

## 2009 ANNUAL REPORT



**SEEING DIFFERENTLY**



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# Profile

**Air Liquide is the world leader in gases for industry, health and the environment, and is present in over 75 countries with 42,300 employees.**

Oxygen, nitrogen, hydrogen and rare gases have been at the core of Air Liquide's activities since its creation in 1902.

Using these molecules, Air Liquide continuously reinvents its business, anticipating the needs of current and future markets. The Group innovates to enable progress, to achieve dynamic growth and a consistent performance.

**Innovative technologies** that curb polluting emissions, lower industry's energy use, recover and reuse natural resources or develop the energies of tomorrow, such as hydrogen, biofuels or photovoltaic energy... Oxygen for hospitals, homecare, fighting nosocomial infections...

Air Liquide combines many products and technologies to develop valuable applications and services not only for its customers but also for society.

**A partner for the long term**, Air Liquide relies on employee commitment, customer trust and shareholder support to pursue its vision of sustainable, competitive growth.

The **diversity** of Air Liquide's teams, businesses, markets and geographic presence provides a solid and sustainable base for its development and strengthens its ability to push back its own limits, conquer new territories and build its future.

**Air Liquide explores the best that air can offer to preserve life, staying true to its sustainable development approach.**

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**12 billion euros**  
**in revenue**

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**42,300 employees**  
**in 75 countries**



**Abdullah AL-Sadi, in Sohar (Oman)**

Air Liquide is present in Egypt, Lebanon, Kuwait, Oman, Qatar, Saudi Arabia and Syria, as well as in the United Arab Emirates, where the Group's Middle East headquarters is located.



2009

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IN FIGURES  
AND IMAGES

# Highlights



## May

- **Industrial Merchant**

### Investments in Russia.

Air Liquide will build and operate a new Air Separation Unit. The Group expands its geographic presence by investing in the Special Economic Zone "Alabuga", located east of Moscow.

## June

- **Electronics**

### Start-up of operations in China for TFT-LCD manufacturers.

The Group invests €25 million in an Air Separation Unit (ASU).

## January

- **Industrial Merchant**

### Investments in France and the Netherlands.

Air Liquide invests nearly €20 million in two new carbon dioxide recovery units.

## February

- **Healthcare**

### Acquisitions in healthcare.

Air Liquide is strengthening its network through targeted acquisitions in the Netherlands and Tunisia.

- **Healthcare**

### Acquisition of Pacific Science in the U.S.

This company is a provider of cryobiology equipment and services to biobanks.

- **Electronics**

### Consolidating leadership in photovoltaic industry.

Air Liquide becomes the main supplier to the three largest photovoltaic production sites worldwide.



## July

- **Industrial Merchant**

### Acquisition in Saudi Arabia.

Air Liquide acquires 75% of Al Khafrah Industrial Gases.

- **Large Industries**

### Start-up of two ASUs in China.

Air Liquide starts up two very large ASUs, producing together 4,000 tonnes of gaseous oxygen per day, as part of a long-term partnership with Jiangsu Shagang, ranked number one among private steel companies in China.

- **Large Industries**

### Start-up of units in the Middle East.

These units and the recent acquisitions of Al Khafrah and Pure Helium amount to US \$150 million.





## October

- **Electronics**

**Major contract with SMIC in China.**

Air Liquide signs a long-term contract with the leading integrated circuit foundry in China.

- **Large Industries**

**Start-up of a hydrogen unit for cleaner fuels in the United States.**

The 142,000 Nm<sup>3</sup>/h steam methane reformer (SMR) is one of the largest hydrogen units in operation in the United States.

- **Large Industries**

**Developments in Vietnam.**

Air Liquide announces the commissioning of two ASUs in South Vietnam, amounting to nearly €30 million.



## November

- **Large Industries**

**Long-term supply agreement signed with Oryx GTL in Qatar.**

GASAL Q.S.C., Air Liquide's subsidiary in Qatar, invests more than €47 million in a new oxygen and nitrogen production unit.

- **Large Industries**

**Major oxygen contract for gasification unit in China.**

Air Liquide invests about €60 million in a large ASU with a production capacity of 2,700 tonnes of oxygen per day.

- **Engineering and Construction**

**Start-up of the world's largest carbon monoxide unit in Saudi Arabia.**

The unit designed and built by the Engineering and Construction teams of Air Liquide has a production capacity of 335,000 tonnes per year.



## December

- **Large Industries**

**Major contract in China.**

Air Liquide signs a new 15-year contract with Bayer Polyurethanes (Shanghai) for the supply of hydrogen and carbon monoxide.

- **Engineering and Construction**

**Launch of a second generation biofuel project in France.**

This demonstration unit, which combines in a single facility all of the

various second generation biofuel production elements, will be the first production unit of this kind in France.

- **Electronics**

**13 new photovoltaic contracts in China.**

Air Liquide becomes the partner of China's three main solar cell manufacturers and confirms its leading position in the photovoltaic market.

# Key figures

## Consolidated Income Statement (summarized)

(in millions of euros)

Revenue	11,976
Operating income recurring before depreciation and amortization	2,969
Operating income recurring	1,949
Operating income	1,959
Net profit (Group share)	1,230
Basic earnings per share (in euros)	4.70
Diluted earnings per share (in euros)	4.70

## Revenue

(in millions of euros)



## Net profit (Group share)

(in millions of euros)



## ROCE - Return on capital employed after tax

(in %)



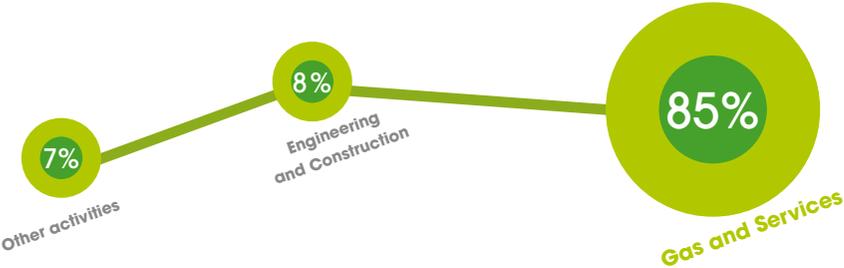
## Dividend<sup>(a)</sup>

€2.25

(a) Proposed at the May 5, 2010 Annual General Meeting

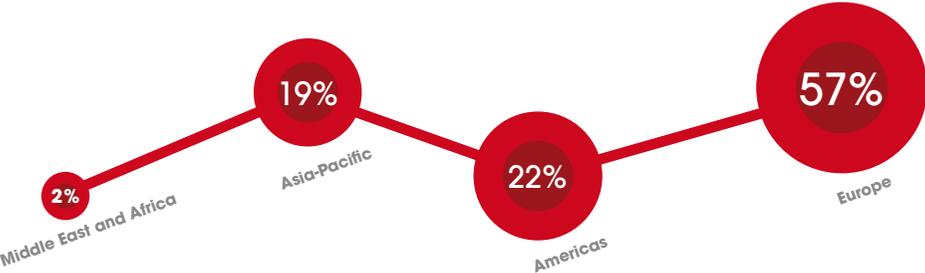
## Group revenue by activity

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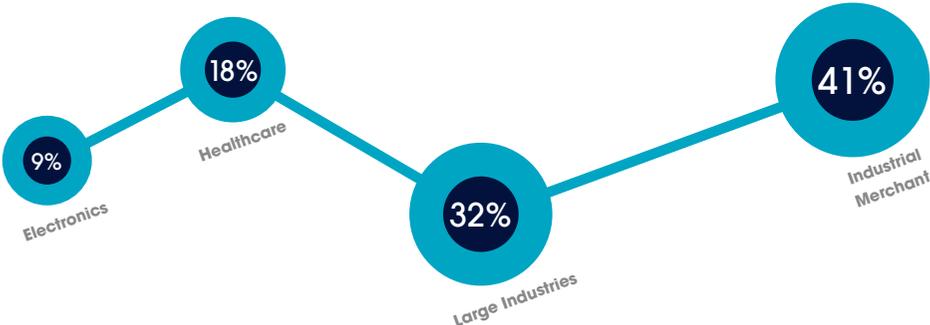
## Gas and Services revenue by geographical area

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## Gas and Services revenue by business line

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**Benoît Potier - Paris (France)**  
He joined Air Liquide in 1981 as a Research and Development engineer. In 2006, he was appointed Chairman and Chief Executive Officer of the Group.



FUNDAMENTALS

SEEING  
FAR  
AHEAD

# Questions and answers with Benoît Potier

Chairman and Chief Executive Officer



We are using three molecules – oxygen, hydrogen, and CO<sub>2</sub> – to develop technological solutions that will respond to energy and environmental challenges. ●●



#### What is your assessment of the 2009 fiscal year?

I view it in a positive light. Air Liquide has come through the crisis well. Despite an unprecedented slowdown of the global economy, we reached the targets we set for 2009. Our total revenue was close to 2008 levels, at €12 billion, and net profit increased 0.8% to €1.23 billion. This performance was possible thanks to the momentum of our ALMA strategic program, whose 2009 priorities were readjusted to focus on cash management, cost control and capital expenditure.

Our operating margin improved significantly, reaching a record level of 16.3%. In the end, we successfully minimized the impact of the crisis, while preserving Air Liquide's growth potential.

#### What were the year's most memorable milestones?

First off, the Group had a number of operational successes. We started up 15 new production units, both in emerging economies like China, South Korea and Malaysia, as well as in the United States, Portugal and so on.

Growth in Healthcare continued, with homecare acquisitions in the United Kingdom, Tunisia and the Netherlands, and also thanks to a strong growth in sales in the hygiene business in response to the H1N1 flu pandemic. Moreover, we strengthened our position as the number one supplier of gases to the photovoltaics industry.

Finally, we made significant technological advances, with the commissioning of next-generation standard units, innovations in carbon capture and storage, and continuing programs in the fields of renewable energies, such as hydrogen energy, second-generation biofuels or solar energy.

#### What are the lessons from the crisis?

The crisis once again demonstrated the ability of Air Liquide employees to mobilize themselves. It also proved the effectiveness of our ALMA strategic program, which was an essential support for reaching our targets. The program gave us the operational and financial levers we needed during difficult moments.

For the world economy, I think one of the most important lessons of the crisis has been the reshuffling of cards at a global level. Like a lot of industrial players, we were surprised by how profoundly mature economies' industrial bases were shaken. No one anticipated how quickly the center of gravity of global industry would shift from mature to emerging economies. Before the crisis, emerging economies accounted for 55% of our project portfolio; today, they constitute 80%. Sixteen of the 20 projects scheduled for start-up in 2010 are located in emerging economies, which now account for 16% of our revenue, or nearly €2 billion.

In mature economies, societal and environmental concerns are generating new opportunities for Air Liquide. The Energy and Environment sectors promise a strong future, together making up a market estimated at more than €30 billion by 2020. Air Liquide intends to play a major role in these sectors, with solutions that help reduce energy consumption and CO<sub>2</sub> emissions, either through energy efficiency, clean conversion or renewable energy.

#### How is 2010 looking?

We are seeing a continued recovery in business in the first part of the year, although it's gradual depending on regions and markets. Emerging economies are already seeing a rapid return to growth, but the pace is slower in mature economies. Thus, oxygen and hydrogen volumes have risen gradually, month over month. In addition to a greater number of start-ups than in 2009, we should also see an increase in the number of growth-related investments in 2010, while remaining cautious, in terms of regular investments. In this context, Air Liquide expects continuous growth in net profit in 2010, in line with its long-term performance.

**Air Liquide attended the Copenhagen Summit. In your opinion, was the Summit a success or a failure?**

The Copenhagen Summit gave cause for hope, but at the same time, the commitment to reducing greenhouse gas emissions was disappointing. Personally, I think we must especially applaud the fact that the whole planet – 192 countries were present – realizes the importance of using natural resources wisely and protecting our environment. Air Liquide has an important contribution to make in facing this crucial challenge. We are using three molecules – oxygen, hydrogen, and CO<sub>2</sub> – to develop technological solutions that will respond to environmental and energy challenges. Being present at Copenhagen as a major player in these technologies gave us the opportunity to enhance awareness of the Group's progress in these fields. These innovations offer real growth opportunities.

**Carbon tax is currently a big topic of discussion. You led a roundtable discussion on different ways to reduce CO<sub>2</sub> at the World Economic Forum in Davos in early 2010. As the Chairman and CEO of a global company, what are your thoughts on this issue?**

A new tax is never good news, even if it sends a strong message concerning the impact of CO<sub>2</sub> emissions and why we need to change our behavior in order to protect our planet. From industry's perspective, the question of emissions arises in a slightly different way. Over and above the main message, companies will have to integrate several factors: the development of innovative technologies and associated investments, competitiveness in countries where they operate, and the need to favor economically viable solutions.

A tax only favors solutions that cost less than the tax itself. Regulations sometimes help the environment to the detriment of the economy. As for emission quota trading, such a system can only hope to improve environmental conditions if it goes beyond plain financial reasoning. We can see that today there is no ideal approach and more thought will be needed on the topic, with environmental imperatives needing to prevail over financial reasoning.

**Air Liquide has strong roots in Europe and contributes to discussions concerning the continent's competitiveness. Can you tell us more?**

Europe accounts for just under 60% of the Group's revenue. Our discussions with other European industrials lead us to back the idea of having a strong industrial policy that enables Europe to maintain its position vis-à-vis the United States, Japan, and tomorrow, China. We must maintain Europe's competitiveness in relation to the rest of the world, bolstering research and innovation budgets and working together effectively and harmoniously to achieve progress. Most industries can maintain job numbers at acceptable levels, as long as they are also able to create the industrial foundations for the future. For instance, in the fields we are involved in: developing processes for CO<sub>2</sub> capture and storage; perfecting energy-efficient construction materials; developing solar energy; and strengthening European expertise in the health sector. The potential for growth – and the jobs that come with it – is there, as long as Europe acts collectively.

**Are you confident in Air Liquide's ability to remain the industry leader?**

2009 was a year of transformation for the Group. Air Liquide demonstrated an ability to adapt its management strategy to the current situation and to act with agility in an evolving world. The Group continued to innovate for customers around the world and pursued development in new geographic and segment markets.

Beyond financial performance, being the leader means actively behaving in a socially responsible manner. To this end, the Air Liquide Foundation, whose role is to develop philanthropic initiatives in three areas, has supported almost 30 projects since its creation in 2008: research on protecting the environment, research on improving the respiratory function, and support for micro-initiatives. In 2009, the Foundation financed 22 projects in a dozen countries to support training, access to healthcare, micro-entrepreneurship, the environment and overcoming disabilities.

In the medium term, I remain confident in the Group's ability to achieve solid and sustainable growth. Our five growth drivers – Energy, the Environment, Emerging Economies, Health and High-Tech – have kept their potential, bolstered by deep-rooted, long-term trends in society. Being the leader means having a vision for the future of the company and its employees, customers and shareholders.



Our five growth drivers – Energy, the Environment, Emerging Economies, Health and High-Tech – have kept their potential, bolstered by deep-rooted, long-term trends in society.

# Management bodies

## The Board of Directors as at January 1, 2010

### A • Benoît Potier

Chairman  
and Chief Executive Officer  
Expiration date of term: 2010\*

### B • Thierry Desmarest

Director – Chairman  
of the Appointments and  
Governance Committee  
Expiration date of term: 2013

### C • Alain Joly

Director  
Expiration date of term: 2013

### D • Professor Rolf Krebs

Director  
Expiration date of term: 2012

### E • Gérard de La Martinière

Director  
Chairman of the Audit  
and Accounts Committee  
Expiration date of term: 2011

### F • Cornelis van Lede

Director  
Chairman of the Remuneration  
Committee  
Expiration date of term: 2011

### G • Béatrice Majnoni d'Intignano

Director  
Expiration date of term: 2010\*

### H • Thierry Peugeot

Director  
Expiration date of term: 2013

### I • Paul Skinner

Director  
Expiration date of term: 2010\*

### J • Jean-Claude Buono

Director  
Expiration date of term: 2012

### K • Karen Katen

Director  
Expiration date of term: 2012



\* Renewal of term proposed to the Annual General Meeting of May 5, 2010.

### Role of the Board of Directors

The Board of Directors determines the major orientations of the Company's activities. Accordingly, it examines and approves the Group's major strategic orientations.

It ensures the implementation of these orientations by Executive Management.

Subject to the powers expressly attributed to Shareholders' Meetings by law and in accordance with the corporate purpose, the Board deals with any issues concerning the smooth running of the Company and manages corporate business pursuant to its decisions.

The internal regulations stipulate that the specific powers legally attributed to the Board of Directors include in particular the choice of corporate officers, the determination of the terms and conditions governing the remuneration and performance of their duties, the convening of the Shareholders' Meeting, the determination of the agenda and draft resolutions, the preparation of the financial statements and Annual Management Report, the drafting of its operating procedures (formation of Committees, distribution of Directors' fees, etc.). The Board also exercises the powers granted to it by the Shareholders' Meeting, particularly with regard to the granting of stock options or the conditional allotment of shares to employees, issues of marketable securities, or share buyback or employee savings programs.

### Functioning of the Board of Directors

#### Informing the Directors

The internal regulations define the methods for informing the Directors. They specify, in particular, that prior to Board meetings, a file of meeting documentation dealing with key items on the agenda is sent out to Board members. The Chairman and Chief Executive Officer, assisted, if need be, by Executive Management members presents to the Board of Directors a quarterly report on the Company's management, the draft annual and interim financial statements and the various issues requiring the Board's authorization or approval.

#### Conduct of meetings

The internal regulations define the frequency of meetings and the rules of convening meetings and participation by video-conference or telecommunications.

#### Formation of committees

The internal regulations define the purpose and operating procedures of the three committees set up.

### Training measures

The internal regulations stipulate that training relating to the Company's businesses is offered to Directors, particularly through site visits or meetings with senior management executives. More particularly, information on the Group's accounting, financial and operational specificities is offered to members of the Audit and Accounts Committee.

### Appraisal of the Board of Directors

The internal regulations stipulate that:  
*"The Board will ensure that an evaluation is carried out periodically of its composition, its organization and its functioning as well as those of its committees. An update will be made by the Board on this topic once a year and a formal evaluation will be carried out under the authority of the Chairman of the Board of Directors every three years."*

### The Board's work in 2009

In 2009, the Board of Directors met six times with an effective attendance rate or attendance rate by telephone of 95.6%.

The Board dealt with a variety of matters related to the following areas:

#### 1. Monitoring of the Group's day-to-day management, particularly by:

- Reviewing the quarterly activity reports and the annual and interim financial statements (allowing to determine the dividend distribution policy and authorize the distribution in 2010 of one bonus share for every 15 shares held).
- Reviewing the Group's financial position.
- Reviewing the minutes of Committee meetings.
- Making decisions, in particular with respect to the investments necessary for the Group's development.
- Reviewing at each meeting the report on ongoing acquisitions, disposals and major projects.
- Reviewing corporate documents.
- Preparing the Annual General Meeting.

#### 2. Monitoring of the Group's main strategies on significant issues

#### 3. Functioning of the corporate governing bodies

(Code of corporate governance, Executive Management, Board of Directors)

For more information, refer to the section entitled "Corporate Governance" in the Reference Document available on our website [www.airliquide.com](http://www.airliquide.com) or by request.

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# The Committees

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## **The Audit and Accounts Committee**

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The purpose of the Committee is to prepare the decisions to be taken by the Board of Directors by examining the following issues and reporting on them to the Board.

### **By receiving reports:**

jointly and separately, in order to compare and combine different points of view, from:

- the Finance, Administration and Legal Divisions;
- the Internal Audit and Internal Control Management;
- the external auditors.

### **Concerning the following points:**

- existing organization and procedures in the Group;
- their actual functioning;
- how the financial statements and the accounts are drawn up.

### **In order to reach:**

by comparing and combining the points of view collected and using their business judgment based on professional experience, a reasonable judgment concerning:

1. Accounts and accounting principles used (their conformity in relation to the reference standards, a fair and complete reflection of the Group's situation, transparency, readability, consistency over time);
2. Existence and functioning of control organizations and control procedures adapted to the Group, making it reasonably possible to identify and manage the risks incurred and to report on them;

3. Organization of the internal audit function, the plans for assignments and actions in the internal audit field, the findings of these assignments and actions and the recommendations and ensuing measures taken;
4. Choice and renewal of the external auditors, review of the tendering process, opinion on the selection of external auditors and the rotation of audit partners, review of proposed fees, information on the overall fees paid indicating the amount of fees paid for non-audit services.

## **The Appointments and Governance Committee**

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Pursuant to the internal regulations, the purpose of the Appointments and Governance Committee is to:

### **1. Concerning the Board of Directors:**

- make proposals to the Board of Directors for renewal and appointment of Directors. The Committee looks for new members on the basis of its evaluation of the needs and developments expressed by the Board of Directors;
- make proposals to the Board of Directors for the creation and composition of Board committees;
- periodically evaluate the structure, size and composition of the Board of Directors and submit to it recommendations regarding any potential change;
- the Committee periodically reviews the criteria applied by the Board to classify a Director as independent; once a year, it examines, on a case-by-case basis, the situation of each Director or each candidate for the duties of Directors in light of the criteria applied and makes proposals to the Board of Directors.

**2. Concerning the Chairman and Chief Executive Officer or the Chief Executive Officer, as the case may be:**

- examine, as necessary and, in particular at the time of expiration of the term of office concerned, the renewal of the term of office of the Chairman and Chief Executive Officer, or the terms of office of both the Chairman and of the Chief Executive Officer. It also examines, if necessary, the question of whether or not it is appropriate to continue to combine these duties (or to separate them);
- examine the changes in these duties and provide for solutions for their renewal, where applicable;
- examine the succession plan for members of the executive management applicable in particular in the case of an unforeseen vacancy;
- examine periodically developments with regard to the Senior Executive Vice-Presidents, hear the Chairman and Chief Executive Officer (or the Chief Executive Officer) on the needs and the potential proposals for their replacement;
- more generally, ensure that it is kept informed by the Chairman and Chief Executive Officer (or the Chief Executive Officer) of planned changes in Executive Management resources (and, in particular, the Executive Committee).

**3. Concerning governance:**

- monitor the changes in the rules of corporate governance, in particular within the scope of the code to which the company refers and inform the Board of Directors of its conclusions; follow up on the application of the rules of corporate governance defined by the Board of Directors and make sure of the information given to the shareholders on this topic;
- prepare the evaluation of the way the Board operates provided for by the internal regulations;
- examine issues of ethics that the Audit and Accounts Committee, the Board of Directors or its Chairman may decide to refer to it;
- ensure the proper functioning of the governance bodies and in particular the transmission of information requested by independent directors;

- assist, at their request, the Chairman and the Chief Executive Officer in their dealings with independent directors, and be the instrument of dialogue aimed at preventing potential situations of conflict on the Board.

**The Remuneration Committee**

**Pursuant to the internal regulations, the purpose of the Remuneration Committee is to:**

- examine the performance and all the components of remuneration including stock options, or other forms of deferred remuneration, pension plans and, in general, the conditions of employment of the Chairman and Chief Executive Officer or both the Chairman and the Chief Executive Officer as well as the Senior Executive Vice-Presidents and make the corresponding recommendations to the Board of Directors;
- propose, where applicable, the remuneration of the Vice-Chairman or Vice-Chairmen;
- examine the remuneration and retirement policy applied to Executive Management and in particular the Executive Committee;
- examine the proposals by Executive Management concerning the granting of stock options and other incentive systems related to the share price to other Group employees and propose their granting to the Board of Directors;
- examine and propose to the Board of Directors the allocation of Directors' fees among Board members.

For more information, refer to the section entitled "Corporate Governance" in the Reference Document available on our website [www.airliquide.com](http://www.airliquide.com) or by request.

