



Air Liquide In China

**A World Leader in Gases, Technologies and Services
for Industry and Health**



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Air Liquide Group

A world leader in gases, technologies and services for Industry and Health.

Air Liquide is present in 80 countries with approximately 66,000 employees and serves more than 3.6 million customers and patients. Oxygen, nitrogen and hydrogen are essential small molecules for life, matter and energy. They embody Air Liquide's scientific territory and have been at the core of the company's activities since its creation in 1902.

Air Liquide's ambition is to be a leader in its industry, deliver long term performance and contribute to sustainability. The company's customer-centric transformation strategy aims at profitable growth over the long term. It relies on operational excellence, selective investments, open innovation and a network organization implemented by the Group worldwide. Through the commitment and inventiveness of its people, Air Liquide leverages energy and environment transition, changes in healthcare and digitization, and delivers greater value to all its stakeholders.

Air Liquide's revenues amounted to 21 billion euro in 2018, and its solutions that protect life and the environment represented more than 40% of sales. Air Liquide is listed on the Euronext Paris stock exchange (compartment A) and belongs to the CAC 40, EURO STOXX 50 and FTSE4Good indexes.

Air Liquide in China

Entering China in 1916 and supplying air separation units to the local market since the 1970s, Air Liquide today operates nearly 90 plants in over 40 cities. After many years of steady growth, we now employ more than 4,000 personnel nationwide. Our main businesses include: industrial and medical gas operations, Engineering & Construction, as well as innovation activities by Global Markets & Technologies and Shanghai Innovation Campus. With a strong presence in China's key coastal industrial areas, Air Liquide is now further expanding into the nation's central, southern and western regions.

Air Liquide pursues profitable and sustainable growth over the long term through delivering excellent performance and acting responsibly, while maintaining a leading position in China. Relying on the Group's long-term strategy and resources worldwide, we strive to create new markets and new business opportunities with a focus on the energy, environment, high technology, and healthcare sectors. With dedicated support from our professional teams, Air Liquide China provides reliable services and value-added solutions to our customers while fulfilling our role as a responsible corporate citizen.

—
1916

Entering China

—
Air Liquide
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Sustainable Development

Air Liquide strives to contribute to a more sustainable world. Safety and ethics are our two prerequisites for all business endeavors.

SAFETY

Safety is our first responsibility at Air Liquide. We are committed to ensuring that our production and operations are safe for our employees, customers and local residents. Air Liquide Group implements an Industrial Management System (IMS) around the world, which integrates technical procedures and standards for all industrial units as well as corresponding audits, to continuously improve safety, reliability and environmental protection standards of our industrial operations. Meanwhile, we remain absolutely committed to building and maintaining a safety culture based on employees' sense of personal responsibility. In this way, we enhance safety through both organizational procedures and personal behavior, in order to continuously boost our safety performance. Furthermore, Air Liquide is dedicated to improving working environment and occupational health management for employees by formulating relevant occupational health and safety policies, work procedures and operation standards.

ETHICS

In all of our business operations, we adhere to the highest ethical standards, particularly regarding human rights, labor rights and the environment. We strictly abide by local laws and regulations, integrate into local cultures and traditions, and transmit Air Liquide Group's values through our actions and our local commitment.

CORPORATE SUSTAINABILITY PROGRAM

Air Liquide Group's Corporate Sustainability Program (CSP) includes:

- Solutions for clean industry
- Solutions for clean transport
- Measures to promote local development

Reinforce community involvement — Air Liquide Care

Air Liquide is committed to developing local economies, protecting life and the environment, and contributing to the development and prosperity of local communities. Under its "Air Liquide Care" umbrella program, Air Liquide China has implemented a series of corporate sustainability projects. These include: Safety Lectures for Children, the "Marathon First Responder Program" to support sporting events, the annual tree-planting event "Green Action", and the "Air Liquide Computer Classroom" which donates recycled computers to students in rural areas.

Air Liquide is devoted to sustainable growth, notably to limit its own and customers' CO₂ emissions. In 2018, Air Liquide announced its Climate Objectives that includes its assets, customers and ecosystems. Within its activities, including production, distribution and services, Air Liquide is committed to reducing by 30% its carbon intensity by 2025, based on its 2015 emission levels.

