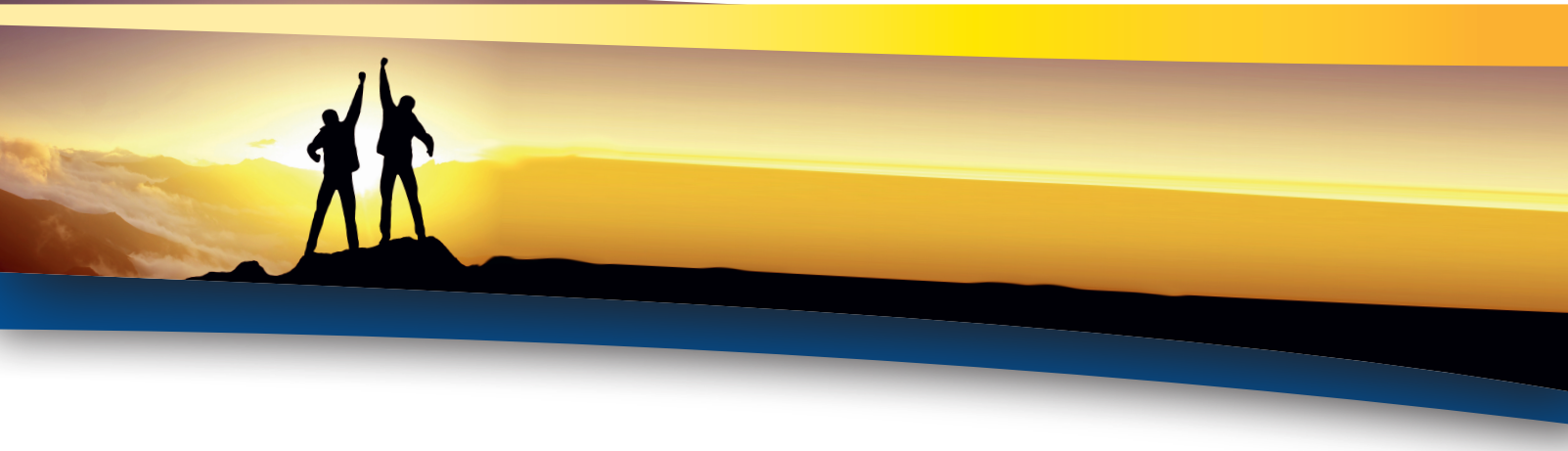


Is Clean Energy Production Granted?

The role of solar photovoltaics, wind and hydrogen in the shift to sustainable energy

Hydrogen must be made

For hydrogen[1] to be the new oil it would have to flow from wells and fields. Yet the natural occurrence of hydrogen on Earth is a research curiosity. For all practical purposes, hydrogen is instead best described as a semi-finished good in the energy supply chain. It must be produced from feedstock and primary energy, then stored, transported and finally converted to provide useful services. Through this conversion hydrogen can be an input for industrial chemical processes and for the synthesis of fuels for aviation and shipping. It can be burnt to provide high-temperature heat. And it can be converted to electricity through gas turbines, combustion engines or fuel cells to power motors and electrical appliances.

[1] In this document, we follow the convention and use "hydrogen" to refer to H_2

Hydrogen will bring value in combination with PV and wind

Hydrogen is only a carrier for energy and not a primary source of energy. This distinction may sound technical. However, it matters on at least three levels.

From a climate and environmental perspective

Hydrogen can only ever be as clean as what is used to produce it. The current hydrogen supply chain relies for 95% on fossil fuels and is a vast emitter of CO_2. Any support to hydrogen leading to an expansion of this current supply chain would therefore be counterproductive. On the other hand, synthetic fuels will be necessary after 2030 to reach net-zero emissions. Hydrogen production powered by PV and wind is the most likely route for the clean synthesis of such fuels.

