

HYDROGEN IN NORMANDY

NORMANDY
HYDROGEN

ENERGY INDUSTRY

24 800
jobs

1 770
companies

60 050
GWh power generation

63 millions €
investment

HYDROGEN INDUSTRY

15 millions €

Regional investment for the
Hydrogen roadmap

A strong **industrial**
and **logistic** territory

Integration of hydrogen
in the energy transition and
management **since 2015**

MAIN COMPANIES

Ariane Group • Air liquide •
Chereau • Efinor
Engie • Ergosup • H2V
Morphosys • SAB Industries
Symbio • Tertu

NORMANDY, A PIONEER IN THE FIELD OF HYDROGEN IN FRANCE

The unique energy potential of Normandy makes it one of the main actors of energy transition in France and in Europe. Because of the growth potential of marine renewable energies, high nuclear electricity production and significant level of fossil fuel imports, **the deployment and development of a hydrogen sector is a priority for Normandy**. With strong industrial and logistic sectors, Normandy is also a huge energy consumer. The use of hydrogen and intelligent multi-energy networks is a challenge to maintain the high-performance economy of the region.

Normandy Regional Council officially adopted the “Normandy Hydrogen Deployment Plan” in October 2018, a regional roadmap with **46 actions** to be implemented between 2 to 5 years, that focuses **on applications from green H2 production to fuel cell recycling**. These actions will benefit from a **regional support of 15 million € over the next 5 years**. **About 100 regional and national stakeholders** are already engaged.

Normandy is an **FRANCE HYDROGÈNE** (French association for hydrogen and fuel cell) member since 2017.

MAIN PROJECTS

The projects in Normandy cover the entire hydrogen value chain:

KNOWLEDGE & MANAGEMENT

- Social acceptance
- Smart hydrogen based energy matrices
- Hydrogen production optimization
- Hydrogen consumers inventory

HYDROGEN PRODUCTION

- Hydrogen production for industries (refinery, fertilizer) and mobility
- Electrolysis and pyro-gasification

MOBILITY

- Network of 15 refueling stations / captive fleet of vehicles
- Hydrogen powered fishery vessel
- River passenger shuttle
- Refrigerated trailer

As transport authority, the Regional Council is also considering further projects for trains and coaches.

INNOVATION, RESEARCH & DEVELOPMENT

▲ INSTITUT CARNOT ESP

(<http://www.carnot-esp.fr>)

A major player in industrial research, the Carnot Institute ESP (Energy and Propulsion Systems) supports its partners in their R&D work by offering an integrated expertise of its laboratories.

▲ CORIA (www.coria.fr)

The research fields of CORIA cover fundamental studies applied to reactive or non-reactive flows: diphasic flows, turbulent mixing phenomena, combustion, plasmas, etc. Physical mechanisms and processes leading to the reduction of pollutant emissions in reactive systems are priority research axes.

▲ GREAH

(<https://greah.univ-lehavre.fr>)

Research group specialized in electrical engineering. It has focused its activities on renewable energies and power storage.

▲ LCS (www.lcs.ensicaen.fr/en)

The Catalysis and Spectrochemistry Laboratory has built its reputation on “operando spectroscopy of the catalyst”. LCS occupies a unique place in the field of automotive depollution, in the production of energy and in bioresources.

▲ LUSAC (<http://lusac.unicaen.fr>)

Laboratory created in 1994 specialized in the field of energy and materials.

TRAINING

▲ INSA (www.insa-rouen.fr)



Engineering school with 7 specializations, 7 Masters, 6 doctoral programs: Chemistry and Processes, Control of industrial risks, Energy and Propulsion, Mechanics, Architecture of information systems, Mathematical Engineering, Civil engineering.

▲ ENSICAEN ENGINEERING SCHOOL (www.ensicaen.fr)



750 students, more than 8000 engineers employed and 150 PhD students.
Electronics & applied physics, Materials & Mechanics, Computer Science.

