3</sup> of air gas produced in air separation units

### OBJECTIVE

To reduce, within five years (2005 to 2009), the Group's annual world consumption of electrical energy by air separation unit, at constant scope, by at least 400 GWh, or the annual domestic consumption of electricity of a city of 180,000 people.

### MONITORING THE OBJECTIVE

In 2005, the Group did not progress in this area (evolution of -168 GWh) in particular due to problems in the United States related to hurricanes and the increased volatility in the electrical energy market. On the other hand, in 2006 and 2007, the Group progressed by 79 GWh and 209 GWh respectively. Cumulatively, since 2005 the reduction in electricity consumption with constant scope is therefore  $-168 + 79 + 209 = 120$  GWh. In the framework of the Group's efficiency program, actions concerning the reduction of electricity consumption of air separation units will continue.



## 2. Cogeneration units

Worldwide, Air Liquide operates **16 cogeneration units**. They produce steam and electricity simultaneously much more efficiently – 15 to 30% – than units that generate steam and electricity separately, which results in major savings in fossil fuels. They consume natural gas and water, most of which is converted into steam for the customer. Most of the steam is 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. Combustion of natural gas gives off carbon dioxide (CO<sub>2</sub>) and produces some nitrogen oxides (NO<sub>x</sub>) emissions, but practically no sulfur oxides (SO<sub>x</sub>) emissions.

These units replace steam and electricity production units that would have produced more CO<sub>2</sub> emissions. Cogeneration units therefore help reduce CO<sub>2</sub> emissions in the industrial basins they supply. In 2007, the Group's cogeneration units **avoided 573,000 tonnes of carbon dioxide emissions being discharged into the atmosphere**.

Cogeneration units	Scope	2003	2004	2005	2006	2007
Annual natural gas consumption (or thermal energy) (LHV Terajoules)	World	71,464	74,065	67,474	68,584	64,685
Annual quantities of CO <sub>2</sub> atmospheric emissions prevented through cogeneration <sup>(a)</sup> (in thousands of tonnes)	World	-856	-647	-666	-693	-573
Air emissions: CO <sub>2</sub> (carbon dioxide) (in thousands of tonnes)	World	3,930	4,155	3,785	3,848	3,629
Air emissions: NO <sub>x</sub> (nitrogen oxides) (in tonnes)	World	4,050	2,060	2,350	2,630	2,300
Air emissions: SO <sub>x</sub> (sulfur oxides) (in tonnes)	World	Below 100	Below 100	Below 100	Below 100	Below 50
Annual water consumption (million m <sup>3</sup> )	World	10	7.9	7.9	8.7	7.9

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

## 3. Hydrogen and carbon monoxide production units

Worldwide, Air Liquide operates **38 large hydrogen and carbon monoxide production units**. Desulfurization of hydrocarbons to produce sulfur-free fuels is one of the main applications for hydrogen. In 2007, the hydrogen Air Liquide supplied to refineries throughout the world resulted in **savings of about 780,000 tonnes of sulfur oxide emissions discharged into the atmosphere**, which is greater than all the sulfur oxide emissions

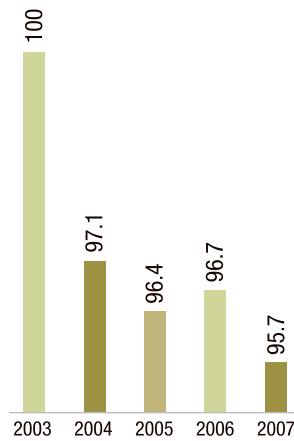
from a country like France. An important application for carbon monoxide is plastics manufacturing. Natural gas is the main raw material used in these production units, along with certain amounts of "process" water. These units emit carbon dioxide (CO<sub>2</sub>) and lead to nitrogen oxides (NO<sub>x</sub>) emissions but produce practically no sulfur oxides (SO<sub>x</sub>). They also consume electricity and their cooling systems require back-up water.

