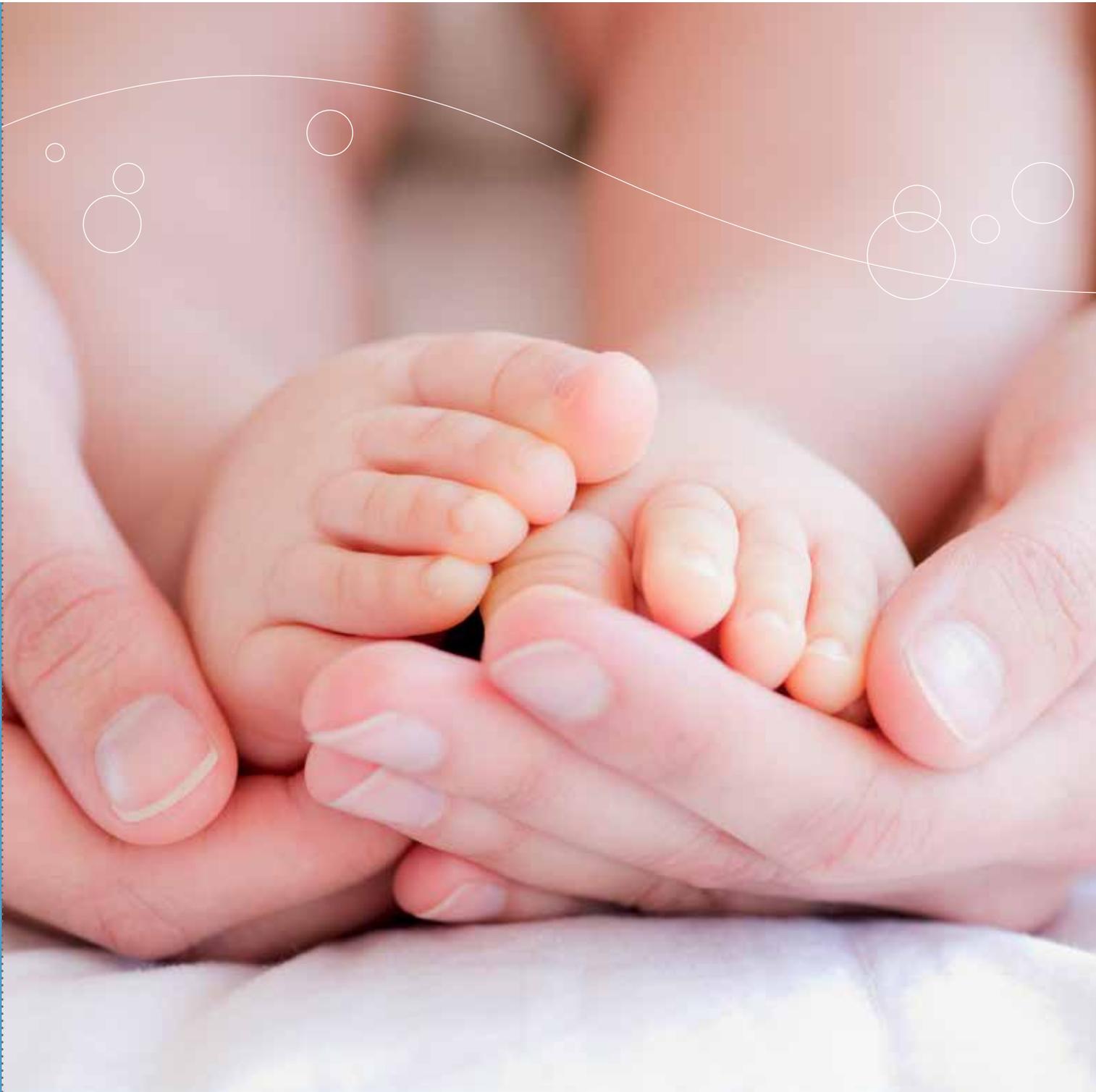


# Protecting Vulnerable Lives



## THE AIR LIQUIDE GROUP

WORLD LEADER IN GASES TECHNOLOGIES  
AND SERVICES FOR INDUSTRY AND HEALTH

In 1902, Air Liquide was born through an invention, a new technology for the liquefaction and separation of air gases. Since then, **innovation** has been essential to the Group's growth strategy.

**9** R&D locations

**300** new patents annually

Present today in **80** countries

More than **50,000** employees

A responsible commitment to all stakeholders

## AIR LIQUIDE HEALTHCARE

### A PATIENT-CENTERED APPROACH

There are thousands of reasons for being a major player in healthcare, and each one touches a life somewhere.

Wherever we are in the world, Air Liquide Healthcare exists to **protect vulnerable lives** through outstanding products, services and support.

Society currently faces a number of public health, economic and technological challenges. **As a responsible company, we aim to bring value to society** through continued safety, reliability, innovation, high quality, cost-effectiveness, ethical behavior and proactive dialogue with all stakeholders.

In all we do, we are **engaged and inventive, with a vision**. Our values, ways of working, and our passionate and compassionate people are vital to our success. Together, we strive to anticipate the demands of patients and healthcare professionals all over the world, responding proactively to their needs.

Every day, our capabilities, expertise and experience contribute to our **commitment to performance and responsibility over the long-term**.



