FEBEG Hydrogen vision for Belgium

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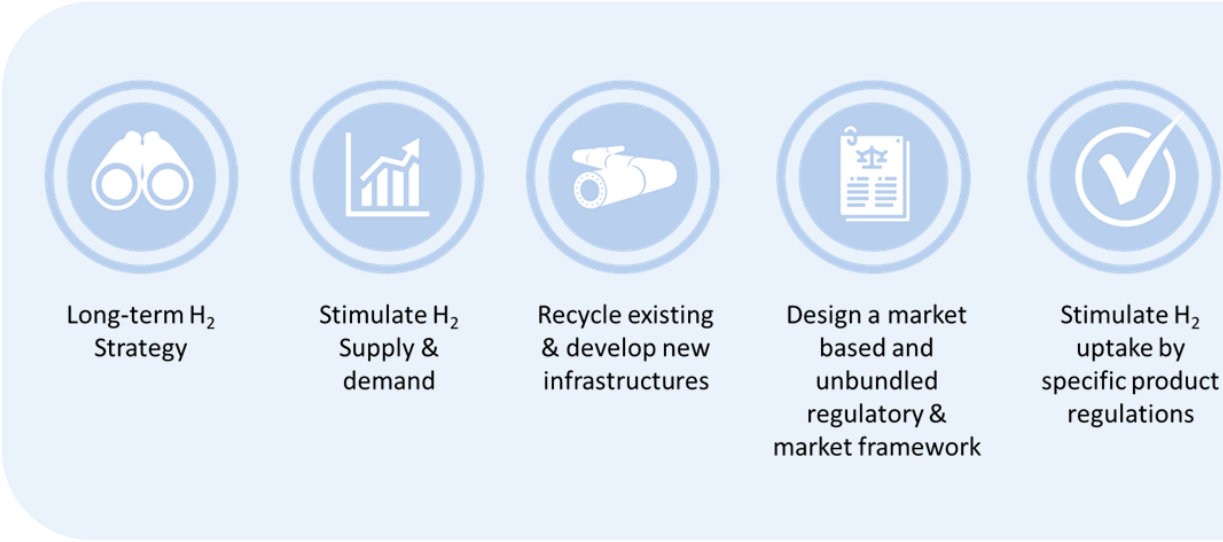
FEBEG is the federation of Belgian gas and electricity companies.

This paper proposes specific policy and legislative measures for the Federal Government and the different regional governments. Our recommendations intend to contribute to and complement the National Climate and Energy Plan 2030 and the Belgian Long-Term Strategy 2050 and provide input for dedicated strategies for Belgium and its federated entities on hydrogen and other renewable and low carbon molecules.

KEY RECOMMANDATIONS



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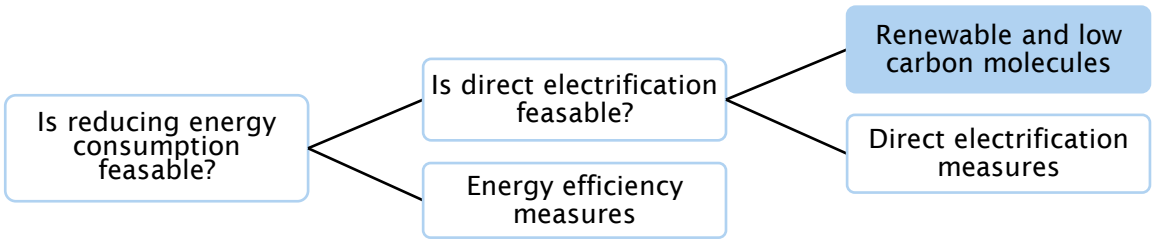
Executive summary

The transition towards carbon neutrality is one of the great challenges of this century. It will be essential to facilitate and accelerate this transition while maintaining the affordability for the end-users and in parallel preserving the reliability and availability of the energy system at current level. At the same time Belgium is in the center of the Western European energy system at crossroads of electricity interconnections, natural gas infrastructure and with major industrial clusters. Belgium and its regions should have the ambition to reconcile these challenges and opportunities. The objective of our recommendations is to reconcile both these elements.

We endorse the analyses of the European Commission that this requires an evolution towards an integrated energy system. This integrated system should be operated with the following logic: first focus on Energy Efficiency; then increase Electrification; and finally develop and use renewable & low carbon molecules.



This paper is focused on the role renewable and low carbon molecules (gasses and liquids), including hydrogen, can play in an integrated energy system to:

- Abate carbon emissions in end-use applications where energy efficiency and direct electrification only partially allows to achieve the objectives;
- Assist in grid stabilization and load management by offering extra **flexibility** to the system.