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## Executive Management and Executive Committee as at January 1, 2010



**A • Benoît Potier**

Chairman  
and Chief Executive Officer  
Born in 1957 – French

**B • Pierre Dufour**

Senior Executive Vice-President  
Born in 1955 – Canadian

**C • Jean-Pierre Duprieu**

Senior Vice-President  
Born in 1952 – French

**D • François Darchis**

Senior Vice-President,  
Engineering and Construction,  
Research and Technology  
Also supervising the Industrial  
Merchant, Electronics  
and Healthcare  
World Business Lines  
Born in 1956 – French

**E • Jean-Marc de Royere**

Senior Vice-President,  
Asia-Pacific  
Born in 1965 – French



F

G

H

I

J

K

**F • Fabienne Lecorvaisier**

Group Vice-President,  
Finance and  
Operations Control  
Born in 1962 – French

**H • Guy Salzgeber**

Vice-President,  
Northern  
and Central Europe  
Born in 1958 – French

**J • Michael J. Graff**

Vice-President, Americas  
Also supervising Safety  
and Industrial Systems  
Born in 1955 – American

**K • Mok Kwong Weng**

Vice-President,  
North-East Asia  
Born in 1953 –  
Singaporean

**G • Ron LaBarre**

Group Vice-President,  
Large Industries World  
Business Line  
Born in 1950 – American

**I • Augustin de Roubin**

Vice-President,  
Southern and Eastern  
Europe (including  
France)  
Also supervising  
Welding and Diving  
activities  
Born in 1953 – French

# Singular ambition, singular strategy

## Singular ambition

In early 2008, the Group set out a clear vision: to be the recognized world leader in its industry. Two years later, despite a damaged business environment, following an unprecedented economic slowdown that affected the entire world, Air Liquide remains on course for long-term development and reaffirms its ambition. More than size and revenue, its leadership is evident in the vision shared by its entire workforce:

- **To be no. 1** means opening doors to new markets before the competition by extending geographic and technological boundaries.
- **To be no. 1** means advancing the industry by bringing new, innovative solutions to our customers, and acting in a socially responsible manner.
- **To be no. 1** means being capable of maintaining strong operational and financial performance over the long term.
- **To be no. 1** means having a vision for the company's future, its employees, its customers and the shareholders who place their trust in us.

## Singular strategy

As needs change and the world evolves, Air Liquide must seize new opportunities related to the rise of emerging economies, the growth of energy and environmental sectors, and the rapid development of health and high technologies. For this reason, Air Liquide has developed an ambitious strategy aiming at long-term growth. In a time of transformation for the world and its markets, the goal is to maintain the momentum gained within the framework of ALMA, the strategic company program.

To achieve this goal, ALMA focuses on **four strategic themes**:

- Build leadership positions in five regions demonstrating dynamic growth: China, Russia, India, the Middle East and Latin America.
- Reduce the cost base by combining its efficiency program with technological competitiveness.
- Develop an applications portfolio in new market segments.
- Train and develop a new generation of talents.

In doing so, ALMA will enable the Group to hold its course for long-term development around its five growth drivers that are maintaining their potential: Energy, the Environment, Health, High-Tech, and Emerging Economies. This will return the Group to its path of solid and sustainable growth once the economic environment has stabilized.

# ALMA, our strategic company program

## ALMA, a strategic medium-term lever

To enable itself to achieve its ambition, Air Liquide launched ALMA, its strategic company program, in early 2008. Objectives include accelerating the Group's growth and continuing to improve its competitiveness in the years to come. The medium-term program relies on seven projects: **three delivery projects** that directly improve performance and **four transformation projects** designed to spur the development of collective and individual practices serving the Group's goals and ambition.

## Our ambition: to be the recognized world leader in our industry



### 3 DELIVERY PROJECTS

**CAPITAL** Reduce the capital intensity of investments while maintaining a profitable return on capital employed (ROCE) of 11-12%.

**GOAL** Identify cost reductions totaling €600 million in efficiency gains between 2008 and 2010.

**GROWTH** Drive development to accelerate medium-term growth.

### 4 TRANSFORMATION PROJECTS

**INTEGRAL** Share a common Group culture.

**HR DEVELOPMENT** Improve skills, train, recruit and develop company loyalty.

**ALLEGRO** Promote understanding of the Group's expertise and strategy and develop an image in line with the new ambition.

**BUSINESS MODELS** Create value by adapting and optimizing economic models used by the Group.

# ALMA, a frame of reference to better adapt to the 2009 context

In late 2008, the Group found itself faced with a new environment of low global industrial production. ALMA, which had been in place since the beginning of the year, proved a decisive asset for minimizing the impact of the economic crisis and adapting to this unparalleled context. Since the processes of company transformation were already underway – including rethinking internal organization methods, mobilizing energies and launching transversal projects – teams could more easily focus their efforts on the priorities defined for 2009: improving efficiency and strengthening the financial position. The 2009 “Cash, Costs, Capex” (“3Cs”) action plan was launched.

- **“Cash”** aims to improve cash management – both receipts and disbursements. Over 500 projects were identified throughout the Group, in areas such as customer credit, supplier payment and inventory. In 2009, the action plans that were subsequently implemented contributed significantly to debt containment and to reducing the Group’s working capital requirements.

- **“Costs”** strengthens the Goal efficiency program through strict management of day-to-day expenditures. Initiatives targeting various structural operational costs, such as logistics, industrial efficiency, general expenses and purchases, which were undertaken in 2009

produced decisive results. Changes in procurement policy were particularly successful: the introduction of a new organization based on geographic platforms, process streamlining and the professionalization of teams cut expenditures. With €335 million in efficiency gains in 2009, the Group surpassed its goal for the year.

- **“Capex”** comprises a number of initiatives aimed at increasing investment selectivity. The Design-to-Cost engineering program and the introduction of an industrial asset management program (that enables, for example, emerging economies to purchase excess cylinders or stock from subsidiaries) helped limit investments to a maximum of around €1.4 billion for 2009. ■



François Darchis  
Senior Vice-President

## Two years after its launch, what is the current status of the ALMA strategic program?

The program was initially launched to accelerate growth in promising economic times, but the Group had to quickly revisit its priorities to deal with the crisis in 2009. Although medium-term goals remained intact, several important precautionary measures were taken.

We also decided to adapt our projects and concentrate our efforts on managing cash, costs, and capex (“the 3 Cs”).

Furthermore, we successfully maintained initiatives that will prove essential to our transformation, like the Air Liquide University, reinforcing internal communication, the BLUEBOOK and its 12 key Group policies, and the formalization of our business line economic models.

## How has ALMA helped the Group minimize the effects of the crisis?

Thanks to ALMA, the Group’s teams were prepared and ready to react. ALMA helped managers respond appropriately and face challenges head-on. That’s the real strength of this program: it enabled us to manage external impacts of the crisis internally, to continue operating in an uncertain world, and to cope with disruptions. There’s no doubt that ALMA is the reason we were so successful in minimizing the impact of the crisis, while maintaining our growth dynamic!

# ALMA in 2010 and beyond....

## 2010: a year of transition

2010 should serve as a transitional year, in which the world will progressively recover from the recession. In this context, Air Liquide remains firmly committed to its ALMA strategic program. The Group will exercise caution regarding the first two components of its 2009 "3Cs" plan – cash management (Cash) and cost control (Costs) – while pursuing a cost-efficiency goal of over €200 million for 2010. In parallel, a greater emphasis will be placed on business trends to accompany the upturn. The year should thus see the start-up of a record number of new units (currently 20 projects) and the signature of new contracts rooted in a portfolio of solid and promising opportunities. In this way, the Group will pursue its industrial investment strategy in order to pave the way for tomorrow's growth. Furthermore, each business line will reexamine its markets

in light of post-crisis changes and identify new opportunities, in terms of both business sectors and geographical areas. At the same time, Air Liquide will continue to carry out transformation projects initiated in 2009, such as the further development of Air Liquide University and strengthening managers' commitment to communication with their teams.

## A new vision for 2010-2015

The crisis brought about a whole new environment with economic and societal changes. In 2010, Air Liquide will strive to analyze and understand these profound changes, which will lead the Group to redefine its priorities and update its medium-term goals. To accompany this transition, Air Liquide will revisit its ALMA strategic program, outlining its objectives for the period between 2010 and 2015. New projects will be defined

and drawn up throughout the second half of 2010, and the year will serve as a benchmark for measuring future progress. ALMA's reinforcement will focus on two essential components: "listening" and innovation. The focus on listening to our customers aims for even greater attentiveness to their expectations and a better ability to anticipate their needs and new market trends, so as to position Air Liquide as a true partner for the long term. Accelerating innovation requires additional R&D investment programs, in order to offer ever more innovative technologies. By uniting the efforts of all, this new vision – consistent with the nature of the contracts and markets in which Air Liquide operates – will help intensify the momentum gained in early 2008 with the launch of ALMA. A new chapter is now beginning for ALMA. The program will emerge as a veritable springboard for meeting the challenges of tomorrow. ■

●● We remain confident in a gradual return to solid growth in mature economies and dynamic growth in emerging economies. Thanks to our ALMA strategic program, our teams are more committed than ever to our ambition of becoming the recognized world leader in our industry. ●● **Benoît Potier, Chairman and CEO**

# A new image for a new ambition

The primary goal of Allegro – one of the seven ALMA projects – is to align the Group's image to its ambition. Its priorities: to increase the Group's attractiveness, attract new shareholders and help motivate employees.

## 1 Increasing Air Liquide's attractiveness around the world

In a competitive environment, gaining recognition as the world leader is a real competitive advantage in a number of fields, including sales, technology and recruitment. The challenge is even greater for Air Liquide, as a large part of its future growth will come from markets and countries where the "brand" is not yet widely known. Furthermore, while the Group benefits from an excellent management reputation, its businesses, capacity for innovation and contribution to major societal issues are still not well known.

With Allegro, Air Liquide has decided to breathe new life into its communications giving voice to the positive

momentum that ALMA brings to the Group. The goal is: to increase Air Liquide's brand recognition and attractiveness around the world.

To do this, the Group is highlighting its visionary spirit and ability to develop innovative technologies and sustainable solutions that enable progress and preserve life. Great attention has also been paid to the consistency of messaging and communications efforts around the world. *"In a Group as diversified as ours in terms of its offers, customers and geographic locations, we need to speak with a unified voice and deliver consistent messages,"* emphasizes Anne Lechevranton, Vice-President, Group Communications.

This is achieved by defining a platform of key messages to help employees in their role as ambassadors. Communications have also been amplified by an increase in media operations. Greater visibility has also come through involvement in memorable international events like the Nissan road show for the launch of its new hydrogen vehicle, participation in the Copenhagen Summit and numerous initiatives in the Health sector—each providing an opportunity to promote the Group's innovation and commitments. ■

## 2 Attracting new shareholders: Air Liquide, much more than a share

Individual shareholders make up the largest portion of the Group's shareholding community, currently holding 38% of capital. Air Liquide is pursuing an active campaign to increase the number of individual shareholders. To achieve this goal, the quality and transparency of information given to its shareholders are essential. First of all, the goal is to simplify things for shareholders by providing clear and precise information, while continuing to develop their interest in Air Liquide. This is done by preparing informative communications on the Group's businesses and strategy, and explaining the growth potential associated with the five drivers.

Communications have thus found a new dynamism while conserving every element appreciated by shareholders over many years. Emphasis was placed on strengthening exchange and dialogue through a dedicated Shareholders Reception Lounge, themed debates and meetings, a new design for the Shareholder's Guide, the new *interactions* newsletter, more pedagogical material included in the Annual Report and the Reference Document. These initiatives that strengthen relations with shareholders have been applauded by the financial community, which awarded Air Liquide with the Grand Prize for Corporate Governance and the Shareholder Democracy prize in 2009. ■

# 3 Mobilizing teams

All over the world, employees need to understand Group strategy and be able to identify the ways in which they can contribute individually to the success of the ALMA program. In this context, managers have a key role to play in translating global objectives into local priorities and actions for their teams.

This is one of the three goals of the Allegro project. Since 2008, emphasis has been placed on understanding the ALMA program's objective, through education and discussion. To this end, "ALMA Workshops" were organized within each of the Group's subsidiaries.

More than 1,500 managers participated in these discussion workshops. In small groups of 5 or 6 participants, they were able to reconstruct and adopt the strategic messages in a collective and convivial way, thanks to a "learning map" touching on ALMA's flagship themes: ambition, objectives, markets, environment.

The goal is twofold: to ensure a shared understanding of the challenges Air Liquide faces in its various activities around the world and to make each manager a "spokesperson" for the strategic company program among his or her teams. ■



**Q&A with Jean-Baptiste Salles**  
General Manager of Air Liquide Morocco

**How were the ALMA workshops organized in your subsidiary?**

The dynamic created by the workshops convinced me to have the majority of employees participate in Morocco. Over six half-days, 150 people – managers, as well as supervisors and other employees – took part in the workshops and reflected on key ALMA work themes within our subsidiary. How should we handle change, and how should we develop skills, practices, and behaviors? These were just some of the fundamental questions that led to constructive discussions. The human and managerial impact of these workshops was profound, especially in terms of identifying training needs.

**As a manager, how did it help you mobilize your teams?**

Sessions that centered on learning, dialogue and transparency were wonderful opportunities to discuss and share points of view. They helped me in my role as General Manager to better understand employees concerns in the context of the worldwide economic slowdown in 2009. The workshops came at the right time to reassure teams of the Group's solidity and reinforce their confidence in the pursuit of growth at Air Liquide Morocco. ■



**Opinion of Mounia Otari**  
Internal Communications

*"I greatly appreciated the ALMA workshops, which were very fruitful for us all. They helped us better understand and utilize the ALMA program. We are now ready to meet the same challenge as all Air Liquide employees: to make our Group the recognized leader in its industry."*

# Good governance: an antidote to the crisis



## Collecting Air Liquide values in the BLUEBOOK

**The Air Liquide BLUEBOOK was made available to all of its employees in late 2009. An easy-to-access and user-friendly tool, this reference document offers a uniform structure, cohesive content, and a clear overview of major rules that apply throughout the Group.**

Air Liquide set a strict scope for its BLUEBOOK, which to date covers the Group's twelve major policies, each having an identified manager (e.g., Finance, Human Resources). Each manager drafted a synthetic, federative document that outlines the major principles of the associated policy.

BLUEBOOK policies may include codes of conduct (to ensure behavior adheres to

existing regulations), procedures (operational guidelines to follow) and reference documents (practical guides).

The Group will devote 2010 to helping employees understand and apply this reference document. The BLUEBOOK is also designed to evolve over time, as new policies are added and existing policies are revised. ■

## THE 12 BLUEBOOK POLICIES

- SER (Social and Environmental Responsibility)
- Risk Management, Internal Controls and Audit
- Legal
- Finance
- Operations Control
- Innovation and Intellectual Property
- HSE (Hygiene, Safety and Environment) and Industrial Management
- Human Resources
- Communication
- Procurement
- Information Technology
- Energy Management System



## Codes of conduct: ethics without orders

**Instead of requiring its entities to adopt a single Group code of conduct, Air Liquide prefers to lay out ten key themes to be included in all codes of conduct and adapted to local contexts.**

By allowing subsidiaries to address ethics on their own terms in an effort to respect local customs and ways of doing business, Air Liquide has committed to a long-term process. So far, 69% of entities have adopted a code of conduct. By late 2010, an ambitious objective aiming for 80% of entities to be involved in drafting a code of conduct should be achieved.

The major topics treated by these entity codes of conduct are supplemented by thematic codes, which clarify subjects that apply to specific groups. This is the case of the anti-corruption code of conduct, which will help employees, as representatives of Air Liquide, acquaint themselves with basic information on anti-corruption legislation and take the steps necessary to respect these criteria. ■

## Ethics Officer

In late 2007, in line with Air Liquide's Principles of Action, a Group Ethics Officer was named. Associated with the Control and Group Audit Department, the Ethics officer aids in ensuring that Group ethical values are respected, while helping draft and implement codes of conduct and anti-corruption.

Should a fraud or discrepancy occur, the Ethics Officer intervenes to help ensure that the treatment of any such situation remains in line with Group values. The Ethics Officer also works with the concerned entity, and other entities, to correct any possible internal weakness that leads to the problem. ■

2010 Objective: 80%  
That's the share of entities expected to have written and adopted a code of conduct.

## Independent, professional Directors

Air Liquide has undertaken major efforts to increase transparency concerning its Directors: disclosure of detailed personal information, curriculum vitae, term start and end dates, their position on concurrent terms, and criteria of independence. The Board of Directors is diverse and balanced, representing a range of experiences, nationalities and cultures: a true value added for the Group. Members are chosen for their skills, integrity, open-mindedness, and commitment to take into account the interests of all shareholders.

In 2009, 16.7% of the Directors on Air Liquide's Board were women (compared to 9.1% in 2008), while the average for major listed companies is 8.8%. Over the past few years, Air Liquide has also made important advances in the transparency and participation of its Board of Directors. With an attendance rate of 95% – one of the French stock market index CAC 40's best – Air Liquide Directors are breaking records. ■

For further information, consult the 2009 Reference Document, available at [www.airliquide.com](http://www.airliquide.com) or by written request.





**Anne-Laure Martinon – Shareholder Services (France)**  
Air Liquide’s Shareholder Services, it is 25 people working every day to welcome and assist you, or even explain taxation of your shares and asset transfers. It keeps you informed in a regular and transparent way through a number of publications and electronic media.



SHAREHOLDERS

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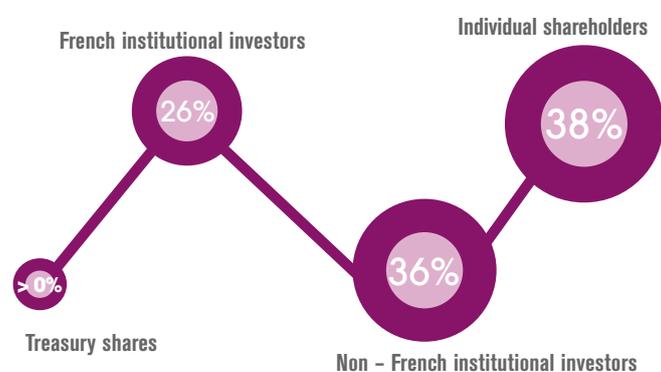
SEEING  
LONG TERM

# Shareholders, an asset to Air Liquide

For many years, individual shareholders and institutional investors have supported Air Liquide's development and growth in a relationship built on trust. Today, the balance of its shareholder base reflects Air Liquide's consideration for all of its shareholders.

## A BALANCED SHAREHOLDER BASE

SHARE OWNERSHIP AS AT DECEMBER 31, 2009



**410,000 individual shareholders** represent 38% of capital.

**32% of capital is held in registered shares** and 68% is held in bearer shares.

At the end of 2009, **the portion of capital held by current and former Group employees was estimated at 2%.**

1.4% of this capital (according to article L.225-102 of the French commercial code) corresponds to shares registered by employees in the framework of capital increases reserved for them or held within a framework of collective management.



## Interview

Laurent Dublanquet – Director of Shareholder Services

**The relationship we have with our shareholders is made to last on the long term.**

### How do you explain the balanced allocation of Air Liquide shares?

We've always considered individual shareholders as prominent stakeholders. We strive to maintain a balance with institutional investors by encouraging the development of individual shareholders, so that their share of company capital remains significant.

### With 38% of the company's capital, individual shareholders play an important role.

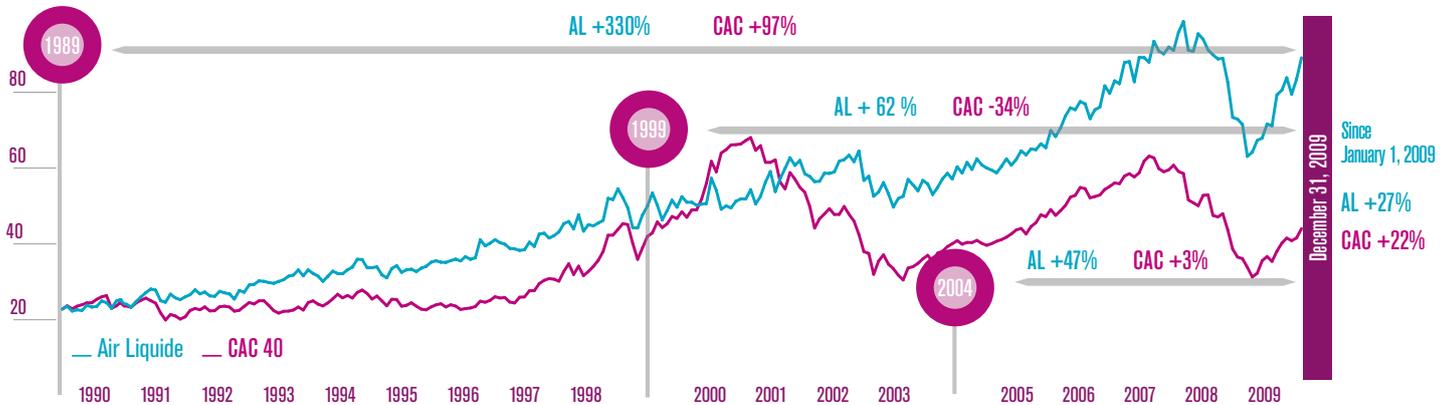
Indeed, that's nearly four times the average of other CAC 40 companies. This ratio is the result of an historic, unique and privileged relationship that we have built with individual shareholders over time. Through their vote at the Annual General Meeting, they hold considerable sway. For this reason, we invite them to express their views and take part in the company's decisions.

### Why are shareholders so loyal to Air Liquide?

It's true that individual shareholders have accompanied and supported the Group's strategy since its creation and initial public offering in 1913! There is a natural harmony between Air Liquide's development model, which is focused on the long term, and shareholders' quest for a sustainable and reliable return on their investment.

A LONG-TERM POTENTIAL STOCK

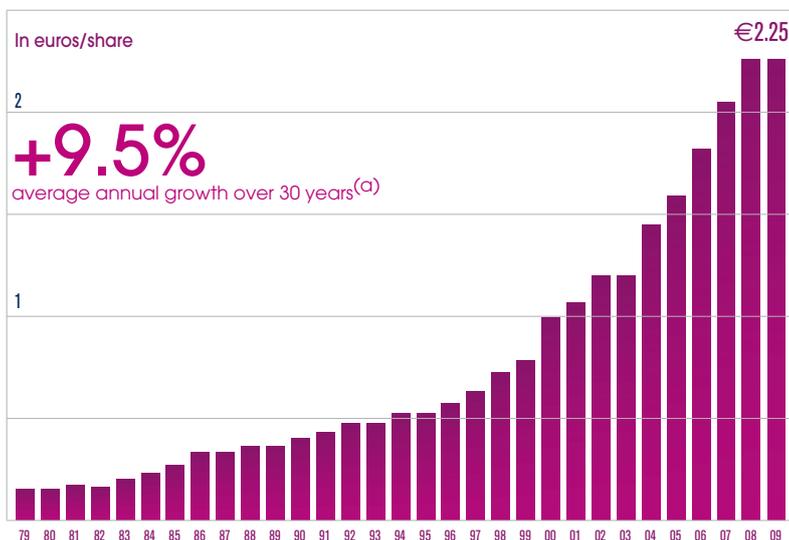
AIR LIQUIDE OUTPERFORMS THE CAC40



Over 5, 10 and 20 years, Air Liquide’s stock has recorded stronger growth than the average of the 40 companies that make up the CAC 40 stock market index.

STEADY DIVIDEND GROWTH OVER TIME

The dividend is set at the Annual General Meeting after approval of the year’s financial statements and profit allocation.



DIVIDEND PAID IN 2010:

**€2.25**  
per share

**49.5%**  
of net profit distributed

(a) Dividend adjusted to account for the allocation of bonus shares and stock split. Data is calculated over a period of 30 years, according to the accounting standards in force at the time.

# Make yourself at home



## COME AND SEE US



### SHAREHOLDERS RECEPTION LOUNGE

75, quai d'Orsay  
Paris 7<sup>th</sup> Arrondissement  
Open Monday through Friday  
from 9:00 am to 6:00 pm (GMT+1)

#### Access

- By commuter train – RER C, Pont de l'Alma station
- By metro – Invalides or Alma-Marceau stations
- By bus – # 42, 63, 80, or 92, Bosquet-Rapp stop
- By car – pay parking La Tour-Maubourg

## MORE COMMUNICATION

Shareholders Services, it is 25 people working every day to welcome and assist you, or even explain taxation of your shares and asset transfers. It keeps you informed in a regular and transparent way through a number of publications and electronic media.

Our advisors are available Monday through Friday at the Shareholders Reception Lounge, opened in 2008 at Air Liquide headquarters. This warm and elegant environment was designed to be an information and exchange premise and is dedicated to Group current and future shareholders, but also to those willing to know the Group better.