Air Liquide also commits itself to the development of hydrogen energy. Hydrogen has amazing potential for helping society tackle the energy transition challenge by including renewable sources in the energy mix and decarbonizing the end uses of fossil fuels. Air Liquide initiated the founding of Hydrogen Council at Davos 2017 World Economic Forum, aiming to accelerate hydrogen economy and realize zero-emission hydrogen society.



Industry

Air Liquide provides a broad spectrum of customers with innovative, customized solutions, including: industrial and specialty gases, energy solutions, application technologies and services. These solutions drive our customers' performance and help them to reduce environmental impact, thus realizing sustainable development.

CHEMICALS

Air Liquide produces air gases, hydrogen and carbon monoxide through proprietary state-of-the-art technologies at competitive prices for the petrochemicals and chemicals industry, and helps them to achieve production safety, improve product quality, optimize processes, better utilize by-products and off-gases, and reduce their environmental footprint.

METALS

From oxygen enrichment for blast furnace to surface protection, we offer a wide range of innovative gas supply solutions to help customers reduce production costs, enhance quality and production efficiency, and optimize the use of critical resources (such as coke, ore, metal scrap and energy) to achieve energy saving and emission reduction.

ENERGY

With rising global demand for energy, spurred by world population growth and economic expansion, Air Liquide works on delivering reliable gas solutions that help customers increase recovery rates of existing fossil fuel reserves, explore unconventional sources of energy, process products safely and produce cleaner fuels.



For more information,
scan the QR code

<https://industry.airliquide.cn/en>

Air Liquide has invested in large ASUs and pipeline networks by signing long-term gas supply contracts which reduce the customer's investment risks while ensuring the safety and reliability of the projects. By leveraging our strong engineering integration and project management capabilities, our advanced Digital Performance Center and Industrial Management System, as well as our rich operational experiences and best practices, Air Liquide can achieve the optimized industrial integration necessary to create long-term values for our customers.

Globally:



374 Air Separation
Units (ASU) located in **35** countries



50 HyCO plants



18 Cogeneration Trains



Over **9,400** km of pipelines
across **30** countries

In China:



Operating **41** large ASUs
in **19** provinces and cities



Operating **11** pipeline networks,
over **200** km in total length

FOOD PRODUCTS

We offer comprehensive process support and services to customers in the food industry to assist them in improving food product quality, enhancing production efficiency, reducing energy consumption and optimizing cost. In compliance with the most rigorous food safety and hygiene standards, our innovative solutions are mainly applied in freezing and chilling, temperature control, modified atmosphere packaging, and food and beverage production.

Nixelia for Freezing & Chilling is an all-in-one gas solution for the optimization of cryogenic process.



TECHNOLOGY AND RESEARCH

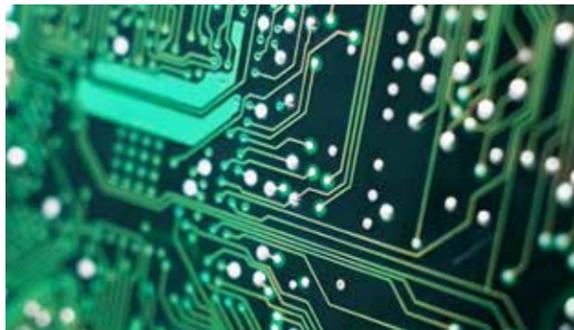
By anticipating customers' end market demands for relevant gas and equipment, we offer high-quality lab gas and equipment solutions for various research and analysis applications at public research institutions, universities, industrial research centers, labs and test services providers. As a trusted partner for the photonics industry, we also provide high-purity gases, stable mixtures as well as dedicated equipment and installations to highly demanding customers.



ELECTRONIC COMPONENTS ASSEMBLY

We support electronic components assembly players with solutions for every step of their processes from assembly to testing, storage and cleaning. In line with the trend toward smaller, lighter and less expensive electronics, we are continuously developing solutions for component assembly and soldering on printed circuit board with the aim of reducing soldering costs and ensuring high quality of solder joints.

Nixelia for Electronics Manufacturing helps the customers to optimize product quality using nitrogen protection and atmosphere technologies.