This approach builds on the longstanding principles of the '*trias energetica'*, in the sense that the third step in the three-step strategy is expanded with renewable and low carbon molecules. The constatation among stakeholders and policy makers grows that renewable and low carbon molecules are needed to ensure feasibility of a reduction of emissions in line with climate agreements. FEBEG believes this requires a framework that focuses on the development of the following elements:

- The development of a long-term hydrogen strategy by Belgium and its regions;
- The development of hydrogen market uptake by stimulating demand and supply;
- The adaption of the existing infrastructure and the development of a strategy for new and dedicated infrastructure;
- The design of a suited regulatory framework with market rules for renewable and low carbon molecules based on the unbundling principles as applied in the electricity and gas market;
- The development of specific product regulation that could stimulate hydrogen uptake.

Why renewable and low carbon molecules, including hydrogen, can become a cornerstone of the integrated energy system.

Increased greenhouse gas reduction

In order to rapidly reduce greenhouse gas emissions in line with climate agreements and in a feasible way **renewable and low carbon molecules will play a key role. This role consists of developing synergies between the electricity sector, gas sector and end-use sectors, including, but not limited to, offering flexibility options to the energy system** (e.g., storage and transformation into other energy carriers), offering carbon capture and usage solutions towards energy intensive industries (e.g. production of e-molecules like e-methane, e-methanol, etc. out of green hydrogen and captured CO_2). As a basic molecule hydrogen has in this respect the potential to become a corner stone in the Belgian energy system, by:

- Contributing to safeguarding the Belgian security of supply;
- Exploiting system benefits via its versatility and offering flexibility across multiple energy carriers, *in casu* electricity and (natural) gas, but also into liquid carriers (e-fuels);
- Taking into account and help protecting the important role energy intensive companies play in the Belgian economy;
- Developing specific know-how locally by supporting hydrogen innovations, development and deployment in order to become an industrial front runner in the hydrogen economy;
- Abate carbon emissions in end-use applications where energy efficiency and direct electrification is not or only partially feasible.

FEBEG thinks the momentum is right for Belgium and its regions, in close collaboration with the FEBEG members, to develop hydrogen's potential to play a key role in a sustainable, reliable, and affordable energy future. Hydrogen is as a feedstock already widely used in some industries, but it has not yet realized its potential to support the energy transition towards climate neutrality. Ambitious, targeted, and near-term actions are needed to further overcome market barriers and reduce costs.

Systemic role for renewable and low carbon hydrogen in Belgian Energy System of 2050

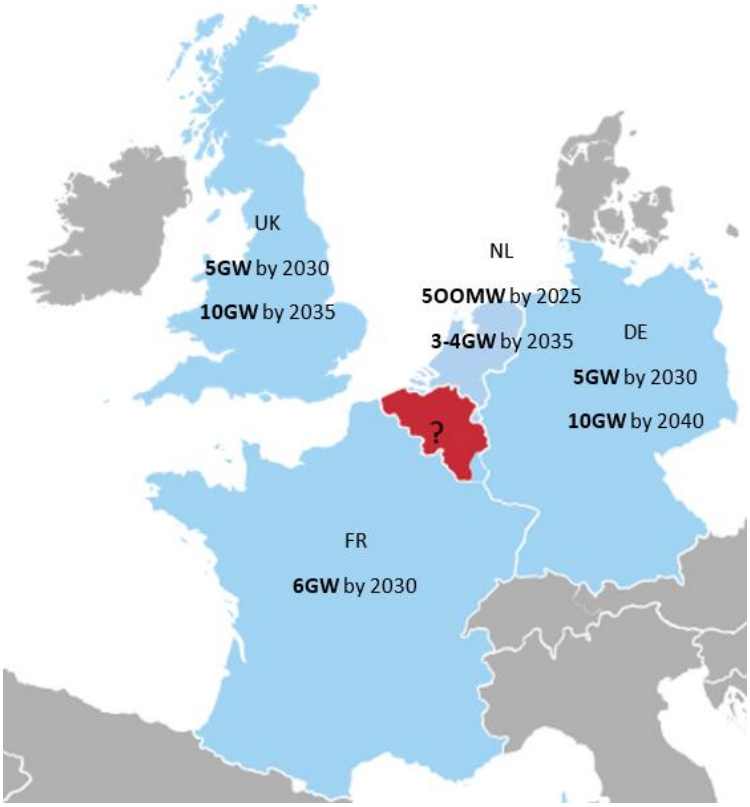
In a recent study by the Federal Planning Bureau[1] two scenario's depicting different states of the Belgian energy system in 2050 were constructed: one with a deep electrification philosophy ("*Deep Electrification")* and another demonstrating a more diversified approach in which molecules occupy a big(ger) share (*"Diversified Energy supply")*. Both studies are compatible with the 1.5°C temperature increase limit as set out by the Paris Agreement.