### 2009 Benchmarks

**25 people** working in Shareholder Services

**150,000 calls** to the hotline

**146,000 visits** to the Shareholders section of our website

All essential information can be found in the 2010 Shareholder's Guide.

# The Annual General Meeting: a perfect opportunity to express yourself

## 2009 Benchmarks

With **5,218 participants** in 2009, Air Liquide's Annual General Meeting is still the 1<sup>st</sup> Meeting in France!

More than **500,000** Invitations sent

Nearly **150,000** voting shareholders

**9 months** of preparation

More than **450 individuals** involved in streamlining the welcome, orientation and security of shareholders and dealing with the technical issues on the day of the Meeting.



## Interview

Bérangère Falcand – Responsible for the Annual General Meeting within Shareholder Services

**We strive to offer synthetic and clear information.**

### What is Air Liquide's approach to making resolutions easier to understand?

The legal nature of resolutions can make them difficult to understand. We try to make them more accessible to shareholders by preparing a purpose summary for each resolution that explains the issues and motivation behind it. Coupled with these efforts to improve transparency, we also designed the Invitation to be more readable and informative.

### Is the Shareholders' Communication Committee involved in organizing the Annual General Meeting?

Of course. This year in particular, the Committee helped identify ways to promote the vote among shareholders and themes to address in order to anticipate their questions. One of the ideas implemented is a letter that presents the voting kit, stressing how important and easy it is to vote.

### What is the purpose of the Annual General Meeting minutes?

The minutes provide a synthesis of the speeches that highlights the major ideas and key messages from the Meeting. The entire question and answer session is transcribed because we attach great importance to discussions with shareholders during the Meeting. The minutes are automatically sent to shareholders who voted or attended the Meeting. They are also available on the Air Liquide website.

# To benefit from the loyalty bonus, opt for registered shares

Your Air Liquide shares are held by your bank



Your shares are part of a securities account or a PEA



you hold **bearer shares** (by default)



... and you don't benefit from the loyalty bonus.

Your Air Liquide shares are held by Air Liquide



Your shares can only be placed in a securities account



you hold **direct registered shares**



... and you benefit from the loyalty bonus!

To benefit from the loyalty bonus and also keep your shares at your bank, there is a simple and easy solution...



Become an **intermediary registered**

shareholder.

The amount of your dividend and the number of bonus shares allocated are increased by 10% after two calendar years. Air Liquide sends useful information directly to you.

## DIRECT REGISTERED SHARES: A SPECIAL RELATIONSHIP

When you choose direct registered shares, your shares are held by Air Liquide. You can manage your shares exclusively through Shareholder Services. You qualify for the loyalty bonus and exemption from handling and management fees.

## INTERMEDIARY REGISTERED SHARES: AN ATTRACTIVE SHAREHOLDING OPTION

When you choose intermediary registered shares, you qualify for the loyalty bonus while keeping the same securities account or PEA with your regular financial intermediary. There are no tax consequences associated with converting to this option.

### Focus

## The loyalty bonus



on the amount of dividends and



on the number of bonus shares allocated

The loyalty bonus rewards the commitment and confidence of registered shareholders.

This measure helps your investment grow over time: it is +10% on the dividend value received and the number of bonus shares allocated.

Air Liquide shareholders qualify for the loyalty bonus of their registered shares held for more than two calendar years.



## Interview

Régis Charpentier – Intermediary registered shareholder

**It's clear to me that intermediary registered shares are more advantageous.**

### How long have you held shares with Air Liquide?

For two years. Personally, I'm a new shareholder with the Group, but my family has held Air Liquide shares for generations! Until recently, my shares were held as bearer shares.

### Why did you decide to convert to intermediary registered shares?

I was convinced by those around me that this is the most advantageous shareholding option. My shares stay in my PEA, which provides a good

incentive for long-term investment, and I'll also benefit from the loyalty bonus. In addition, all information about the Group is sent directly to me by Air Liquide, which helps me share the Group's projects and values and encourages me to vote in the Annual General Meeting.

### Was the conversion process easy?

Yes, it was very simple and quick. I filled out the form and e-mailed it to my bank. The following day, I received written confirmation that my request had been processed.

### Why did you choose intermediary over direct registered shares?

With intermediary registered shares, I don't have to change my habits. I can still follow my portfolio on my usual banking website, without cumulating more contacts. My Air Liquide shares are the first that I've converted to intermediary registered, and I've seen nothing but benefits.

# A deep connection with shareholders

## Loyalty bonus and trust

**Air Liquide is one of few companies that integrates shareholder relations into its sustainable development approach. It's a wise choice, since shareholder relationships are built not only on a fair return on investment but also on transparency and dialogue.**

The Air Liquide shareholder base is a balanced mix of French (26%) and non-French (36%) institutional investors and individual shareholders (38%) – it is a strength that Air Liquide is determined to maintain. Indeed, individual shareholders are viewed as important stakeholders within the Group, on par with institutional investors. Is it difficult to satisfy these two very different groups simultaneously? Definitely not. Their interests converge in a number of areas, starting with transparency. Both are looking for the Group to provide readable, understandable information that meets their needs. Air Liquide was a pioneer on this front, publishing its first Shareholder's Guide in 1980! Since then, the Group has continued innovating to offer exhaustive, high-quality financial information adapted to different stakeholders (Annual Report, Shareholder's Guide, Letter to Shareholders, website, etc.). This is coupled with a profound desire to interact and listen through the Shareholders' Communication Committee, the Shareholders Reception

Lounge, conferences and frequent fairs with the international financial community. In short, all Air Liquide shareholders receive the same attention and care, whether they hold one share or several thousand, whether they are experienced investors or just starting out.

### A shared, long-term vision

Our shareholders' quest for sustainable, regular profits aligns with Air Liquide's own long-term industrial strategy. Since the Group relies on the loyalty of its shareholders, it strives to ensure reliable profits. The result: Air Liquide's share price has more than quadrupled in the past 20 years. Net earnings per share have followed a similar pattern at an increase of around 9% average annual growth over 30 years. Air Liquide is committed to sharing the fruits of this growth with its shareholders. Over the past 10 years, nearly 50% of net profits have been redistributed through dividends. ■



## HONOR ROLL

The following awards are testament to Air Liquide's commitment to excellence in shareholder democracy and corporate governance year after year.

- **Best General Shareholders' Meeting of the Year.** This prize recognizes the CAC 40 (French stock market index) company whose Annual General Meeting demonstrates best practices.
- **Grand Prize for Corporate Governance.** This prize honors the SBF 120 (French stock market index) stock issuers that best meet investor demands in terms of transparency and best practices.
- **Shareholder Democracy prize.** This prize focuses on access to a fair and straightforward voting process at the Annual General Meeting and the availability and distribution of information beforehand.
- **2008 Strategist of the Year** for Benoît Potier. This prize is awarded to the CEO who developed the best financial and industrial strategy during the previous year.



## INTERVIEW WITH TWO SHAREHOLDERS

### Gabriel Leylavergne is a direct registered shareholder

*"I purchased Air Liquide shares in 1994 for three reasons: the Group's reputation, the reliable performance of its share, and its resistance to market fluctuation thanks to a diverse portfolio of businesses worldwide."*

### Christine Clet-Messadi is the European Share Manager at Allianz Global Investors\*

*"We are long-time Air Liquide shareholders because of the proven strength of its economic models as well as the strong growth possibilities its businesses offer over the long term."*

#### As a shareholder, what makes your relationship with Air Liquide special?

**G.L.:** As an individual shareholder I really feel like we have, the executive team's ear. It's a feeling of transparency that appears to be shared by institutional investors.

The current Chairman and CEO is very popular and has succeeded in making the Group's policy sustainable. Since I live far from Paris, I rarely attend Air Liquide's Annual General Meetings. The one or two times I did go, I found the atmosphere to be very welcoming, with easy communication between shareholders and management.

**C.C-M.:** I agree: that it's a strong element of the corporate culture. Such a strong partnership between a company and its shareholders is rare. As an institutional investor, we enjoy remarkable access to information that's unique in the CAC 40. Recently, we wanted more details on sustainable development and new technological applications related to hydrogen and oxygen. We requested an interview and obtained a two-hour meeting with Air Liquide's Director of Sustainable Development. That kind of thing doesn't happen with every company.

**G.L.:** This sense of transparency, I find it in the information and materials made available by Air Liquide. Aside from the press, which often mentions the Group, I read the letters to shareholders, visit the website, and more. For shareholders who want to know more about the company and how it works, there are many options available.

**C.C-M.:** It's the same for us. In addition to having fairly easy access to Air Liquide's management, we also turn to the communication materials that the Group makes available to investors. ■

\* Allianz Global Investors France holds Air Liquide shares and meets Group requirements on behalf of its clients.

*"Why did I invest in Air Liquide? To build a stock portfolio for my children and grandchildren. For me, Air Liquide is a stock you hold to make it bear fruit."*

**Gabriel Leylavergne**

*"Air Liquide pursues an effective share policy that encourages strong loyalty among shareholders. Aside from growth, it's the best possible guarantee for protecting the Air Liquide capital."*

**Christine Clet-Messadi**

“We owe our shareholders professionalism, consideration and value creation.”

Benoît Potier, Chairman and CEO



**Xiao Xiao Lei on the Ain Sebaa site (Morocco)**

A Chinese national, Xiao Xiao Lei has been based in Morocco since the end of 2009 and will remain there for a total of two years. With an educational background in engineering, he is responsible for monitoring industrial efficiency projects, as well as managing Chinese customer relations. He has been given this opportunity thanks to the START program, a global Group program intended for recent graduates.





# HUMAN RESOURCES

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SEEING  
THINGS  
AS ONE

# An excellent employer

## Working toward Group strategy and supporting goals by

identifying which profiles are indispensable to the markets and regions where Air Liquide is present, while also favoring the full professional development of its employees and ensuring a good working environment: this is the mission assigned to the Human Resources Department.

Reflecting the Group's development model, which, from its inception and by the nature of its operations, is internationally oriented and open to cultural diversity, Human Resources finds strength in diverse backgrounds, nationalities and cultures. This diversity serves as a source of creativity and dynamism for the Group, which has made it a priority in its Human Resources policy.

### The company and its employees: facing the economic crisis together

In a context of severe economic slowdown, the Group was able to rely on the responsiveness and unity of its employees. In order to limit the impact of the crisis on the Group, Air Liquide had to redefine its priorities in 2009: cash management, cost control and investment selectivity. It was a necessary initiative in the short term reinforced by the long-term relationship between the company and its employees. The Group was able to count on the motivation of its teams and the commitment of all employees from every business and geographical area. This ability of employees to respond rapidly is also the sign of a strong corporate culture based on clear and shared goals. These long-term goals allow each employee to feel part of the Group's growth momentum, which is supported by its five growth drivers, that remain intact despite the economic crisis context.

**Air Liquide has formulated eight golden rules that sum up the principles of its HR policy.**

**These give each of the Group's human resources managers and professionals a clear, uniform idea of the principles and responsibilities that they must carry out on a daily basis.**

- Provide a safe and ethical working environment
- Select the right people and assign them to the right positions
- Encourage diversity
- Measure performance against consistent standards
- Develop people based on a long-term vision
- Identify, develop and recognize expertise
- Regularly train people to improve our performance
- Pay for performance and contribution





## A close relationship

To enable each employee to reveal his or her potential and express his or her career wishes, Human Resources has organized a network of correspondents by activity and geographical area. The goal is to cover all employees and organize career meetings with each employee once every 3-5 years on average.

## A perfect balance between talent and education level

The primary mission of Human Resources is to recruit men and women whose backgrounds and previous training best meet Air Liquide's development needs. In exchange, the Group must give them the means to fulfill their mission, and also reveal their full potential. More than just their background, the Group strives to take into account the human qualities and commitment of each employee. Each person is in control of his or her performance and can, with the necessary drive and ability, advance in professions and geographical areas far removed from their original training. Air Liquide thereby gives each employee the chance to apply his or her talents to other activities, change environments through a strong mobility policy and live several professional lives during their career!

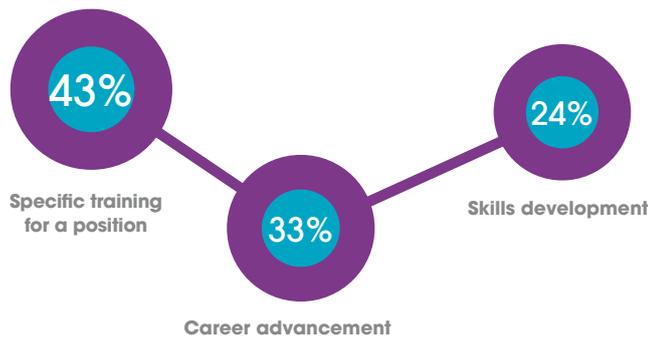
On the international level, and more specifically in emerging economies, the Group introduced several innovative tools to attract the talents needed for its development. The Group must strengthen its appeal as an international employer. The START program enables young professionals from leading universities to join the Group and begin their career on an international note. Throughout the two to three years of the program, these young graduates receive personalized evaluation and follow up. This first professional experience enables them to share Group values, better understand how it works and obtain high-responsibility positions in their home

countries. Operating on the same principle, the IIP (International Internship Program) program invites students to take part in Group Internships in different geographical areas during the summer. These internships let them discover the professions and career opportunities within the Group that are open to them upon graduation. ■

## Recruiting efforts in China

Its strong presence in emerging economies requires Air Liquide to recruit enough profiles to meet its needs. In these areas, young graduates generally receive several job offers from major companies. Air Liquide must, therefore, differentiate itself in order to attract these young talents, notably by strengthening its image as an excellent employer. In China, the efforts undertaken by the Group have met with success, as the number of candidates greatly outnumbers the number of positions available.

## Distribution of training days



In general, training affects over 90% of the workforce and an equal percentage of men and women.

## Fostering loyalty through mobility and training

Mobility is a strength and an essential component of the Group. Air Liquide therefore encourages the mobility of its employees, whether geographic or professional. This mobility allows each employee to explore a variety of new advances within the Group throughout his or her career. The fact that each employee's desire for advancement is taken into account whenever possible, is a key reason for the high level of loyalty displayed by the company's employees. This mobility is also encouraged by effective support for spouses, on a case-by-case basis, through the creation of a position or recourse to multi-company cooperation, if necessary.

Another central priority of the Human Resources policy is the development of training. The policy helps optimize employees' performance and encourage their full development over the long term.

In 2009, investments in matters of training surpassed 2% of total wages. To support the priorities defined within the framework of the ALMA program, training focuses on project management, human resources management and financial training adapted to the job for targeted populations. Training needs are expressed during the annual interview between the employee and his or her immediate manager. Needs are then consolidated by the Human Resources Department in charge of establishing an annual training plan.

In 2009, Air Liquide University was launched, within the framework of the ALMA strategic program. Through a training foundation common to all subsidiaries, the University facilitates the spread of common rules and best practices in fields like project management, while also explaining the fundamentals of the Group



(ambition, mission, values). This is particularly true of the orientation programs for new employees. Beyond the strict rationale of adapting an employee to a position, training plays an important role in spreading a common, shared culture.

## Diversity: a difference worth cultivating

Through its presence in over 75 countries, the variety of its businesses and the number of its subsidiaries, Air Liquide views diversity as both a reality and a strength. It's a reality because the Group's 200 corporate executives come from 22 different countries, and 85% of them have had at least some international work experience. Mobility serves to encourage this diversity of nationalities within subsidiaries. It's a strength because it notably enables managers to understand other points of view and behaviors and learn from these differences. In some countries, this multicultural dimension is externally monitored and serves as an extra-financial criterion for public requests for proposals.

Finally, the balance between men and women is an important aspect of this diversity. The commitments Air Liquide has made over the years in this field are yielding results: between 2003 and 2009, the percentage of women hired to executive and engineering positions rose from 24 to almost 30%, while 36% of these employees have been identified as high-potentials. To put this in perspective, consider that 15 to 20% of those enrolled in engineering schools are women.

Among the 200 employees constituting its "top management", Air Liquide now counts 33 women, compared with 12 in 2007. Among them, 11 hold a CEO post, versus 3 in 2007.



### Diversity in all its aspects

At 35, Simona Cristea-Floris is the International Recruiting and Development Programs Director at Air Liquide. She also won the 2009 Pierre Faure Prize, given by the *Fondation Polytechnique*, which recognizes the managerial abilities and skills of this young engineer who graduated in 1996 from the *École Polytechnique* (France).

Born in 1974 in Romania and holding a degree in Physics, Simona Cristea-Floris came to France

in 1997. She joined Air Liquide in 1999, as part of an MBA program in France (*Collège des Ingénieurs*), before being named Marketing Manager of a newly created subsidiary. She next advanced to a Development Manager position in services linked to gas with Industrial Gas Services France. In 2004, she became a Project Manager at Air Liquide Engineering, where she was in charge of air separation unit (ASU) construction projects. ■

### Adapting to disabilities to develop new potential

The integration of disabled individuals is one of Air Liquide's core commitments. On the international level, where Air Liquide counts 522 employees with disabilities (499 in 2008), the Group is leading several initiatives that are adapted to each country, according to the local, cultural and historical context. Disabilities are seen not as a difference within the Group, but rather as an element of diversity and mutual enrichment. Disabilities must be taken into account and understood in order to become an integral part of company life. The Group's goal here is the same as for all of its employees: to enable all employees to express their talents and performance, and to provide them with the means to advance within the Group.

In France, the Group has initiated a "Mission Handicap", a disability taskforce responsible for coordinating the various scheduled initiatives: assistance with internships or continuing education, job retention, improved collaboration with workplace help centers, awareness campaigns and more. Equally convinced that better integration brings diversity and equal opportunity, Air Liquide signed a corporate agreement for 2007-2009. In line with this agreement, Air Liquide will pursue its efforts in favor of disabled employees. ■

In 2009,  
70% of the workforce  
benefited from  
training.



# Cultivating and uniting talent

Skilled and motivated teams with a shared corporate culture will play an important role in the Group's future success. The ALMA program works toward this goal with two transformational projects: "HR Development" and "Integral".

## 1 Attracting and retaining the best

Air Liquide's HR Development project aims to attract top talent, provide appropriate training with ambitious objectives, and encourage long-term development with real prospects for the future. In 2009, despite an economic environment that limited recruiting, the Group saw significant need for new skills. For this reason, Air Liquide continued to develop its reputation as an employer of choice around the world, maintaining an active

presence on university campuses in Asia, Africa and Eastern Europe. Major initiatives included the Campus Management program, which established a club of campus managers to share best practices in building relationships with schools and universities (e.g., key actions, knowledge transfer, image tools, demonstration stands). These efforts help to improve the Group's visibility and attract high-potential candidates.

Air Liquide further motivates its employees by rewarding technical expertise. Over 1,000 specialists have been identified from among the Group's various businesses for advancing technology and supporting change within the organization (e.g., innovation management, skills and knowledge transfer). Finally, 2009 saw the creation of Air Liquide University, which spearheads the Group's learning programs. ■

## 2 Creating a strong, shared Group culture

In a world of constant change, the Group must continually push its boundaries and integrate new employees from diverse backgrounds. Now, more than ever, it's crucial that Air Liquide define its values and develop a common culture. The Integral project, which got underway in 2009, does just that. In addition, the BLUEBOOK provides a reference for the Group's policies. This document gathers and lays out Air Liquide's expectations for subsidiaries on major cross-cutting issues like innovation, the environment, safety and risk management.

It's a governance tool that also helps spread corporate culture. Finally, Air Liquide University has developed two on-boarding programs to introduce new employees to the Group, its businesses, and the way it operates. This approach ensures quicker, more efficient integration of new hires and helps to spread a company culture across borders and throughout the entire organization. ■

# Improving performance

Air Liquide University, created in 2009 as part of the ALMA project, has two objectives: to develop and implement cross-functional training programs and to provide a common reference point for all of the Group's training and development programs. In addition to transferring and sharing knowledge, the University supports the Group's strategic priorities. It helps to spread Group culture and to develop manager networks across businesses and borders.



**Q&A with Edith Lemieux**  
Director of Air Liquide University

**What is the focus of the University's curriculum?**

The curriculum centers on four themes: integrating new employees, developing managerial skills, mastering business models, and strengthening core areas like project management, finance and safety.

**How does the University operate?**

Consistent with the rest of Air Liquide, the University operates using a decentralized model in the Group's three main geographic areas. Subsidiary training managers organize most courses, which are delivered locally, close to the trainees.

The University was inaugurated in October 2009, with more than 300 participants in the first few months. In 2010, we've set an ambitious goal of training 3,000 employees.

**What are your priorities?**

In the current environment, we're emphasizing financial skills development and managerial effectiveness, in addition to on-boarding programs for new hires. The University has also launched several initiatives aimed at improving our training offering, including forums for sharing best practices and e-learning modules on various subjects (e.g., on-boarding, professional development, languages). ■

**Positive feedback on the LAUNCH program**

The LAUNCH program (on-boarding) aims to introduce new employees to the Group's businesses and activities. An initial pilot program in West and Central Africa in June 2009 was an unequivocal success. *"The course is mandatory for all managers. For new employees, it's a full introduction to the Group's activities. For long-time employees, it's a useful refresher course,"* explains Hanne Samba Sall, HR Director for Africa. *"Understanding the company we work for is essential if we want to build a real Air Liquide culture based on shared Group values."* Marie-France Durandière, a young manager who took the training course, shares this enthusiasm: *"The seminar was thorough and inspiring. It provided me with a bird's eye view of the Group and a chance to interact with my colleagues from other countries and see what's happening outside my subsidiary. You can't help but be proud to work at Air Liquide!"* ■

# Health and Safety: a deeply rooted culture



## Q&A with Michael Graff

Member of the Executive Committee,  
Vice-President, Americas  
Also supervising Safety and Industrial Systems

**For Air Liquide, continuous and lasting improvements at the workplace about health and safety for employees and partners are a top priority. The Group pursues an ambitious target of “zero accident”.**

**How is the Health and Safety policy rooted in the Air Liquide culture?**

Health and safety have been part of our vocabulary for many years. Among other things, the Group strives to strike the right balance between rules and requirements, on the one hand, and the freedom for employees to act and take initiatives on the other. The Air Liquide goal is to achieve “zero accident” among employees, as well as contractors, customers and patients.

**How is the policy implemented?**

Currently, three initiatives stand as pillars of continuous improvement for the Group. The first is management’s visible commitment – at the Group level and across all entities – to health and safety through the Safety First program, which has been in place for over 25 years. The second is the IMS (Industrial Management System), a structured system for managing industrial operations that was implemented across all Group entities in 2005. Preventative and proactive, the IMS ensures continuous improvement in health and safety, the environment and the reliability of our product supply for customers. The third

and final initiative involves strengthening the Group health, safety and risk management culture. More than rules and a management system, it is the commitment, motivation, actions, behavior and mindset of individuals in their daily work that helps Air Liquide excel in this area.

**What were the highlights of 2009?**

First of all, Air Liquide launched a new communication campaign with the slogan: “think SAFETY, act SAFELY”. The Group also strengthened a number of initiatives to improve management of risks linked to our processes, including accident risk analysis in plants, identification of Elements Important for Safety (EIS) and other initiatives aimed at improving the operational management and maintenance of these elements. As a result of those efforts, the accident frequency rate continues to decrease, both for Air Liquide personnel and for our contractors.

**What are the Air Liquide priorities for 2010?**

Above all, the Group is focused on continuing efforts to reduce the number and frequency

rate of accidents among our employees and contractors. We plan to achieve this objective through concrete actions in the workplace and by continually motivating our employees. Other priorities include comprehensive training programs for all levels developing skills critical to industrial risk management and sharing lessons learned across our global operations. We have focused on two measures in particular: improving the quality and scope of accident and near-miss reporting, and ensuring in-depth analysis and systematic communication of significant events throughout the Group. During IMS audits, we will pay special attention not only to compliance, but to the effectiveness of our management system and the collection of best practices for continuous improvement. I will end by mentioning how important it is for employees to remain motivated when it comes to health and safety. At Air Liquide, we feel safety is a commitment, a commitment shared by all of our employees, to assure that we meet our customers and patients needs in a safe and environmentally responsible manner. ■



## An approach shared with contractors

**The Health and Safety goals identified for contractors are the same as those pursued within the Group, both in terms of safety performance and continuous improvement.**

The demand for a uniform Health and Safety policy stems from the desire to develop a strong culture within the Group. Indeed, the Group takes as much interest in the Health and Safety of its partners' employees as its own. Many of these individuals have worked with Air Liquide for years, and have formed strong working relationships with Group employees. The Air Liquide perspective is that they all belong to the same team. It is therefore vital that they share the same attitudes as their colleagues when it comes to safety.