**Pascal Vinet**, Vice President  
Healthcare Global Operations  
Member of Air Liquide's Executive Committee



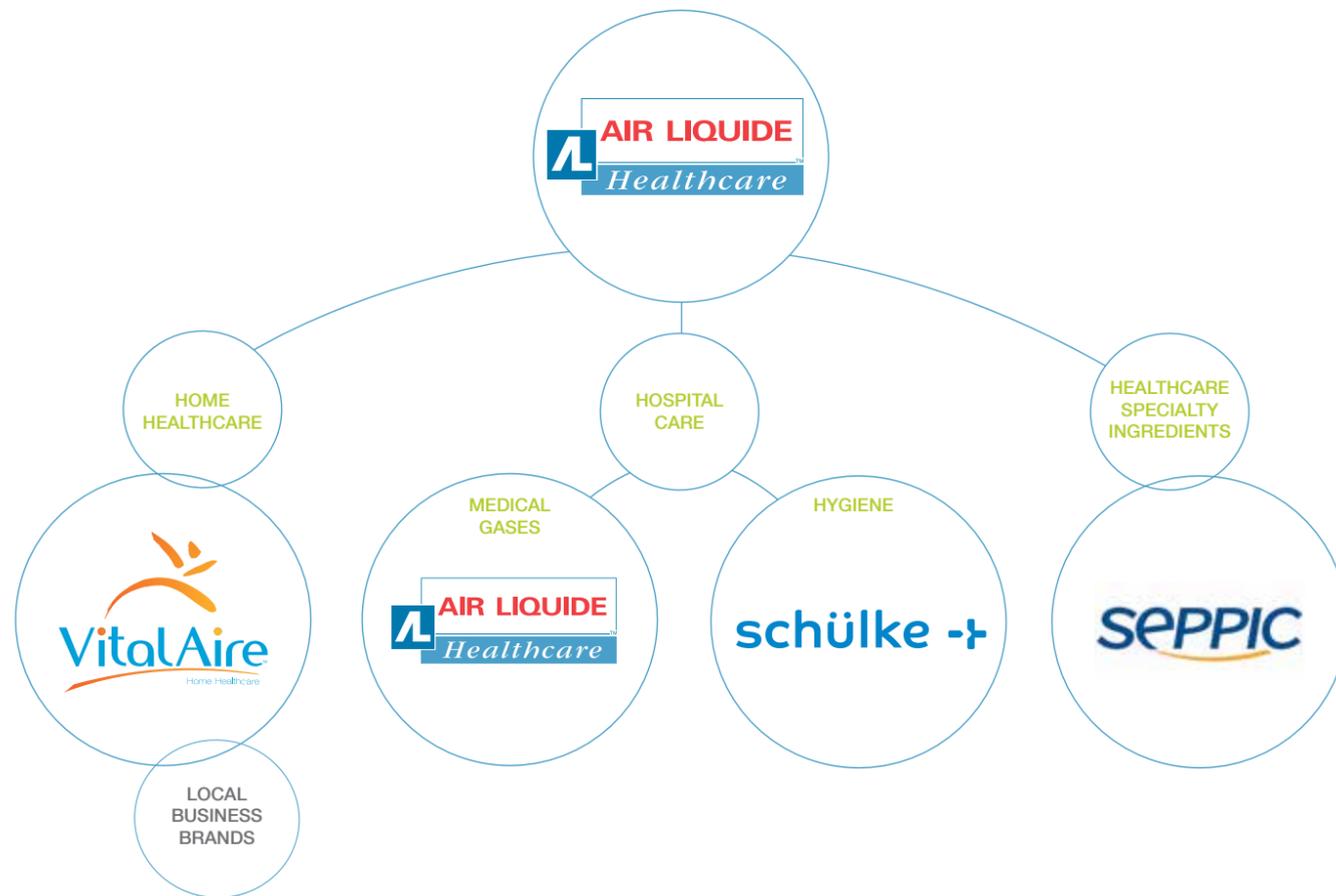
**Diana Schillag**, Vice President  
Healthcare World Business Line

**Challenges:** ageing population | rise of chronic diseases | pandemics | nosocomial infections | rising pressure on state budgets | growing healthcare needs in developing economies | new technologies

# AIR LIQUIDE HEALTHCARE

PRESENT THROUGHOUT THE CONTINUUM OF CARE

Air Liquide Healthcare is a world leader in medical gases, home healthcare, hygiene products and healthcare specialty ingredients



Under whichever brand you know us, you can trust our commitment to protecting vulnerable lives

## AIR LIQUIDE HEALTHCARE INSPIRING FIGURES

A dedicated team of more than **12,000** employees in **35 countries** around the world influence the lives of **1,200,000** patients at home and serve over **7,500** hospitals and clinics



# AIR LIQUIDE HEALTHCARE'S PURPOSE

WE AIM TO PROVIDE CUSTOMERS IN THE CONTINUUM OF CARE FROM HOSPITAL TO HOME WITH MEDICAL PRODUCTS, SPECIALTY INGREDIENTS, AND SERVICES THAT CONTRIBUTE TO PROTECTING VULNERABLE LIVES

Vulnerability refers to the fragility of human existence. Each of us can become vulnerable for a short period of time, or permanently. Vulnerability may result from age, illness or loss of autonomy – thus increasing our exposure to risk.

