

**Green Hydrogen opportunities for emerging economies  
Webinar**

Tuesday, 14 June 2022, 13:30-15:30 CET

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**SUMMARY**

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**Background and context**

Green hydrogen, produced using clean energy sources like renewable power, will be essential in realising a global net-zero economy. Hydrogen is a cross-cutting energy vector that can help to decarbonise end-use sectors such as heavy industry and transport, and provide a flexibility solution for integrating higher shares of variable renewable energy sources. Hydrogen could cover more than one fifth of the total global energy demand in 2050, and at least two-thirds of the total production is projected to be green hydrogen. This implies a total cumulative investment need of USD 5-12 trillion in renewable power, electrolyzers and pipeline reconfiguration by 2050.

By 2050, countries outside of the Organisation for Co-operation and Economic Development (OECD) that are primarily represented by emerging and developing economies would need the most green hydrogen to contribute to decarbonising their industry and transport sectors. Fortunately, many emerging and developing countries are endowed with abundant low-cost renewable energy resources that can make them major producers of green hydrogen that can potentially bring large social and economic benefits.

Solutions are urgently needed, however, there is no one-size-fits-all solution, and national strategies released today show that decisions are made based on national circumstances. The complexity of the hydrogen value chain requires approaching it from a system perspective encompassing the entire value chain, to identify the benefits that fit these circumstances and priorities. Moreover, implementing measures to create an enabling environment for project developers, and developing suitable financing solutions will play a crucial role to foster the creation and growth of the green hydrogen market.

The webinar, organised by OECD's Clean Energy Finance and Investment Mobilisation (CEFIM, <https://www.oecd.org/cefim/>) programme, aims to raise awareness about the importance of addressing the entire value chain of green hydrogen to assess a country's potential, and to help identifying key enabling market and investment de-risking solutions.

## Welcome

There is already significant focus and high interest on green hydrogen given its role as a key decarbonising energy vector. Its technology, trade and policy aspects have received significant global attention. At the Clean Energy Finance and Investment Mobilisation programme, business models and financing solutions that are needed to operationalise green hydrogen's potential are being investigated.

### **OECD Digital Study on Green Hydrogen (publication in Summer 2022)**

More than 40 countries have now released hydrogen roadmaps, including several emerging and developing countries from South and South-East Asia, Africa and Latin America. Many other countries are engaging in the international debate, but still analysing the hydrogen value chain to identify their priorities, set their ambitions and develop national strategies. Overall, while national targets and flagship projects have been announced, only a few initiatives have mobilised the investments matching these ambitions. In view of these gaps, the OECD is preparing a digital study to raise awareness on the importance of a holistic approach the value chain.

Beyond the complexity of the value chain, countries need to identify and prioritise the most suitable and effective usages for green hydrogen, which can build on the global learnings, but should be adapted to answer country-specific matters, considering as well other options to reduce emissions such as direct electrification. Domestic green hydrogen production can bring local advantages, such as ensuring energy access; creating new, high-skilled jobs; reducing fossil fuel imports; from local industry and transportation.

The lack of land availability or the high price of renewable electricity in certain regions will require developing regional and global trade. Several developed economies, such as Japan, Korea or the European Union (EU), are developing trade agreements to mitigate the risk of a lack of competitive domestic hydrogen production and diversify their energy sourcing, thus mitigating geopolitical risks. Thus, this offers additional opportunities to emerging economies with large renewable resources endowment that will likely become exporters and could serve the needs of these countries. For instance, after Russia has cut off some gas supply to Europe in May 2022, the European Commission presented the REPower EU plan to accelerate the hydrogen-based transition to find new sources of clean gas supply (namely, green hydrogen and its derivatives like green ammonia). This plan sets a target of 10 million tonnes of renewable hydrogen imports by 2030, corresponding to 2% of its total final energy consumption, and to 10% of the current hydrogen consumption worldwide.