Several tools are available to carry out this policy, beginning with Behavioral Safety Visits (BSV). Safety criteria are systematically used in the selection of partners, and contracts must specify health and safety requirements in detail (e.g., skills and training programs, protective equipment). The Group also organizes regular meetings with its partners' management. Advantages of this approach include the chance to get to know one another, reaffirm the importance of health and safety, clarify Air Liquide expectations, share best practices and lessons learned and identify common and complementary health and safety initiatives.

Thanks to the improved reporting of the accidents occurring at contractors' sites since 2008, the Group now has a reliable indicator to measure progress, as well as the information it needs to implement effective preventative measures with its contractors. ■

### FOCUS: TONG LIHUA, CHINESE RMR

**I have been working with Air Liquide for nine years. I became a Risk Management Representative (RMR) at Air Liquide China in May 2005 and a Group International expert in 2009. My office is in Shanghai.**

My job is to identify and assess risks and to approve mitigation measures for all of our projects and facilities in China, based on the Group safety, health and environment procedures. Risk management is a "new territory" for our new employees, so all staff – even marketing and sales employees – receive risk management training.

The risk management process begins upstream with a review of all aspects of the project, from customer specifications and project organization to operation. In 2009, we analyzed and assessed 39 large-scale projects and 300 smaller ones.

The challenges to overcome are numerous: starting up new projects with various customers, developing business in new territories, and pipeline construction. Plant size is increasing, along with pressures and expectations regarding quality and reliability. All of these factors result in complex risks. We need to develop new mitigation action plans and strengthen skills through local hiring and transfer of knowledge sharing across the Group.

Our work here also serves the Group as a whole. To make our small H<sub>2</sub> and O<sub>2</sub> production units more competitive, we developed a local supply and equipment process that was upgraded to meet Group standards and validated after risk analysis. The process has since helped other Air Liquide subsidiaries win projects in India, South Korea and the Philippines. ■



### THE SAFETY CAMPAIGN

Air Liquide aims to develop a strong culture of safety that engages employees, with a slogan that highlights the importance of individual effort and encourages them to "think SAFETY, act SAFELY". The campaign originality lies

in its modern tone, fresh colors and activity kits for entity managers. By raising awareness and renewing messages, the campaign should contribute to the continued decline in the number of accidents.



**Valérie Bortot – Advanced Technologies (Sassenage, France)**

Cryogenics and hydrogen energy top the Advanced Technologies list of priorities. To address challenges in these areas, it relies on its own skills and expertise and supports Air Liquide's development strategy, particularly in the fields of energy and the environment.



**INNOVATION**

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SEEING  
WITH FRESH  
PERSPECTIVE

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# Innovation within Air Liquide

Innovation is one of Air Liquide's fundamental values. Within the Group, a pool of some 1,000 researchers of 30 nationalities join their talents to develop the innovations of the future. Together, they design cutting-edge solutions for the health, environmental, IT and communication sectors. Every day, they help accelerate the Group's growth and optimize its industrial practices, while also defining the shape of tomorrow's world.

At Air Liquide, innovation is composed on the one hand by Research and Development and on the other by the Advanced Technologies Division (DTA). However, Group innovation requires the efforts of all.

## An open, adaptable skill set

Innovation combines several components that interact and operate in total synergy. The World Business Lines, bringing together Healthcare, Large Industries, Electronics and Industrial Merchant, are heavily involved in R&D because they help define work programs. In addition, a network of players intervenes in close collaboration on topics ranging from modeling and product industrialization to market placement.

ALTEC is part of this process. This Air Liquide entity is organized like an internal service provider from which countries and customers may request specialized expertise or technical execution.

For several years, Group innovation has integrated two new concepts: open innovation, where a dedicated R&D team watches over new technologies and develops partnerships with innovative start-ups; and field innovation, which draws ideas from contact with customers. In the end, Air Liquide benefits from an innovation ecosystem that is sufficiently open and adaptable to react and even anticipate technological changes to any of the elements in the chain.

## Eight main R&D centers

R&D relies on eight research centers located in France, Germany, the United States and Japan. They cover fifteen research domains, whose strategy is defined in conjunction with the World Business Lines, then articulated into projects. These projects are then distributed among the R&D centers, based on centers competences and customer demands (electronics in the United States and Japan, photovoltaics in France, etc.). This organization of Group R&D into large projects allows for long-term work on certain subjects, and also for a proactive approach to integrating new technological advances related to the R&D centers. The research also relies on satellite teams who work directly on customer sites or with operational subsidiaries of the Group.

The R&D teams focus their efforts on three major themes: a sustainable environment (reduction of CO<sub>2</sub> emissions, new energies), a communicating world (electronics) and a healthier life (new therapeutic gas applications, inhalation therapies). In order to use all their assets, the teams remain in close, constant contact with approximately 100 academic research laboratories around the world and interact directly with privileged industrial partners. Their goal: to constantly improve gas production technology, develop new applications and services, and help the Group benefit from all their technical expertise.

## Successful integration of Lurgi

The 2007 acquisition of the German engineering company Lurgi, one of the world leaders in processes for producing hydrogen, synthesis gases and biofuels (bioethanol, biodiesel), helped Air Liquide double the size of its engineering operations. This operation opened new perspectives for Group R&D in three fields: natural gas reforming, gasification and biofuels, especially second generation biofuels, whose production requires the provision of large quantities of oxygen and/or hydrogen.

Two years later, the Frankfurt Research and Technology Center (FRTC) is perfectly integrated into R&D, with teams highly involved in core industry projects. The researchers feel fully committed, thanks in large part to the Technical Career Ladder, which currently needs several key skills in line with the technologies provided by Lurgi. From now on, R&D will be spurred on by exchanges between the employees of the Frankfurt research center and those of other research centers in France and the United States.

## Cryogenics and Hydrogen Energy on the agenda

The other driver of Innovation, Advanced Technologies develops tomorrow's technological solutions. It has a unique know-how in cryogenics and gas applications, especially regarding very low temperatures, high-purity and high-pressure gases.

It carries out high-tech projects and contributes to opening new markets buoyed by its deep innovation culture, its experience in international cooperation projects and its ability to test and market high technological value-added solutions.

### Q&A with Andreas Ochs

Director of the Frankfurt Research and Technology Center (FRTC)

#### What role did you play in the FRTC integration?

FRTC was the R&D department of Lurgi, an engineering company acquired by the Air Liquide Group in July 2007. My role was to integrate it into the research centers network of Air Liquide. More precisely, I worked on the transfer of people and assets and coordinated our activities with the Group's. It was quite a challenge to manage this transformation while allowing our researchers to continue their work!

Within this network, we bring specific skills and, sometimes, a slightly different approach to Research and Development, thus making this network even richer.

#### How did the integration process go?

The changeover went smoothly. We all feel comfortable at Air Liquide. The Group is looking for new talents and they take people development seriously. They truly value people.

#### How has the integration affected FRTC?

Air Liquide is a very professional and result-oriented company. It knows its strengths and does what it says. It's impressive! We're proud to be onboard the Air Liquide ship. We can exchange ideas and network with other scientists and engineers. It gives us more visibility. And we feel recognized because our work is meaningful and beneficial to the Group. The general outlook is positive: new opportunities are coming along and we have a solid base to meet them.



## Benchmark

More than **60%** of R&D budget is dedicated to environmental issues (saving energy, producing gases through cleaner solutions, developing tomorrow's energies), and protecting life.

### Innovation serving H2E (Horizon Hydrogen Energy)

Hydrogen constitutes one of the solutions for addressing on the short term the challenges of sustainable transportation (reducing greenhouse gases, local pollution in cities and reliance on fossil fuels). Hence Air Liquide has initiated and is now coordinating an ambitious program: H2E. By 2015, it aims at building a sustainable and competitive hydrogen energy industry serving to markets for which hydrogen and fuel cells already meet the needs for energy solutions: whether stationary (mobile phone antenna relay stations) or mobile applications (e.g., industrial forklifts). These markets will support the launch of this new industry and ensure the successful deployment of hydrogen energy in transportation by around 2015, the timeframe announced for the first sales of hydrogen and fuel cell vehicles.

The R&D effort will focus on each aspect of the industry, notably the development of innovative technologies for hydrogen production based on renewable energies, for high pressure storage and for fuel cells. The program will also contribute to the set-up of a suitable regulatory framework, thus exposing the public to this new energy carrier.

H2E brings together 19 partners recognized in the field of hydrogen energy – industrial groups, small and medium-sized businesses, and public research laboratories – that will finance a large portion of the €190 million total investment, €67 million of which is financed by OSEO (the French agency supporting innovation). H2E helps accelerate innovation along a shared industrial roadmap, in line with the strategic vision of major nations committed to the development of hydrogen energy.

Air Liquide has chosen to initiate and participate in numerous demonstration projects around the world (in Europe and Canada, for instance). To coordinate these actions, the Group has implemented a dedicated organization: Air Liquide Hydrogen Energy (ALH2E). ALH2E will drive innovation projects in this field, such as the H2E program. It is also tasked with the development and implementation of an offer and a logistical organization specifically adapted to market needs, thereby preparing the Group for the introduction of hydrogen vehicles by 2015.

With ALH2E and Axane, responsible for fuel cell development, Air Liquide enjoys a unique position among gas producers.





R&D benchmarks

**€218** million  
innovation budget

**1,000**  
researchers

**8**  
Research and Development centers,  
more than 200 industrial and academic partnerships

Recognized know-how in the space industry

Air Liquide’s unique skills in very low temperature cryogenic technologies and in space, demonstrated over more than 40 years through the Ariane program, greatly contributed to the development of Planck and Herschel, the two most complex scientific satellites ever constructed in Europe.

For the Planck mission, Air Liquide successfully met an exceptional technological challenge by handling the development of a dilution cooler for the HFI (High Frequency Instrument) that achieved unprecedented performance levels. The challenges of the Herschel astronomy satellite lay mainly in the design and manufacture of a cryogenic tank. Thanks to Air Liquide’s recognized know-how in high-precision welding for space applications, an extraordinary tank with a capacity of 2,400 liters was designed.

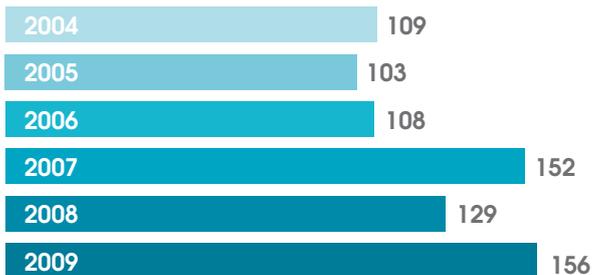
These projects constitute a new step for the Group in its collaboration with the scientific community, notably in the search for the origins of the universe.

ISIS: expertise in information systems

Within the Group, ISIS (Information Systems for Industrial Solutions) develops and implements innovative solutions for information systems in the fields of gas production and logistics. For instance, it helped reduce the mileage traveled by gas delivery trucks through the combination of several solutions: wireless telemetry equipment installed at customer storage to record and transfer consumption data, algorithms to anticipate this consumption, and optimized deliveries.

To increase efficiency, these solutions use the most modern information technologies as well as the latest R&D developments. However, to properly design and implement these systems on an industrial scale, Air Liquide needed to innovate its organization and methods. ISIS therefore gathers teams of highly skilled experts, who are able to operate in the Group’s various geographic areas. Furthermore, thanks to well-structured solutions and high-performance tools, the operation of the implemented solutions and the assistance provided to users are taken into account. ■

NUMBER OF PATENTS FILED IN THE GROUP’S FOUR MAIN PRESENCE ZONES (EUROPE, THE UNITED STATES, JAPAN AND CHINA)



ISIS and its team of telecommunications experts have developed the new Air Liquide Group telemetry equipment for monitoring liquid levels in customers’ tanks. Named “BRIO”, this new tool is particularly innovative because it is completely wireless (no electric nor telephone wires necessary). It is also inexpensive, as it is standardized and works anywhere in the world.

Every day, it transmits liquid level information across a platform that is accessible by all authorized employees. Its great ease of installation and use enables Air Liquide teams in all countries to quickly introduce tools aimed at improving liquid gas logistics, according to the model defined by the Industrial Merchant business line.

## ENERGY

# CO<sub>2</sub> capture and storage

Among the processes used to heat raw materials, the use of fossil fuels and air is quite common. Air Liquide's oxycombustion process replaces the air with oxygen during the combustion phase, making it easier to capture CO<sub>2</sub>.

Oxycombustion is a promising solution for reducing CO<sub>2</sub> emissions from traditional industrial activities, including coal-fired power plants, blast furnaces and cement works.

### More oxygen, less CO<sub>2</sub>

Using pure oxygen in place of air when burning coal or other fossil fuels (e.g., natural gas, oil) eliminates the use of nitrogen in the early stages of combustion. The resulting emissions contain more than 85% CO<sub>2</sub>, compared with just 15% in the case of classic combustion. The captured CO<sub>2</sub> is then purified and transported to a suitable site, where it is sustainably stored underground, reproducing the same effect that nature has carried out for millions of years in natural deposits.

### Applying technology to clean energy

Air Liquide is active throughout the CO<sub>2</sub> capture and storage cycle, supplying the oxygen required for oxycombustion, as well as engineering and combustion expertise. The Group's researchers develop special burners that have been adapted to use oxygen and test them on platforms at the Claude Delorme Research Center in France and the Delaware Research and Technology Center in the United States. Oxycombustion expertise, initially acquired in glass and steel manufacturing, is now used to produce clean energy. ■



### Focus

In the field of CO<sub>2</sub> capture and storage, Air Liquide is taking part in several pilot-scale demonstration projects:

- In Europe, Air Liquide has partnered with Total on the Lacq project in France. The Group is supplying oxygen (240 tonnes per day) and oxycombustion burners developed especially for the project, which began in 2010.
- In Australia, the Group is providing Callide Oxyfuel Services with an air separation unit and a cryogenic purification unit for CO<sub>2</sub>. Start-up is scheduled for 2011.

## Benchmarks

# 800

That's the number of combustion-related patents filed by Air Liquide, thanks to the Group's cutting-edge expertise in this area. To date, 40% of technical glass furnaces (e.g., TV, LCD and crystal) worldwide have been converted to oxycombustion.

## Q&A with François Moisan

Executive Director of Strategy and Research at ADEME

### What approaches does ADEME recommend for limiting CO<sub>2</sub> emissions?

Limiting energy use and increasing energy efficiency above all else, followed by the use of non-carbon energies (especially renewable energies). We also count on CO<sub>2</sub> capture and storage to reduce emissions by up to 20%.

### What are the advantages to developing this field?

The construction of demonstration units will help us prove its feasibility. We have already located potential markets, mostly in emerging economies. We think that France, with its world-class centers for research and industry,

can put together an excellent offer. Development of CO<sub>2</sub> capture and storage also requires the involvement of French industrial companies like Air Liquide, which already has a presence at several demonstration units around the country.

ENVIRONMENT

# The challenge of fuel desulfurization

Sulfur is removed from crude oil during refining using a hydrogen-based process called hydrodesulfurization. As a major global supplier of this gas, Air Liquide provides a solution that combines productivity and respect for the environment in industrial processes.

By reducing the amount of pollution emitted by motor vehicles, fuel desulfurization improves air quality.

### Hydrogen, key to preserving the atmosphere

Fuels with low sulfur content emit less sulfur oxide (SO<sub>x</sub>) and allow the use of catalytic converters. Air Liquide supplies hydrogen to refineries around the world to facilitate production of these clean fuels. As a result, more than 700,000 tonnes of sulfur dioxide emissions are avoided every year, which is more than the total annual emissions of a country like France (450,000 tonnes).

### Toward stricter standards

Environmental standards concerning the sulfur content of fuels vary considerably from one country to the next. Countries such as the United States, Canada, Japan and members of the European Union have established very low thresholds (<50 ppm) for gasoline and diesel and are now turning to the hydrogen market for fuel desulfurization. On the other hand, in Eastern Europe, the Middle East, Asia and South America, fuels with much higher levels of sulfur are still used. The installation of new desulfurization units to meet stricter legislation in these regions will contribute to growth in the hydrogen market for Air Liquide. ■

Benchmarks

+50%

That's the increase in Air Liquide's global hydrogen production capacity since 2007. The Group operates **more than 200** units around the world, including **almost 40** major units. Its **1,850 km** pipeline network spans **18 countries** and enables Air Liquide to serve customers in several industrial basins.



Focus

From research to production and gas transport, Air Liquide masters the hydrogen chain. Aside from desulfurization, hydrogen is used in a variety of fields (e.g., chemistry and electronics) and as a fuel for rockets and spacecraft launch systems (e.g., ARIANE V). Research activities center on reducing the amount of CO<sub>2</sub> emitted by hydrogen production units, either by developing CO<sub>2</sub> capture solutions or by working on production processes like steam reforming. As early as 2011, Air Liquide will open one of Europe's largest units in Rotterdam, with a production capacity of 130,000 Nm<sup>3</sup> of hydrogen per hour.

Q&A with Jean-François Mauro

Director of AIRFOBEP

What do we know about sulfur dioxide (SO<sub>2</sub>)?

SO<sub>2</sub> is produced when we burn fossil hydrocarbons that naturally contain sulfur, such as fuel oils or coal. This pollutant is a health hazard and threatens the environment. For this reason, AIRFOBEP has been asked to evaluate pollutant concentration levels. AIRFOBEP is an organization that monitors

air quality in the region around the southern French region of Étang de Berre.

How can regulations be enforced in such a highly industrialized region?

In France, local authorities can impose regulations that are more stringent than national requirements when the situation in a particular area warrants it.

The Fos-Berre region includes several of these regulations, such as the STERNES system, which is specific to the Bouches-du-Rhône department and operated by AIRFOBEP. The strength of the system lies in its ability to force industrialists to reduce their SO<sub>2</sub> emissions in cases where increased pollution is observed or anticipated.

## HIGH-TECH

# Herschel and Planck satellites in orbit

The European Space Agency's scientific satellites – among the most complex ever produced in Europe – are dedicated to exploring the universe. As a technological partner, Air Liquide provided innovative cryogenic solutions placed at the heart of the satellites, which are essential for achieving these two missions.

Launched by Ariane 5 in May 2009, both satellites entered orbit about 1.5 million kilometers from the moon, nearly four times the distance to the moon.

### Origins of the universe

What was the universe like at its birth more than 13 billion years ago? Planck will attempt to answer this question by measuring the first radiation emitted in the universe when it was "just" 380,000 years old, which extremely weak light is very difficult to detect. This information will provide a more precise picture of the mechanisms of galaxy formation. Herschel will breach the mystery of the birth of stars too. Using an infrared telescope to detect light too weak to be viewed with even the most powerful optical telescopes, Herschel will enable observation of nascent stars and solar systems as well as galaxies born more than 12 billion years ago.

### Mastering the cold

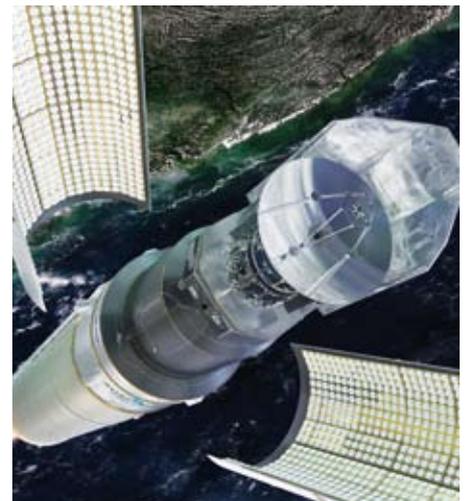
Air Liquide has worked on Planck for nearly 10 years in close collaboration with specialists from the Néel Institute (CNRS) and the *Institut d'Astrophysique Spatiale* on behalf of the French *Centre national d'études spatiales*. In addition to the cooler, the Group also supplied several facilities to fill tanks on the ground with ultra-pure and high-pressure helium, as well as a control unit to ensure that the cooler functions properly while in flight. Onboard Herschel, detection instruments will be cooled to about 1.6 Kelvin (-272°C) using superfluid helium stored in a "cryostat". This extraordinary high-capacity tank (2,400 liters) was designed and built by Air Liquide. ■

### Benchmarks

Weighing nearly **2 tonnes**, Planck carries a telescope that is **1.5 meters** in diameter. Mission length: **21 months**.

Herschel is equipped with the largest telescope ever installed in space, with a **3.5 meter**-diameter mirror (1.5 times larger than the Hubble space telescope, which was placed into orbit in 1990). Herschel weighs 3.25 tonnes and is **7 meters** tall. Mission length: **42 months**.

The satellites are in orbit approximately **1.5 million km** from the earth.



### Focus

**In order for the two satellites to operate, they must be cooled to extremely low temperatures. Planck must be able to detect temperature variations as small as one millionth of a degree. To do this, its instrumentation must be kept at an even lower temperature than the one observed. Air Liquide has developed a dilution cooler which performance has never been reached before. With its entrance into orbit, Planck became the coldest known point in space!**

### Questions about the Big Bang

#### How did the universe history begin?

Let's go back 13.7 billion years ago to the Big Bang. In an unparalleled explosion of infinitesimal length, an enormous amount of matter and energy was unleashed and the universe emerged: the Big Bang. In just a fraction of a second, the universe went from smaller than a single

atom to bigger than a galaxy. Since then, it has grown, transformed and evolved continuously.

#### What is the origin of the Big Bang?

Scientists are quite certain that, at the time of the Big Bang, the environment was extremely dense, and temperatures were high, nearing

several billion degrees. As the universe expanded, temperatures gradually dropped. Even 380,000 years after the Big Bang, the universe was still 1,000 times hotter and 1 billion times denser than today, and stars and galaxies did not exist.

HEALTH

# A treatment for sleep apnea

A little-understood disorder that can have serious consequences, sleep apnea is characterized by pauses in breathing during sleep. Air Liquide offers an innovative assistance program for sleep apnea patients who receive in-home treatment.



Given the disorder's potential dangers – including automobile and work accidents (due to extreme drowsiness), cardiovascular irregularities, diabetes and depression – sleep apnea is usually treated with daily therapy, at home and for life, using continuous positive airway pressure (CPAP).

**CPAP respiration**

The concept is simple: throughout the night, a nasal mask connects the patient to a machine that delivers pressurized air. Breathing gradually becomes normal, as a proper supply of oxygen begins to reach the blood. The treatment has two benefits: it reduces daytime drowsiness and improves the patient's overall health.

**Worldwide care**

Air Liquide is a world leader in home healthcare, with a presence in 30 countries. The Group provides apnea patients with integral care, including CPAP equipment, training, assistance and treatment follow-up. In Europe, Air Liquide provides care for 19% of apnea patients, in cooperation with their attending physicians. In 2009, the Group pursued its strategy of global development with acquisitions in the Netherlands and Tunisia, and the opening of its first center for sleep apnea patients in Lebanon. However, one of the countries that currently holds the most potential is China. The Group opened a sleep center in Shenzhen in January 2009, and another in Beijing in March. ■

**Focus**

The efficiency of CPAP treatment for sleep apnea is linked to its length of use. Ensuring treatment is followed during the first months is a key factor in its ultimate success. However, sometimes it is difficult to convince patients to follow treatment in the first months. During the first half of 2009, Air Liquide launched VitalPCC in France, an innovative, personalized support program for sleep apnea patients. This program will be implemented worldwide starting in 2010. In addition to traditional follow-up home visits by medical technicians, telephone support by nurses, as well as new educational tools (a sleep diary, manual, patient DVD, etc.) created with the help of medical experts, will be offered to doctors for their patients. The aim of this reinforced homecare program is to increase patients' motivation and compliance, in order to make treatment more efficient and increase quality of life.

