

THE FRENCH HYDROGEN STRATEGY

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OVERVIEW OF THE FRENCH HYDROGEN MARKET

To face the challenges of ecological transition and climate emergency, the French State plans to develop low-carbon and renewable hydrogen and their industrial, energy and mobility uses. The core objective, enacted into law, is to have 20-40% of total hydrogen and industrial hydrogen consumption sourced from low-carbon and renewable hydrogen by 2030. Pursuant to the government's Multi-Annual Energy Programme (PPE), the first objective is to reach a rate of 10% carbon-free hydrogen for industrial usage by 31 December 2023, then between 20-40% by 31 December 2028. Regarding power-to-gas installations, the objectives are 1 to 10 MW by 31 December 2023 and 10 to 100 MW by 31 December 2028. For hydrogen charging and refuelling stations, the objectives are rather limited: 100 charging stations by 31 December 2023 and 400-1,000 by 31 December 2028.

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To support the development of low-carbon and renewable hydrogen, the French State will invest €7bn by 2030, with €2bn to be directly invested as part of the government recovery plan to address the economic impact of the Covid-19 pandemic. Three priorities have been set for this investment: (i) decarbonising industry (with a carbon neutral objective for 2050), (ii) developing hydrogen mobility and (iii) supporting and developing France's research capacity.

Regarding hydrogen storage, we understand from the French electricity transmission system operator (RTE) that storage of large amounts of electricity in the form of hydrogen in order to manage renewable energy intermittency should not be required before circa 2050. Therefore, the use of hydrogen to store excess electricity is unlikely to be a short-term priority.

The efficiency of France's low-carbon and renewable hydrogen strategy, which was published jointly on 9 September 2020 by the Minister of Ecological Transition and the Minister of Economy, will be supervised by a National Hydrogen Council (Conseil National de l'hydrogène) which was set up on 11 January 2021. For private operators, the French association for hydrogen and fuel cells (France Hydrogène, previously Afhyac), aims to play an important role in the development of the French hydrogen sector by rallying different stakeholders from across the private sector.

The future of the French hydrogen sector will depend on the ability of stakeholders to significantly increase the production of low-carbon and renewable hydrogen by electrolysis and to create a competitive hydrogen industrial cluster. To be economically viable, the production of renewable and low-carbon hydrogen needs to increase substantially, which will entail *“the development of demand for renewable gases and a large amount of inexpensive electricity”*¹. The national strategy for the development of hydrogen aims to have a low-carbon and renewable hydrogen production capacity via electrolysis of 6.5 GW by 2030. However, to date, due to the market’s lack of maturity, the development of hydrogen will, at least in the short term, be highly dependent on public subsidies and/or aids. Therefore, the viability of hydrogen depends not only on technical improvements but also on a positive legal and economic environment as well as confidence of the stakeholders in the financial, technical and legal structuring of the projects.

LEGAL FRAMEWORK RELATING TO THE CONSTRUCTION AND OPERATION OF HYDROGEN PROJECTS

The legal framework in France is being consolidated and new developments are expected in the coming weeks and months, including the expected publication of an important regulation by the French authorities.

Existing legal framework

Under the current framework it is possible to develop hydrogen projects, but depending on their type, they must comply with different requirements.

For hydrogen production, the most common regulations are town planning and environmental laws, which already apply to any renewable energy project. Developers will have to ensure that the development of an industrial project is permissible under local town planning and other applicable regulations. This potentially includes filing for either a building permit or a prior declaration of works, depending on the size and characteristics of the project.

In addition to building authorisations, a prior declaration or, as the case may be, an environmental authorisation, would need to be applied for by the developer. The hydrogen sector may indeed be covered by several sections of France’s Environmental Regulation (nomenclature ICPE) applicable to certain facilities which impact on the environment. Some projects may require environmental impact studies and public inquiries, which may extend the duration of the proceedings. For instance, the construction and operation of a production unit producing hydrogen in industrial quantities could be, depending on the characteristics of the project, subject to an environmental authorisation, a building permit and an examination on a case-by-case basis by the relevant public authority to determine if an environmental impact study is required. Furthermore, if the hydrogen project is located in an industrial area, this will need to be considered.

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We note that there is some uncertainty regarding the application of the French transposition of the IED (Industrial Emissions Directive) to the production of low-carbon and renewable hydrogen. However, the French authorities have published an interpretation note which indicates that the IED is not automatically applicable to non-commercial projects producing hydrogen. The environmental impact of such projects should also be taken into account to determine whether the IED is applicable or not. For hydrogen refuelling points, a new legal framework was published in late 2018 and has been in force since 1 January 2019.

