

Hydrogen fuel cell engineering

Stacks – Systems – Industrialization – Test benches



Fuel cells are among the technologies that are helping us to transform our energy sector. They represent highly efficient and flexible power source technologies that offer diverse benefits. They can be used in a wide range of applications to generate and distribute electricity, providing an autonomous, mobile and unlimited source of power.

Field of applications



Stationary power supply for off grids



Material handling



Fuel cell electric vehicles



Aerospace



Space, etc...

Axane, a subsidiary of the Air Liquide group, designs tailor-made solutions and provides hydrogen fuel cell engineering that covers every aspect required to customize your project involving fuel cell technology:

- ✓ Specifications
- ✓ Design
- ✓ Modeling
- ✓ Optimization of energy systems (system efficiency)
- ✓ Tests
- ✓ Control engineering
- ✓ Production of the first industrial system
- ✓ Integration
- ✓ Upgrade



Our benefits

More than 15 years of PEM fuel cell solutions



From the AME to the integrated solution (design, industrialization, production and operation)



More than 20,000 hours MEA lifetime in operation



Heat control: $-20 / +50^{\circ}\text{C}$
ambient temperature
(storage, start-up, operation)



Mastery hydrogen consumption (low):
 $0.74 \text{ Nm}^3/\text{kWh}$ for complete system



A proprietary technologies portfolio:
liquid-cooled stacks (graphite closed cathode cells), air cooled stacks, balance of plant, including the design of key components

Unique experience feedback



On deployed and full-time operated fuel cells (telecom base load power, material handling, and military applications)



More than 300 systems deployed worldwide

Strengths of a Group

- ✓ Hydrogen solutions can be handled globally and worldwide within the Air Liquide group
- ✓ Reduced time to market and development costs
- ✓ Global approach with Air Liquide hydrogen supply chain when needed
- ✓ Over 100 qualified suppliers



Our capacities

- ✓ **Test facilities:** several laboratories, different test benches for fuel cells, hydrogen systems and storages tests, functional or component tests. Additional test facilities for other gases or non-hydrogen components.
- ✓ **Modeling:** in-house fuel cell models, fluent
- ✓ **Engineering:** SolidWorks, proprietary and Air Liquide databases
- ✓ **Project management:** shaped development cycle, quality management, Advanced Product Quality Planning, flexible resource allocations

CONTACTS

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Axane is a subsidiary of the Air Liquide group.

The world leader in gases, technologies and services for Industry and Health, Air Liquide is present in 80 countries with approximately 67,000 employees and serves more than 3 million customers and patients.