▲ NORMANDY UNIVERSITY (www.normandie-univ.fr)



Multidisciplinary Universities in Caen, Rouen and Le Havre - Master's degrees: Physics, Engineering Sciences, Development of Scientific Instruments, Optics, Detection; Physics, Mechanics, Engineering Sciences, Energy, Fluids and Environment; Mechanics, Engineering Sciences, Mechatronics, Components, Reliability.

▲ CREATION OF AN "HYDROGEN CAMPUS"

Project of an "H2 Academy" to train the future profiles on the hydrogen trades.

CLUSTERS & SUPPORTS

▲ NORMANDIE ENERGIES (www.normandie-energies.com)



Association of energy professionals, Normandie Energies set up a hydrogen cluster aiming to gather complementary skills and expertise for hydrogen projects development.

▲ NEXT MOVE (www.nextmove.fr)



Next Mowe is a Mobility and Automotive R&D competitiveness cluster, which since 2006 has been mobilizing its energies to foster the development of collaborative projects between members, to contribute to development in the regions of companies, in particular SMES, and to promote innovation in the sector.

▲ NORMANDIE MARITIME (www.normandie-maritime.fr)



Normandie Maritime's mission is to promote, develop and coordinate the regional maritime and river economy sector. It contributes to the development of projects for Hydrogen marine mobility.

▲ LOGISTIQUE SEINE NORMANDIE (www.logistique-seine-normandie.com)

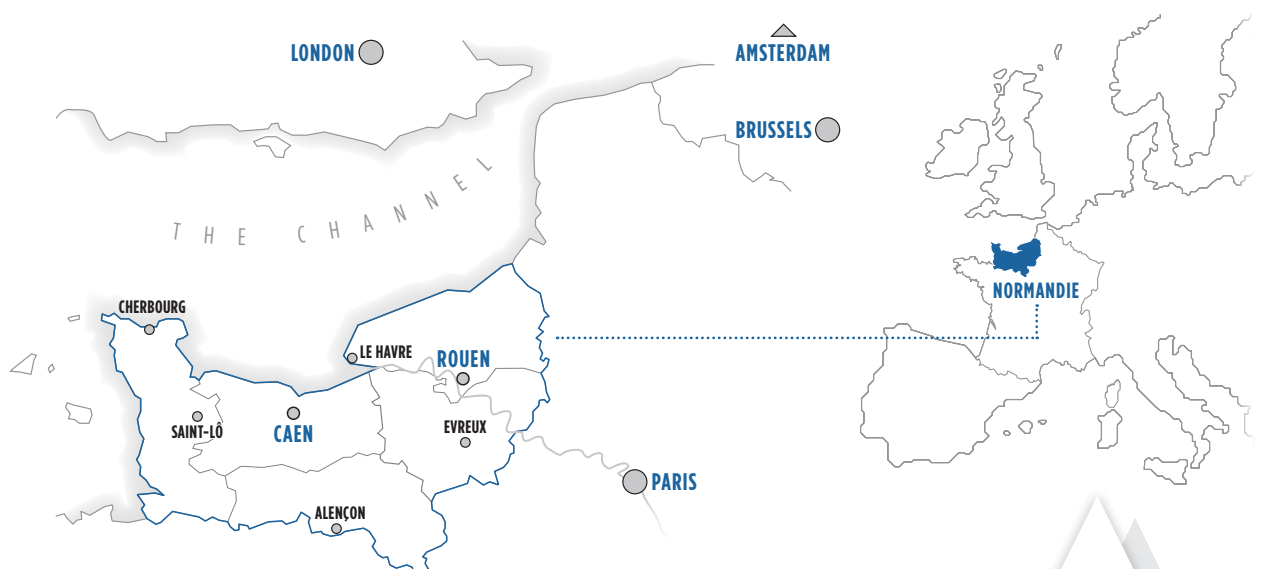


Network of excellence of the logistics chain, Logistique Seine Normandie supports its 185 members to sustain their competitiveness, promote the logistic chain along the Seine Valley and brings logistics expertise for land use and planning.

▲ AD NORMANDIE (www.adnormandie.fr)



AD Normandie (regional agency for economic development) works closely with companies for improving local competitiveness. Representative of Business France Invest in Normandy, AD Normandie extends a whole range of services to foreign investors setting up their businesses in Normandy.



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