In our healthcare activities we are constantly confronted with the vulnerability of life: patients undergoing painful medical procedures, in emergency rooms, operating theatres, exposed to the risk of hospital-acquired infections, patients suffering from chronic diseases, multipathologies, elderlies, etc.

As a responsible company, it is our duty to protect these lives through our products, services and support.

## AIR LIQUIDE HEALTHCARE STANDS FOR...

### Active Long-Term Partnership

We are passionate about working closely with our customers and engaging healthcare stakeholders to drive dialogue and action for continual improvement.

### Integrated Solutions for Better Healthcare

We leverage our capabilities, solid heritage, performing business model, financial stability, global presence and expertise to design and deliver molecules / devices / services that best meet our customers' current and future needs.

### Anticipating Challenges

We seek insight into the most important challenges facing the healthcare community, enabling us to proactively find the most relevant and efficient solutions.

WE ARE COMMITTED | INVENTIVE | WITH A VISION

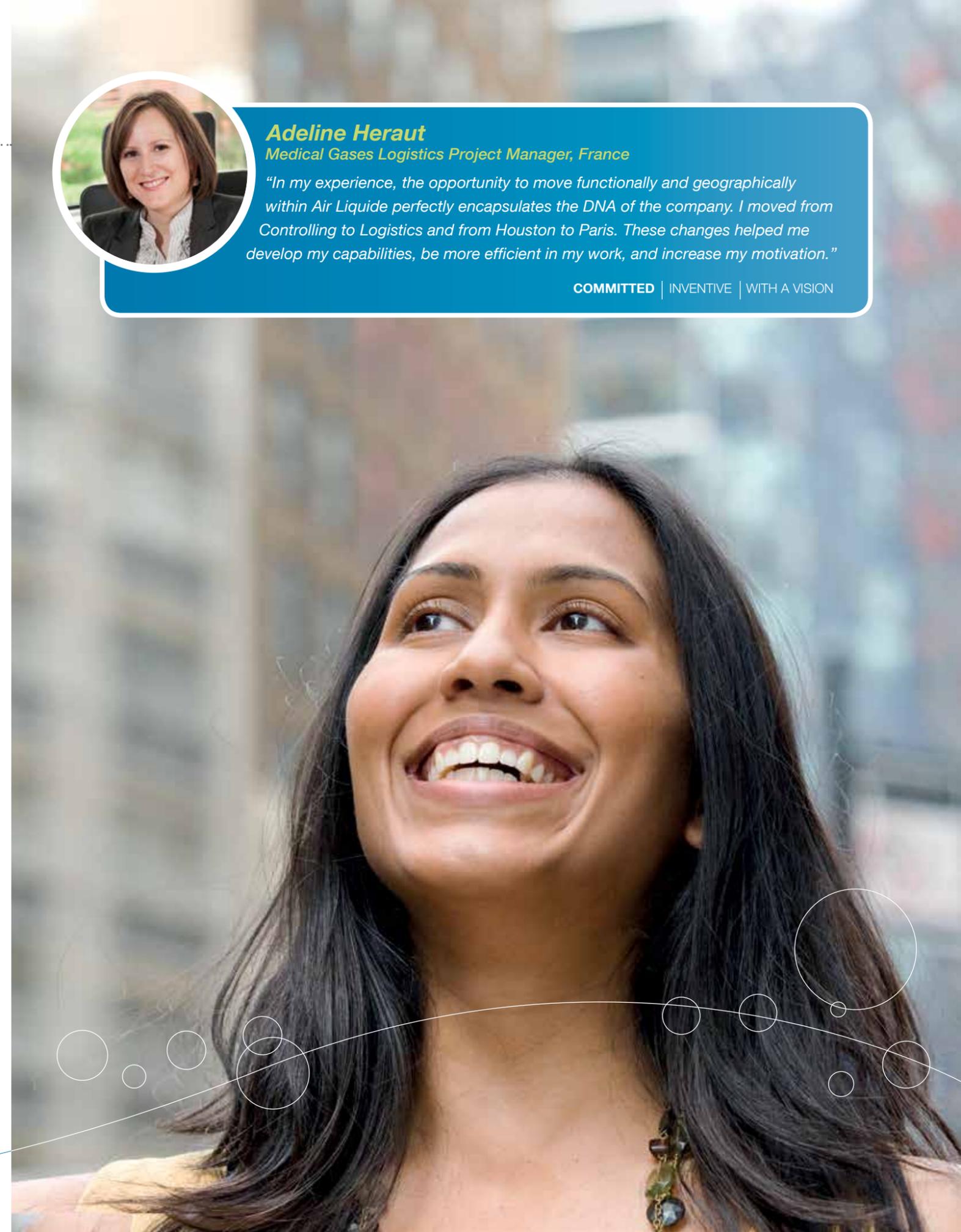


### Adeline Heraut

Medical Gases Logistics Project Manager, France

*"In my experience, the opportunity to move functionally and geographically within Air Liquide perfectly encapsulates the DNA of the company. I moved from Controlling to Logistics and from Houston to Paris. These changes helped me develop my capabilities, be more efficient in my work, and increase my motivation."*

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# OUR COMMITMENT TO RESPONSIBILITY

## The Air Liquide Foundation



180 philanthropic projects  
in 42 countries

A budget of €6 million  
since its creation in 2008

Created in 2008, the Foundation's mission consists in promoting medical research to improve respiratory function, advancing scientific projects that preserve our planet's atmosphere and supporting micro-initiatives to promote local development in countries where the Group operates.