The study is supplemented with:

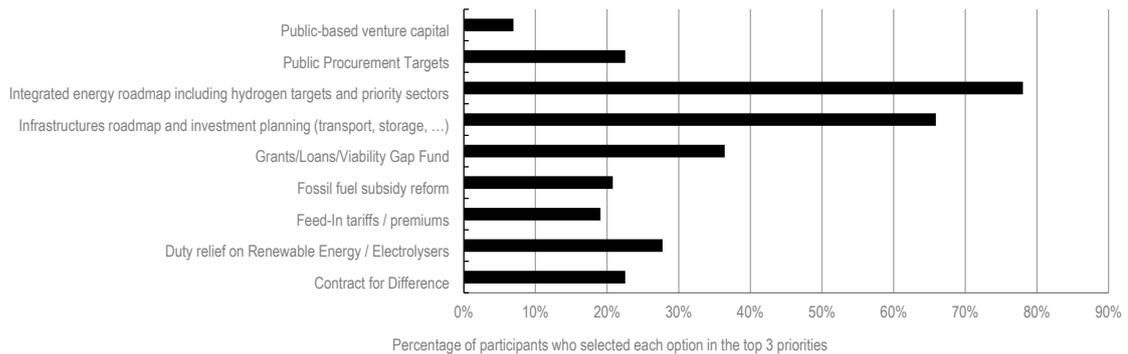
- Business cases and success cases to identify the success factors of various projects across the world. An illustrative green steel business case enabled to highlight the impact of developing an integrated green hydrogen / green steel based projects along the value chain in terms of CAPEX, OPEX and possible enabling measures to reinforce the competitiveness versus conventional production routes.
- A country self-assessment exercise<sup>1</sup>, consisting in giving a grade to 27 statements to make a self-assessment of the country potential, the key stakeholders and the main attention points across the value chain. The results enable to identify the Upstream, Midstream and Downstream opportunities, as well as the possibilities to develop domestic or export usages.

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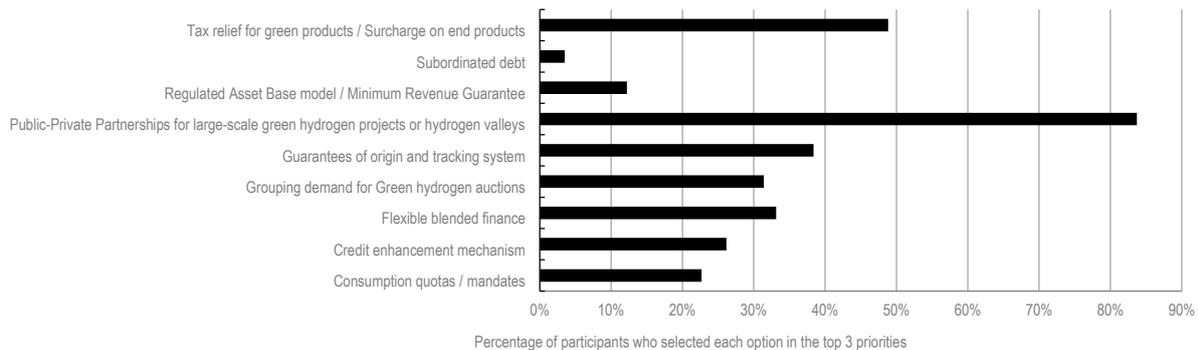
<sup>1</sup> The beta-version of the questionnaire is accessible on <https://forms.office.com/r/skPs857UAW> and requires less than 15 min to complete.

As the number of respondents grow, it will as well enable to compare one’s self-assessment with other respondents from the same country, as well as to compare different countries.

- A checklist to help countries build an enabling environment ahead of developing their roadmaps. Forty-five questions along the value chain support policymakers in the process of identifying the main barriers to investment in parallel of defining national hydrogen strategy and policies.
- A matrix of various market enabling and financing solutions that could support the deployment of green hydrogen. During the meeting, a poll enabled participants to select their recommendations for policy makers’ priorities on de-risking and financing solutions at:
  - Market creation stage



- Market growth stage



- The results above highlights the expectations to have a robust, integrated roadmap at an early stage, but that there is no one-size-fits all solution to create a green hydrogen market. As market grows, creating large-scale projects may still require support from the public sector, either through direct participation in projects, and/or to boost competitiveness of green hydrogen and its derivatives via various measures.

## Panel and Open Discussion

*Dialogue with participants were structured around the following questions for the Panel and Open Discussion:*

Which issues are most critical for governments of emerging economies to create an enabling environment to develop green hydrogen projects?

What are the key challenges and barriers for project developers to implement large-scale projects in emerging economies?

How can international co-operation help speeding up and scaling up green hydrogen projects in emerging economies?

What are the key measures identified and/or implemented by policy makers that can help trigger investment decisions?

