

# Stratégie hydrogène du Luxembourg

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## EXECUTIVE SUMMARY



# Executive Summary

Along with electrons allowing direct and efficient electrification, hydrogen (H<sub>2</sub>) is a promising molecule as a carbon-free energy carrier to support the progress of the energy transition in certain sectors that are difficult to decarbonize by direct electrification. This molecule allows to store energy in a flexible way and to release it, a priori, without a carbon footprint. The latter advantage however is directly depending on the ecological footprint of hydrogen production. In stark contrast to fossil hydrogen, only renewable hydrogen produced from renewable energies truly avoids greenhouse gas (GHG) emissions.

## This strategy

### **(i) describes the context of decarbonisation and the role of hydrogen as part of the ambition to achieve climate neutrality at latest until 2050,**

Luxembourg's priority goes to energy efficiency and direct electrification. Renewable hydrogen can play a role in the integration of energy sectors in the long term. Initially however its use will be limited to sectors that are difficult to decarbonize by direct electrification, such as heavy industry.

### **(ii) takes stock of the situation, and estimates the potential for decarbonisation by use of hydrogen**

In Luxembourg, an annual consumption of fossil hydrogen of around 450 tonnes (H<sub>2</sub>) has been identified in industry. The substitution of presently used fossil H<sub>2</sub> by renewable H<sub>2</sub> should constitute an intermediate objective, allowing for GHG emissions savings of up to >5,000 tonnes (CO<sub>2</sub>) per year. Then, renewable hydrogen will contribute to the gradual decarbonisation of other hard-to-abate processes.

Against the background of the target climate neutrality by 2050, renewable hydrogen and its renewable derivatives can help cutting GHG emissions by 1 to 2 million tonnes of CO<sub>2</sub> equivalent per year. Hence, up to around 20% of current overall Luxembourgish GHG emissions could be avoided in the three priority sectors, namely (A), industry, (B) transport and a (C) future-proof integrated energy system. This decarbonisation potential corresponds to a demand potential for hydrogen, which could exceed 125,000 and reach 300,000 tonnes (H<sub>2</sub>) per year, in Luxembourg.

### **(iii) proposes seven key measures to promote production, import and use of renewable hydrogen aimed at reducing GHG emissions, and to ensure thereby the implementation of the present strategy.**

**Measure 1:** Contribute to the definition of the legal and regulatory framework at EU level

The priorities at the European level are: (i) to aim for a strict certification of renewable H<sub>2</sub> and its derivatives, (ii) to ensure that support instruments are strictly limited to renewable H<sub>2</sub>, (iii) to participate in the production of renewable H<sub>2</sub> within the framework of European and international partnerships to tap into the most attractive renewable H<sub>2</sub> production potentials, and (iv) to develop and regulate the transmission, storage and distribution infrastructure thereby facilitating the trade of renewable H<sub>2</sub> on the internal market.

**Measure 2:** Cooperate with EU Member States and third countries

Luxembourg will need to cooperate with international partners at different levels and on a variety of subjects related to renewable H<sub>2</sub>: e.g. (i) Greater Region – a project to convert a gas pipeline into a H<sub>2</sub> pipeline, (ii) Benelux Union – joint study on the cross-border H<sub>2</sub> infrastructure of the future, (iii) the Pentilateral Energy Forum – studies and joint political declarations, (iv) North Seas Energy Cooperation – analysis of the optimal use and landing of offshore energy, and (v) EU – the Union’s renewable energy financing mechanism, as well as with (vi) third countries – a feasibility study to clarify whether Cape Verde could become a producer and exporter of renewable H<sub>2</sub>.

**Measure 3:** Identify opportunities in Luxembourg – Research and innovation

Research and innovation as well as professional training linked to renewable H<sub>2</sub> will offer opportunities for different sectors: (i) public research, (ii) innovative industrial players, (iii) transport and mobility sector, (iv) sustainable finance sector, (v) service sector specializing in the certification of different types of H<sub>2</sub> or (vi) zero-emission maritime navigation.

**Measure 4:** Materialise flagship projects

In order to develop, analyse and carry out flagship projects, certain avenues are described: (i) positive consequences for the economy of the RD&I sector (see Measure 3), (ii) decarbonisation study focussing on industrial processes analysing among other subjects the potential of renewable H<sub>2</sub>, (iii) feasibility of ecosystems around renewable H<sub>2</sub>, (iv) implementation of pilot projects for domestic production of renewable H<sub>2</sub>, (v) methanation of the CO<sub>2</sub> contained in biogas, (vi) installation of a first H<sub>2</sub> refilling station, above all to meet future demand for transit and road transport mainly for lorry and bus transport, (vii) connection to an interconnected network dedicated to H<sub>2</sub> and (viii) flagship projects developed under the IPCEI program with Luxembourgish participation.

**Measure 5:** Prioritise actions – Towards targeted decarbonisation by renewable hydrogen

Considering the energy efficiency first principle, the limited supply and the high cost of renewable H<sub>2</sub> in the short and medium term, the importance of prioritizing demand, so as not to artificially increase its price, is logical. The use of renewable H<sub>2</sub> will be steered towards certain sectors: (a) Industry with processes that are difficult to decarbonize, (b) Transport with for example aviation which is hard to electrify and dependent on the evolution of H<sub>2</sub> technologies and renewable synthetic fuels, and (c) H<sub>2</sub> contributing to the emergence of an integrated energy system.

**Measure 6:** Develop instruments to support a developing renewable hydrogen market

Market instruments will be developed in accordance with European rules and used to guide the decisions of stakeholders. These instruments will seek to stimulate the supply of and demand for renewable H<sub>2</sub>.

**Measure 7:** Implement and continuously improve – Taskforce H<sub>2</sub> Luxembourg

An informal governance structure is established to ensure the implementation of this strategy. Two levels will be complementary in the so-called “Taskforce H<sub>2</sub> Luxembourg”: (i) a permanent steering committee under the lead of the ministry of energy with representatives of the various ministries, and (ii) expert groups will allow to regularly assessing the measures taken, to quantifying the budgetary requirements, to refining the objectives and ensuring continuous improvement. This governance structure is formalised with the adoption of the strategy by the government.

**En collaboration avec :**

Ministère de l'Économie  
Ministère de l'Enseignement supérieur et de la Recherche  
Ministère de l'Environnement, du Climat et du Développement durable  
Ministère des Finances  
Ministère de la Mobilité et des Travaux publics  
Ministère des Affaires étrangères et européennes

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