**Benchmarks**

- **5%** of the global population suffers from sleep apnea, and **8** out of **10** people with sleep apnea are unaware of their condition.
- **A** person with untreated sleep apnea is **6** times more likely to be involved in an automobile accident or to have coronary problems.
- **More than 500,000** home healthcare patients around the world use the services of **7,800** dedicated Air Liquide employees.

**Questions about sleep apnea**

**What is sleep apnea?**

Sleep apnea is characterized by frequent and prolonged breathing pauses during sleep, lasting between 40 and 50 seconds each. Often the result of being overweight, sleep apnea can lead to repeated episodes of partial or complete collapse of the pharynx.

**What are the symptoms?**

Patients snore, usually quite loudly, and experience frequent breathing pauses that are noticeable and often worrisome to their partners. This results in low-quality sleep. During the day, they have a tendency to fall asleep very easily, significantly increasing the risk

of motor vehicle or work-related accidents.

**How is it diagnosed?**

There are two types of sleep studies, carried out in a hospital's sleep laboratory or a clinic, which measure the number of breathing pauses per hour of sleep.

# Intellectual property: a tool for competitiveness



**Q&A WITH**

**Thierry Sueur**

Vice-President  
of Intellectual  
Property at  
Air Liquide,  
and Chairman  
of the *Mouvement  
des Entreprises  
de France* (MEDEF)  
Intellectual Property  
Committee

## **What does the MEDEF Intellectual Property Committee do?**

The Committee interacts both proactively and reactively with Government authorities in France and throughout Europe to advocate businesses' desire to optimize "intellectual property" and related legislation, including patents, trademarks, designs, copyrights and technology transfers. Its single goal is to improve business competitiveness.

## **Why are you lobbying for an EU-wide patent system?**

For economic reasons, first of all. Protecting intellectual property rights in a single country rather than 27 is more cost-effective. Currently, a European patent costs between four and five times more than an American patent! Second, to

improve legal security. Air Liquide is currently involved in legal proceedings in several countries concerning the same patent. We could win in Germany, but lose in England. For a unified market, that's an aberration! We need uniform decisions and unified patent rights, especially as investments in technology are certain to rise.

## **How would you assess recent patent application statistics?**

The number of applications has taken off on a global level, from +10 to +12% per year. The increase can be explained by two phenomena: growth in the number of applications from developed countries coupled with a tendency to register in multiple areas, as well as the arrival of new countries on the intellectual property scene.

South Korea and China alone have recorded truly impressive figures! For its part, the French Patent Office has recorded a modest but consistent 1.5% increase in registrations each year. This figure isn't spectacular, but there are two underlying causes: the recognized stability of major companies like Air Liquide, and a frantic race for patents in industries like automobiles, where many patents are registered in France but few are registered in the United States. To encourage small and medium-sized businesses to register more patents, the French National Institute of Intellectual Property is following the example set by its German counterpart and undertaking an awareness campaign. The initiative is already beginning to bear fruit.

**Why does Air Liquide employ a decentralized approach to intellectual property?**

The Group’s approach is both centralized and decentralized. It’s centralized in that it’s led by a unified management division and intellectual property is essentially held by Air Liquide SA, mostly because it finances the majority of projects. This centralization results in a coherent portfolio of patents and trademarks, which the Group can then license to its subsidiaries. But the approach is also decentralized in that Air Liquide employs intellectual property specialists at a number of sites around the world. Integrating resources in this way helps reduce costs, because it is no longer necessary to subcontract patent registration to outside patent firms. In the end, the Group is better protected and benefits from a coherent policy.

**What can we learn by reviewing Air Liquide’s patent applications in the major geographical areas where the Group operates?**

A good indicator must reflect the international potential of innovations. That’s why patent applications abroad are important criteria, even though they cost 10-20 times more. This benchmark adopted by Air Liquide also revealed its strict selection process: for every four inventions received, three are pursued, two patents applications are submitted in France, and only one is submitted

abroad. This criterion is less useful, however, if we’re comparing the United States and Croatia, for example. For this reason, Air Liquide has decided to focus its patent application activities on regions viewed as “key” to the Group’s present and future. That includes Europe, the United States, Japan and – of course – China. In short, when Air Liquide is ready to invest heavily in an invention, applying for patents in these regions means the company expects high profits in return.

**In your opinion, is the Inventor Recognition Program at Air Liquide still effective?**

It is a flagship program in France, throughout Europe and in many countries around the world, but there is always room for improvement. Air Liquide is currently reflecting on how to change the program to make it more favorable to inventors. It is consistent with Group convictions, meaning that the program promotes innovation as everyone’s responsibility rather than an exclusive domain of R&D. In fact, 50% of inventions come from the field, from employees who sell gases and who solve customers’ problems. By placing inventors in the limelight, the program confirms that innovation is a hallmark of the Group. A clear sign: its budget remained stable in 2009. ■

**FOCUS**

**156**

**four-zone patents in 2009**

That’s the number of patent applications submitted in the four major regions where the Group has a presence (Europe, the United States, Japan and China). The growth (103 in 2005) can be explained by heightened interest in China. Air Liquide recently set up a veritable “Industrial Merchant” strategy to develop its market in the country, which explains its decision to begin protecting a number of major innovations in China. Just 10 years ago, Air Liquide would have chosen Japan, France, Germany and the United States.

**36%**

This is the share of Air Liquide’s revenue which contributes to the preservation of life and the environment. It represents an improvement from 33% two years ago. The number highlights the growing importance of sustainable development in the Group’s operations. When considered alongside the 60% of R&D expenditures dedicated to environmental challenges, the figure reveals a long-term trend for Air Liquide’s revenue.

“ 50% of inventions come from the field, from employees who sell gases and who solve customers’ problems. ”



**Les Enfants du Danube (Duchonka, Slovakia)**

The humanitarian association *Les Enfants du Danube* ("Children of the Danube") aims at giving financial and moral support to the least fortunate children of Slovakia. Since its creation, the association has helped 2,500 children and young adults.



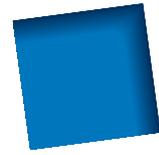
# CORPORATE CITIZENSHIP

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SEEING  
THE WORLD  
AROUND US

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# Air Liquide Foundation



**AIR LIQUIDE** FONDATION  
D'ENTREPRISE

Over the years, Air Liquide and its subsidiaries around the world have participated in a number of philanthropic initiatives, particularly in the areas of preservation of life and the environment. In 2008, these efforts culminated in the creation of a Foundation to encourage and develop projects in three main areas: healthcare, the environment and micro-initiatives.

In 2009, its first full year of operations, the Air Liquide Foundation refined its means of functioning and set up projects. This experience helped the Foundation identify the most promising sectors for investment, particularly in terms of Micro-initiatives, in order to best serve beneficiaries.

## **A sustainable strategy for giving**

The Air Liquide Foundation aims at supporting humanitarian projects in countries where the Group operates. With a budget of €3 million over five years, the Foundation can take a long-term view when using its framework for action to select initiatives that are consistent with its objectives. Financial, material and volunteer support is distributed on an annual basis. Amounts range from €50,000 to €60,000 for research, and from €10,000 to €15,000 for Micro-initiatives.

## **Health and environmental research**

The Foundation supports research into the human respiratory system. In this area, it finances work by the PremUp Foundation in Paris on the chronic respiratory diseases that affect premature babies. It also supports a program to identify respiratory

diseases undertaken by the *Institut Pasteur* of Shanghai. In addition, the Foundation is involved in environmental protection. So far, it has sponsored two expeditions: Generali Arctic Observer, led by Jean-Louis Étienne, and Under the Pole, which aims to measure the thickness of the polar ice caps.

## **Micro-initiatives for local development**

The Foundation supports community initiatives that encourage local development in parts of the world where Air Liquide operates. An appropriate framework is determined for each project. For example, in Thailand, it has partnered with *Aide Médicale Internationale* (AMI) to develop a medical training program for health professionals working in Burmese refugee camps. In Vietnam, it is working with *Enfance Avenir Partenariat Vietnam*, to build a social protection center for underprivileged children in Long Hai. The Foundation is also involved in Burkina-Faso, where *Humanitaire Ici Là-bas Aider et Partager* (HILAP) is constructing a housing and education center for women in Pama. ■



## Air Liquide Foundation online

Air Liquide has created a website dedicated to its Foundation. It provides detailed information on the Foundation's objectives, means of functioning, Board of Directors, Project Selection Committee, as well as the initiatives it supports and the ways in which projects are submitted and selected for sponsorship. It also enables anyone to submit a project support request online, in French or in English.

[www.fondationairliquide.com](http://www.fondationairliquide.com)



**Bénédicte Katlama** – Air Liquide Shareholder, Member of the Shareholders' Communication Committee (SCC) and of the Foundation's Project Selection Committee (PSC)

### What do you think about the Foundation?

I discovered it in November 2008, during my first SCC meeting. Its role in Air Liquide's philanthropic efforts really interested me. It caught my eye right away!

### What encouraged you to become a PSC member?

In addition to my interest in the projects presented, I appreciated the analysis offered by the project owners, especially the Micro-initiative sponsors. Inviting individual shareholders to take part in the Committee alongside researchers and specialists adds another perspective.

### Can you describe the project selection process?

It's very efficient and respectful of different opinions. First, I receive an e-mail with the pre-selection committee's report and a meeting agenda that summarizes the projects under exam.

Then I give my opinion on each project – its objective, organization, etc. – and I vote.

### Has any particular project caught your eye?

The 2010 General Arctic Observer expedition impressed me with its scope and the high level of multidisciplinary and technical skills involved. Not to mention the reputation of its leader, Jean-Louis Étienne!

### Has this been a rewarding experience for you?

I'm directly involved in Air Liquide's social and humanitarian activities, in its areas of expertise. It's a real learning experience! I've seen that a CAC 40 company can pursue philanthropic activities where social and human objectives take priority over concerns about corporate image. ■

### 2009 figures

**22**

projects financed, including **5** research projects and **17** Micro-initiatives

**32**

projects in exam

**45%**

of supported projects come from Group employees

# PremUp, treating respiratory diseases in premature babies

Every year in France, 4,000 premature babies suffer from bronchopulmonary dysplasia, a chronic respiratory disease. The anti-inflammatory medication currently used in neonatal centers to combat the affliction can have dangerous side effects, particularly neurological.



In an effort to improve the respiratory health of premature babies, the PremUp Foundation has developed a program with two purposes: identifying the inflammatory mechanisms that cause bronchopulmonary dysplasia (BPD) and developing new treatments for this debilitating disease.

## Potential consequences

An infant with BPD is dependent on supplementary oxygen supplied by a mechanical ventilator, beginning 28 days after birth and/or 36 weeks in the womb. Beyond the first few weeks of life (neonatal period), the disease has three major consequences on the infant's respiratory system:

- prolonged oxygen dependence in the short or medium term, possibly resulting in extended hospitalization or home oxygen care,
- increased risk of respiratory infection in the medium or long term, depending on the severity of the original illness,
- more frequent and severe viral respiratory infections in the first few years of life, possibly resulting in multiple hospital visits.

BPD also has non-respiratory effects, interfering with an infant's growth, neurological development and ability to learn.

## Fighting infection

The causes of BPD are still unclear, with different events before and after birth having been identified as potential risk factors. On a physiopathological level, the respiratory development could be the result of multiple stresses on undeveloped lungs. Such stress commonly manifests itself in the form of lung inflammation, which is considered as one of the main factors of BPD. Very few therapies have proved

effective in preventing BPD. The effectiveness of corticosteroids (major anti-inflammatory drugs administered after birth) in reducing the incidence of BPD supports an anti-inflammatory strategy. However, the serious consequences of this treatment for neurological development discourage its widespread use and justify the search for other types of anti-inflammatory drugs.

## Partners in charting the disease's evolution

Ongoing research aimed at eradicating this respiratory disease is in line with the Air Liquide Foundation's concerns in this area. It comes at no surprise then that the Foundation, which is involved in scientific research to improve respiratory health, supports the PremUp project. The research project, which received €50,000 in financial support, has two objectives: understanding the inflammatory mechanisms that lead to BPD in premature babies, and identifying alternative therapies by testing a new class of anti-inflammatory drugs. The Foundation's financial support was used to recruit a technician, buy the necessary equipment and purchase consumables (e.g., cells). ■

## Background



On the clinical side, PremUp cares for about 2,000 premature babies – including 600 to 800 very premature babies at higher risk for BPD – at three perinatal centers in the Ile-de-France region every year. These three centers also perform clinical research trials, some of which are publicly financed. Over the past years, there have been three major breakthroughs in BPD treatment:

administering corticosteroid injections to mothers at risk of premature delivery was found to reduce the incidence of the disease by 50%; an exogenous surfactant treatment was developed to replace missing air in lungs; machine-assisted respiration was rendered less stressful on lungs.



### PREMATURE BABY FIGURES (France)

- 7% of births are premature
- Every year 15,000 infants are born before the 7<sup>th</sup> month of pregnancy
- 30%-50% of infants that weigh less than 1kg are at risk of developing BDP
- Approximately 4,000 infants develop BPD every year.

### Testimonial – Professor Pierre-Henri Jarreau

Neonatal Medical Ward at Port-Royal/Cochin Hospital (Paris)

#### What is bronchopulmonary dysplasia?

BPD is a disease that occurs only in premature babies. These infants are born without surfactant – a vital substance that contains lipids and proteins – in their lungs. Without it, respiration is difficult and requires artificial assistance. Dysplasia is therefore associated with a certain type of patient (i.e., premature babies) and aggressive lung care (e.g., machine-assisted respiration, oxygen). All of these factors lead to the subject of our project: inflammation of the lungs. If we can limit that, we can stop the development of dysplasia.

#### What are the effects of the disease?

Dysplasia poses neurological risks for the baby's development, due to a variety of factors, including intermittent lack

of oxygen and prolonged hospitalization. In addition, these premature babies are more vulnerable to ordinary infant infections (e.g., colds), so they are often re-hospitalized for respiratory reasons.

#### How does your project promote research?

With the help of experimental models, we studied the effects of certain anti-inflammatory treatments, including type 4 phosphodiesterase (PDE4) inhibitors, which play a role in inflammation. But the effects on pulmonary development are more difficult to analyze. To learn more, we developed a project with two components: the first, which centers on the development of PDE4 around the time of birth, is nearly finished; the second, which focuses on analyzing inflammation mechanisms at the

pulmonary cellular level and the role of PDE4 in these mechanisms, should finish in 2010.

#### What impact would a less aggressive treatment have?

There are several possible paths, including machine-assisted respiration, which I'm also working on. The idea of developing new, non-toxic – especially for the brain – anti-inflammatory drugs is the one we're following at the moment, but we're still far from clinical application! The stakes are high for families. Imagine fewer infants leaving the hospital while still on oxygen! Imagine a lower risk of respiratory disease after they do leave and, consequently, a lower risk of re-hospitalization. We'll have taken a major step forward! ■

## ENVIRONMENT

# Generali Arctic Observer Expedition The North Pole by balloon

In April 2010, French doctor and explorer Jean-Louis Étienne will cross the Arctic Ocean from Spitzberg to Alaska, passing over the North Pole. The Air Liquide Foundation is a technological partner in this final chapter of a trilogy that began with a sleigh in 1986.



The goal of the expedition is to observe ice coverage and continuously measure the atmospheric concentration of CO<sub>2</sub> in order to test model simulations executed by the French *Laboratoire des Sciences du Climat et de l'Environnement* (LSCE). The mission will also serve to inform the public and academic community on the current state of the polar ice caps, climate change, and energies of the future. The expedition received support from the Air Liquide Foundation, as part of its commitment to environmental conservation initiatives.

### A polar adventure

The journey will take place aboard a *Rozière* balloon, propelled by a mixture of helium and hot air. Bertrand Picard and Brian Jones previously used this mode of transportation during their trip around the world. The balloon consists of an envelope, 28 meters high and 16 meters in diameter, filled with 2,200m<sup>3</sup> of helium and 500m<sup>3</sup> of hot air. The balloon will not be "steerable", meaning it will be carried by prevailing winds rather than propelled by a motor. Navigation will require locating the right wind at the right altitude in the right direction. A navigator on the ground will indicate the correct altitude to Jean-Louis Étienne.

The Air Liquide Foundation is providing the helium that will raise the balloon into the air, as well as the materials required to inflate the balloon quickly. It will also supply medical oxygen and the material necessary for breathing. Indeed, in the quest for a favorable wind, Jean-Louis Étienne may rise to altitudes as high as 4,000 meters, where there is less oxygen

in the air. In these situations, he can count on the oxygen provided by the Foundation to keep his senses sharp. The Foundation will also supply gases (nitrogen, ethanol) to ensure optimal use of the combustible gas that heats the air in the balloon, even in extremely cold conditions.

### Another challenge met!

Every partnership between Air Liquide and its Foundation and Jean-Louis Étienne presents significant technological challenges. Beyond materials and gases, Group specialists provide support for gas use, logistics for transporting gases, and more. For example, Group teams developed a lightweight hydrogen tank to store fuel during Mission Banquise (his 2002 ice floe expedition) and organized the delivery of liquid nitrogen to the middle of the Pacific Ocean for the Clipperton expedition (his 2004-05 study of the coral atoll). Recently, they developed a system to rapidly inflate a balloon (in less than four hours) for the Generali Arctic Observer expedition. Thanks to this device, teams stationed in Spitzberg will be able to take off within a few hours of the navigator's green light. It's this expertise, not just the Group's products, that explains why Jean-Louis Étienne turned to Air Liquide and its Foundation. ■

## Background



Air Liquide began collaboration with Jean-Louis Étienne in 2002, during his *Mission Banquise*.

One of his clean energy sources was a fuel cell by AXANE, an Air Liquide subsidiary, powered by hydrogen supplied by the Group.

For subsequent expeditions, Jean-Louis Étienne returned to Air Liquide, and later to the Foundation. For the Group, helping to prepare for these expeditions is always an adventure! First of all, an explorer is always on the lookout for new technology. Secondly, Jean-Louis Étienne is constantly putting his technical partners to the test.

Once, he even requested a delivery of liquid nitrogen at 196°C to the middle of the Pacific Ocean! The Air Liquide technical teams approach these challenges with enthusiasm, despite the difficulties they involve. In fact, they often find that the knowledge gleaned from the expedition is as rewarding as the mission's successful completion.



### Testimonial – Jean-Louis Étienne

Doctor and explorer

#### What's at stake with this mission?

I wanted to lend my logistical services to researchers. The LSCE, which works on climate models, is interested in measuring atmospheric CO<sub>2</sub> in this relatively pure area of the world. With the French *Centre national d'études spatiales* (CNES), I'm going to measure airborne particles as well as the earth's magnetic field using a miniature prototype developed in partnership with the French *Commissariat à l'Énergie Atomique* (CEA) and the European Space Agency (ESA). Several in-depth educational projects are also planned. For example, teachers will have direct, real-time access to data collected during the mission.

#### How can you see the accelerated melting of the Arctic ice cap?

Through its change in color. The Arctic used to be nearly

all white for most of the year, with snow covering the ground and ice covering the ocean. With climate change, snow and ice are appearing later – in the fall – and disappearing earlier. As a result, the land and water are now darker and absorb more heat. The Arctic is becoming a light receptor/absorber.

#### How will this impact biodiversity?

Indigenous people have already been affected. On the west coast of Greenland, the Inuit can no longer rely on ice to connect their villages in the winter, as was previously the case. In northern Canada, people built their villages on permafrost – soil that was permanently frozen, but it is now beginning to thaw. The ecosystem has also been disturbed. The ice cap's retreat causes the ocean to inundate more land earlier and earlier in the year, opening up zones of intensive

fishing where no regulations apply. As for the polar bear, its hunting territory grows smaller as the ice cap shrinks.

#### Does education have its limits regarding raising awareness?

For twenty years, I've been working in order to share information on a subject I'm passionate about. The awareness is there! But one of the problems I come up against is the imperceptible nature of global warming: +0.8°C in a century. It's difficult for the public to grasp the importance! Moreover, CO<sub>2</sub> is a colorless, odorless gas. Unlike an acute affliction, which would raise awareness much more quickly, we're dealing with a chronic disease that progresses very slowly. ■

### THE EXPEDITION IN FIGURES

Made of polyester and nylon, the balloon's envelope:

- holds 2,200m<sup>3</sup> of helium and 500m<sup>3</sup> of hot air
- measures 28m in height and 16m in diameter

For the transpolar flight:

- 360kg of propane on board
- 12 tanks positioned around the basket
- 15-20 days of self-sufficiency

## MICRO-INITIATIVES

# Sponsorship: a lasting commitment

All the Micro-initiatives supported by the Foundation are overseen by Air Liquide employees on a voluntary basis. It's the opportunity for Group employees to show their commitment to social and humanitarian issues by participating in local civic initiatives that truly interest them.

### Micro-initiatives in figures

**17** projects financed  
in 2009 and **about 20** planned for 2010

The Foundation's creation has had a measurable impact on Air Liquide. Over the past year, the Group has seen its employee sponsors take an active interest in the initiatives, adding a new social and humanitarian dimension to their jobs. Interest continues to grow, with more and more employees volunteering to take part.

#### The sponsor's role

Air Liquide employees interested in becoming a sponsor must first seek the support of their manager. Since sponsors represent an important link between the project owner and the Foundation, they must speak French or English to facilitate communication between the two parties. Ideally, sponsors will work at an Air Liquide site near their project.

Sponsors play a key role. They meet with their project owner on location to ensure that the project meets the Foundation's selection criteria. They also follow the progress of the project step by step, evaluating its technical and financial feasibility, overseeing the delivery and proper use of the grant, and more. Along with their project owner, sponsors establish a progress schedule, which is provided to the Foundation's team. Once the operation is finished, sponsors prepare a summary of how their initiative unfolded.

#### The common denominator: human dignity

Micro-initiatives are organized under six major themes that reflect the Group's sponsorship commitments.

For education and training, the main concern is fighting illiteracy and encouraging training programs for women and young people. To this end, the Foundation is supporting a training and residence center for women in Burkina Faso.

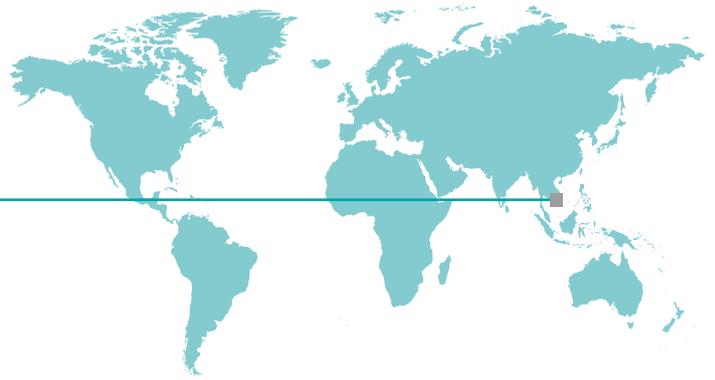
Environmental conservation is another priority that the Foundation is pursuing by supporting sustainable development awareness workshops in Slovakia.

Improving the comfort and social integration of disabled people is another important commitment. The Foundation is participating in the construction of an educational center for autistic children in France's Haute-Garonne region.

To encourage local entrepreneurship, the Foundation supports the development of economic initiatives, like rice paddy fish farming in Madagascar.

In terms of health, support is given to organizations that provide care to the most disadvantaged populations, such as the Phelophepa hospital on rails in South Africa.

In the area of social assistance, the challenge is to provide some security to the most disadvantaged populations. In Vietnam, for example, the Foundation is helping to build a social protection center for orphans. ■



## Focus on VIETNAM

# A housing center for orphans in Long Hai

The Long Hai social center is a place for street children and victims of Agent Orange (a powerful defoliant composed of dioxins) to live and learn. Initiated by the *Association Pour les Enfants des Rizières*, the center's priorities include providing a safe place for these children, checking and monitoring their health, and delivering special care and supporting operations. Another goal is to educate or provide professional training to these children, who are excluded from the public education system. A boarding school, with a capacity of 60 children and 30 infants, is planned for the center. The project, which is supported by the Air Liquide Foundation and presented by *Enfance Avenir Partenariat Vietnam*, focuses on constructing and developing the infirmary and multimedia room. The first buildings were constructed in a single month and inaugurated in October 2009; a great accomplishment! Four classrooms, an administrative building, a cafeteria and a meeting room already welcome children during the day.