In addition to these regulations, which are common to any industrial project in France, the French authorities have recently published a regulation defining the conditions for the production of low-carbon and renewable hydrogen by electrolysis to benefit from a support mechanism and a traceability framework.

Expected legal framework

On the basis of Article 52 of Law no. 2019-1147 dated 8 November 2019 on Energy and Climate, the French authorities published an ordinance on hydrogen dated 17 February 2021 (the Ordinance).

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One of its purposes is to introduce definitions of hydrogen into the French Energy Code. Depending on the energy used to create hydrogen (renewable or not) and a yet to be determined carbon dioxide threshold, hydrogen will be categorised as renewable, low-carbon or carbonaceous. Only renewable or low-carbon hydrogen produced by electrolysis will benefit from a support mechanism.

Support mechanism

As is already the case for most renewable energy projects in France, the Ordinance provides that the French authorities may launch a tender procedure to meet the objectives set by law, i.e. reaching 20-40% of low-carbon and renewable hydrogen out of the total hydrogen and industrial hydrogen consumption by 2030. In this respect, the Ordinance only indicates that the awarded candidates may benefit either from (i) an operating aid in the form of a contract to be determined (e.g. power purchase agreement, contract for difference) with a maximum 20-year term or (ii) a combination of an operating aid and an investment aid. France Hydrogène favours the idea of an operating aid that would take the form of a contract for difference, where a premium is granted to the producer of low-carbon and renewable hydrogen in €/kg.

The Ordinance also contains provisions already applicable to other renewable energy support mechanisms. In particular, excluding contracts already entered into, the administration may suspend (partially or totally) the support mechanism if it no longer meets the objectives of the PPE.

The next step is to draft the specifications for the call for tenders, which should be launched in 2022. These specifications will have to be carefully reviewed by future bidders, bearing in mind that, given the different technologies and possible offtakes, there is a discussion on whether one or several calls for tenders should be published according to different hydrogen applications.

To ensure the hydrogen produced is renewable or low-carbon, the Ordinance provides a guarantee of origin mechanism as well as a guarantee of traceability mechanism. While a guarantee of origin certifies the renewable or low-carbon nature of the produced hydrogen, a guarantee of traceability ensures that renewable or low-carbon hydrogen has been physically delivered to the purchaser or to the final user. Such a distinction is not common in the French market, where only the guarantee of origin mechanism applies.

From 30 June 2021, the Ordinance also provides that guarantees of renewable hydrogen origin from, or established in, other EU member states may be recognised and treated in the same way as a guarantee of origin linked to a production unit located in France, provided that a similar level of requirements are met. According to the Ordinance, a similar mechanism could be set at a later stage for guarantees of origin for low-carbon hydrogen.

A mechanism for guarantees of origin also exists for biogas injected into the gas grid network produced by anaerobic digestion. The Ordinance complements this system with new provisions and extends it, as of 1 April 2023, to renewable hydrogen injected into the natural gas grid network.

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Looking at the timetable for these mechanisms, the decree containing specific provisions on the support mechanism should be published this year. In parallel, the European Commission should be notified of the support mechanism during the second half of 2021 as a result of the State aid regime.

Injection of hydrogen into the natural gas grid network

If the hydrogen produced is not consumed on site, transported by trucks or shipped, then it should be injected into either a network dedicated to hydrogen or the natural gas network. This can be done either after the conversion of hydrogen into natural gas by methanation or without conversion but in compliance with any quantity threshold set for technical purposes. In this respect, pursuant to Article L. 111-97 of the French Energy Code *"subject to preserving the proper operation and level of safety of natural gas infrastructures, a right of access to natural gas transmission and distribution facilities as well as liquefied natural gas facilities [...] is guaranteed by the operators who operate these infrastructures to customers, renewable gas producers, low-carbon hydrogen producers [...]"*.

This right for renewable and low-carbon hydrogen producers to access the natural gas grid network was introduced by Law no. 2019-1147 on Energy and Climate dated 8 November 2019. However, to date, the conditions pursuant to which a hydrogen project may be connected to the grid have not been set. Prior to their publication, these conditions must be approved by the Energy Regulation Commission (CRE).

At this stage, the only projects injecting hydrogen into the natural gas network are experimental (for instance, project GRHYD or project Jupiter 1000).

In parallel, a report published in July 2020 states that the French natural gas transmission system operators (GRTgaz and Téréga) and nine other European gas transmission operators aim to create dedicated hydrogen transport infrastructure, a European hydrogen backbone of 23,000 km by 2040. It is envisaged that most of this infrastructure should constitute repurposed natural gas pipelines with only a few new pipelines created.