AUTOMOBILES AND MANUFACTURING

As a trusted partner for automobile makers and other manufacturing industries, we offer solutions covering all manufacturing processes, from the elaboration of lightweight raw materials to the fabrication and treatment of subcomponents and the recycling of parts. Our solutions help industries optimize processes and achieve sustainable development.

Nixelia for Laser Welding optimizes welding quality and reduces cost.



GLASS

Customized patented technological solutions are created for all stages of glass (car windows, tablewares, or screens of smartphones) production process. We also provide energy-efficient on-site oxygen generation systems and glass application equipment to improve the melting process while reducing energy consumption and carbon emissions.

Nixelia for Melting-Heat Oxy-Combustion reduces fuel and oxygen consumption.



PHARMACEUTICALS AND BIOTECHNOLOGY

With our advanced expertise in temperature control, inert gas atmosphere protection and gas-liquid mixing applications, we are able to ensure safe supply of reliable, high-purity gas products in complex production environment. We meet our customers' requirements for quality assurance, mandatory traceability and process control of pharmaceuticals and biological product manufacturing.



ENVIRONMENTAL PROTECTION

Through close partnerships with industries including paper manufacturing, printing and dyeing, textiles, and chemicals, we have developed a series of gas solutions and technologies for both waste water and solid waste treatment. We can help our customers to meet the strictest environmental regulation challenges, which is needed to continue their production activities.

Nixelia for Water Treatment digests biodegradable pollutants and reduces sludge at the source.



RENEWABLE ENERGY

Air Liquide is one of the leaders in developing hydrogen energy, dedicated to the production and application of hydrogen, as well as the construction of hydrogen filling stations. Being committed to the development of bio-natural gas, we offer biogas purification equipment and biomethane liquefaction technology to help customers upgrade biogas produced from wastes and sewage sludge, which will be used for power generation, heating, and as a vehicle fuel.

Blue Hydrogen: Air Liquide has committed to producing at least 50% of the hydrogen for transportation through carbon-free processes by 2020.