### Testimonial – Jérôme Paules

Project Owner and Business Intelligence Architect at Air Liquide

In May 2009, during an adoption process, I discovered the Vung Tau orphanage and met its director Mrs. Trang Dai. She's a dynamic woman who also runs a home for children who are past the normal age of adoption (seven years of age and older), watching over them until they turn 18. Relying on her inexhaustible energy rather than Government help, she raises funds to provide these children with an education. She recently decided to open a social residence in Long Hai to provide daily schooling for 200 children, and eventually plans to open a nursery for around

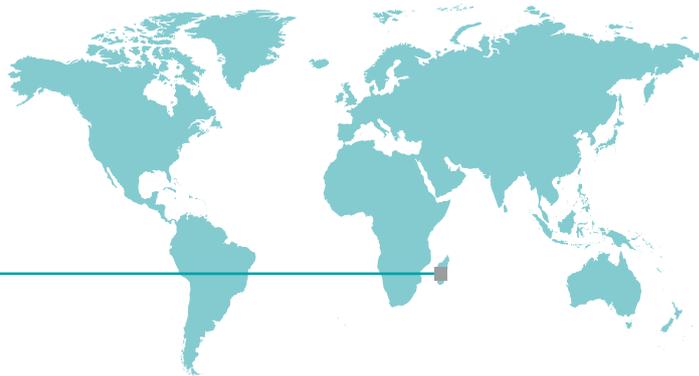
100 orphans. Through *Enfance Avenir*, the association that helped with my adoption, I discovered *Enfance Avenir Partenariat Vietnam* and offered to help locate sponsors. We submitted a file to the Air Liquide Foundation, which accepted the project. Since then, I have been closely involved: overseeing the project with its sponsor, Air Liquide Vietnam HR

Director Nguyen Van Lam, and delivering regular updates to the Foundation. Thanks to this funding, the social residence opened its doors in November 2009, just one year after its construction began. I have continued to help the association since then and will soon organize my first charity sale of Vietnamese handicrafts. Even with limited resources, we can still do a lot of good! ■



### Background

Long Hai is a small coastal town of 40,000 residents, mostly fishermen, located 20km from Vung Tau, south of Ho Chi Minh City. The town draws many families from Vietnam's poorest provinces. Several thousand of the poorest families are unable to feed or educate their children. The province is also home to more than 3,500 victims of Agent Orange, a substance that is still causing significant damage, particularly among disadvantaged populations. In December 2006, Long Hai was devastated by Typhoon Durian. The storm destroyed many homes and affected 90,000 families and their children, exacerbating their already precarious situation.



## Focus on MADAGASCAR

# Rice paddy fish farming reaches great heights

Is it possible to stimulate sustainable local fish farming while eliminating malnutrition among peasant populations, especially in the Haute Matsiatra region? Working closely with local agricultural cooperatives, the NGO *Association Pisciculture et Développement Rural* (APDRA) has set out to answer this question with a project that pairs rice cultivation with fish farming. The technique involves introducing carp spawn into rice paddies during cultivation. In just a few months, this cultivation/farming method produces fish of more than 250g on average and increases rice production by an average of 10%. The extra equipment requires little investment and optimizes land and water resources. Access to carp spawn is the main constraint for the tens of thousands of agricultural households in the region. Thanks to the Air Liquide Foundation support, APDRA was able to train 35 spawn farmers and to hire a Malagasy technician/trainer for a permanent office that opened in Fianarantsoa in 2009. Fish farmers will continue to receive technical support during the next two production cycles, between September 2009 and May 2011.

### Testimonial – Fabien Cousseau

APDRA Technical Consultant

In 2007, after patient observation and analysis of local practices in a neighboring area, APDRA decided to support several production cooperatives in Haute Matsiatra. High atop the plateaus, amid skeptical local residents, we had to prove our commitment and integrate ourselves into the community's economic and social fabric. Among other advantages, rice paddy fish farming helps fight malnutrition by providing a source of animal proteins and doubles as an agro-ecological practice. The introduction of fish into a rice paddy increases fish fertility and yields by 10%.

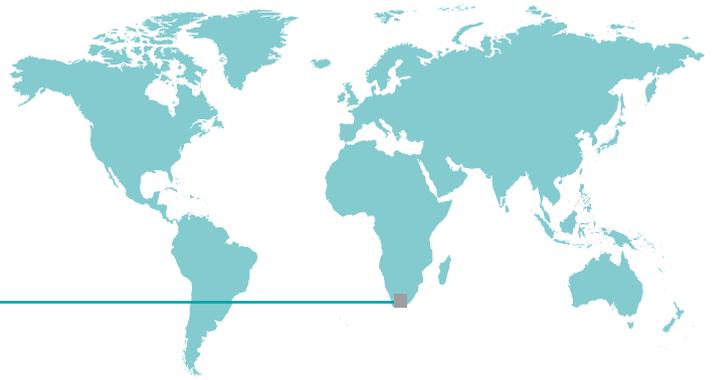
Developing rice production and fish farming requires overcoming one major challenge: producing spawn to populate the rice paddies. High costs and poor distribution have made spawn production structurally unprofitable in Madagascar. APDRA aims at increasing the number of producers through training and to help them defend their rights. To address these needs, we have set up training teams made up of two APDRA technicians and an experienced local resident, working in full cooperation. Thanks to the Air Liquide Foundation's support, full consulting and advisory

services are available to local residents after their training. We were also able to finance the recruitment of a Malgasy technician/trainer and open an office in Fianarantsoa. Of the 35 producers trained in October, 25 have already been successful in obtaining spawn. The next milestone will be in June 2010 when the first fish are harvested from the paddies! ■



### Background

Haute Matsiatra rises 900-1,200m above sea level. Its tropical mountain climate has an active rainy season – 1,300mm of precipitation per year (compared to 700mm in Paris!) – followed by a dry season. About 77% of the region's rural households live below the poverty line, due to the landlocked area's poor access to training and fertilizer. Faced with a malnutrition problem, the State is looking for ways to struggle against the rural population's protein deficit while developing new sources of revenue. That's where fishing and aquaculture come in. The sector's rapid expansion is playing an important role in the country's economic development. Combined with other family agricultural activities, freshwater fish farming presents an interesting solution from nutritional, economic, social and environmental perspectives.



## Focus on SOUTH AFRICA

# Phelophepa, a hospital on rails

The name “Phelophepa” is painted in red letters on each of the train’s 16 cars. A mix of Tswana and Sotho dialects, “Phelophepa” means “good health”. The program’s goal is to provide a modern and economical healthcare system to the most disadvantaged people in the nation’s poorest, most remote areas. Inside, are an ophthalmology clinic, six dentist offices, a psychology ward and a pharmacy. The facilities are managed by a team of 16 permanent physicians who oversee approximately 40 medical interns. The interns stay for a period of two weeks to gain work experience. Created in 1994 by the South African railroad company Transnet, Phelophepa is the continent’s only “hospital on rails” experiment. Air Liquide has supported this exemplary humanitarian endeavor for several years. In 2009, the Foundation decided to focus its support on the psychology ward, which treats people who are dealing with serious distress caused by extreme poverty. The ward’s approach is original, in that it uses group work and interactive tools like a puppet theatre, music, videos and more. The staff touches on questions of violence with groups of children between the ages of 6 and 13, as well as suicide, sexuality and AIDS.

### Testimonial – Dr. Leslie Galane

Head of the Dental Clinic on the Phelophepa Health Care Train, South Africa

After a great experience as an intern during my last year of training, I decided to join Phelophepa full-time in April 2009. Our work begins early at the dental clinic, where we treat 100 to 150 patients each day. I am responsible for supervising the student interns, giving professional advice to my assistants, managing equipment and sterilization, and ensuring that our clinic’s policies comply with mandatory health legislation.

Our staff also runs oral hygiene awareness campaigns for adults and outreach programs in schools.

Phelophepa offers a wonderful opportunity to give something back to people who cannot afford even the most basic healthcare services. It is very satisfying to think that I will have made a mark in their lives.

Phelophepa is all about commitment and teamwork. Now, all we need is a second train, and we’ll be able to serve all the people of South Africa every year! ■



### Background

Created in 1994 in the spirit of democracy, Phelophepa covers 15,000km in four of the country’s nine provinces between January and September each year. The convoy makes 36 one-week stops, offering on-board medical examinations and free tests, as well as services for nominal fees (e.g., prescriptions for 5 rands or €0.50). Each week, the train welcomes around 1,500 patients who, for the most part, have never seen a doctor. In a single season, nearly 45,000 individuals receive care.

Transnet provides two-thirds of the funding; the rest comes from various partners, charitable organizations and grants. Since its opening, Phelophepa has helped 17 million people. The results have been so positive that Transnet recently agreed to finance a second Phelophepa.

# Responsible procurement



## Ethical dialogue with suppliers

Air Liquide's "Responsible procurement" approach brings its suppliers closer in line with the Group's Social and Environmental Responsibility commitment by encouraging suppliers to share the Group's best practices, seeking opportunities to improve competitiveness, and finding common solutions to reduce the risks associated with operating in emerging economies. It raises suppliers' awareness of fundamental principles, so that they can make changes in their day-to-day operations. To foster greater confidence in the approach,

Air Liquide has also implemented several tools that have already proven quite efficient. On the buyer side, a Procurement Code of Conduct outlines principles of ethics and sustainable development. On the supplier side, Group framework agreements incorporate sustainable development clauses, which may be subject to external audit, as well as safety and environmental reporting requirements. Finally, subcontractors who wish to join Air Liquide's pool of suppliers must complete a sustainable development questionnaire as part of a critical supplier screening process. ■

## The risk chart

In 2009, Air Liquide hired an external consultant to conduct an HSE risk analysis of a panel of 50 suppliers representing the Group's major procurement categories. Charting risk in this way will help identify high-risk types of purchases, as well as geographic areas to monitor. This initiative will enable the Group to rank suppliers based on performance, criticality, location, purchase category, the environmental impact of their products, and their awareness of sustainable development. The implementation of supplier audits based on geographic or purchase category risk is among the possible outcomes of this process. ■



## The sustainable development questionnaire

Air Liquide's critical supplier screening process has two objectives: to raise awareness among major suppliers – particularly in emerging economies – about the social, environmental, and safety issues contained in the Group's policy, and to incorporate health, safety and environmental criteria into the supplier evaluation process.

The concept is simple: a questionnaire is sent to each potential supplier. In this questionnaire, two sections – one social, one environmental – outline mandatory requirements: existence of a health and safety policy, periodic inspection of at-risk workstations and tools, enforcement of minimum wage and compliance with REACH legislation, and knowledge of energy consumption. This process of choosing suppliers based on non-financial criteria is a way for Air Liquide

to eliminate those companies that present too great an HSE risk. Selected suppliers may then participate in Air Liquide requests for proposals. If selected, they sign a contract with a sustainable development clause (e.g., health and safety policy for employees, labor rights compliance) and an associated audit clause that subjects them to inspection without advance notice on these issues.

This methodology was initiated with a request for proposals for cryogenic tanks and cylinders in late 2008 and will be gradually deployed across the Group in 2010. An evaluation of contracts in progress is also planned for the end of the first full year. In this way, Air Liquide will soon measure how well each supplier limits its site's utility consumption (e.g., water, energy). ■

## “BETTER&CLEANER” THE R&D OLYMPICS

Launched December 1, 2009, as a sustainable development competition, the “B&C” Olympics are a perfect example of Air Liquide's SER policy in action.

### Teamwork

Five R&D centers – Air Liquide Laboratories (Japan), the Claude Delorme Research Center (France), the Technical Center for Welding Activities (France), the Delaware Research and Technology Center (United States) and the Frankfurt Research and Technology Center (Germany) – must come together in a joint project to share the best environmental practices from researchers around the world. Reducing each entity's carbon footprint is certainly one of the program's goals, but the Olympics are also a chance to increase employee awareness of environmental issues and Air Liquide's R&D work in this area. It's important not only to participate, but to work collectively towards reducing the greenhouse gas intensity of future Air Liquide products and services.

### Performance

Each entity's annual environmental performance will be evaluated based on three key indicators: paper consumption, water consumption and number of business flights. In addition, R&D employees will be entirely free to suggest noteworthy local initiatives that aim to improve the sustainability of operations (e.g., waste collection and recycling, improvements to energy management). Finally, each entity may select a specific environmental project that requires an investment of up to €50,000.

### Podium

The two winning finalists, based on the three key indicators, will be announced in December 2010, along with the three best local initiatives. Chosen in April 2010, the best project proposal shall be based on the same sustainable development criteria and financial feasibility. ■

“ Sustainable development means progress with values.”



**Mustakim Patei and Akrab Ali (Jebel Ali, United Arab Emirates)**

Air Liquide serves more than one million customers in over 75 countries, covering a wide range of services and industries, from welding to food and beverage, and from electronics to pharmaceuticals. To best respond to the demands of each market, the Group is organized into different World Business Lines.



# ACTIVITIES

# SEEING A COMMON PATH

# Industrial Merchant

Industrial Merchant counts customers in five major domains: Food and Pharmaceuticals, Materials and Energy, Technology and Research, Craftsmen and Distributors, Automotive and Fabrication. With a wide network of experts and researchers, the Industrial Merchant World Business Line provides industrial companies from around the world with a very wide range of solutions for setting up or optimizing their manufacturing procedures.

## **A difficult but well-handled year**

In a difficult context, the activity demonstrated the relevance of its economic model and took advantage of the diversity of its markets. It was able to maintain a good level of performance through sustained demand from emerging economies as well as rigorous price and cash management, strict production cost control and a reduction in overhead expenses. The Group also demonstrated responsiveness in its management of investments, marked by asset reallocation. One large-scale program allowed subsidiaries located in emerging economies to purchase excess cylinders or storage vessels from other geographical areas. Finally, the strong performance of the Food and Pharmaceuticals markets is noteworthy.

## **Innovation across the board**

Air Liquide has built a broad network of experts in gas applications, who are located around the world. In order to meet the needs of industrial companies, the Group has developed cutting-edge technological know-how in each of its markets, optimizing its customers' manufacturing processes, as well as the ergonomics and safety of its products. This is especially true in the welding and gas cylinder sectors, which each register a very high number of patents every year. In this way, for example, new LASAL™ mixes for laser welding were developed, and numerous cylinders were equipped with intelligent ALTOP™ or MINITOP™ caps, thus improving the user's comfort and safety. In addition, innovation applies to the means of production, as evidenced by the development of LILO™,

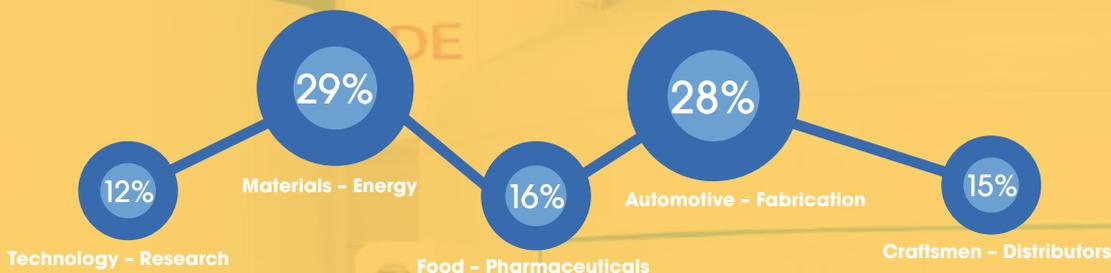
the Group's new liquid gas production unit. The unit is modular and transportable, making it ideal for meeting the needs of certain geographical areas. The first LILO™ is currently under construction in Alabuga, Russia.

## **An economic model strengthened by acquisitions**

In 2009, the Group successfully seized new opportunities to increase its market share throughout the world. Such was the case in Saudi Arabia, with the acquisition of Al Khafrah, the third-largest producer and distributor of gas in cylinders and in bulk. After Pure Helium in 2008, this investment positions Air Liquide as a major player in this fast-growing market. The Group also invested in order to improve its productivity and service in certain geographical areas: in Norway, with the purchase of a filling center, and in Angola, to serve the petroleum exploration sector. In Canada and Brazil, the Group acquired cylinder distributors and resellers in order to gain direct access to its end customers. As a result, Air Liquide is present at each step in the value chain and can, therefore, provide offers that better meet customer needs, while also increasing its profitability. ■



€4,277 million revenue



## Intact growth drivers

### The vitality of emerging economies

The high level of resistance to the economic downturn shown by emerging economies enabled the activity to obtain increased revenue. Air Liquide invested significantly in these markets in liquid capacity, filling centers, and sales team training. In 2009, Air Liquide also rolled out its ready-to-use filling unit design, FLOXFILL™, in the specialty gases field. These standardized plants, housed in a container, help make the Group more competitive, while offering customers shorter delivery times and more extensive product lines.

### Energy solutions

#### Coal

Inerting is a highly valued technique for exploiting underground coal mines in total safety and reliability. Strengthened by its experience and its AMSA™ systems, which can generate nitrogen directly on site at pre-determined flow and purity rates, Air Liquide is a recognized player in inerting solutions. In 2009, the Group signed three contracts in Australia with the country's largest mining companies, in order to exploit the North Goonyella, Carborough Downs and Wambo coal deposits.

#### Oil

While only 25% of the oil contained in a deposit can ordinarily be extracted, EOR assisted extraction techniques increase this rate up to 80%. Air Liquide offers its customers global solutions for gas injection that can

fracture rocks or liquefy hydrocarbons.

The solutions include supplying gas, making storage means available, and supplying compression and reheating facilities. After operating in North America, where these techniques are very widespread, the Group is now developing projects in Europe.

#### High-Tech:

#### Numerous developments

Air Liquide signed several contracts in the fields of fiber optics (China, Korea) and substrates intended for the solar energy industry. A contract was also signed for the start-up of a large plant for the encapsulation, assembly and testing of electronic components in Asia. ■

# Large Industries

Air Liquide delivers industrial gases from dedicated "on-site" production units, or via a pipeline network.

The world leader in this market, the Group produces industrial gases for a wide range of manufacturing processes and applications, of which they are often key raw materials.

## Successfully weathering the crisis

Air Liquide operates more than 15 pipeline networks in a dozen different countries totaling more than 8,500 kilometers, constantly aiming at a flexible offer. The ability to manage our large pipeline networks to maximize efficiency during many types of demand scenarios is an important feature of the business, and it has proved a flexible asset for the Group to control costs during the 2009 recession.

The diversity of our customers has provided significant revenue stability. While volumes were notably lower in the first half of 2009, particularly in the European steel industry, the second half of 2009 showed improved volumes and profitability growth for the Group. Investments in 2009 have bolstered longstanding partnerships with major customers in Europe and North America. Air Liquide also continued its expansion as a dynamic, innovative player in emerging economies.

## Standardizing production units to reduce costs

Heavy industries are booming in emerging economies today, particularly in China and the Middle East, driving rapid expansion of the industrial gas market. To keep pace with soaring demand and to better optimize capital, Air Liquide has developed a series of standardized production units that are less expensive, more compact and easily assembled therefore allowing for shorter construction and delivery times.

For air separation, a new line of pre-engineered standard units has been developed: the "YangO<sub>2</sub>" series, whose name reflects their Chinese heritage (Yang means "oxygen" in Mandarin). These units are prepackaged and manufactured at the Air Liquide Engineering facilities in Hangzhou, China. The first YangO<sub>2</sub> successfully started up in Asia in 2009, and nine others are currently under construction in Europe, the Middle East, Asia and South America.

For hydrogen, a new, standardized design for large plants has been completed and is now under construction in two separate projects (Europe and North America).

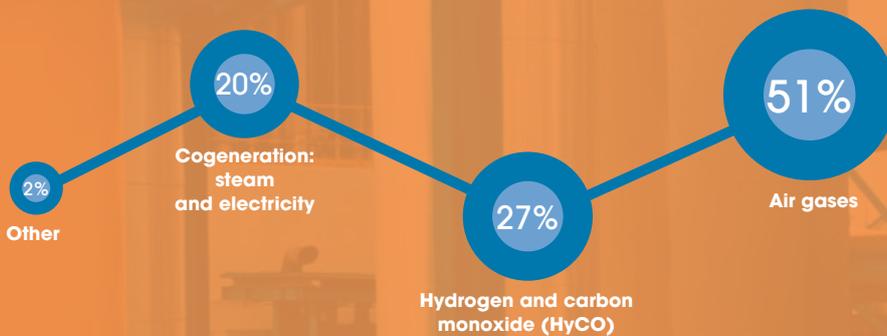
## Commissioning projects across the world

2009 was an active year for the commissioning of new facilities. On average, Air Liquide commissioned more than one major facility per month in 2009 in nine different countries; including Malaysia, and South Korea, where the Group started its first YangO<sub>2</sub> ASU. Three 2,000 tonnes per day (TPD) oxygen plants were commissioned in China for the steel industry.

In all, the Group started up 15 major new projects come on stream, which will contribute to significant revenue growth in future years. ■



€3,219 million revenue



## Preparing the ground for a promising future

In 2009, the Large Industries business line continued its strong momentum and consolidated existing partnerships, reinforced its innovation potential, started new units and launched many projects. Its dynamic, flexible and diversified teams were key reasons for this success.

Among the new projects launched during the year, Air Liquide commissioned a state-of-the-art HyCO plant with notable energy efficiency and environmental protection benefits to replace two older Air Liquide facilities in Estareja, Portugal. It emits 25% less carbon dioxide than the technology it replaced. The investment testifies to the Group's determination to pursue its growth strategy in Europe.

In China, the Group entered into a long-term contract signed in March 2007 with Jiangsu Shagang, China's

number one private steel company and fourth-ranking steel producer. The contract, the largest "Over the Fence" (i.e., industrial gases supplied by pipeline) contract in China to date, included the construction of two new ASUs to supply 4,000 TPD of oxygen and 600 TPD of nitrogen and argon. These units, fully commissioned in July 2009, were designed and manufactured by Air Liquide Hangzhou, the Group's engineering center in China.

In Singapore, SOXAL (Singapore Oxygen

Air Liquide Pte Ltd), a 100% subsidiary of Air Liquide, started up a new ASU on Jurong Island, Singapore's expanding refining and petrochemicals platform. This unit, integrated into the company's five existing ASUs and pipeline network, delivers 1,200 TPD of oxygen, plus additional volumes of nitrogen for the network, to Shell's mono-ethylene glycol (MEG) plant. Also on Jurong Island, SOXAL is building a large hydrogen plant to serve an expanded pipeline network, which will start in 2010. ■

# Healthcare

**Hospitals, homecare, hygiene:** Air Liquide supplies gases, services, and equipment that improve the quality of life and well-being of health professionals and their patients, with an offer that combines safety, satisfaction and performance.

## Sustained performance in 2009

Despite fewer acquisitions, the Healthcare business line nearly matched its 2008 growth rate (+7%). Hygiene saw revenue increase 13% due to the H1N1 flu pandemic. Homecare improved 8%, thanks to a new contract with the United Kingdom's National Health Service to serve over 10,000 patients in South East England. The Group intends to continue developing services that aim to improve quality of life for respiratory patients. Lastly, the hospital market grew at a more modest +3.5%.

## A worldwide development strategy

Air Liquide has strong roots in Western Europe and ranks as the market leader in several of these countries. There, the Group develops solutions that are effective and preventative and that promote observance of homecare treatment in order to manage public health expenditures. Elsewhere in the world, the Group is pursuing an aggressive strategy notably in China's fast-growing hospital and homecare markets.

## Renewed homecare ambitions

Homecare is experiencing strong growth as a result of longer life expectancies, rising hospital costs, an increase in respiratory diseases and the requirement for compliance in treatment plans. In the Netherlands, Air Liquide acquired Comcare Medical and Resmed in January 2009 to become the market's second largest player with 12,000 patients.