TO DEVELOP A MORE STRUCTURED AND MATURE HYDROGEN MARKET, THE ROLE OF PUBLIC INITIATIVES AND AUTHORITIES WILL BE DECISIVE.

Additionally, the Ordinance provides for fuel or natural gas storage concession holders to be exempt from obtaining a new mining title (authorisation) to store hydrogen underground. This is on the condition that the geological formations in which hydrogen storage is planned are included in the perimeter covered by the mining title the concession holder already has. This exemption should facilitate the development of underground hydrogen storage.

WHAT DIFFERENT BUSINESS MODELS DO WE SEE IN THE MARKET?

The national and European initiatives in the development of hydrogen in France

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2020: the year in retrospect

To develop a more structured and mature hydrogen market, the role of public initiatives and authorities will be decisive. To support this, the ADEME (the French public agency for ecological transition) launched a series of calls for proposals in October 2020.

The first call for proposals, called "Hydrogen Territorial Ecosystems", aims to support investments in ecosystems that combine production and/or distribution of hydrogen on the one hand, and hydrogen uses (industrial, mobility or stationary) on the other. This call for proposals will be endowed with €275m by 2023. The deadline for submitting applications is 16 September 2021.

The second call for proposals, titled “Technological bricks and hydrogen demonstrators,” aims to support innovation that will develop or improve components and systems used for the production and transportation of hydrogen, as well as its uses. For instance, companies that wish to design and build new demo vehicles or develop large electrolyzers as demonstrators could respond to this. This call for proposals is endowed with €350m until 2023. The deadline for submitting applications is 31 December 2022.

More generally speaking, the development of hydrogen projects will also benefit from the programme “Investing for the Future” (*“Programme d’Investissements d’Avenir”* – PIA) in which the French government finances innovative and promising projects. Furthermore, an agreement was recently concluded between the European Investment Bank (EIB) and France Hydrogène on 13 November 2020 to accelerate the development of hydrogen projects in France. The EIB’s experience should benefit the development of these hydrogen projects.

2021: a new momentum

In 2021, a call for expressions of interest named “Hydrogen Applications”, which will benefit from a €65m budget, should be launched by the French National Research Agency. Based on the national low-carbon and renewable hydrogen development strategy that was published in September 2020, this would support research related to new technologies that could be used for hydrogen development.

In addition, from a broader perspective, France signed a manifesto for the development of a hydrogen value chain with 22 other countries. The aim of these countries is to develop an important project of common European interest (IPCEI) for hydrogen starting in 2021. France is supporting this project with a financial allocation of €1.5bn. This project will consider the research and development of electrolyzers, a gigafactory of electrolyzers, the industrialisation of components or hydrogen fuel cells, etc.

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2022: still uncertain

When France’s national strategy for the development of hydrogen was published, the French authorities expressly announced their wish to open the first call for tenders under the support mechanism for the production of low-carbon and renewable hydrogen in 2022.

However, in a deliberation dated 24 September 2020, which gave an opinion on the draft Ordinance relating to hydrogen (now published), the French Energy Regulation Commission indicated that if the hydrogen sector is not structured or mature enough, a temporary and experimental period for support mechanisms could be established. The Commission suggested that over-the-counter agreements could be concluded in order to obtain more feedback from the market to adjust the remuneration in view of the costs actually borne by the producers.

The important role of local initiatives

France’s regions are strongly invested in the energy transition and have, therefore, an important role to play in the development of hydrogen.

Many regions have already launched several initiatives, including:

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- the Auvergne-Rhône-Alpes region aims to develop a project named "Zero Emission Valley" which consists of financing a fleet of 1,000 fuel cell vehicles, building 20 hydrogen refuelling stations and 15 electrolyzers;
- the Brittany region published its roadmap for the development of hydrogen by 2030. This includes three main building blocks: (1) developing local hydrogen ecosystems (production, storage, power-to-gas, charging points, etc.), (2) developing a research capacity for innovation and (3) preparing a pooled investment plan;
- the Centre-Val-de-Loire region is supporting the development of a power-to-gas plant (Methycentre) where hydrogen will be used for mobility purposes (vehicles) or transformed into natural gas for other uses (heating, for instance); and
- Corsica is hosting a research platform (Myrte) where the electricity produced from a solar plant is converted into hydrogen (power-to-gas), then the hydrogen is stored before being converted again into electricity with a fuel cell that is injected into the distribution network when needed (night, winter, etc.).

These local initiatives provide a glimpse of the various possible uses for hydrogen (mobility, storage, research, etc.).