- **There is no silver bullet to reach net zero, thus a systemic approach is crucial.** Yet, green hydrogen will have a role to play in various sectors: it is identified as one solution among other technologies such as energy and material efficiency, electrification, or Carbon Capture and Storage. Solutions can be complementary, as green hydrogen is an enabler for the integration of high shares of variable renewables, and can benefit from the surplus of electricity production. Green hydrogen is not only an enabler to decarbonise current usages (domestically or for exports), but also offers socio-economic benefits, such as energy security or job creation (supported by skill development), thus contributing to a just transition. Specific vulnerabilities like water stress must also be considered in this holistic approach.
- **Understanding the timeframe of the energy transition is key.** Financing R&D in the early stages is key to accelerate the market uptake, and some technical issues around storage, infrastructure, or hydrogen handling are not totally harnessed yet. Rapid scale-up and major investments must occur in next decade to be consistent with the targets of the Paris Agreement, focussing on the short term barriers to investment decisions. For instance, identifying the offtakers for the first projects, possibly ready to pay for a market premium, will enable to create early demand. For emerging economies, it is also paramount to analyse if they can find local users to create market (e.g., the current industrial users of H<sub>2</sub> such as refineries and fertilisers producers, busses and trucks, isolated grids, natural gas blending), or if they have access to infrastructures to export their first kilo/mega-tonnes of hydrogen production.
- **Defining long-term projects pipelines, implementing key regulations and launching de-risking instruments are priorities to create an enabling environment.** Direct grants and CAPEX funding may not be the most suitable solutions to address early barriers such as offtake risks. Indirect support, such as guaranteeing the availability or the fast-track construction of infrastructures can bring in project developers. Similarly, a one-stop-shop for all permitting processes can shorten project development time.
- **Several governments are designing action plans** covering legal and regulatory enablers, market instruments, support for infrastructures, technological development, and international trade agreements. International dialogue to compare and analyse the impact and progress of these policies will help to converge on best practices.
- **International organisations can support the development of a global market by defining green hydrogen fuel standards, certification schemes and trade policies to ensure sustainability of the traded goods.** The global market will require green hydrogen fuel standards, certification schemes and trade policies to ensure sustainability of the traded goods. H<sub>2</sub> trade will also encompass many derivatives, such as green ammonia or e-fuels,

and eventually industrial products such as green steel will need to be defined to encourage the development of hydrogen-based products.

- **Early business cases exist for green hydrogen, although they may need tailored support to mitigate the risks.** In zones with large low cost renewable production, prices under USD 2/kg H<sub>2</sub> can be achieved, which is below the natural gas prices in the context of the current commodities crisis. Small-scale projects or niche markets, such as island grids, can already provide competitiveness versus current solutions, for instance diesel generators.
- **The size of investment for large-scale projects will require diversifying the sources of financing and sharing the risks among actors.** Both the international and the local financial sector will need to engage and understand the green H<sub>2</sub> projects to reach the announced 2030 and 2050 targets. Complexities around financing will require developing specific solutions, notably through public-private partnerships and blended finance.
- **Hydrogen valleys and vertical integration along the value chain will provide strong opportunities to scale up the market and increase the share of added value in emerging economies.** Clusters and hubs models are being developed in various geographies and lessons learnt could benefit to countries engaging in green hydrogen development.

#### Concluding remarks and next steps

- The study aims to understand the opportunities at the local level and the need for developing solutions that take into account national circumstances and priorities. These will need to cover the entire value chain and address the social and economic benefits and impacts, beyond climate and environmental benefits.
- Country strategies, technology studies and learning curve analysis hint that significant cost reductions can be achieved from economies of scale in the coming years, although creating a robust market will require bespoke policies and innovative financing solutions. Regulatory uncertainty must be overcome to create a favourable investment environment.
- Stakeholders must strengthen coordination, create industry alliances, develop international partnerships, and bilateral agreements to create markets. Definitions, standards, certification, tracking schemes will be key for harmonisation across different countries, to ensure sustainability and to reach the scales of global production and trade.
- The digital study ***Green Hydrogen opportunities for emerging economies*** will be released on the [CEFIM webpage](#) in Summer 2022. It can be used as a starting point for CEFIM partner countries interested in developing a hydrogen economy, for instance as part of a [Clean Energy Finance Roadmap](#) or the implementation of the [Industry's net-zero Transition Framework](#).