T&D Europe paper on Hydrogen: Facts about Smart Sector Integration

Executive summary

T&D Europe welcomes the European common efforts to develop a new role for hydrogen in the decarbonisation of the energy system, embodied in the REPowerEU plan on a joint European action to fast forward the green transition. To achieve the REPowerEU objectives, T&D Europe calls for immediate and significant investments in the electricity grids, including an analysis and planning for such investment needs.

The European Commission's objective to ensure a climate-neutral Union by 2050 will require appropriate regulatory, market and investment decisions. This means taking a holistic view on energy infrastructure development, to step up the EU's efforts to ramp up hydrogen production and find the most effective place for hydrogen in the electricity network.

To achieve this and enable a rapid clean energy transition, T&D Europe is presenting recommendations on the role of hydrogen based on facts about Smart Sector Integration (SSI). In short, Smart Sector Integration is a smarter, more integrated and more optimised energy system, in which all sectors can fully contribute to decarbonisation, including those where progress has been slow to date (e.g. transport, industry, buildings).

Moreover, it will explore how the electricity sector and in particular the transmission and distribution infrastructure can accelerate the deployment of clean energy production to achieve the EU's climate ambitions.

Direct electrification as priority path for the most energy efficient solution

In keeping with the "Energy Efficiency First" principle, electrification of end-user demand is the most important path through which SSI contributes to climate neutrality[1].

As part of the REPowerEU plan, the Commission has calculated[2] that an additional 500 TWh of renewable electricity per year, which is about half the level of current EU renewable electricity generation including hydropower, will be needed to produce the 10 million tons target for hydrogen within the EU by 2030. This need for increased electricity is challenging but not impossible.

[1] European Commission (2020), *Contribution of the Electricity Sector to Smart Sector Integration, Fourth report of the European Commission expert group on electricity interconnection targets*, p.15

[2] European Commission (2022), *Staff Working Document: Investment needs, hydrogen accelerator and bio-methane plan*, p.28

Direct electrification offers opportunities to avoid conversion losses and reach a very high energy-system efficiency at a low cost, where this is **technologically feasible and cost-effective** with mature areas such as wind and solar, as well as heat pumps and electric vehicles. For sectors that are difficult to electrify, such as high-temperature processes, other climate-neutral options should be assessed to achieve decarbonisation of the energy system.

Scaling up electricity infrastructures and smart grids as the hydrogen backbone

The transmission and distribution (T&D) infrastructure is vital for both direct electrification and indirect electrification with hydrogen electrolysis, a key enabler to reduce reliance on fossil gas. To ensure the electricity T&D grids can absorb an increased shared of hydrogen deployment, **structural investments** should take place not just in renewable energy generation and electrification in key sectors such as heating and transport, but also in **future-proofing the grids.**

Future-proofing the grids means preparing the grids to the upcoming needs of the clean energy transition, resulting in new tasks and challenges.

This future preparedness involves an ongoing discussion between network operators, users and technology providers on what investments are needed today to allow the grids to become as future-proof as possible.

Scaling up technologies and stepping up RDI efforts to optimise the use of existing electricity infrastructure and enhance operations across sectors and technologies are challenges that can be approached with confidence.

Europe has probably the best and most intricate electricity system in the world. At the same time, Europe is also home to a strong clean energy ecosystem that is capable to deliver on Europe's needs. For transmission and distribution of electricity, Europe is home to a world-leading grid technology sector, providing conventional, digital and innovative solutions for a future-proof electricity network that is more and more decentralised and more and more digital. The strength of the sector lies in the combination of large, multinational corporations and a large variety of specialised SMEs. Together they form a strong industrial base in Europe.

By 2050 the EU's electricity network will support and connect sustainable cities and communities, where prosumers can manage their energy production and consumption with microgrids, where transportation can be powered by electricity and where an increasing share of decentralised renewable energy production can be easily integrated. This requires a **futureproof, smart, digital network** with easy and **cybersecure data interoperability** and with the necessary interconnections to manage the seasonal fluctuations in renewable generation.

This strengthened T&D industry can benefit from incentives to the **flexible use of grids** to avoid costly infrastructure expansion due to the deployment of electrolysers. To increase cost-efficiency, electrolysers in future energy systems need to be dispatchable and use renewable electricity to reduce infrastructure needs.

For hydrogen to play a key role in decarbonisation it must be green

Under the Green Deal is the key objective for the EU to achieve carbon neutrality by 2050. To do so, and as reinforced in the updated REPowerEU Communication, reducing Europe's energy dependencies, including fossil gas, will require great investments in green hydrogen.

Hydrogen electrolysis from water using renewable sources is likely to play the most significant role in the long term[3]. Hydrogen has the potential to channel large amounts of renewable energy to sectors for which electrification is otherwise difficult, such as industry and transport.

These sectors can be decarbonised with hydrogen from renewable power, replacing hydrogen produced from fossil fuels, as well as fossil fuels and feedstock in several processes. The use of **clean hydrogen generation** is vital to ensure a long-term energy transition, and the use of renewable electricity for hydrogen production **should not increase emissions** in the overall energy system. Moreover, hydrogen can play a key role in maintaining a high level of **security of supply** with the addition of hydrogen storage facilities.

Boosting green hydrogen use should be embedded within Smart Sector Integration

Decarbonisation of large portions of energy uses in sectors such as transport, buildings and industry, should take into account the integration of those different sectors. This means using a comprehensive **Smart Sector Integration strategy** to ensure optimal synergies are enabled across sectors, taking a holistic view of supply, demand, the optimal link between energy carriers and end-use sectors, while **considering energy efficiency, security of supply, and the policy framework,** among others.

The need and impact of green energy imports will have to be carefully assessed

The EU will have to continue import energy to achieve Europe's objective of climate-neutrality. This means that depending on the demand and supply, electricity imports from neighboring countries and gases or liquids sourced from global markets will have an impact on the European vs the non-European production, which the EU should consider in its assessment on availability of climate-neutral energy supply.

[3] European Commission (2020), *Contribution of the Electricity Sector to Smart Sector Integration, Fourth report of the European Commission expert group on electricity interconnection targets*, p.23

Hydrogen projects with the lower risk of stranded costs should be prioritised

Projects which have the most optimal cost/benefit balance for climate-neutral scenarios, including hosting capacity for hydrogen generation and improving the smartness of the network, should be prioritised for investment. This could translate with the priority replacement of grey hydrogen in heavy industrial processes (e.g. concrete, metallurgy), followed with hydrogen transportation as the second priority in the energy transition, taking into account the maturity of electrical solutions.

Stranded costs for high-risk projects should be avoided to ensure swift engagement with the most viable projects, and to provide network operators certainty that investments can be recovered via the network tariff and that the remuneration will remain at a predictable and market-based level.

To conclude, this means adapting the European and national frameworks for State Aid and energy taxation to introduce economic signals, in order to mitigate the risks that private investors cannot effectively manage.