Air Liquide Engineering & Construction

Air Liquide is a world leader in gases, technologies and services for industry and health, with a presence in 80 countries with approximately 67,000 employees, serving more than 3.7 million customers and patients.

In the Middle East, the company draws on the expertise of more than 1,100 employees, operates 34 sites and serves customers in sectors including oil and gas, refining and petrochemicals, metal fabrication, construction, electronics, food and beverage and healthcare.

Dating back to 2002, Air Liquide's presence in the region is key for the group. Today, Air Liquide oversees its growing operations and investments throughout the Middle East, including the group's largest single industrial investment and most significant 'over the fence' hydrogen contract – Air Liquide's Yanbu Hydrogen Production Site in Saudi Arabia, providing hydrogen to Yanbu Aramco Sinopec Refining Company (Yasref) as well as a growing number of large and small scale industries in both Yanbu and Jubail (Saudi Arabia's leading industrial cities), via Air Liquide's hydrogen pipeline networks, representing in the region a combined length of 37km, and a total hydrogen transport capacity of over 200,000Nm3/hr each.

By investing over $400mn in the Yanbu hydrogen production site and hydrogen pipeline network, Air Liquide is not only bringing infrastructure and expertise in hydrogen supply solutions and technology, but also driving local investments, talent development and strengthening the local supply chain in Yanbu. Air Liquide's hydrogen infrastructure in Yanbu consists of two global scale hydrogen production units and one purification unit, which together boasts a 340,000Nm³/hr production capacity and is connected to its hydrogen pipeline network.

With the world of energy changing, hydrogen is one of the energies that constitute a solution to meet the challenges of industries and for clean transportation – reduction of greenhouse gases, of pollution in cities, and of dependency on fossil fuels. For more than 40 years, Air Liquide has been developing unique expertise in the mastery of the entire hydrogen chain (production, storage, and distribution).

Air Liquide has an extensive experience in supplying industrial gases that are vital for many industries. Many processes require the use of oxygen, nitrogen and hydrogen in large volumes. Companies in the region are investing to increase the capacity and productivity of their plants, and are increasingly focused on emerging technologies in fields such as hydrogen production with lower emissions. Air Liquide Engineering & Construction is one of the world's leading suppliers of hydrogen plants and CO_2 management solutions. Our suite of hydrogen and carbon capture technologies and excellence in process experience, combined with decades of operational experience, ensures the competitiveness, safety, reliability and sustainability of solutions for customers.

Today, the majority of hydrogen is produced from natural gas through the steam methane reforming (SMR) process. Air Liquide has developed an innovative cold capture system (Cryocap) that can capture up to 90% of the CO_2 released during this hydrogen production through a cryogenic process. A world-first in this field, this technology could also improve efficiency, leading to increased hydrogen production by up to 20%. After purification, the captured CO_2 can be used to meet a variety of industrial needs for carbonic gas (carbonation of sparkling beverages, food preservation, freezing, etc.).

Air Liquide's innovative technology, Cryocap, demonstrated at industrial scale in Port Jerome, France, enables the capture of CO_2 from a hydrogen production unit via a combination of cryogenic and membrane processes. (Copyright: Adrien Daste)

Clean hydrogen can also be produced through water electrolysis. Air Liquide is demonstrating the advantages of this technology by leading a major project in Europe, HyBalance. This project was developed in Denmark and is supported by the European Fuel Cells and Hydrogen Joint Undertaking and the Danish ForskEL programme. This is a major demonstration of the complete value chain, from the storage of hydrogen produced through renewable sources (wind turbines) to its distribution for applications in clean transportation and the industrial sector. The company is also currently integrating the world's largest PEM electrolyser to supply carbon-free hydrogen at its liquid hydrogen plant in Becancour, Canada, which has been operating for more than 30 years.

Air Liquide's blue hydrogen initiative, which aims to gradually make hydrogen production carbon neutral, also includes hydrogen produced from biomethane. Thanks to the process of purification, biomethane is produced from biogas, composed primarily of methane and carbon dioxide. Biogas is a renewable energy produced during the anaerobic digestion of biomass, or from sanitary landfills. This biomethane can be used to produce bio-hydrogen, and has been demonstrated recently with the opening of a public hydrogen station in Offenbach am Main in Germany in partnership with Hyundai.

Air Liquide is continually developing innovative technologies and solutions for reducing carbon emissions during the hydrogen production process.