**Energy efficiency of these units per m<sup>3</sup> of gas produced has improved by about 4% for five years.**

Hydrogen and carbon monoxide units	Scope	2003	2004	2005	2006	2007
Annual thermal energy consumption (LHV Terajoules)	World		50,336	75,380	86,699	94,880
Annual electricity consumption (GWh)	World		375	435	507	512
<b>Evolution of energy consumption per m<sup>3</sup> of air gas produced <sup>(a)</sup></b>	<b>World</b>	<b>100.0</b>	<b>97.1</b>	<b>96.4</b>	<b>95.7</b>	<b>95.7</b>
Air emissions: CO <sub>2</sub> (carbon dioxide) (in thousands of tonnes)	World		1,628	2,895	3,389	3,795
Air emissions: NO <sub>x</sub> (nitrogen oxides) (in tonnes)	World		Below 1,000	700	800	950
Air emissions: SO <sub>x</sub> (sulfur oxides) (in tonnes)	World		Below 500	Below 500	Below 500	Below 250
Annual consumption of process and back-up water (in million m <sup>3</sup> )	World		5	5.3	9.6	9.8
Discharge to water: oxidizable matter (in tonnes)	World		Below 50	Below 100	Below 100	Below 100
Discharge to water: suspended solids (in tonnes)	World		Below 500	Below 500	Below 500	Below 500

(a) Hydrogen and carbon monoxide. Base 100 in 2003.

## Evolution of energy consumption per m<sup>3</sup> of air gas produced in hydrogen and carbon monoxide units



### 4. Acetylene production units

Worldwide, Air Liquide operates **53 acetylene production units** (a gas used mainly in welding and metal cutting). They produce

the gas through the decomposition of a solid - calcium carbide - using water. This process produces lime, that is generally recycled (at around 90%) in industrial and agricultural applications.

Acetylene units	Scope	2004	2005	2006	2007
Annual electricity consumption (GWh)	World			12	11
Annual water consumption (in million m <sup>3</sup> )	World	0.4	0.4	0.4	0.4
Annual calcium carbide consumption (in tonnes)	World	36,200	38,900	38,100	38,500
Quantity of lime produced (in tonnes)	World	41,900	45,000	44,000	44,000
Air emissions of volatil organic compounds (VOC) (in tonnes) <sup>(a)</sup>	World				170

(a) Mainly loss of acetylene into the atmosphere.

### 5. Nitrous oxide production units

Worldwide, Air Liquide operates **12 nitrous oxide production units**. Nitrous oxide is used nearly exclusively as an anesthetic

gas in medicine. It is produced from ammonium nitrate in solid form or as a solution in water. The cooling circuits of these units require back-up water.

Nitrous oxide units	Scope	2004	2005	2006	2007
Annual electricity consumption (GWh)	World	6	6	7	6
Annual water consumption (million m <sup>3</sup> )	World	0.1	0.1	0.1	0.1
Annual ammonium nitrate consumption (in tonnes)	World	25,100	24,500	24,540	21,500
Estimate of loss of nitrous oxide into the atmosphere (in tonnes)	World	800 <sup>(a)</sup>	800 <sup>(a)</sup>	800 <sup>(a)</sup>	780 <sup>(b)</sup>

(a) Estimation for the years 2004 to 2006.

(b) Corresponding to the equivalent of 242 thousands tonnes of CO<sub>2</sub>.

## 6. Carbon dioxide liquefaction units

Worldwide, Air Liquide operates **51 carbon dioxide liquefaction units**. Carbon dioxide has many industrial applications but is used mainly in the food industry to deep-freeze foods or to

produce carbonated beverages. 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 the process.

Carbon dioxide liquefaction units	Scope	2004	2005	2006	2007
Annual electricity consumption (GWh)	World	306	353	320	340
Annual water consumption (million m <sup>3</sup> )	World	1.8	1.9	1	1.2
Discharge to water: oxidizable matter (in tonnes)	World	Below 100	Below 100	Below 50	Below 50
Discharge to water: suspended solids (in tonnes)	World	Below 100	Below 100	Below 50	Below 50

## 7. Hygiene and specialty production units

**Hygiene and specialty production units** are located at **7 sites** in France, Belgium and Germany. These units consume natural

gas, electricity and water. Combustion of natural gas produces small quantities of carbon dioxide.

Hygiene and specialty units	Scope	2003	2004	2005	2006	2007
Annual electricity consumption (GWh)	World	17	18	18	18	20
Annual natural gas consumption (LHV Terajoules) <sup>(a)</sup>	World	217	271	228	245	245
Air emissions: CO <sub>2</sub> (carbon dioxide) (in thousands of tonnes/year)	World	13	12	9	9	9
Air emissions of volatile organic compounds (VOC) (in tonnes)	World					320
Annual water consumption (million m <sup>3</sup> )	World	1	0.6	0.5	0.5	0.5
Discharge to water: oxidizable matters (in tonnes)	World	Below 1,000	Below 1,000	Below 1,000	Below 1,100	Below 1,000
Discharge to water: suspended solids (in tonnes)	World	Below 100	Below 100	Below 100	Below 100	Below 100

(a) Including thermal energy corresponding to steam purchases.