## Partnerships with patient organizations

We proudly partner the European Federation of Allergy and Airway Diseases Patients Associations (EFA) and support their efforts to inform and increase awareness of Chronic Obstructive Pulmonary Disease (COPD) in Europe.

## Endorsement of the Helsinki Declaration for patient safety in anaesthesiology

We were one of the first companies to endorse the Helsinki Declaration – developed by the European Board of Anaesthesiology (EBA) and the European Society of Anaesthesiology (ESA) to emphasize the key role of anaesthesiologists in patient safety and the important role of industry in developing, manufacturing and supplying safe drugs and equipment for patient care.



**William Darbshire CEO**  
The Australian Lung Foundation

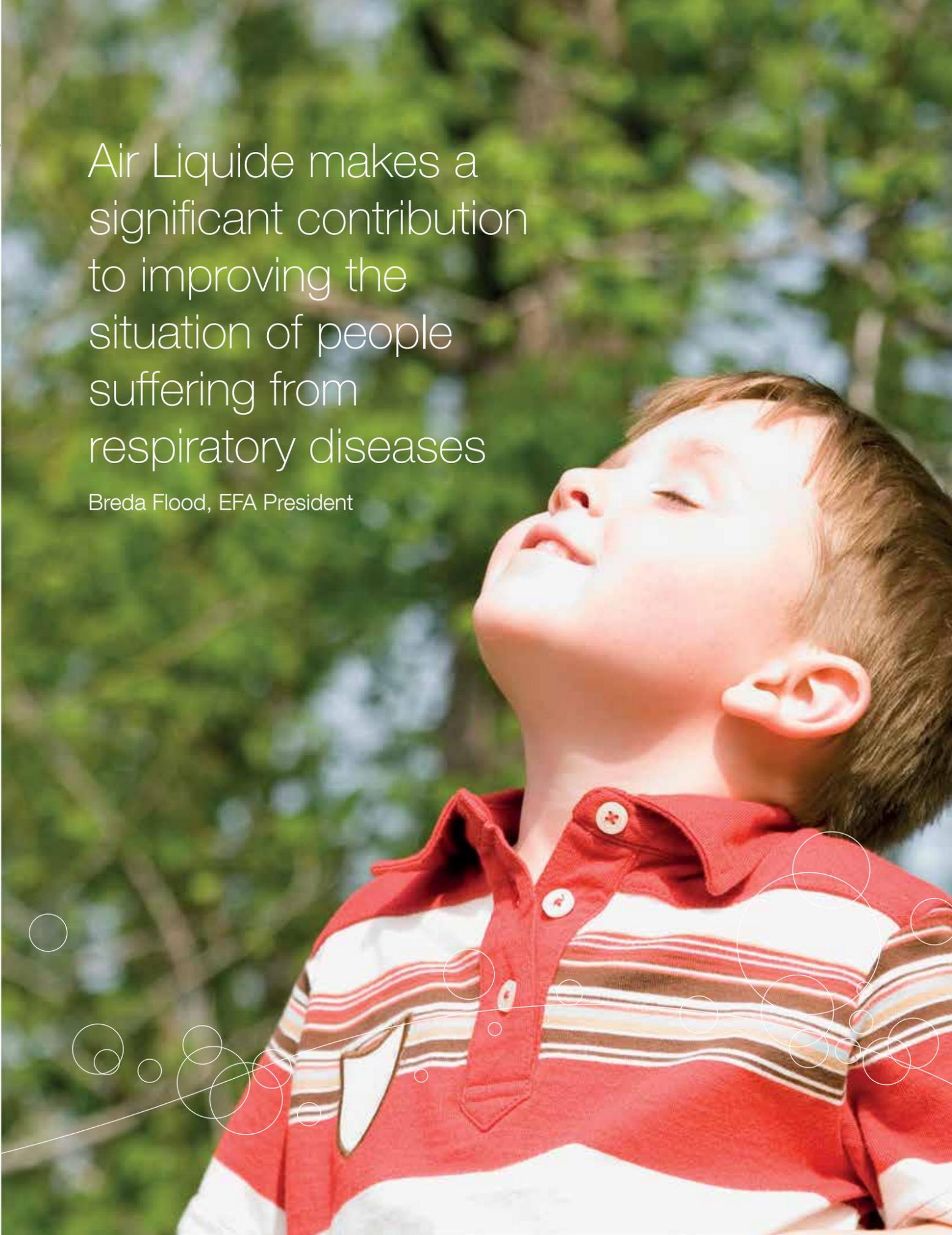
*"For well over a decade, Air Liquide Healthcare has been our valued Industry Partner in the National COPD Programme, standing shoulder to shoulder with us to prioritise lung health and support over 16,000 households in Australia."*

*"In 2008, after continued support in awareness, events, unrestricted education grants, and collaboration on patient resources like the Oxygen Handbook, we proudly elevated Air Liquide Healthcare to the level of Platinum Level Industry Partner."*



Air Liquide makes a significant contribution to improving the situation of people suffering from respiratory diseases

Breda Flood, EFA President



# ADDRESSING PUBLIC HEALTH CHALLENGES

## TO PROTECT VULNERABLE LIVES

The rise of chronic diseases poses a major public health challenge. In the respiratory field, Chronic Obstructive Pulmonary Disease (COPD) and sleep apnea are on the rise.