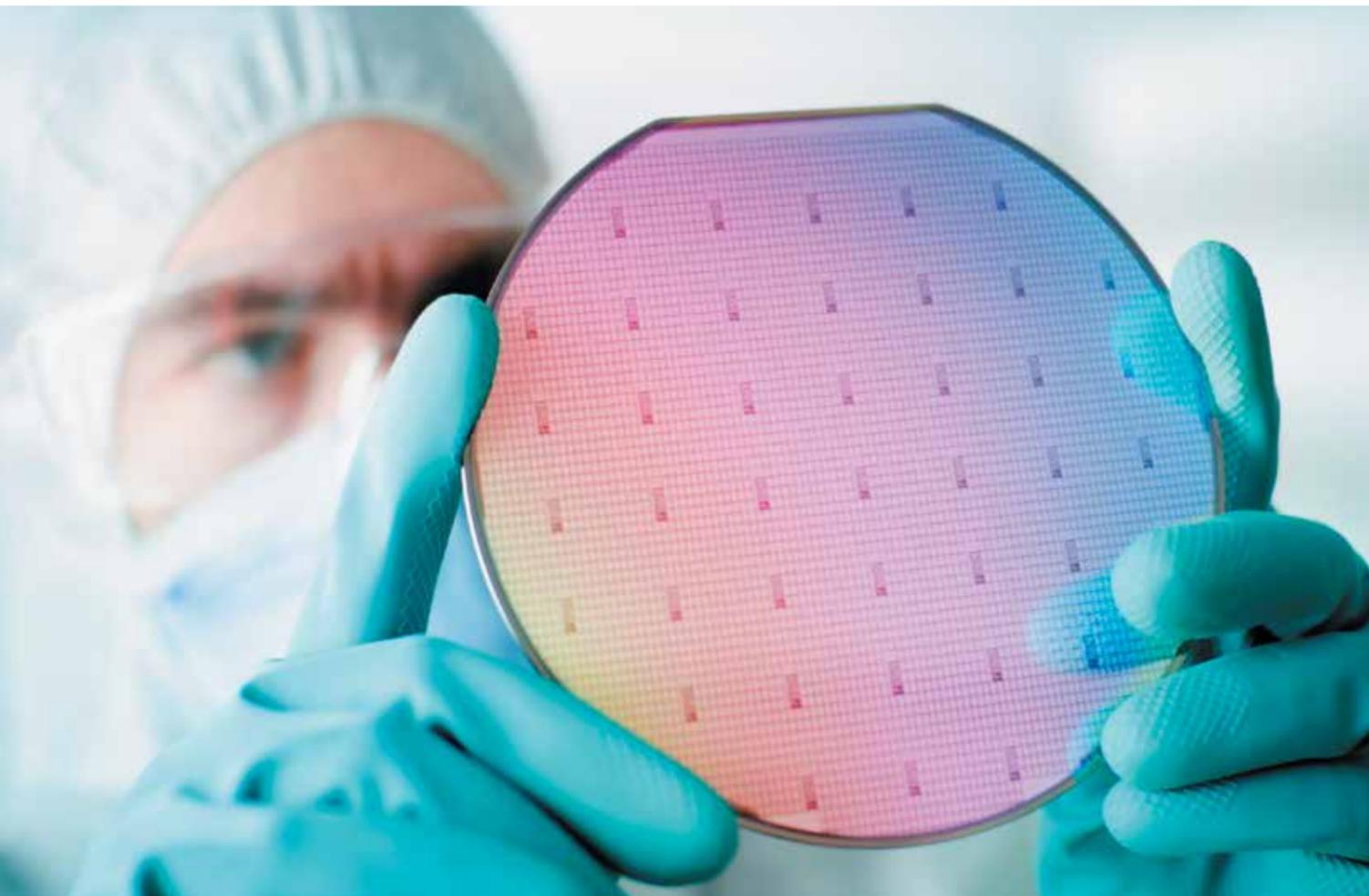


Electronics

Air Liquide designs, manufactures and supplies more efficient and powerful molecules and materials, helping the most advanced companies in electronics technology with their technological innovations while driving forward the globalization of smart technology.

In the semiconductor industry, we provide the customers with ultra-pure carrier gases, specialty gases and advanced materials, which are used in the chip manufacturing process and maintaining an ultra-clean atmosphere to protect manufacturing tools. In flat panel display industry, we provide electronics specialty materials and ultra-pure carrier gases to deposit, etch or functionalize the material layers that constitute the TFT. Meanwhile, we have been committed to supporting the photovoltaic industry towards sustainable and profitable growth for nearly 30 years.

As Air Liquide's only Electronic Materials Center in China, Electronic Materials Center China was founded in 2007 and put into production in 2008. After completing the Phase II and Phase III expansion respectively in 2014 and 2017, the center now produces, mixes and fills specialty gases. This further strengthens Air Liquide's ability to provide safe and efficient high-purity electronics specialty gases to customers in electronics and related industries.



Main Offers

HIGH-PURITY BULK GASES (CARRIER GASES)

N₂, H₂, O₂, Ar, He and compressed dry air (CDA) widely applied in electronics manufacturing in terms of production process and inert atmosphere protection, as well as uninterrupted gas purification and on-line continuous quality control (CQC) services.

HIGH-PURITY ELECTRONICS SPECIALTY MATERIALS (ESMS)

High-purity ESMs and gas mixtures mainly used for etching, cleaning and material deposition in the fabrication processes of semiconductor, FPD and photovoltaic industries.

ADVANCED MATERIALS (AMS)

Innovative solutions customized with cutting-edge technologies, including silicon oxide/nitride precursors, High-k/Low-k precursors, metal and metallide precursors.



EQUIPMENT & INSTALLATION (E&I)

Turn-key solutions comprising design, manufacture and installation of ESG and chemical distribution systems, ultra-pure pipeline and ground monitoring system (GMS).

TOTAL GAS AND CHEMICAL MANAGEMENT (TGCM)

Professional on-site services which help customers to use ESGs and chemicals in a safe, reliable and sustainable way.



For more information,
scan the QR code



<https://www.electronics-airliquide.com/our-locations-asia/china>

Healthcare

Committed to researching various types of disease, Air Liquide Healthcare aims to provide customers a full spectrum of care -- from hospital to home healthcare -- by supplying medical products, healthcare specialty ingredients and services that contribute to protecting vulnerable lives.