## 8. Welding equipment and products production units

The **welding equipment and products production units** are mainly located on **14 sites** in the world. They are welding

equipment assembly (electric welding units, torches, regulators) or welding consumables (electrodes, welding wire and flux) production units.

Welding equipment and products production units	Scope	2006	2007
Annual electricity consumption (GWh)	World	38	36
Annual thermal energy consumption (LHV Terajoules)	World	197	223
Air emission: CO <sub>2</sub> (thousands of tonnes)	World	11	13
Annual water consumption (million m <sup>3</sup> )	World	1.1	1.2
Annual consumption of raw materials (thousands of tonnes) <sup>(a)</sup>	World		150

(a) Metals and materials for the production of welding products



## 9. Engineering and construction units

The engineering and construction units are located on 6 sites, in France, China, Japan and India<sup>(a)</sup>. They are mainly units for the construction of air separation columns and cryogenic tanks.

(a) The Indian site is not included in the consolidation scope.

Engineering and construction units	2007
Scope	World
Annual electricity consumption (GWh)	5
Annual water consumption (million m <sup>3</sup> )	0.1
Annual consumption of raw materials (thousands of tonnes) <sup>(b)</sup>	7.2

(b) Mainly metals

### 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, 98 “low threshold” and 24 “high threshold” Air Liquide sites are involved. Seveso regulations apply only to Europe but if the Seveso “high threshold” criteria were applied worldwide, 16 other Group sites could be included.

### CO<sub>2</sub> DIRECTIVE IN EUROPE

The objective of the European directive, which establishes a quota system for greenhouse gases emissions in Europe is to decrease these emissions like the Kyoto Protocol. Implementation for CO<sub>2</sub> in the industrial sector began on January 1, 2005. As air separation units emit practically no carbon dioxide, this directive only applies, 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<sub>2</sub> per year) for the 2005-2007 period covered the emissions observed.

For the second period (2008 to 2012), the directive will only apply to six cogeneration sites<sup>(c)</sup> in France, Germany, the Netherlands and Spain and a single hydrogen production site in Belgium. Air Liquide’s quotas (about 1.4 million tonnes of CO<sub>2</sub> per year) should cover the anticipated emissions.

(c) We must add the new cogeneration unit (and the corresponding quotas) of Pernis in the Netherlands that will go on line in 2008.

### EUROPEAN REACH REGULATIONS

REACH (Registration, Evaluation, Authorisation and Restriction of Chemicals) is a set of European Union regulations (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.

These regulations went into effect in June 2007, but the registration and evaluation procedures will be spread out over about 12 years.

Air Liquide’s main products such as oxygen, nitrogen, rare gases, CO<sub>2</sub>, hydrogen and helium are excluded from REACH.

Carbon monoxide, acetylene and a few specialty gases in electronics fall, however, under these regulations. In addition, one quarter of the revenue of the specialty chemicals business is concerned by REACH.

In total, about 6% of the Group’s revenue is concerned by REACH.

## Transportation

In 2007, trucks delivering Air Liquide liquid gases or gas cylinders traveled **377 million kilometers** throughout the world and emitted about 413,000 tonnes of carbon dioxide. On-site nitrogen, oxygen and hydrogen units reduced truck deliveries, a source of carbon dioxide (CO<sub>2</sub>) emissions. These on-site units were able to save the 59 million extra kilometers traveled by trucks and therefore the emission of 63,000 tonnes of carbon dioxide. **The efficiency of the deliveries** of liquefied gases (oxygen, nitrogen, argon, carbon dioxide) measured in kilometers traveled

per tonne **has been improved by nearly 5% since 2003**, corresponding to a **reduction in CO<sub>2</sub> emissions of about 20,000 tonnes a year**.

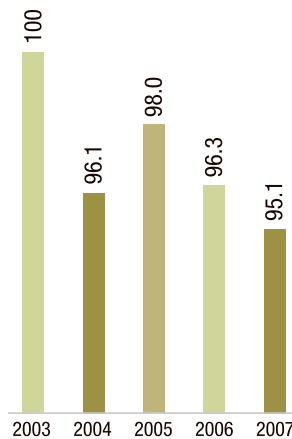
Supplying large customers via pipeline from the Group's production units also limits transportation. These pipeline systems, which are environmentally friendly and safe, total over **8,000 kilometers worldwide**. For air gases and hydrogen, which represent most of the volumes the Group delivers, **84% of deliveries are made via pipeline or through on-site units. As a result, only 16% of all air gases or hydrogen are delivered by trucks.**

