

ROADMAP

Roadmaps aim to inform citizens and stakeholders about the Commission's work in order to allow them to provide feedback and to participate effectively in future consultation activities. Citizens and stakeholders are in particular invited to provide views on the Commission's understanding of the problem and possible solutions and to make available any relevant information that they may have.

TITLE OF THE INITIATIVE	A EU Hydrogen Strategy
LEAD DG – RESPONSIBLE UNIT	DG ENER, C1
LIKELY TYPE OF INITIATIVE	Communication to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions
INDICATIVE PLANNING	Q2 2020
ADDITIONAL INFORMATION	–

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A. Context, Problem definition and Subsidiarity Check

Context [max 10 lines]

In December 2019, the Commission presented the **European Green Deal**¹ as the new European Growth Strategy setting out a clear agenda to make Europe by 2050 the first climate neutral continent in the world and to enhance the EU's natural capital. This fundamental transformation of Europe's economy to a green and competitive economy requires fundamental changes and breakthrough technologies. The Green Deal identified clean hydrogen as a priority area where the EU needs climate and resource frontrunners to develop such technologies and commercial applications. This also builds on the Commission's 2018 Long-Term strategy, "A Clean Planet for All"², which highlights the critical role that hydrogen can and must play in achieving climate neutrality.

Recognising the need for stronger coordination across the value chain, the new **Industrial Strategy** presented by the Commission in March 2020 announced a "European Clean Hydrogen Alliance" to bring together investors with governmental, institutional and industrial partners.

The upcoming **strategy for energy system integration** ("smart sector integration" announced in the Commission Work Programme for June 2020) will outline a vision to create a smarter, more integrated and more optimised energy system, in which all sectors can fully contribute to decarbonisation. Hydrogen will be an important element of that strategy, but its key role and its wider scope warrant a specific approach. In particular Energy Intensive Industries, by scaling up their use of hydrogen, should play a key role in developing a sizeable, well-functioning clean hydrogen market and a cost-effective infrastructure.

Investments to boost the production of renewable energy and of supply, storage and transport of clean hydrogen have a strong potential to support the recovery from the COVID-19 crisis, while supporting the leadership of EU industry in its transition to climate neutrality while creating these new markets. This points to the need for a comprehensive European approach to enable clean hydrogen to already contribute to increased greenhouse emission savings by 2030, and to give a push to this future ecosystem with a view to larger-scale deployment by 2050.

In this context, the Commission has decided to adopt a **new dedicated strategy on hydrogen in Europe**, in synergy with the strategy on energy system integration and bringing different strands of action together, from research and innovation over production and infrastructure to the international dimension.

Problem the initiative aims to tackle [max 25 lines]

The EU's increased climate ambition implies an accelerated transformation of the energy system since energy production and use account for more than 75% of the EU's greenhouse gas emissions. To date, Europe has made significant progress in decarbonising its electricity production. But progress has been slower for other energy carriers (gas, liquid fuels, heat), and fossil fuels remain predominantly used in end-use sectors such as transport, industry and buildings. For those hard-to-abate sectors where other alternatives might not be feasible or have higher costs such as heavy-duty and long-range transport, as well as energy-intensive industrial

¹ COM(2019) 640 final

² COM(2018) 773 final

processes, clean hydrogen will play a key role in decarbonisation.

The initiative will focus on supporting the deployment of renewable hydrogen (also referred as 'green') as a priority. In a transition phase, the production of low-carbon hydrogen (also referred as 'blue') based on natural gas, combined with carbon capture and storage (CCS) technologies, or other low-emission pathways if they are commercially available, may support the effective scale-up of renewable hydrogen by contributing to satisfy medium-term demand for hydrogen. The term clean hydrogen covers both renewable and low-carbon hydrogen.

Renewable hydrogen (produced through electrolysis from water using renewable electricity) can play an important role, providing the mobility sector and industry with emission-free energy and feedstock. It can also provide long-term, large-scale storage, and flexibility to the energy system. Renewable hydrogen supports the integration of renewable electricity generation as it decouples the energy production and usage in location and time and can balance electricity demand and supply. This is amongst other uses also important for electricity grid management, and as well for isolated or stand-alone regions of the EU, or for specific and local uses concentrated in a restricted area or city.

However, today hydrogen accounts for less than 1% of Europe's energy consumption and is mainly produced through highly carbon-emitting pathways ('grey' hydrogen) and used as feedstock in sectors such as fertilisers and refineries. The interest and the capacities vary substantially between Member States. Moreover, the production of renewable hydrogen is still considerably more expensive than the conventional, highly carbon-intensive methods, which does not reflect the associated environmental and climate externalities. Finally, conversion of renewable electricity to hydrogen is currently not as efficient as direct consumption of renewable electricity due to conversion losses associated with the production of hydrogen.

There are barriers such as lack of production, infrastructure, high cost and low efficiency to address, and a need to look at the whole value chain in order to advance towards a hydrogen ecosystem at a scale that contributes to meet the 2030 and 2050 climate and energy goals in a timely and cost-effective way. To ensure efficient allocation of resources and use of clean hydrogen where it is most valued, strong price signals and functioning markets are needed together with an enabling framework to ensure the upscaling of renewable hydrogen in order to overcome the current market failure. In addition to massive scale-up, research and innovation are needed to increase the efficiency and the functioning of the whole value chain.