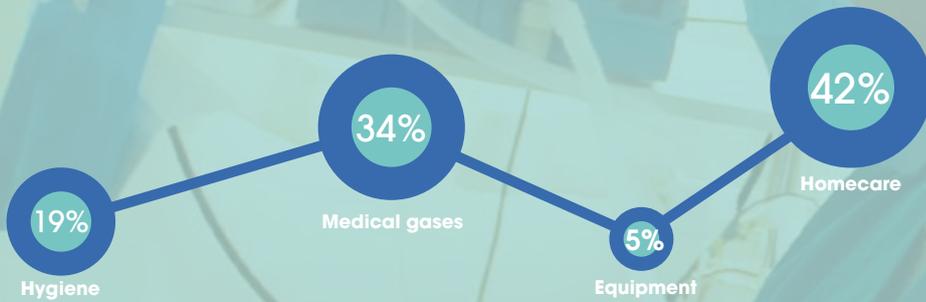
## Air Liquide strengthens its cryobiology offer

Cryobiology involves conserving biological samples (e.g., tissue, blood) at cryogenic temperatures. The market's steady growth is the result of increased cellular research and therapy. With the purchase of Pacific Science, Air Liquide continues to develop its presence in the United States, which represents 40% of the global cryobiology market. This acquisition has helped the Group extend its global cryobiology offer to North America, including biobank design, vacuum transfer line installation, nitrogen supply, freezing and storage installations, complete monitoring of procedures and tracking cell conservation parameters.

## A new generation of artificial ventilation

Through its subsidiary Air Liquide Medical Systems, Air Liquide is launching a range of artificial ventilation systems designed to treat respiratory diseases at hospitals, in emergency rooms and in patients' homes. In October 2009, the Group began producing the Monnal T50 respiration system in France. The device is used in hospitals and homes to treat chronic respiratory deficiencies linked to neuromuscular diseases. In early 2009, Air Liquide also launched the Monnal T75, geared specifically toward hospital recovery rooms and intensive care units. ■

€1,824 million revenue



## Hygiene, a booming field

With SARS, the H1N1 and H5N1 flu viruses, prion diseases and nosocomial infections, Air Liquide is undeniably becoming a major player in the field of hygiene, where the world market is currently growing by 10% per year. Approximately 1,100 employees, including 100 researchers, develop and distribute new products to combat prion diseases and improve pathogen detection. In 2009, Hygiene revenue increased 13%.

Air Liquide is a European leader in hospital disinfection, with disinfectants and antiseptics designed for operating rooms, endoscopy, surgical instrument sterilization, and hand and surface hygiene. Although the fight against nosocomial infections is the largest Hygiene market, the Group also has many customers in pharmaceuticals, agriculture, medical and dental offices, and city Governments.

Air Liquide develops its Hygiene activity worldwide under two well-established brands: Anios (France) and Schülke (Germany). Both design a wide range of antiseptic, disinfectant and biocide products and procedures that are distributed throughout the world. Two thirds of their sales come from the healthcare market. Anios earns the last third from industrial activities and city Governments, while Schülke offers preservative additives (e.g., for paint, cosmetics).

Although the economic crisis curbed biocide sales, the H1N1 flu pandemic boosted hospitals' demand for disinfectants and increased public demand for alcohol-based hand disinfection gels. To respond to these exceptional circumstances in several countries, Anios and Schülke had to invest in additional production capacity in France and Germany. ■

# Electronics

## **Air Liquide has partnerships with the world's leading producers**

of semiconductors and flat screens. These component parts are used to manufacture the electronic products that we use every day, including computers, telephones and even cameras. The Group also contributes to growth in the photovoltaic market, working with leading manufacturers of photovoltaic cells and panels.

### **A comprehensive and evolving offer with high added value**

In the photovoltaic, flat screen and semiconductor markets, Air Liquide distinguishes itself with a comprehensive, high-quality range of specialty gases (e.g., silane), carrier gases (e.g., nitrogen, oxygen, hydrogen, argon and helium), as well as services and fluid management. The Group's offer now covers the entire array of equipment and facilities for ultra pure fluids, with outstanding added value. Thanks to ongoing R&D efforts, its product line is continually evolving. For example, its new ALOHA line of molecules, called "advanced precursors", are custom-made to suit new processes used by semiconductor manufacturer customers. In the rapidly growing and highly profitable market for "advanced precursors", Air Liquide has become a recognized leader with its ZyALD, SAM.24 and Torus™ products. Also of note is the Group's promising entry into this market in Taiwan, Korea and the United States.

The other major strength of the Electronics business line is its ability to help customers grow and expand geographically, knowing that most of the market is located in Asia.

### **A sensitive market at an economic crossroads**

The semiconductor segment, which generates most of the revenue for the Electronics business line, was hit hard by the economic slowdown that began at the end of 2009. Signs included lower production volumes and plant shutdowns. In this difficult climate, Air Liquide succeeded in maintaining sales of carrier gases, which, unlike electronic specialty gases (ESGs), are weakly

linked to manufacturing. This is especially the case with nitrogen, which accounts for 70% of gas sales and is essentially used as a safety and purge gas. By late 2009 ESG sales returned to their pre-crisis level. Strong growth in gas sales and services is expected to solidify this new trajectory in 2010.

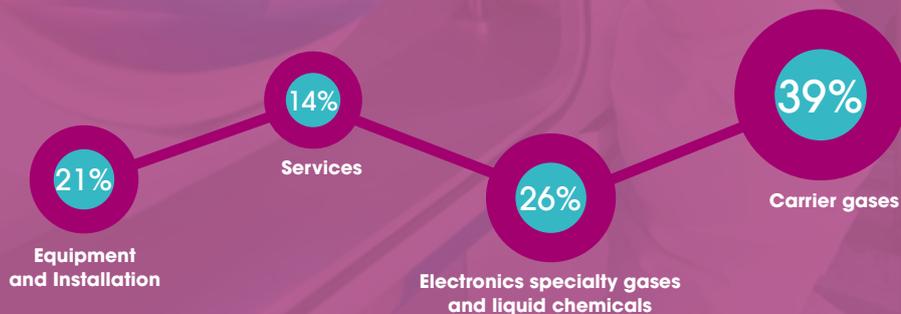
### **New contracts in China**

In 2009, the Electronics business line succeeded in strengthening its leadership position in China by providing services and ultra pure specialty and carrier gases to manufacturers of semiconductors and flat screens. This was the case with:

- semiconductor manufacturers like SMIC and WA&T, a joint-venture between Hynix (a South Korean manufacturer of memory semiconductors) and the Wuxi provincial Government. Air Liquide will supply WA&T with nitrogen and compressed air via pipeline.
- flat screen manufacturers such as Tianma and BOE. The Group is supplying BOE, the leading Chinese manufacturer of TFT-LCD flat screens, with nitrogen from on-site generators, hydrogen produced from an electrolysis unit and bulk oxygen and argon for its new plant in Hefei. ■



€872 million revenue



## Air Liquide consolidates its leadership

In 2009, Air Liquide contributed to more than 40% of the world's total production of photovoltaic cells. As the primary supplier of gas, precursors and services to manufacturers of photovoltaic solar cells, the Group offers standardized products and services in over 20 countries.

The photovoltaic solar market brings together energy and the environment, two of Air Liquide's growth drivers. Now booming, the market is seeing strong development characterized by increasing integration of companies and a drastic decline in manufacturing costs. Two segments make up the market: crystalline silicon photovoltaic cells (85% of the current market) and thin layer photovoltaic cells on glass (15%). The Group has partnerships with eight of the 10 leading manufacturers of crystalline silicon cells and holds more than 40% market share in thin layer cells. Air Liquide supplies over 100 solar cell manufacturers, whose combined annual production capacity surpassed 10 GWp in late 2009.

Air Liquide is expanding its offer to include new molecules and is supporting its customers' efforts to reduce costs by investing in: new carrier gas production plants near its customers, transport and packaging logistics, and R&D into the molecules of the future.

In 2009, the Group became the main supplier for the world's three largest photovoltaic production sites:

- In Thalheim, Germany, home to Europe's biggest "Solar Valley", the Group is investing in Europe's largest nitrogen production unit for the German photovoltaic industry. The unit will meet the needs of the QCells Group and its subsidiaries, which produce advanced thin layer technologies.

- In Singapore, the Group supplies carrier and specialty gases to REC, the global leader in silicon materials for the photovoltaic industry.
- In China, which is home to 35% of global solar cell production, Air Liquide has signed more than 15 new long-term contracts. The Group now has partnerships with the three largest solar cell manufacturers that use crystalline silicon technology: Suntech, JA Solar and Yingli Green Energy. ■

# Engineering and Construction

For both the Air Liquide Group and its third-party customers, the Engineering and Construction Division designs air separation units and hydrogen and synthetic gas production units. It also operates in the field of renewable technologies with biofuels, in alternative technologies with methanol and derived products, and in traditional technologies with refining. It operates throughout the entire world, serving a wide variety of customers.

## A recognized leader

The Engineering and Construction division owns its technologies and places innovation at the heart of its strategy. It is a recognized leader in its various markets: air separation, synthetic gas (syngas) and hydrogen production, and the production and transformation of methanol. The development of new technologies enables it to meet customers' evolving expectations and needs.

This innovation translates into:

- products, as illustrated by the standardization of air separation units,
- processes, such as Bioliq, developed by Lurgi in close collaboration with the Karlsruhe Technology Institute in Germany, to create second generation biofuels.

## Strong showing in 2009

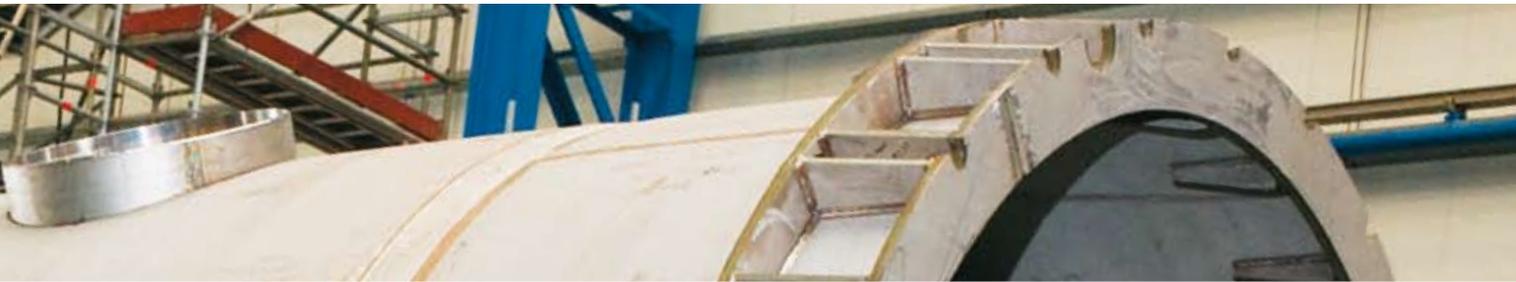
Despite the context of economic crisis, Engineering and Construction had a very good year in 2009. The activity achieved revenues over €1 billion, in line with its performance in 2008. This positive result is explained by the completion and start-up of contracts initiated over the last several years, notably in:

- **Saudi Arabia**, with the start-up of the world's largest carbon monoxide unit at the end of 2009. Delivered to Saudi International Petrochemicals Company (Sipchem) and located in the Jubail industrial complex, it will produce 333,000 tonnes of carbon monoxide per year.
- **The United States**, with the late September 2009 start-up of the nation's largest hydrogen production unit on the ConocoPhillips refinery site in California.

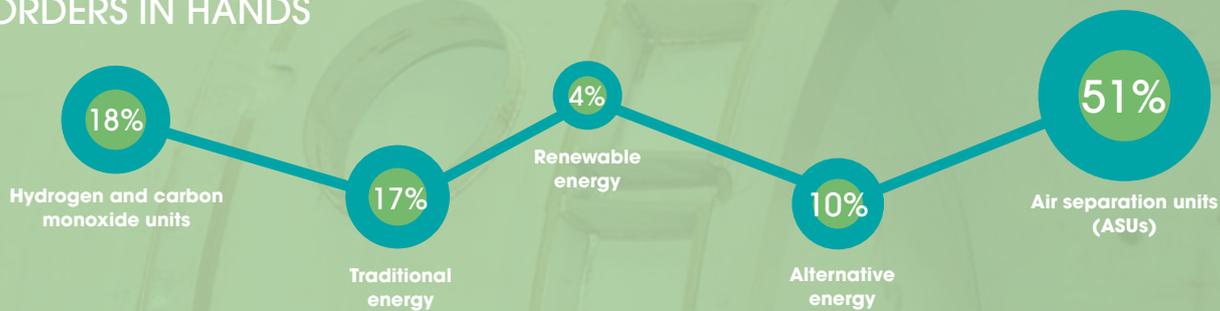
## An expected drop in orders

Several contracts were signed in emerging economies:

- **Brazil**, with PetroQuimica Suape, for the construction of two units for the manufacture of polyethylene terephthalate, textile fibers and plastic packaging;
- **Qatar**, with a long-term contract for the supply of oxygen to Oryx, a producer of clean diesel, naphtha and liquefied petroleum gas (LPG). The Air Liquide subsidiary GASAL is investing in an oxygen and nitrogen production unit with a capacity of 750 tonnes of oxygen per day;
- **Russia**, with Gazprom Komplektatsiya, for the supply of an isomerization and hydrotreating unit and its Astrakhan refinery to produce cleaner, higher quality gas;
- **China**, with the addition of four contracts, including one with Shaanxi Yulin Natural Gas Chemical Industry, Yuntianhua Group. Air Liquide is investing in a new air separation unit (ASU) with a production capacity of 2,700 tonnes of oxygen per day to supply oxygen and nitrogen. Also in China, SCIPIG strengthened its collaboration with Bayer by claiming a major industrial gas contract for a period of 15 years;
- **Vietnam**, where the Group is strengthening its leadership position through the construction of the country's largest ASU – 1,200 tonnes per day – for the Vietnam National Chemical Corporation. ■



## ORDERS IN HANDS



2009 total orders in hands: €4.4 billion, including €2.5 billion from third-party orders



## Standardization of air separation units

“Design-to-Cost” and “Design-to-Market” convey the Group’s ability to mobilize all its skills and focus on one objective in order to define, develop and deliver a winning solution. This is the case with the standardization of oxygen production units, which increases Air Liquide’s and its customers’ competitiveness.

### Cheaper, faster, more reliable

As the fruit of a joint effort between operations, engineering and acquisitions, the success of ASU standardization depends, first of all, on having a product fitting well with the market’s needs. Through cost sharing and the manufacture of component parts in large series, ASU standardization is a source of savings, both for Air Liquide and its customers. It also optimizes risk management related to design, construction and start-up, and increases production reliability.

In addition, it helps shorten the plants’ delivery time. For all of these reasons, Air Liquide has developed a real expertise in standardized ASU design and manufacturing. The goals: to serve a large number of customers with optimal technical, pricing and timing performances.

In 2009, Air Liquide took several important steps toward the launch of new air separation units:

- YangO<sub>2</sub>: delivery time has been halved for this standard, medium-capacity unit that produces pressurized oxygen gas. The first

unit was successfully delivered at the end of June 2009 to the steel manufacturer Dongbu in the Dangin industrial basin in South Korea.

- LILO: the design of this standard liquid oxygen and nitrogen production unit helped reduce investments by 20%. The first installation is underway in Russia. ■

# Welding

Air Liquide Welding designs filler materials, equipment, tool, and services for industrial manufacturers, artisans and the general public to cut and weld metals.

## An offer to meet all demands

Air Liquide Welding (ALW) distinguishes itself with the depth and breadth of its products and solutions. Spread over five commercial brands, the line covers all customer profiles and needs. The Group subsidiary has partnered with a wide variety of customers from railroad, naval, automotive, nuclear, food, chemical and other industries. In 2009, ALW added new products: consumables (electrodes and wire/flux combinations) for high-temperature applications in petrochemical constructions as well as a new strip/flux combination offer for cladding. This process is used to apply a layer of often expensive material with highly specialized properties (e.g., anticorrosive, highly durable, etc.) to a metal with a non-alloyed or slightly alloyed base at a relatively low cost.

## A particularly challenging time

Air Liquide Welding was significantly affected by the crisis, with sales dropping 32% in 2009. The decline was particularly noticeable in Europe, where 90% of total welding revenue is earned and where the automotive industry plays an important role. The subsidiary faced European customers with declining business, the mass liquidation of stock by distributors, and a drop in the price of raw materials that had to be incorporated into product prices. The subsidiary was more resilient in emerging economies, thanks to energy-related markets in particular. This was the case in China with nuclear plants, thermal power plants and railroad transportation; in India with petrochemicals and nuclear plants; and in Southeast Asia with offshore operations.

## Responsiveness and adaptability

Faced with these challenging circumstances, Air Liquide Welding drastically reduced its costs. It also revisited its approach to the automation market with three goals in mind: improving product quality, raising the level of service and increasing profitability. ■



# Specialty chemicals



SEPPIC supplies high value-added products to the healthcare, cosmetics and food industries, as well as a number of industrial activities.

## Harnessing synergies

SEPPIC's strength and reputation are linked to its ability to harness unique synergies of each customer. With this expertise, the company aims to enhance performance and add value to its products. To this end, SEPPIC combines creativity and technical mastery with proximity to customers and the ability to anticipate their needs.

## Well-positioned in the nutrition market

In November 2009, SEPPIC introduced a new 100% natural sweetener to the French market. Extracted from a plant, Stevia, Rebaten 97% is 250 times sweeter than sugar but has no calories, making it a direct competitor with low-calorie artificial sweeteners. The launch of this new product took place mere weeks after its authorization by AFSSA, thanks to SEPPIC's advance preparation. Rebaten 97% expands SEPPIC's human nutrition and nutraceutical offer, which includes a wide range of ingredients for dietary supplements, functional and dietary foods. Pharma nutrition is a rising sector that posted positive growth in 2009, despite the economic crisis.

## Sustained performance in 2009

The diversity of its customer portfolio and geographic locations helped the company maintain strong sales, especially in Asia and South America. Its development strategy, which centers on health, beauty and well-being, offers promising prospects as the needs of populations continue to grow.

## Vaccine adjuvants: SEPPIC consolidates its leadership

Already recognized in the field of animal vaccine adjuvants, SEPPIC is now a leading player in human vaccines. In 2008, SEPPIC helped launch CimaVax, the first therapeutic vaccine to combat lung cancer. This launch helped accelerate the development of many projects undertaken in partnership with the best research institutes in the world. ■



# Cryogenics and Space

Cryogenics, space, aeronautics...  
Air Liquide is a key player in the development of advanced technologies. Its high level of expertise makes it an essential partner for cutting-edge industries and the scientific community.

## Expert in cryogenics

A worldwide reference in the field of cryogenics, Air Liquide has partnered with laboratories, research centers and major scientific projects, as well as a number of research and development players in the industry. The Group recently won several contracts for the supply of helium liquefiers with its Helial product line. In late November 2009, it participated to the restarting of the world's biggest particle accelerator – the Large Hadron Collider – alongside CERN, the European Organization for Nuclear Research. Inaugurated in October 2008, this scientific instrument will help shed light on some of the biggest mysteries of fundamental physics: the origin of matter, the Big Bang theory, etc.

## New markets

Advanced Technologies (DTA) focuses its efforts in particular in the fields of energy and environmental protection by working, for example:

- in the hydrogen energy field, notably on designing refueling stations,
- on superconductor cables for transportation,
- on major nuclear fusion projects, including ITER (Cadarache, in southern France),
- on the purification of biogas,
- on the treatment of gaseous effluents.

## The space adventure continues

On May 14, 2009, Ariane launched Herschel and Planck, two of the most complex satellites ever developed in Europe. For Herschel, DTA designed and manufactured an extraordinary cryogenic tank with a capacity of 2,400 liters for storing helium. For Planck, it developed a dilution cooler with unique attributes. It allows the instruments to operate at extremely low temperatures: a tenth of a degree above absolute zero. The launch concluded the project, which mobilized dozens of employees for more than ten years. In 2009, with CNES and others, Air Liquide continued its work in the development of future cryogenic equipment for Ariane, the European launch vessel.

## Aeronautics

Air Liquide is a preferred partner in aeronautics, alongside builders and equipment suppliers. DTA develops respiratory equipment and both ground and on-board oxygen and nitrogen gas-generation systems. ■



# Diving

Aqua Lung has built a reputation in three major markets: sport and leisure diving, military equipment and aquatic sports.

## Innovation, reliability and quality

Aqua Lung combines safety, innovation and high quality in all of its products – regulators, buoyancy compensators, fins, masks and diving suits, swimming goggles and masks, and even rebreathers. The organization is structured around its core businesses – sport and leisure diving, military equipment and aquatic sports – Aqua Lung designs and develops a wide range of products that are distributed around the world.

## Complementary activities

In 2009, despite the economic crisis, Aqua Lung saw its revenue grow 0.5%. This is the result of a diversification strategy that has seen the Group's subsidiary expand into complementary markets.

In 2009, a 12% drop in sport and leisure diving sales – one of Aqua Lung's main businesses – was offset by:

- strong growth in the swimming market (18% increase in sales),
- outstanding growth in the military market (55% increase in sales).

## Spotlight on the military

Aqua Lung has been cultivating its expertise in military equipment design for many years, with diving equipment, personal protection equipment for air teams, and tactical support equipment for special forces. Fueled by the intensification of military operations worldwide, this market's strong growth in 2009 can also be explained by two major contracts signed in 2008:

- the CRABE contract with the French Navy for 150 rebreathers, totaling €5 million. Non-magnetic, extremely quiet, and invisible to mines, this rebreather recycles some of the gas exhaled by the diver to increase autonomy and comfort. A new line of rebreathers noted for their durability and reliability also helped the subsidiary increase export sales.
- the PHODS contract for 2,000 devices destined for depressurized helicopter crews in the American forces, totaling €8 million. ■



# Preserving the environment

## CO<sub>2</sub>: a more demanding indicator

Air Liquide carefully measures the CO<sub>2</sub> emitted from its hydrogen and cogeneration units, as well as the emissions generated by power suppliers for air separation and other units. As a result, the Group reports total emissions of nearly 17 million tonnes per year. For context, compare this figure to the 100 million tonnes emitted by large cement manufacturers or the 150 million tonnes from large non-nuclear energy producers.

Today, Air Liquide has reached a level of development that allows it to measure total CO<sub>2</sub> emissions. Moving beyond traditional objective figures that are too simple and absolute, the Group is working on the development of an indicator based on a financial ratio. It's an important long-term project that will continue in 2010, notably involving the Finance Division. ■

### DIRECT AND INDIRECT GREENHOUSE GAS EMISSIONS (GHG)

2006	7,917	7,631	15,548
2007	8,100	7,995	16,095
2008	9,014	7,952	16,966
2009	9,386	7,447	16,833

■ Total direct GHG emissions  
(in thousands of tonnes CO<sub>2</sub> eq.)

■ Total indirect GHG emissions  
(in thousands of tonnes CO<sub>2</sub>)

## Focus on Air Liquide's carbon footprint

Since 2008, Air Liquide has measured the carbon footprint of its main products – oxygen, nitrogen and hydrogen – using a carbon content index. The products are categorized based on how they are distributed (e.g., pipeline, liquid or bottle) and where they are produced (France, United States, Germany and Japan for oxygen and nitrogen; Belgium and the United States for hydrogen).

In 2009, the Group expanded for the first time the scope of the project to include other large European countries, Canada and China. Other products, like argon and CO<sub>2</sub>, were also added to the measurement index. These steps will help the Group address questions from customers, who often want to include this information when calculating their own carbon footprints. ■





## Copenhagen

Air Liquide attended the Copenhagen summit (COP15) on climate change in December 2009, along with other French groups such as Alstom and PSA Peugeot Citroën. Although Air Liquide isn't one of the world's largest greenhouse gas emitters, the Group remains a major player in the search for innovative solutions for its customers.

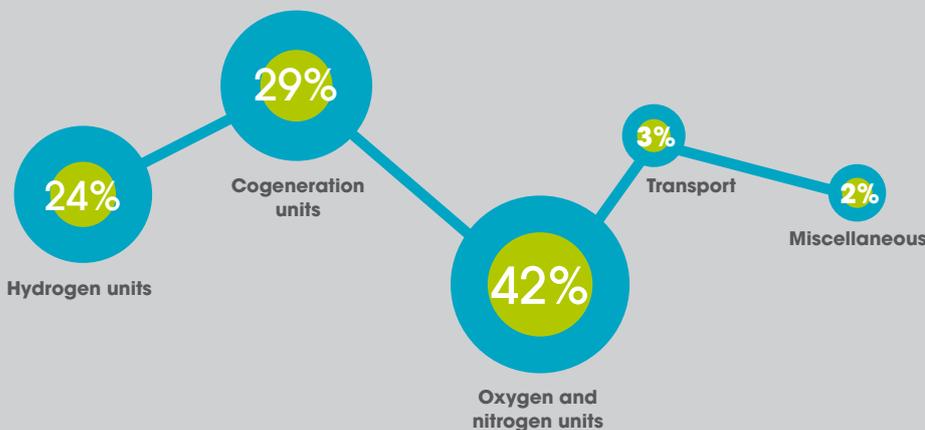
Several conferences took place in conjunction with the summit, including "Bright Green", an event organized by the Confederation of Danish Industry. There, Air Liquide presented its strategy to improve energy efficiency and reduce CO<sub>2</sub> emissions, alongside partners like Babcock & Wilcox.