We strive to ensure patients at home receive the maximum benefit from long-term oxygen therapy and continuous positive airway pressure, both treatments of reference and areas of our expertise.

### COPD: A major cause of disability and death throughout the world

COPD is a lung disease which restricts airflow and leads to breathing difficulties. COPD involves a progressive cycle of dyspnea and reduced quality of life. It is often associated with acute exacerbations of symptoms.

**210 million people** live with COPD globally, with many more undiagnosed<sup>(1)</sup>  
COPD is the **4th leading cause of death**, forecast to become 3rd by 2030<sup>(1,2)</sup>

Over **1 million patients with severe COPD** use long-term oxygen therapy<sup>(3,4)</sup>

The long-term administration of oxygen (>15 hours per day) to patients with chronic respiratory failure has been shown to increase survival in patients with severe resting hypoxemia.<sup>(5)</sup>

- (1) WHO. Chronic respiratory diseases. [http://www.who.int/gard/publications/chronic\\_respiratory\\_diseases.pdf](http://www.who.int/gard/publications/chronic_respiratory_diseases.pdf)
- (2) WHO. The global burden of disease. 2004 UPDATE. [http://www.who.int/healthinfo/global\\_burden\\_disease/GBD\\_report\\_2004update\\_full.pdf](http://www.who.int/healthinfo/global_burden_disease/GBD_report_2004update_full.pdf)
- (3) Doherty DE *et al.* Recommendations of the 6th long-term oxygen therapy consensus conference. *Respir Care*. 2006;51(5):519-25.
- (4) Stoller JK *et al.* Long-term Oxygen Treatment Trial Research Group. Oxygen therapy for patients with COPD: current evidence and the long-term oxygen treatment trial. *Chest*. 2010;138(1):179-87
- (5) Global Initiative for Chronic Obstructive Lung Disease (GOLD). Global strategy for the diagnosis management and prevention of chronic obstructive pulmonary disease. Update 2013. p.28.

### Obstructive Sleep Apnea Syndrome (OSAS): The silent epidemic

OSAS is characterized by repeated pauses in breathing during sleep (apneas) lasting more than 10 seconds. OSAS results from a mechanism of obstruction of upper airways.<sup>(1)</sup>

OSAS affects **1 % to 6 %** of the world's adult population<sup>(2)</sup>

**8/10** of those suffering are unaware of their condition<sup>(3)</sup>

OSAS causes drowsiness, which can lead to accidents and an increased risk of cardio-vascular events

Positive Airway Pressure (PAP) is the treatment of choice for moderate and severe obstructive sleep apnea and should be offered as an option to all patients.<sup>(4)</sup>

- (1) ANAES. Clinical and economical evaluation of surgery in sleep apnea syndrome.
- (2) WHO. Chronic respiratory diseases. [http://www.who.int/gard/publications/chronic\\_respiratory\\_diseases.pdf](http://www.who.int/gard/publications/chronic_respiratory_diseases.pdf)
- (3) Kapur V *et al.* The medical cost of undiagnosed sleep apnea. *Sleep*. 1999;22(6):749-55.
- (4) American Academy of Sleep Medicine in the *Journal of Clinical Sleep Medicine*, 2009, p.268



# HOME HEALTHCARE

## SAFEGUARDING PATIENTS' INDEPENDENCE

As a leader in Home Healthcare we take care of 1,200,000 patients whose treatment for chronic diseases requires the use of medical equipment for respiratory assistance, infusion therapy and nutritional assistance.

Our multi-disciplinary teams (pharmacists, nurses, nutritionists and technicians) aim to provide these in the most cost-effective way possible.

### Our expertise

#### Respiratory

Our Respiratory Home Healthcare activity includes the following services, each in compliance with international clinical guidelines:

Long-Term Oxygen Therapy for very severe COPD

Continuous Positive Airway Pressure (CPAP) for sleep apnea

Home mechanical ventilation for chronic respiratory failure

#### Infusion

By supporting drug administration at home, our Infusion activity contributes to the management of:

Diabetes

Orphan diseases: Pulmonary arterial hypertension, cystic fibrosis

Cancers

Nutritional deficiencies

Pain

Parkinson's disease

Immunodeficiency

We aim to improve patients' autonomy, adherence to treatment, clinical outcomes and quality of life

#### **Nkosinathi Mngadi**

*Home Healthcare Advisor, South Africa*

*"As middle man between local authorities, doctors and patients on long term-oxygen therapy, I'm in the perfect position to contribute to improving the patient care pathway. Home healthcare advisors such as myself build a relationship of trust with all stakeholders and being directly in contact with patients, we encourage them to stay on treatment. Patients are better served this way."*

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# HOME HEALTHCARE

## SAFEGUARDING PATIENTS' INDEPENDENCE

### Our Home Healthcare Offer

We provide a complete suite of services in most countries, including:

Facilitating discharge from hospital

Setting up efficient and secure treatment at home, respecting medical prescriptions at all times

Testing and selecting medical devices through our medical-technical evaluation lab

Delivering medical devices and consumables

Training patients and their family on medical devices

Providing patients' support programme – VitalAire O<sub>2</sub>, VitalAire CPAP – to increase adherence to treatment