	Scope	2003	2004	2005	2006	2007
Kilometers traveled by all vehicles delivering gas in liquid or cylinder form (in millions of km)	World	303	325	369	375	377
Estimate of CO <sub>2</sub> emissions generated by these vehicles (in thousands of tonnes)	World			404	411	413
<b>Evolution of the efficiency of deliveries for liquefied gases (oxygen, nitrogen, argon, carbon dioxide) <sup>(a)</sup></b>	<b>World</b>	<b>100</b>	<b>96.1</b>	<b>98.0</b>	<b>96.3</b>	<b>95.1</b>
Estimate of truck transport kilometers avoided through on-site customer units (in millions of km)	World	-55	-54	-56	-60	-59
Estimate of CO <sub>2</sub> emissions avoided by these on-site units (in thousands of tonnes)	World			-57	-64	-63
Percentage of deliveries of air gases and hydrogen via pipeline or on-site	World			84% <sup>(b)</sup>	85%	84%

(a) In km per ton delivered. Base 100 in 2003.

(b) In 2005, this percentage only applied to air gases.

### Evolution of the efficiency of deliveries liquefied gases (in km per ton delivered. Base 100 in 2003)



## Industrial Management System (IMS) and quality and environmental certification indicators

In 2004, the Group launched a new industrial management system (IMS) to strengthen safety, reliability, the preservation of the environment and risk management. **At the end of 2007, it had been rolled out in nearly all the Group's units (over 99% of the Group turnover).** At the start of 2007, a new indicator was established to track the percentage of revenue covered by the Group's IMS internal audits. In 2007, 18 entities were audited, i.e., **46%** of the Group's activities in terms of revenue.

The Group has taken several other quality initiatives, especially in the implementation of good production practices (Common Good Manufacturing Practices) and ISO certification. ISO 9001 quality certifications cover about 73% of the Group's revenue. The Group has also undertaken a proactive approach to preserving the environment by belonging, in France, to the Entreprises pour l'Environnement (EPE) association and by obtaining ISO 14001 certifications, an international benchmark in the environment.

**These ISO 14001 certifications now cover about 24% of the Group's revenue.**

In %	Scope	2004	2005	2006	2007
Estimate of the Group subsidiary revenue concerning the effective implementation of <b>IMS</b> in the field	World				46%
Estimate of Group subsidiary revenue % covered by an <b>ISO 9001</b> quality certification	World	65%	67%	73%	73%
Estimate of Group subsidiary revenue % covered by an <b>ISO 14001</b> environmental certification	World	14%	15%	22%	24%

## INNOVATION

A certain number of indicators on innovation are presented below.

Apart from these indicators, innovation is an integral part of the Air Liquide culture and is one of the basic components of its sustainable development approach.

Certain patented innovations make a major contribution to the Group's growth. Each year, Air Liquide singles out the inventors of patents that have been successfully marketed.

On November 8, the anniversary date of the Group's foundation in 1902, all the Group's units took part in an Innovation Day.

Finally, **60% of the Group's R&D budget is devoted to work on life, the environment and sustainable development (energy efficiency, cleaner production processes and new energies).**

### Indicators for the Group as a whole

Research	2007
Budget	Nearly 190 million euros
Number of researchers	920 researchers with more than 25 nationalities
Number of research centers	8
Industrial partnerships	Over 100
Academic collaborations	Over 120 with universities and research institutes
Number of inventions patented	2,847

Patents	2003	2004	2005	2006	2007
New inventions patented during the year	236	225	236	267	263
Patents filed directly in the Group's 4 main zones of operations <sup>(a)</sup>	105	109	103	108	152

### Number of patents filed in the Group's four main presence zones <sup>(a)</sup>

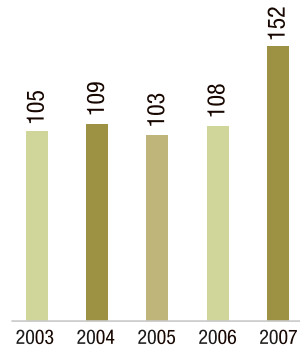
(Europe, the United States, Japan and China)

#### OBJECTIVE

To disseminate innovations within the Group and recognize innovators. Within five years (2005-2009), and in the largest number of areas, to file over 500 new patents, valid directly in the Group's four main zones of operations: Europe, the United States, Japan and China <sup>(a)</sup>.

#### MONITORING THE OBJECTIVE

In 2005, 2006 and 2007 with respectively 103, 108 and 152 patents filed in these four zones, the Group is definitely in line with its objective in this area.



(a) According to the definition of the Group's Intellectual Property Department.