MEDICAL GAS

With strong capacities in medical gas production, delivery, and management, Air Liquide offers hospitals and healthcare professionals safe, efficient, reliable, and innovative gas products: medical oxygen, carbon dioxide, anesthetic gases, gases for medical equipment, and hospital laboratory gases.

HOME HEALTHCARE (VITALAIRE)

Focusing on respiratory disease and infusion therapy, VitalAire is devoted to developing integrated treatment solutions for patients of diabetes, chronic obstructive pulmonary disease and sleep apnea. These solutions include the following, depending on local needs: cost-effective treatment equipment and consumables, 24-hour emergency hotline, disease information management platform, regular patient education courses, patient experience centers, as well as after-sales visits and trainings.

RESPIRATOR CARE EQUIPMENT (AIR LIQUIDE MEDICAL SYSTEMS)

Air Liquide Medical Systems provides hospitals with a variety of ventilators, respirators and aerosol therapy equipment, and offers comprehensive respiratory treatment and life support to patients with acute or serious illnesses.

HYGIENE & ANTISEPSIS (SCHÜLKE)

Schülke provides high-quality disinfection and antiseptic products and services to protect humans and products from pathogenic bacteria and microorganisms pollution.

KEY FIGURES

Air Liquide Healthcare has
16,500 employees around
 the world who influence the lives of
1,600,000 patients at home and
 serve over **15,000** hospitals & clinics

SPECIAL INGREDIENTS (SEPPIC)

Seppic develops and supplies innovative special ingredients to the cosmetics, pharmaceuticals, nutrition, vaccine, and industrial markets, and holds an important position in the field of adjuvants for veterinary vaccines.

Customized Supply Modes

Relying on advanced technologies and experienced expert teams, Air Liquide offers customized solutions for customers and delivers gases through four professional and safe supply modes: packaged gas, bulk liquid, on-site, and pipeline.

PACKAGED GAS

For customers who need mobility or small volumes of gas, cylinders are an extremely practical method of supplying gas while satisfying the requirements of various manufacturing processes. Air Liquide's transport fleets deliver individual cylinders or bundles of various volumes to customers based on their needs.

BULK LIQUID

For customers of medium and large needs, Air Liquide delivers liquid bulk gases via dedicated cryogenic tankers to customers' on-site cryogenic tanks. With proven expertise in the liquid supply of gases, we boast rich experience in installing, maintaining and monitoring supply systems of different scales to meet the needs of customers from different industries.

ON-SITE

For customers requiring very large quantities of gases, Air Liquide installs, operates and maintains dedicated on-site plants directly on customer premises to satisfy various needs for supply and purity. We also remotely monitor and manage the day-to-day operations of the on-site facilities to help customers improve production efficiency and safety.

PIPELINE

For customers with large volume requirements or those concentrated in industrial basins, Air Liquide continuously supplies oxygen, nitrogen, hydrogen, carbon monoxide and syngas to customers in the chemicals, petrochemical, refining and metals through more than 200 km of pipelines in China. We conduct 24/7 monitoring on the pipelines and gas production units to ensure safe and reliable gas supply.

For more information,
scan the QR code



<https://industry.airliquide.cn/en/supply-modes>

KEY FIGURES OF E&C CHINA :

As of 2018,
more than

130

large and mid-size ASUs

and nearly

290

standard units were sold

in over

40

cities in China and
worldwide.

we are able to design and
manufacture super-large
ASUs with a capacity of

150,000

Nm³/h of oxygen.

For more information,
scan the QR code



[https://www.airliquide.com/
china/ec-china](https://www.airliquide.com/china/ec-china)

Engineering & Construction

Leveraging local cutting-edge innovations, a comprehensive portfolio of proprietary technologies and local engineering resources, Air Liquide Engineering & Construction (E&C) is committed to assisting our customers in achieving safe, reliable and competitive operations by supplying production units of low emissions, low energy consumption and high price-performance ratio.

Air Liquide has accumulated rich experience in project management, and has developed a series of mature project management processes and tools. Today, we offer solutions for a wide variety of projects, from turn-key, "EPC (Engineering, Procurement, Construction) type", equipment sales, to complex projects involving multiple technologies.