Monitoring patients' compliance to treatment and reporting data to physicians

Coordinating services with healthcare professionals

Ensuring 24/7 assistance



**Pascal Strauss,**  
Head of Marketing, Germany

*"It was always my vision to connect home healthcare services and pharmaceutical drugs, as home patient support programmes are fundamental to improving patients' compliance to treatment. This vision became a reality with our company Licher, a home healthcare provider and specialist in Parkinson's Disease. We created a global offer, associating medicine, device and service. This is greatly appreciated by doctors. We're improving the quality of life of vulnerable patients. That's what really matters!"*

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**Vanessa Boullanger**  
Nurse, France

*"Commitment is everything. I train diabetes patients and caregivers on equipment and treatment so they can be autonomous once they return home. Responsive follow-up support, engagement and ethics are important. Staying at the forefront of technological progress is also key to improving patients' quality of life."*

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# HOSPITAL CARE

## PROTECTING PATIENTS, SUPPORTING HEALTHCARE PROFESSIONALS

### A global vision and expertise in hospital care

Our medical gases and services care for pediatric and adult patients during acute episodes, mainly in the hospital environment: emergency rooms, operating theatres, medical and surgical intensive care units. We support healthcare professionals with innovative solutions – molecules, devices and services – for life-saving procedures, diagnosis and treatments.

### We offer:

Pharmaceutical quality medical gases

Healthcare professional training for optimal and safe use of medical gases

Continuous inventory monitoring, ensuring patient safety and operational efficiency

Innovative medical gas packaging and administration solutions

Design, installation, maintenance of gas storage and distribution systems

Cryobanking and hospital laboratory support solutions

Medical equipment

Hygiene disinfection



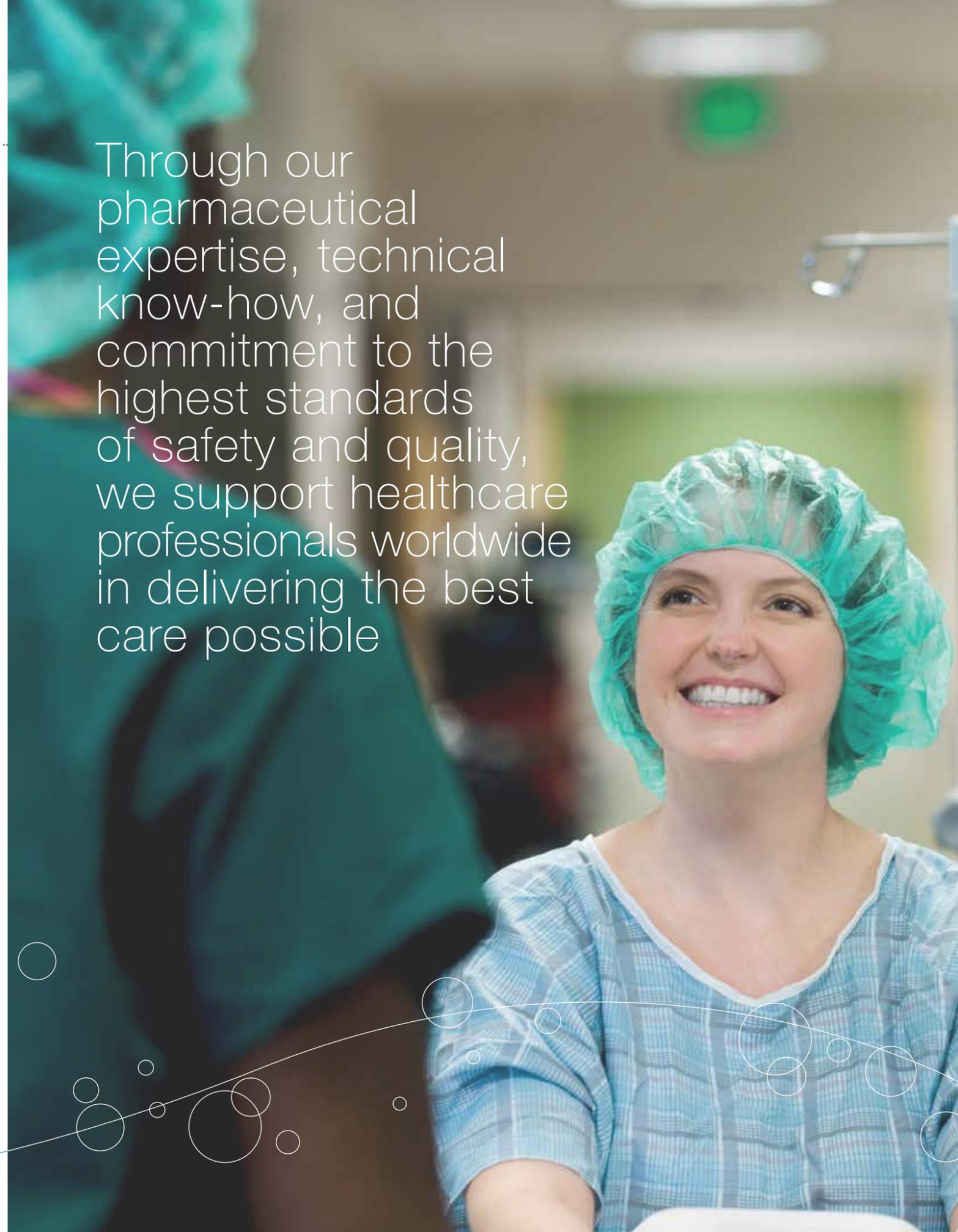
### Genevieve Giovannoni

Head of Regulatory Affairs, Healthcare Global Operations

*“Each of our healthcare activities operates in a regulated environment. Medical gases have a drug status in most of the countries where we are present. Our production sites are classified as pharmaceutical establishments, vetted by each country’s national health authority. Globally we develop, manufacture and market safe and effective medicines in full compliance with pharmacovigilance and materiovigilance regulations. Our focus on pharmaceutical quality control, pharmaceutical traceability and stringent transportation conditions ensures uninterrupted delivery to hospital and customer satisfaction. Trained personnel help guarantee safety at every step.”*

