

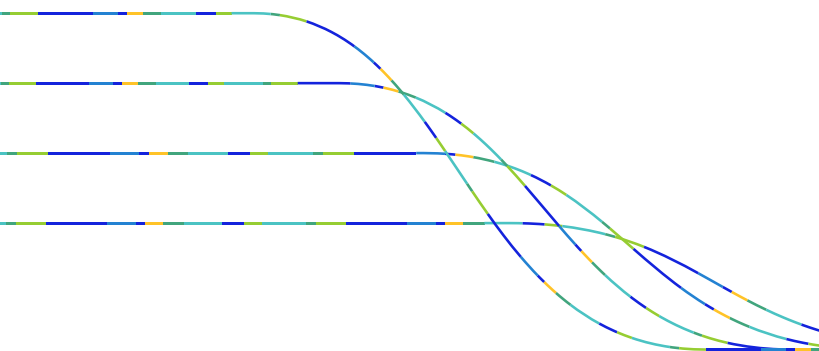


Hydrogen zero-emission generators

ENEDIS

An experiment for the ecological transition of the regions

Enedis is the public service for the ecological transition, a public service for the 21st century that is close to the heart of the French population. With the regions, Enedis is building the new electric France to create a more sustainable future. This new electric France sees electricity as the energy of the ecological transition and the distribution grid as its engine.



With a goal of carbon neutrality by 2050, Enedis is fully committed to reducing its direct CO₂ emissions.

Working with many industrial partners, the company has been experimenting with alternative and low-carbon solutions for certain uses. This is the case with the generator sets, for example.

Essential to the quality of service for customers, the generator sets are deployed by Enedis when they are the best alternative to ensure power supply continuity is maintained for customers in the event of disconnection due to an incident or to carry out work on the distribution grid. Initial experiments were carried out in the **Alsace Franche-Comté, Alpes, Bretagne and Centre-Val de Loire** regions to assess the replacement of conventional generator sets with hydrogen technologies. Other technologies (using batteries or hybrid technologies) are also currently being tested in other regions of France.

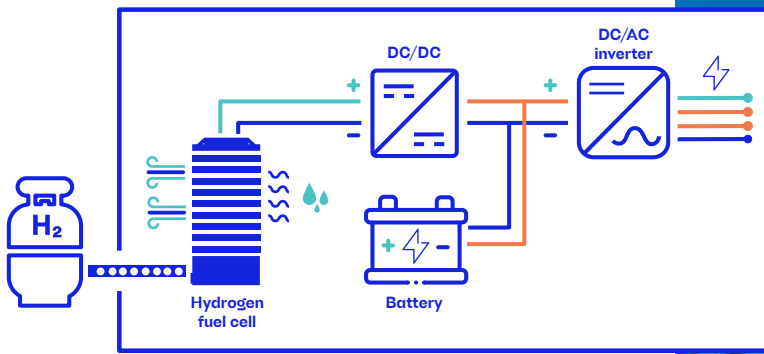
The aim of this experimental phase is to enable Enedis to identify technologies appropriate to its needs, in different work configurations, in various regions and with a wide range of technical partners.

How does a hydrogen zero-emission generator work?

A hydrogen zero-emission generator is designed to replace the solutions currently in use. The generators tested by Enedis have a power of around 100 kVA, their dimensions can vary from one model to another but overall represent a container that can be transported by lorry to a worksite.

At the core of a hydrogen zero-emission generator is a fuel cell powered by a hydrogen storage system which is generally in the form of a metal structure (around 1.80 m high) in which steel hydrogen cylinders are placed.





Through an oxidation reaction between hydrogen (H_2) and the oxygen (O_2) in the air, the pile produces water (H_2O)... and electricity. Combined with an inverter and a battery, the generator delivers alternating current, suitable for supplying electricity to customers during work carried out by Enedis or its contractors.

The advantages of hydrogen zero-emission generators

The experiments carried out by Enedis will define the place of hydrogen technology in the industrialisation of zero-emission generators. However, some initial benefits can already be seen with hydrogen technology:

- 100% removal of direct CO_2 emissions compared to a diesel generator set
- Decrease in noise pollution
- Elimination of unpleasant odours

In the search for alternatives to its conventional generator sets, Enedis is looking for solutions that are industrially relevant, acceptable to the public and easily adaptable to current operational needs.



Renewable, low carbon or fossil?

Although hydrogen has long been classified by colour, since 2021 French regulations have classified hydrogen according to the energy used to produce it.

Renewable hydrogen could be one of the solutions finally selected by Enedis to supply its zero-emission generators, in keeping with its goal of carbon neutrality by 2050. This involves using hydrogen produced from renewable energies such as solar or wind power.

On the other hand, fossil fuel based hydrogen involves the conversion of natural gas to hydrogen, generating CO_2 . This is currently a solution that has been industrialised for its efficiency, particularly in the chemical industry.

Low-carbon hydrogen is obtained either by CO_2 capture, or by electrolysis with electricity produced from a non-renewable energy source whose production emits CO_2 at a level below a set threshold (defined today at 3 tons of CO_2 per ton of hydrogen produced). Carbon capture & storage technology and its use remain in development.

Press service contact

service-presse@enedis.fr

01 47 74 75 98

Enedis is a public service company, operator of the electricity grid.

It develops, operates and modernises the electricity grid, and manages the associated data.

It carries out connections, 24 hour breakdown service, meter readings and all technical maintenance.

Acting on behalf of local authorities and grid owners, it is independent of the energy suppliers who are responsible for the sale and management of electricity supply contracts.

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ENEDIS

Enedis - Tour Enedis
34 place des Corolles
92079 Paris La Défense Cedex
+33 (0)1 47 74 75 98
enedis.fr

Limited Company with management board and supervisory board
Capital of 270,037,000 €
R.C.S. Nanterre 444 608 442
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