Air Liquide launched its E&C activities in China in 1995 by establishing a large-scale E&C center in Hangzhou. Today, these operations specialize in designing, engineering, manufacturing and constructing leading-edge air separation plants, syngas purification units, carbon monoxide plants, hydrogen recovery plants, and other industrial gas plants.

Air Liquide E&C also operates another major engineering center in Shanghai, which focuses on solution development and project execution based on proprietary Lurgi technologies such as Steam Methane Reformer (SMR) and purification. In addition, we provide support for licensing Lurgi technologies. Together these endeavors allow us to contribute significantly to clean energy conversion in China.



Innovation

Innovation is one of the pillars of Air Liquide's strategies, which empowers the company to remain competitive and explore new markets. Depending on our first-class creative talents and advanced facilities, we commit ourselves to finding new gas applications and developing cutting-edge technologies and solutions to address the world's significant challenges in environment, energy, health, urbanization and high-tech by reducing pollution, increasing energy efficiency, optimizing the use of natural resources and developing alternative sources.



With a strong expertise in cutting-edge technologies, Air Liquide continuously opens new business frontiers. We commit ourselves to developing, shaping and incubating new markets, sustainable for the society. From high tech (space, aerospace, scientific research) to energy transition (hydrogen energy, clean transportation), we develop user-focused, innovative and competitive solutions.

- Boasting over 50 years of expertise in mechanical cold production, liquefaction, storage and distribution of cryogenic fluids at very low temperatures.
- Providing high-purity gas purification equipment and Continuous Quality Control systems (CQC) to meet the very stringent specifications of the electronics industry.
- Promoting the use of hydrogen for clean transportation by supporting the creation of hydrogen infrastructure.
- Supplying biogas upgrading equipment and bio-methane liquefaction technology to contribute to circular economy.

Our R&D projects and achievements in China

- Development of High-efficiency Oxygen Aeration Device
- Development of Solid Fuel Oxy-combustion Technology
- Study on Oxygen-enriched Bio-mass Gasification
- Development of Precursor Materials for Advanced Display
- Study on Protective Atmosphere for Electronic Component Assembling
- Development of High-efficiency Syn-gas Purification Technology
- Development of High-speed High-efficiency Welding Technology
- Development of Fast Metal Carbonizing Technology



RESEARCH AND DEVELOPMENT

Air Liquide's R&D enables us to carry out research work in collaboration with internationally renowned universities and also to develop our partnerships in developing economies to provide solutions to the society's future challenges. Our R&D activities are at the heart of our Group's strategy. Air Liquide's Innovation Campuses are strategically located in Germany, China, the United States, France and Japan and based on 3 dimensions:

- Science - producing molecules with high added value
- Technologies - enriching our process portfolio for greater diversity
- Understanding of usages - meeting the societal challenges of our clients and patients

The Shanghai Innovation Campus officially opened in February, 2016. Embedded in China's innovation ecosystem, Shanghai Innovation Campus aims to expand Air Liquide's innovation capabilities and business frontiers in Asia Pacific through strong cooperation with universities and scientific research institutions, addressing issues such as energy transition, greenhouse gas emission reduction, wastewater treatment, urban air quality, food safety, and healthcare.



Human Resources

Air Liquide regards people as its most valuable assets and strongest advantage, and always attaches great importance to talent recruitment, training and development.

RECRUITMENT

Air Liquide continuously recruits talented professionals and has campus recruitment projects such as Lingyun, Yang Fan@New Heights, and Qihang for fresh graduates by creating tailor-made rotation programs and comprehensive training and assessment systems.

EMPLOYEE DEVELOPMENT

Respecting employees' personal and career development needs, Air Liquide provides managerial and technical development plans for its people. Furthermore, we offer systematic training courses and professional development plans to improve employees' competence and core competitiveness.

EMPLOYER BRAND

Air Liquide is deeply committed to employer brand building and has received high acclaim in the Chinese talent market. Air Liquide China has received the following awards: "100 Employer Excellence of China" award and "Excellence in Corporate Training" award by 51job, "China's Top 100 Most Attractive Employer" award by Universum, "Best Practice in Engagement & Retention" award by Wolters Kluwer, and "Best Career Development Framework Award" by Mercer.

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