[1] DEVOGELAER, D., Fuel for the Future, More molecules or deep electrification of Belgium's energy system by 2050, Federal Planning Bureau, October 2020.

The essential question in the study boils down to: should we electrify, produce hydrogen domestically or import hydrogen? The deep electrification and diversified energy supply option seem rather interchangeable due to rather limited differences between the two options. In both cases power demand raises significantly towards 2050. Also, the marginal costs, which are used by the Planning Bureau as a proxy for the wholesale power prices, are very comparable in both scenario's. What is obvious though, is that importing hydrogen should at least partially be part of the equation. Not importing Hydrogen would triple electricity demand by 2050 to 240 TWh.

But why should Belgium invest in electrolyzers and carbon capture then? The Federal Planning Bureau states clearly that **electrolyzers combined with gas-fired power plants** (equipped with carbon capture technology) **are the main daily, weekly, and annual flexibility providers in '*Diversified Energy Supply*'.** This flexibility is needed considering the strong planned intermittent capacity growth in the upcoming years. **In the '*Deep Electrification*'** scenario, electricity imports together with EVs (storage) become more important daily and weekly flexibility providers: they compensate for the lower installed electrolyzers capacity. **The latter nevertheless contributes substantially to flexibility and even provides half of the annual flexibility needs. Therefore, electrolyzers play a crucial role in the Belgian Energy system of the future no matter the chosen pathway.**

What are our neighboring countries doing in terms of hydrogen development?



What FEBEG thinks is needed to kick-start the hydrogen ecosystem in Belgium

1. Develop a long-term hydrogen strategy

- **Define the role** for hydrogen and other renewable and low carbon molecules in a dynamic and adaptive long-term energy strategy and develop a concrete roadmap with clearly defined intermediate milestones in order to stimulate market uptake.

- To realize these ambitions, it will also require a **roadmap** for the considerable long-term research and innovation and demonstration and scale-up efforts and means.

- The **regulatory framework** has to be both **robust and flexible**, to fit the various pathways of hydrogen development, including import and export of hydrogen, CO_2 or e-molecules.

- Create a clear **push and pull policy** for hydrogen. Demand, supply, storage, and infrastructure will all have to develop and there are major dependencies between them. Potential investors in production capacity need insight into demand trends. The **development and dimensioning of the infrastructure network** are again linked to the expected supply and demand. Both the development of demand, supply, storage and infrastructure are significantly influenced by government policy.

- **Investments** in renewable and low carbon energy technologies should be part of the national economic recovery plan post Covid19.

2. Develop a market by stimulating supply and demand

Renewable and low carbon hydrogen technologies are available, but costs remain challenging. Policies that help to create sustainable markets for renewable and low carbon hydrogen and molecules are needed to underpin investments by suppliers, distributors, and users. In this respect FEBEG identified several recommendations:

- Focus on the **realization of demonstration projects** in the initial phase is essential, e.g. electrolyzers, grid injection projects, CCU and CCS projects, industrial applications and transport applications. The next step in the process should focus on scaling-up and on roll-out.

- As **support** is currently needed to realize these first projects, these projects should be able to benefit from support via Federal and regional innovation funds, dedicated national and/or regional support programs & European support (e.g., EU-ETS,

innovation fund) and schemes that make it possible to interpret state aid rules in a more flexible way (i.e. IPCEI). It is important to set up these **schemes** in a short term, with sufficient attention for flexibility, taking into account future learnings curves and (project)needs.

- In developing national and/or regional support programs, we believe that **capex and opex** support should be thoroughly investigated. Another complimentary option could be to investigate how the market uptake of hydrogen could be supported by a **pull towards offtake**, meaning that the use of renewable and low carbon molecules could be supported (e.g. through carbon contracts for difference, the EU-ETS, etc.).

- Support local and ambitious **renewable targets and projects** as they produce the raw material for producing green hydrogen, but primarily also to increase the uptake of direct electrification.

- Consider the **import** of green hydrogen and hydrogen-based carries (ammonia, synthetic gas, methanol, etc.) as an important route to complement (limited) local renewable energy production. Belgium has an important geographical, infrastructural and industrial advantage to become a key player in these interconnected markets.

- Deploy a framework to support cross-border hydrogen and CO_2 trade. An efficient **guarantees of origin** scheme is essential.

- In order to improve the price signal that emitting CO_2 should give, look into - taking account the specificities of each sector - the European options to expand the EU-ETS towards non-ETS-sectors or to introduce a CO_2 price for non-ETS-sectors.

- Look into potential **system optimisations** between the gas and electricity grid and eliminate unnecessary or hindering regulatory barriers, e.g. double tariffication (in electricity and gas system) for renewable electricity as feedstock for hydrogen needs to be avoided. This principle should maximally be harmonized on a European level (and within Belgium) in order to maintain a level playing field.