A common theme that has emerged from these local initiatives is the application of hydrogen for mobility/how to develop hydrogen within the smart city concept. In this respect, it is worth noting that the French General Local Authorities Code (*Code général des collectivités territoriales*) provides that, subject to a non-existent, insufficient or inadequate supply on their territory, local authorities may create and maintain hydrogen refuelling infrastructure for vehicles or ships, or set up a service including the creation, maintenance and operation of such infrastructure or refuelling points. The operation of such infrastructure could include, in particular, the purchase of hydrogen needed to supply vehicles or ships (art. L. 2224-37 of the General Local Authorities Code). In addition, local public entities may act as shareholders of project companies dedicated to the production of renewable energy, including renewable hydrogen, located on their territories (art. L. 2253-1 of the General Local Authorities Code).

We note that there are some legal barriers still in place and this may constitute an obstacle to the development of hydrogen mobility. For instance, the parking and driving of hydrogen vehicles through tunnels can still be prohibited under certain circumstances.

Public initiatives in need of private stakeholders

Private stakeholders will have a key role to play in the development of hydrogen in France and this is already happening. There are many private companies that are already comfortable using hydrogen – for example in the oil, petrochemical and chemical industries – and are willing to follow the path of low-carbon or renewable hydrogen.

In addition, national and local public authorities will need the cooperation of private operators to undertake, for example, operational management of their infrastructure or direct deployment of new solutions, such as charging stations. Therefore, private stakeholders will also be operating public projects by meeting the needs of public entities through public contracts (either public procurement contracts or concessions). Furthermore, private stakeholders will be needed for the development of complex local hydrogen ecosystems. For example, after producing electricity from renewable energy projects, the electricity could be converted into hydrogen through electrolyzers for use in local refuelling stations (buses or trucks for refuse collection or trains).

Therefore, public initiatives for the development of the use of hydrogen vehicles under public concessions will play a role in the development of the hydrogen sector in France, combined with the role of private stakeholders in this booming but not yet mature market.

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WHAT DOES THIS MEAN FOR THE ENERGY, TRANSPORT AND INFRASTRUCTURE SECTORS?

Energy: One of the first identified applications is the production of low-carbon or renewable hydrogen to replace hydrogen produced for industrial purposes. In our view, this will constitute the main development for hydrogen in the coming years. In addition, injection of hydrogen into natural gas network is already being experimented with by the main stakeholders in the French gas sector and public entities. However, low-carbon and renewable hydrogen should not be a source of electricity production in the years ahead. In this respect, the French electricity transmission system operator indicated that the use of hydrogen storage for electricity production will not be required before 2050.

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Transport: The main objective of the French authorities is to develop hydrogen as an alternative fuel for collective and freight transport. At this stage, we see that the main initiatives to develop hydrogen in the transport sector come from public entities at the regional or local level. These initiatives may have an impact on concession holders and public procurement contractors who could rapidly have to handle this new technology and adapt contractual mechanisms to reflect the risk allocation between public entities and private operators. This challenge for the transport sector will require a deep transformation of the infrastructures made available to operators and public/private initiatives to support these changes. From a general standpoint, these initiatives are strongly supported by the French authorities (notably through the ADEME or the Caisse des Dépôts et Consignations) and should, in certain contexts, constitute a credible alternative to electric-powered vehicles.

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Infrastructure: One of the main mid-term challenges for the infrastructure sector is the strengthening of the existing gas network and the development of a dedicated network for the transport of hydrogen. This challenge also raises questions about the need to regulate such infrastructures and clarify the applicable regulatory framework for the transport of hydrogen that remains unaddressed at this stage in the French Energy Code.

In addition, the infrastructure sector will be impacted by the deployment of hydrogen mobility. Indeed, the development of hydrogen as an alternative fuel will require the adaptation of port, marine and aviation infrastructure in many ways: storage, transport, distribution, refuelling, etc. In this respect, for the aviation sector, the French Ile-de-France region, Paris Airport (ADP), Airbus, Air France-KLM and Choose Paris Region Agency have recently launched a joint call for expression of interests for exploring hydrogen opportunities on airports. Beside the question of the development of hydrogen-powered aircraft, such calls for interest will allow experts to question the development of hydrogen infrastructure in an airport environment.

This is the fifth article in our ‘Hydrogen – What is the hype about?’ series, which provides an overview of the hydrogen sector and the strategy for its development in multiple jurisdictions. To read other articles in the series please [click here](#).

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[1] Regulatory Treatment of Power-to-Gaz, “European Green Deal” Regulatory White Paper series (paper #2) relevant to the European Commission’s Hydrogen and Energy System Integration Strategies, ACER and CEER, 11 February 2021

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