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Through our pharmaceutical expertise, technical know-how, and commitment to the highest standards of safety and quality, we support healthcare professionals worldwide in delivering the best care possible



# HOSPITAL CARE

## PROTECTING PATIENTS, SUPPORTING HEALTHCARE PROFESSIONALS

### Our medical gases portfolio

Our established portfolio of gaseous drugs is used daily, notably in emergency rooms, operating theatres and intensive care units. They assist healthcare professionals in primary care and private practice. We also provide hospitals and clinics with the related medical devices.

Main Molecules	Therapeutic Areas
Oxygen-O <sub>2</sub>	For respiratory diseases or intensive care
Nitric Oxide-NO (KINOX™ and VasoKINOX™)	For resuscitation
Nitrous oxide - N <sub>2</sub> O	For anesthesia
O <sub>2</sub> /N <sub>2</sub> O premix (KALINOX™)	For anesthesia or analgesia
Xenon-XE (LENOXe™)	For anesthesia
Carbon dioxide - CO <sub>2</sub>	For celioscopy procedures
Medical air	For respiratory diseases or intensive care

We pursue the clinical developments of these molecules for new indications.

Everyday, medical staff at the hospital save lives. Without medical gases this would be an impossible task

Duane Wong  
Respiratory Therapist - Intensive Care Unit  
BC Children's Hospital, Vancouver, Canada

**Kyuhyun Kim**  
Medical Gas Service Technician, Canada

"In addition to medical oxygen provision, we've developed services supporting healthcare professionals delivering the best care to patients. Working in preventative maintenance for medical gas systems in hospitals, I look after every single gas outlet, source and piece of medical gas equipment. As time has gone by, I've developed an ability to identify potential risk situations, so I can suggest preventive solutions for customers – great for safety and great for satisfaction."

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# HOSPITAL CARE

## PROTECTING PATIENTS, SUPPORTING HEALTHCARE PROFESSIONALS

### Hygiene – essential in maintaining patient and healthcare professionals safety

As a European leader in hospital disinfection, we provide a wide range of disinfectants for the medical environment, proactively contributing to patient and healthcare staff safety.

Disinfectants are the first line of defence against the spread of nosocomial infections.

We provide disinfectants for operating theatres, patients' rooms, medical instruments and medical staff's hands.

We provide skin disinfectants for patients' preoperative preparation as well as antiseptics for efficient wound healing.

We have over 120 years' expertise through our specialized brand **Schülke**.

### Our Hygiene Portfolio

Skin & hand disinfection, wound & mucosa antiseptics

Surgical instrument & endoscope disinfection

Surface disinfection



#### **Prof. Reinier Mutters**

*Institute for Medical Microbiology and Hygiene, Marburg, Germany*

*"Nosocomial infections are a major public health challenge, often caused by multi-resistant bacterial pathogens. A single hospital-acquired infection means increasing distress and risks for the patient and additional costs for the community, about €6,000 to €10,000 per case.*

*With no significant commitment to antibiotic development in this environment, infection control and prevention are, in my eyes, of the highest importance to fight the problem. Adequate disinfection is essential to prevent transmission of microorganisms.*

*Air Liquide Healthcare is well placed to address this public health challenge through its therapeutic and preventive products as well as its professional training and research."*

According to the World Health Organisation, over 5-10% of hospitalized patients in developed countries acquire nosocomial infections, and in some developing countries, the proportion affected can exceed 25% <sup>(1)</sup>

(1) WHO. <http://www.who.int/gpsc/background/fr/>



# HEALTHCARE SPECIALTY INGREDIENTS

## A UNIQUE SYNERGY OF EXPERTISE

SEPPIC, part of the Air Liquide Group since 1986, designs, manufactures and supplies **healthcare specialty ingredients** – excipients and active ingredients – for the **personal care, pharmaceutical and vaccine industries**.

SEPPIC is a **recognized leader** for a variety of product lines, with a **unique combination of expertise** in the fields of biology, chemistry, analysis, immunology and formulation.