- As most end users are connected to the DSO grid, an integrated strategy on the DSO level is needed too.

- Moreover, renewable and low carbon molecules can offer extra flexibility on the DSO level as well.

- Blending to stimulate demand while decarbonising:
    - Gas grid: two paths with different timeframes:

        <u>Short term</u> promotion market uptake: through mixing a certain amount of renewable and low carbon gasses into the existing gas grid while using the potential of guarantees of origin (e.g. biogas, biomethane, e-methane, renewable and low carbon hydrogen, etc.).

Mid and long term: setting-up a dedicated (including the reconversion of the existing gas grid) hydrogen and CO_2 infrastructure (*cf. infra* 3.).

- Transport fuels: mixing obligation of renewable and low carbon hydrogen and renewable and low carbon hydrogen based synthetic fuels could stimulate market uptake. Integrating ReFuNobio's (Renewable Fuels of Non-Biological origin) such as hydrogen and hydrogen based synthetic fuels in the Belgian Transport Fuels legislation is needed, as this is not yet the case although this option is foreseen in the Recast of the Renewable Energy Directive. The legislators should review how the implementation of the RED II can contribute to encourage the use of renewable and low carbon hydrogen and hydrogen-based energy carriers and to ensure a level playing field for battery-electric and fuel cell-electric applications.

3. Adapt the use of existing infrastructure and look into new and dedicated infrastructure

- The development of a hydrogen backbone should be researched thoroughly.

- Hydrogen networks are expected to represent a future natural monopoly justifying regulation, including third party access. Unbundling rules should therefore apply. Existing hydrogen grids used for specific chemical applications are out of scope.

- An harmonized approach with respect to the regulatory framework within the EU would be beneficial.

- The development of the electricity, natural gas grid and the hydrogen grid should be effectively coordinated (including EU-wide harmonization) to minimize societal costs.

- Point-to-point hydrogen grid developments legitimize particular regulatory approach. In the initial phase of market uptake though, a lot of point-to-point infrastructure will be developed, we should thoroughly research if and how we could integrate this kind of infrastructure into a regulated monopoly.

- Transport of hydrogen via tube trailers and direct lines are commercial activities and are therefore not expected to represent a natural monopoly.

- Building infrastructure around industrial clusters and decentralized hydrogen production could be a good starting point.

- CO_2 transportation networks could be expected to represent a future natural monopoly justifying regulation, including third party access.

- In the initial phase of market uptake, CO_2 will probably not be transported via pipelines networks, but rather via more flexible solutions e.g. ships and trailers.

4. Apply the principles of the unbundling in designing market rules for renewable and low carbon gasses

- The policy focus needs to be on laying down the regulatory framework for a liquid and well-functioning hydrogen market and on incentivizing both supply and demand in lead markets. This includes bridging the cost gap between conventional solutions and renewable and low-carbon hydrogen and national and regional support programs (cf. supra).

- The Belgian potential for renewable electricity production must be optimally exploited. Enabling framework conditions will push concrete plans for large wind and solar plants, at least partially, dedicated to mega- and gigawatt-scale renewable hydrogen production. As the potential for new RES installations of a certain scale is limited in Belgium, conditions on additionality of RES should not hinder electrolyzers development.

- By 2030 the EU will aim at completing an open and competitive EU hydrogen market, with unhindered cross-border trade and efficient allocation of hydrogen supply among sectors. therefore, it is critical Belgium and its regions should become a frontrunner in claiming and developing a market position (e.g. the Netherlands has shown ambitions to develop a TTF for hydrogen).

- The **production and supply** of hydrogen is a commercial activity and should not be open to network operators nor to actors with regulated activities in hydrogen transport.

- **Hydrogen storage facilities that are integrated in the network** could represent a future natural monopoly as well and therefore justifying regulation, although it could be a commercial activity as well. The storage of renewable and low carbon gasses differs in that respect for electricity storage which always should be a commercial activity (only in the case of fully integrated network components an exemption on this principle is possible).

5. Specific product regulation that could stimulate hydrogen uptake

- Comprehensive terminology and European-wide criteria for the **certification of renewable and low carbon hydrogen** is needed.

- It should be an option to validate the use of renewable and low carbon hydrogen within the EU ETS.

- To ensure interoperability of markets for pure hydrogen, common quality standards (e.g. for purity and thresholds for contaminants) or cross-border operational and trade rules may be necessary.

- A **reliable system of Guarantees of Origin** (GOs) for renewable and low carbon gasses and, in a later phase, e-liquids will be required.

- Coordination between the different regions within Belgium and with other European countries will be needed in the further development of the GO system and the aim needs to be on further implementing a system that seeks as much as possible European harmonization in terms of rules and methodology, with an evolution towards and EU market for GO's.

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