With an increasing number of Member States that have already adopted, or are in the process of adopting, national hydrogen strategies as well as industry initiatives such as the "2x40 GW renewable hydrogen" ambition, there is a pressing need to develop a European approach. Free cross-border flow and trade of hydrogen is an important cornerstone to its broad application. An EU strategy avoids the risk of uncoordinated action, which could lead to market fragmentation and reduce the benefits of switching to renewable hydrogen. Together with a targeted Clean Hydrogen Alliance it will allow promoting the competitive position of the EU industry and preserving its current technology leadership position, through inter alia focused support to research and innovation. The envisaged European Partnership for Clean Hydrogen will gather together knowledge, technological and financial resources available across public and private stakeholders through a coordinated pan-European approach

The international dimension of hydrogen bears critical importance due to its geopolitical implications in terms of security of supply and the ongoing work at global level on standardisation (linked to the EU technology leadership position). The EU could also benefit from an enhanced collaboration on hydrogen with its international partners, including e.g. the Ukraine, the Western Balkans and neighbouring countries along the Mediterranean, as well as at multilateral level with its peers to advance technology breakthroughs. Furthermore, a global approach on hydrogen is needed for efficient and consistent deployment, for instance for boosting hydrogen in long-distance maritime transport.

Basis for EU intervention (legal basis and subsidiarity check) [max 10 lines]

The legal basis for this initiative is Article 194(2) of the Treaty on the Functioning of the European Union.

It is an initiative in an area of energy, which is a shared competence between the EU and Member States. When identifying in which areas and what kind of EU action could bring added value for accelerating the clean energy transition and decarbonisation through the use of clean hydrogen, this strategy will properly take into account the principle of subsidiarity.

EU action on hydrogen will avoid a fragmented approach by ensuring efficiency and effectiveness and addressing the transition of the European energy system in a coordinated way, ensuring transversal reduction of greenhouse gas emissions and harnessing the benefits of the internal market.

B. What does the initiative aim to achieve and how [max 25 lines]

The aim of the strategy is to bring different existing and new strands of action together to create an enabling environment to scale up clean hydrogen for a climate-neutral economy.

The strategy should create the conditions across the whole value chain for clean hydrogen to contribute cost-effectively to boosting and decarbonising the economy and aims to:

- identify the role that clean hydrogen can play in the context of the green recovery and the growth strategy that is the Green Deal with the ambition of a climate-neutral Europe by 2050, including the

- actions needed in the period up to 2030;
- identify the main barriers that currently prevent scaling-up the production and use of clean hydrogen and exploiting its associated benefits that would justify additional action at European level;
- identify a set of actions to address those barriers and foster a competitive European value-chain and the large scale production and use of clean hydrogen in a cost-effective way, taking into account the subsidiarity principle;
- address the challenge of concomitant development of a well-functioning hydrogen market and a corresponding cost efficient EU infrastructure.

Actions could include non-legislative measures, as well as legislative measures to be further developed in the context of future legislative proposals, in particular the June 2021 legislative proposals on energy and climate to enable increased climate ambition. Actions will be complementary to those identified in the strategy for smart sector integration and reinforced by the work of the European Clean Hydrogen Alliance, and could cover inter alia the following broad areas:

- actions to support a clean energy industrial value chain to achieve a massive scale-up in production and demand of clean hydrogen.
- enhancing the regulatory framework for clean hydrogen as an energy carrier in connection with the strategy for smart sector integration, including in relation to markets rules and infrastructure and the creation of a robust certification scheme.
- identify how different funding instruments and research and innovation could be used to support all parts of the value-chain and facilitate the uptake and large scale deployment of renewable hydrogen.
- develop an investment agenda, including for infrastructure needs.
- boosting Member States' cooperation to exploit synergies and benefit from the internal market framework.
- engaging international community and promoting international cooperation.

C. Better regulation

Consultation of citizens and stakeholders [max 10 lines]

Stakeholders and the public at large have been able to express their views on the role of hydrogen in the events and workshops organised in the context of the preparation of the energy system integration strategy and the online possibilities (devoted functional mailbox). These contributions will also be taken into account for the purposes of this initiative, to the extent of their relevance to the hydrogen strategy as described above.

In addition, this roadmap will be published and be open for comments, encouraging stakeholders and the public at large (including NGOs, academic or research institutions and citizens) to contribute. Contributions are welcome on matters relevant to the aims of this initiative as expressed in parts A and B of this roadmap, such as production, distribution and use of hydrogen in various sectors, from the perspective of decarbonisation, sustainability, market and economy or other. Contributions can be sent through the 'Give feedback' tool available for this initiative on the 'have your say' website.

Evidence base and data collection [max 10 lines]

This Communication will draw from a comprehensive literature review and specific studies carried out by the Commission in the last years. It will also benefit from technical input received from experts during various workshops and meetings, as well as during all the various consultation activities carried out for the preparation of the energy system integration strategy, where the role of hydrogen is part of the discussions. It will also take into account the input received from stakeholders and the general public through the 'have your say' webpage created for this initiative.

While the strategy will identify policy areas where action will be taken by the Commission, the specific follow-up actions will follow their own approval process, in line with better regulation requirements, including the requirement to conduct an impact assessment and an in-depth public consultation when applicable.