Another conference gave Air Liquide the opportunity to present several of the Group's advanced research projects in different fields: energy efficiency, CO<sub>2</sub> capture and storage, and the development of alternative and renewable types of energy (e.g., second-generation biofuels, photovoltaic energy, hydrogen as a clean energy vector/H2E program). Lastly, COP15 was also a fantastic opportunity to meet and talk with other industrial manufacturers, NGOs and French Government representatives, including the French ambassador to Denmark, who stopped by the Air Liquide stand. ■

## France will produce second-generation biofuels

It's official! A pilot unit for converting biomass (agricultural and forest residues) into second-generation biofuels will be built in Bure-Saudron, which is located in northeast France. This demonstration unit will be the first of its kind in France. Working alongside the French *Commissariat à l'Énergie Atomique* (CEA), which is leading the project, and the CNIM Group (*Constructions Industrielles de la Méditerranée*), the master builder, Air Liquide will supply key technologies to transform synthesis gases into biofuels. Engineering and Construction teams from Lurgi, a Group subsidiary, will coordinate some of the technical engineering and several back-end procedures, from gasification to biofuel promotion. ■

BREAKDOWN OF DIRECT AND INDIRECT EMISSIONS OF GREENHOUSE GASES (GHG)





FINANCIAL  
INFORMATION  
&  
SUSTAINABLE  
DEVELOPMENT  
INDICATORS

# Consolidated income statement (summarized)

FOR THE YEAR ENDED DECEMBER 31

In millions of euros	2008	2009
<b>Revenue</b>	<b>13,103.1</b>	<b>11,976.1</b>
Purchase	(5,547.1)	(4,563.3)
Personnel expenses	(2,176.8)	(2,236.5)
Other income and expenses	(2,437.4)	(2,207.3)
<b>Operating income recurring before depreciation and amortization</b>	<b>2,941.8</b>	<b>2,969.0</b>
Depreciation and amortization expense	(992.8)	(1,020.0)
<b>Operating income recurring</b>	<b>1,949.0</b>	<b>1,949.0</b>
Other non-recurring operating income and expenses	(30.2)	10.1
<b>Operating income</b>	<b>1,918.8</b>	<b>1,959.1</b>
Net finance costs	(214.4)	(221.7)
Other financial income and expenses	(55.9)	(52.9)
Income taxes	(401.5)	(419.1)
Share of profit of associates	24.8	19.8
<b>Profit for the period</b>	<b>1,271.8</b>	<b>1,285.2</b>
- Minority interests	51.8	55.2
<b>- Net profit (Group share)</b>	<b>1,220.0</b>	<b>1,230.0</b>
<b>Basic earnings per share (in euros)</b>	<b>4.70</b>	<b>4.70</b>
<b>Diluted earnings per share (in euros)</b>	<b>4.67</b>	<b>4.70</b>

# Statement net income and gain and losses recognized directly in equity

FOR THE YEAR ENDED DECEMBER 31

In millions of euros	2008	2009
<b>Profit for the period</b>	<b>1,271.8</b>	<b>1,285.2</b>
<b>Items recognized in equity</b>		
Fair value variation of financial instruments	(27.5)	(2.1)
Change in foreign currency translation reserve	(1.4)	35.0
Actuarial gains (losses)	(143.0)	(32.9)
<b>Items recognized in equity, net of taxes</b>	<b>(171.9)</b>	
<b>Net income and gain and losses recognized directly in equity</b>	<b>1,099.9</b>	<b>1,285.2</b>
- Attributable to minority interests	53.3	55.6
<b>- Attributable to equity holders of the parent</b>	<b>1,046.6</b>	<b>1,229.6</b>

# Consolidated balance sheet (summarized)

FOR THE YEAR ENDED DECEMBER 31

In millions of euros	December 31, 2008 <sup>(a)</sup>	December 31, 2009
<b>Assets</b>		
<b>Non-current assets</b>		
Goodwill	3,956.2	4,002.9
Intangible assets and property, plant and equipment	10,236.1	10,596.8
Other non-current assets	726.3	940.1
<b>TOTAL NON-CURRENT ASSETS</b>	<b>14,918.6</b>	<b>15,539.8</b>
<b>Current assets</b>		
Inventories and work-in-progress	818.3	709.7
Trade receivables and other current assets	3,388.3	2,931.5
Cash and cash equivalents including fair value of derivatives (assets)	1,493.6	1,444.6
<b>TOTAL CURRENT ASSETS</b>	<b>5,700.2</b>	<b>5,085.8</b>
<b>TOTAL ASSETS</b>	<b>20,618.8</b>	<b>20,625.6</b>

In millions of euros	December 31, 2008 <sup>(a)</sup>	December 31, 2009
<b>Equity and liabilities</b>		
Shareholder's equity	6,757.4	7,583.7
Minority interests	144.3	168.2
<b>TOTAL EQUITY</b>	<b>6,901.7</b>	<b>7,751.9</b>
<b>Non-current liabilities</b>		
Provisions, pensions and other employee benefits and deferred tax liabilities	2,754.5	2,777.5
Non-current borrowings	6,205.2	5,528.9
Other non-current liabilities	193.4	280.8
<b>TOTAL NON-CURRENT LIABILITIES</b>	<b>9,153.1</b>	<b>8,587.2</b>
<b>Current liabilities</b>		
Provisions, pensions and other employee benefits	244.8	222.4
Trade payables and other current liabilities	3,553.9	3,197.1
Current borrowings including fair value of current derivatives (liabilities)	765.3	867.0
<b>TOTAL CURRENT LIABILITIES</b>	<b>4,564.0</b>	<b>4,286.5</b>
<b>TOTAL EQUITY AND LIABILITIES</b>	<b>20,618.8</b>	<b>20,625.6</b>

(a) Corresponds to the amounts as of December 31, restated for the impacts of the application of the option offered by revised IAS19 "Employee Benefits" to immediately recognize all actuarial gains and losses and adjustments arising from the asset ceiling, net of deferred tax, in addition to the firsttime adoption of IFRIC14.

# Consolidated statement of cash flows (summarized)

FOR THE YEAR ENDED DECEMBER 31

In millions of euros	2008	2009
<b>Operating activities</b>		
<b>Cash flow from operating activities before changes in working capital</b>	<b>2,206.7</b>	<b>2,274.5</b>
Changes in working capital	127.9	165.5
Other	(41.7)	11.8
<b>Net cash from operating activities</b>	<b>2,292.9</b>	<b>2,451.8</b>
<b>Investing activities</b>		
Purchase of property, plant and equipment and intangible assets	(1,908.3)	(1,411.0)
Acquisition of subsidiaries and financial assets	(242.3)	(109.2)
Proceeds from sale of property, plant and equipment and intangible assets	50.5	78.5
Proceeds from sale of financial assets	7.5	1.9
<b>Net cash used in investing activities</b>	<b>(2,092.6)</b>	<b>(1,439.8)</b>
<b>Financing activities</b>		
Dividends paid		
- L'Air Liquide S.A.	(550.8)	(601.9)
- Minority interests	(39.0)	(28.8)
Proceeds from issues of share capital	44.5	175.1
Purchase of treasury shares	(168.2)	(1.1)
Increase (decrease) in borrowings	1,042.0	(416.6)
<b>Net cash from (used in) financing activities</b>	<b>328.5</b>	<b>(873.3)</b>
Effect of exchange rate changes and change in scope of consolidation	(41.2)	45.7
<b>Net increase (decrease) in cash and cash equivalents</b>	<b>487.6</b>	<b>184.4</b>
<b>NET CASH AND CASH EQUIVALENTS AT BEGINNING OF PERIOD</b>	<b>653.9</b>	<b>1,141.5</b>
<b>NET CASH AND CASH EQUIVALENTS AT END OF PERIOD</b>	<b>1,141.5</b>	<b>1,325.9</b>

# Net indebtedness calculation

In millions of euros	2008	2009
Non-current borrowings (long-term debt)	(6,205.2)	(5,528.9)
Current borrowings (short-term debt)	(611.4)	(826.4)
<b>TOTAL GROSS INDEBTEDNESS</b>	<b>(6,816.6)</b>	<b>(6,355.3)</b>
<b>Cash and cash equivalents</b>	<b>1,262.9</b>	<b>1,385.3</b>
Derivative instruments (assets) - fair value hedge of borrowings	116.2	79.2
Derivative instruments (liabilities) - fair value hedge of borrowings	(46.9)	0.0
<b>TOTAL NET INDEBTEDNESS AT THE END OF THE PERIOD</b>	<b>(5,484.4)</b>	<b>(4,890.8)</b>

# Statement of changes in net indebtedness

In millions of euros	2008	2009
<b>Net indebtedness at the beginning of the period</b>	<b>(4,660.2)</b>	<b>(5,484.4)</b>
Net cash from operating activities	2,292.9	2,451.8
Net cash used in investing activities	(2,092.6)	(1,439.8)
Net cash used in financing activities excluding increase (decrease) in borrowings	(713.5)	(456.7)
<b>Total net cash flow</b>	<b>(513.2)</b>	<b>555.3</b>
Effect of exchange rate changes, change in scope of consolidation and others	(311.0)	38.3
<b>Change in net indebtedness</b>	<b>(824.2)</b>	<b>593.6</b>
<b>NET INDEBTEDNESS AT THE END OF THE PERIOD</b>	<b>(5,484.4)</b>	<b>(4,890.8)</b>

# Consolidated statement of changes in equity

FOR THE YEAR ENDED DECEMBER 31

In millions of euros	Share capital	Additional paid-in capital	Retained earnings (including net profit)	Net income recognized directly in equity					Total equity
				Fair value of financial instruments	Translation reserves	Treasury shares	Shareholders' equity	Minority interests	
<b>Equity and minority interests as of January 1, 2009</b>	1,435.1	18.4	6,172.8	(16.3)	(741.8)	(110.8)	6,757.4	144.3	6,901.7
<b>Profit for the period</b>			1,230.0				1,230.0	55.2	1,285.2
Items recognized in equity			(34.4)	(2.1)	36.1		(0.4)	0.4	0.0
<b>Net income and gain and losses recognized directly in equity for the period</b>			1,195.6	(2.1)	36.1		1,229.6	55.6	1,285.2
Increase (decrease) in share capital	18.3	153.4					171.7	3.4	175.1
Distribution			(601.9)				(601.9)	(28.8)	(630.7)
Purchase of treasury shares						(1.1)	(1.1)		(1.1)
Share options and shares issued for employees			19.7				19.7		19.7
Put options granted to minority shareholders								(1.3)	(1.3)
Other			0.3			8.0	8.3	(5.0)	3.3
<b>Equity and minority interests as of December 31, 2009</b>	1,453.4	171.8	6,786.5	(18.4)	(705.7)	(103.9)	7,583.7	168.2	7,751.9

In millions of euros	Share capital	Additional paid-in capital	Retained earnings (including net profit)	Net income recognized directly in equity					Total equity
				Fair value of financial instruments	Translation reserves	Treasury shares	Shareholders' equity	Minority interests	
<b>Equity and minority interests as of January 1, 2008</b>	1,313.6	5.9	5,945.3	11.2	(732.7)	(215.0)	6,328.3	148.1	6,476.4
<b>Adjustment of Equity and minority interests as of January 1, 2008</b>			41.2				41.2	2.0	43.2
<b>Profit for the period</b>			1,220.0				1,220.0	51.8	1,271.8
Items recognized in equity			(136.8)	(27.5)	(9.1)		(173.4)	1.5	(171.9)
<b>Net income and gain and losses recognized directly in equity for the period</b>			1,083.2	(27.5)	(9.1)		1,046.6	53.3	1,099.9
Increase (decrease) in share capital	4.3	37.2					41.5	3.0	44.5
Allotment of bonus shares	133.2	(14.3)	(118.9)						
Distribution			(550.8)				(550.8)	(39.0)	(589.8)
Cancellation of treasury shares	(16.0)	(10.4)	(245.9)			272.3			
Purchase of treasury shares						(168.2)	(168.2)		(168.2)
Share options			14.5				14.5		14.5
Put options granted to minority shareholders								(10.0)	(10.0)
Other			4.2			0.1	4.3	(13.1)	(8.8)
<b>Equity and minority interests as of December 31, 2008</b>	1,435.1	18.4	6,172.8	(16.3)	(741.8)	(110.8)	6,757.4	144.3	6,901.7

# Key indicators

Consult the 2009 Sustainable Development Report in the Reference Document.

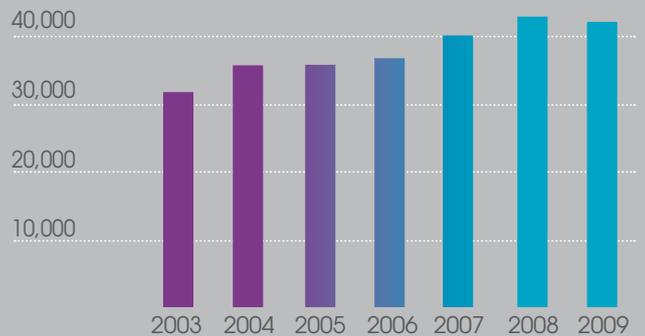
## Net profit and dividend

In the last 10 years, **the growth in value of a portfolio of Air Liquide shares has been +8.7% a year** on average, including gross dividends reinvested in shares, bonus shares and loyalty bonuses granted to registered shareholders. The Group's objective is to maintain this comprehensive remuneration policy for shareholders to ensure regular long-term value enhancement in a transparent manner.



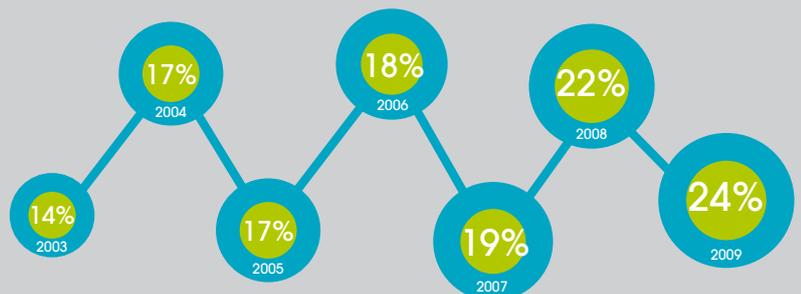
## Evolution of employees

Located in 75 countries worldwide, the Air Liquide Group has continued to grow and develop skills. With 42,300 employees in 2009, against 31,900 in 2003, Air Liquide displays growth of its workforce by **nearly 1/3 in 6 years**.



## Percentage of women among engineers and managers

Diversity is one of the pillars of Air Liquide's Human Resources Policy which, seeks a better, more equitable division of responsibilities between men and women. Between 2003 and 2009, the percentage of women among engineers and managers rose from 14% to 24%, representing **a growth of more than 70% in six years**.



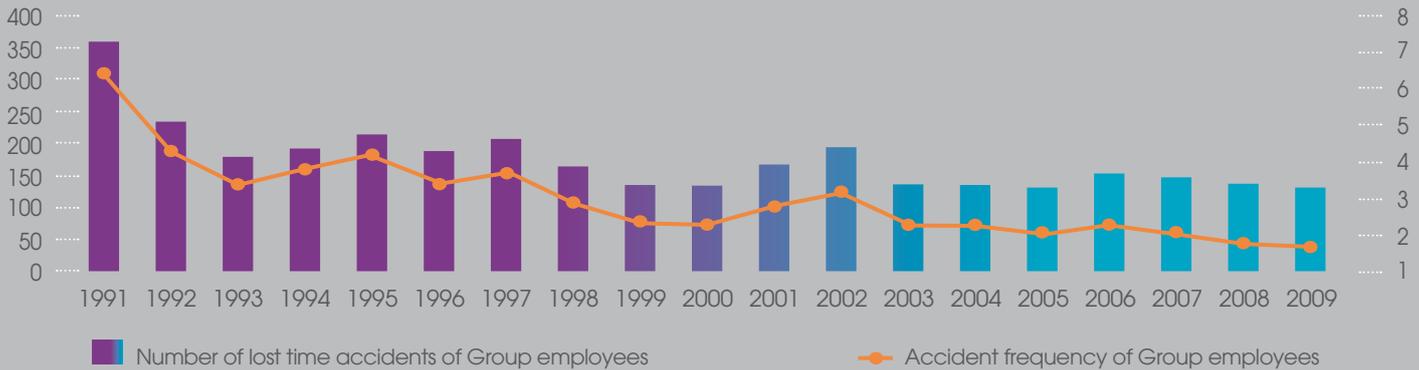
# Safety: number and frequency of accidents of Group employees and subcontractors

Over the last 19 years, the number of accidents has been divided by nearly three, going from 359 in 1991 to 131 in 2009.

Moreover, the **accident frequency of the Group in 2009 reached its lowest**

**level ever:** 1.7 accidents per million hours worked. It is almost four times less than 19 years ago, even though the number of employees has increased by 50% in the same period! Furthermore, since 2008, the Group published the number of accidents

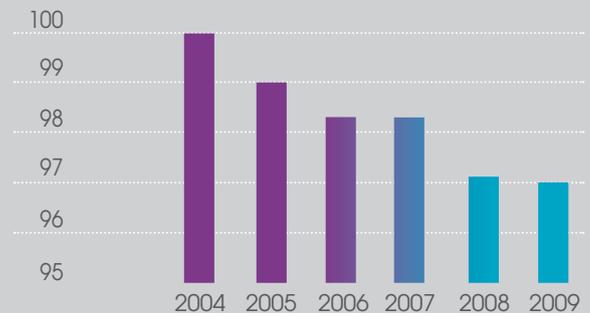
for subcontractors and temporary personnel. The results prove positive, since the number of accidents has also decreased in this area, going from 154 in 2008 to 148 in 2009.



## Hydrogen units more efficient

The energy efficiency per m<sup>3</sup> of CO<sub>2</sub> of gas produced by these units continued to improve in 2009 and reached almost 3% compared to 2004, which is equivalent to **a decrease in CO<sub>2</sub> emissions on the scale of 100,000 tonnes per year.**

EVOLUTION OF ENERGY CONSUMPTION PER M<sup>3</sup> OF GAS PRODUCED <sup>(a)</sup>



(a) Hydrogen and carbon monoxide. Base 100 in 2004.

## Number of international patents filed

The number of patents filed during the year 2009 reached the record figure of 280, which is greater than that for each of the preceding six years!

Moreover, within five years, the number of patents filed directly in the Group's four main presence zones <sup>(b)</sup> has risen and went from 109 to 156, showing **a growth of more than 40% in comparison with 2004.**

NUMBER OF PATENTS FILED IN THE GROUP'S FOUR MAIN PRESENCE ZONES (Europe, the United States, Japan and China)



(b) Europe, the United States, Japan and China.

# Glossary

## **A**bsolute zero

It is the coldest temperature theoretically possible. By international agreement, it is defined as  $-273.15^{\circ}\text{C}$  or 0 Kelvin.

## **A**DEME

ADEME (*Agence de l'Environnement et de la Maîtrise de l'Énergie*) The French Environment and Energy Management Agency, which participates in applying French public policy in the fields of the environment, energy and sustainable development.

## **A**djuvant

An additive that strengthens another element or reinforces the element's effectiveness.

## **A**dvanced precursors

The increasing performance of electronic chips requires the use of new materials. These materials are supplied and integrated into the chips by advanced precursors, complex molecules that are generally liquid.

## **B**iomass

Organic materials, usually plant-based, that can be used to produce energy, or to serve other purposes.

## **C**arrier gases

Carrier gases (nitrogen, oxygen, hydrogen, etc.) are used to transport and dilute process gases or to protect semiconductors from minute dust particles.

## **C**NES

CNES (*Centre National d'Études Spatiales*) The French national space agency, in charge of proposing to the French Government a space policy for France, within the European framework, and implementing this policy. It works with scientific partners and industrial companies which collaborate on the space programs designed by the Center.

## **C**NRS

CNRS (*Centre national de la recherche scientifique*) The French National Center for Scientific Research is a public research organization. It produces knowledge for the benefit of society. CNRS undertakes research in all scientific, technological and societal fields.

## **C**ogeneration

The simultaneous production of steam and electricity. Cogeneration enables more efficient use of primary energy and produces less air pollution, specifically fewer carbon dioxide ( $\text{CO}_2$ ) emissions.

## **D**ilution cooler

This system works by mixing two isotopes of helium,  $3\text{He}$  and  $4\text{He}$ , which circulate through tubes of extremely small dimensions. It serves to lower the temperature of the Planck satellite's sensors to 0.1 K ( $-273.05^{\circ}\text{C}$ ) and stabilize this temperature to a millionth of a degree.

## **E**ffluent

Any gas or liquid waste material that carries polluting agents and contains substances hazardous to the environment.

## **E**xogenous surfactant

An endogenous pulmonary surfactant is a complex molecule produced by an organism that helps it reduce the effort required for breathing. A deficit of this molecule causes respiratory distress syndrome in premature babies, which can be treated by administering exogenous surfactants.

## **F**uel cell

A fuel cell is an electrochemical device that produces electricity by using hydrogen and oxygen. It makes no noise and only emits water.

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## **G**reenhouse effect

The greenhouse effect prevents solar heat from dissipating back into space. This effect is necessary because without it, the average temperature on the surface of the earth would be -18 °C. However, negative consequences arise when too much greenhouse gas concentrates within the atmosphere.

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## **H**<sub>2</sub>CO unit

Unit that simultaneously produces hydrogen (H<sub>2</sub>) and carbon monoxide (CO).

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## **I**nfrared

Infrared radiation is electromagnetic radiation that is invisible to the eye. It has a wavelength greater than that of visible light, notably above that of red light, giving it its name.

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## **L**iquid gases

Gases can assume a liquid form, usually at an extremely low temperature, thus considerably reducing their volume. For example: when reheated, one liter of liquid nitrogen at -196°C produces close to 700 liters of nitrogen gas at room temperature. This makes it possible to more easily transport, distribute and store gases.

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## **N**uclear fusion

Nuclear fusion involves fusing light atomic nuclei, resulting in the formation of a new element. Fusion reactions are carried out under highly controlled conditions and produce large amounts of energy. Countless nuclear fusion reactions occur naturally on stars, such as the sun.

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## **O**n-site unit

Industrial or medical gas production unit set up on the customer's site and operated by Air Liquide.

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## **R**are gases

Rare gases are natural, inert products found in very small quantities in the air we breathe: argon (0.9% of air), neon (0.002%), krypton (0.0001%), xenon (0.00001%).

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## **REACH**

The European Union's REACH (Registration, Evaluation, Authorization and Restriction of Chemicals) regulation governs the registration, evaluation and authorization of chemical products produced in or imported within the European Union.

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## **Reforming**

Natural gas reforming enables the production of hydrogen through a high-temperature chemical reaction between methane (the main element of natural gas) and steam.

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## **S**ilicon

After oxygen, Silicon is the most common element present in the earth's crust. It does not exist in a free state, but is found in composite substances, such as silica (a component of sand).

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## **Sleep apnea**

Iterative temporary stop of respiration during sleep. Sleep apnea is frequent (5 to 10% of the adult population in industrial countries), severe (multiplies by six the risk of motor vehicle accidents and heart problems) and still under-diagnosed. Air Liquide is the leader in France and Europe for devices and follow-up monitoring of patients undergoing Continuous Positive Airway Pressure (CPAP) treatment. The Group expands its activity to the rest of the world.

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## **SO<sub>x</sub>**

Sulfur oxides are pollutants that cause acid rain, smog and respiratory illnesses. They are produced by the combustion of hydrocarbons containing sulfur.

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## **Superconductivity**

A phenomenon characterized by zero electrical resistance and the exclusion of the interior magnetic field in certain so-called "superconducting" materials. Superconductivity occurs at very low temperatures.