### SEPPIC offers a comprehensive leadership portfolio of products:

Polymers, emulsifiers of natural origin, excipients and actives for the personal care market

Adjuvants for livestock and therapeutic human vaccines

Functional coating and natural actives for the pharmaceutical market



**Philippe Msika**  
SEPPIC Director of Innovation

*“Innovation according to SEPPIC, is our vision for humanity and the environment. It refers to our dedication to humankind, human health and human welfare. It refers to the fruit of our creativity and our permanent quest for efficiency and quality in developing tomorrow’s drugs, vaccines, cosmetic products and nutritional supplements.*

*However, in our world today, there are still some major challenges that SEPPIC must address and provide solutions to. These include: the increasing ageing population, the need to control pandemic threats, to find new treatment options for chronic diseases and to provide better quality of life and food security. At SEPPIC, innovation is open to technological advances. We are in touch with trends happening in the society and the environment and we are mindful of the development of our partners and clients. This is proof of our sense of responsibility and commitment to human and animal health and wellbeing.”*

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According to the World Organisation for Animal Health, 75% of infectious animal diseases can be transmitted to humans. Through the vaccination of livestock, we also protect people <sup>(1)</sup>

(1) WHO. [http://www.who.int/features/factfiles/food\\_safety/facts/fr/index3.html](http://www.who.int/features/factfiles/food_safety/facts/fr/index3.html)



# ANTICIPATING UNMET NEEDS

Our areas of R&D expertise include:

Medical gases

Chronic or acute respiratory illnesses

Technologies and medical equipment

The fight against nosocomial infections

Healthcare Specialty Ingredients

A team of over 250 researchers

Innovation and new technologies

Medicine and technology are converging in patient care at a very fast pace.

We pay particular attention to technological advancements and develop **in-house technologies and know-how** allowing us to create unique and added value integrated offers for all our healthcare activities.

One of our affiliates – **Air Liquide Medical Systems** – develops medical equipment essential to our hospital care and home healthcare activities. In a growing collaborative world, we also develop partnerships with medical device manufacturers.



**Dr. Joelle Texereau**

*R&D Respiratory Physician, Paris-Saclay Research Centre, France*

*“As a young doctor, I remember a woman who came to the hospital with a very severe infection that caused her to lose her sight. The causative germ was a very common bacterium found in her 4-yr-old grandson. The fact that same germ could be carried almost ‘silently’ by one individual but severely injure another made me realize the extent of the medical unknown. I believe that my past and current experience continues to feed my passion for medical research. At Air Liquide Healthcare, the collaboration between academic and operational patient-facing professionals is somewhat unique and very stimulating.”*

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**Francisco Avatte**

*Product Manager, Air Liquide Argentina*

*“In the respiratory medical equipment field, I always think that the final destination of my actions is a patient, whose life often depends on the medical equipment we are providing. Caring about safety and service is really what matters in my job.”*

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Monnal® T60 ventilator in an emergency unit.

# INNOVATION

## THROUGH RESEARCH AND DEVELOPMENT

### In Medical Gases

**Our interdisciplinary approach** to research and development brings together respiratory physicians, anaesthesiologists, pharmacists, pharmacologists, pain management experts and engineers.

Through our pre-clinical programmes and clinical trials we evaluate the potential of medical gases and demonstrate the efficacy, safety and benefits of Air Liquide gaseous drugs in new indications. We are conducting international clinical trials in anaesthesia, respiratory therapies and analgesia.

### In Hygiene

Our researchers are committed to improving responses to infections caused by harmful bacteria and viruses. **Our anti-infection expertise addresses nosocomial diseases** and dangerous infectious outbreaks in the hospital environment.

We develop and reformulate products to meet the constantly evolving requirements of the regulatory environment.

### In Specialty Ingredients

With over **175 patented inventions currently active**, we are stepping up our innovation efforts in the fields of polymers, emulsifiers and active ingredients.

Our researchers – experts in biology, immunology, chemistry and formulation – seek tomorrow's ingredients and are specifically committed to developing green products and solutions, including clean, solvent-free methods of synthesis.

### In Home Healthcare

We develop, evaluate and integrate **new technologies** such as medical devices and telemonitoring.

We create **patient support programmes** with medical experts to enhance patients' compliance to treatment and quality of life.

We contribute to therapeutic practices evaluation by performing observational and medico-economic studies on long-term oxygen therapy, CPAP therapy, insulin pump therapy. By demonstrating the **cost-effectiveness of our solutions** we contribute to the sustainability of healthcare systems.



### **Baptiste Bessiere**

*R&D Scientific Expertise - Preclinical Study Manager  
Paris-Saclay Research Centre, France*

*"As with many new ideas, my proposal to test gases in different Central Nervous System pathologies like Parkinson's required perseverance. But in 2011, after the preclinical study in Parkinson's Disease passed the first proof of concept step, our research team was rewarded through the grant we received from the Michael J. Fox Foundation for Parkinson's Research for further preclinical evaluation.*

*By being a pioneer in such pathologies, we have the opportunity to improve the lives of millions of patients. Now the huge work is to transform big ideas into concrete and value-added solutions."*

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*Air Liquide Healthcare is a world leader in medical gases, home healthcare, hygiene products and healthcare specialty ingredients. It aims to provide customers in the continuum of care from hospital to home with medical products, specialty ingredients and services that contribute to protecting vulnerable lives.*

**For more information, please contact:**

Corporate Communications  
Air Liquide Santé International  
28, rue d'Arcueil - 94250 Gentilly Cedex - France  
Tel : + 33 (0) 1 49 69 46 00

**Disclaimer**

*Information in this brochure is intended to serve a global community. Our gaseous drugs are subject to country specific regulatory considerations, which affect the information we can provide on our products. In addition the registration status of medicines may not be the same in different regions of the world and the approved product labels may also differ according to country specific requirements. Therefore please check the registration details of these products locally in order to get up-to-date information.*

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