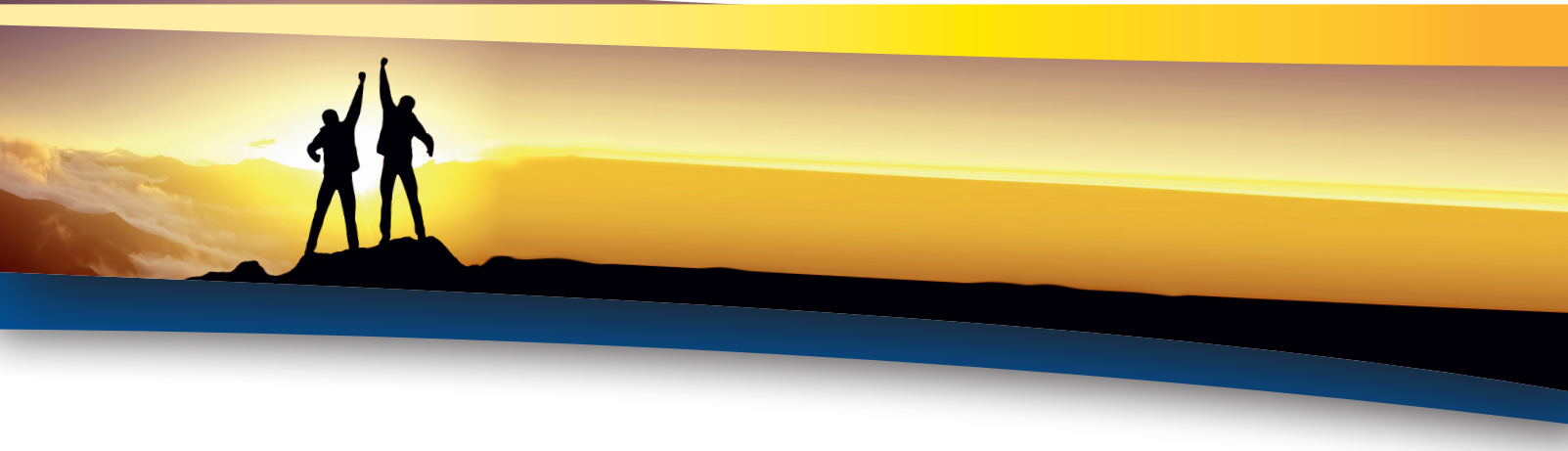
From an energy security perspective

Energy distribution through hydrogen is only as secure as the primary energy source used to make hydrogen. Hydrogen production from European PV and wind electricity would increase Europe's security of supply. Hydrogen imports or hydrogen production from imported primary energy sources would not.

From an economic perspective

Hydrogen is in competition with other carriers for the distribution and storage of energy such as electricity networks, batteries and pumped hydro. Europe already has great assets in alternative carriers to hydrogen. It matters to European welfare that financial resources are invested in the most cost-effective solution, following the EU's long-held principle of technology neutrality.

May 2020



Installing and manufacturing PV and wind is strategic for Europe

On the same three levels, Europe has a strategic incentive to support both the installation and manufacture of PV and wind systems.

From a climate and environmental perspective

To shift to a carbon-neutral, 100% renewable energy system, Europe needs to electrify it further and to replace fossil-fuel generation. Two technologies have the potential to contribute at scale to this shift: PV and wind.

Integration of PV with infrastructure or agriculture provide additional benefits by e.g., reducing land use, reducing cooling demand, reducing water evaporation and protecting crops.

Thanks to Europe's know-how, regulations and increasingly clean power mix, manufacturing PV and wind components in Europe is a safe way to guarantee that they provide the best environmental value over their lifecycle.

From an energy security perspective

PV and wind produce electricity locally from locally available natural resources. International disputes and supply-chain disruptions have threatened Europe's supply in oil and gas (to mention only energy). Never have they obscured the sky or stopped the wind. PV and wind are therefore assets in terms of energy security no matter where the components are manufactured.

However, with PV and wind set to produce at least 75% of Europe's electricity by 2050, is it wise to become fully reliant on foreign supplies and technology? In the same way as a civil nuclear technology base was developed for strategic reasons, so does it make strategic sense to nurture a domestic PV and wind technology base. This is compatible with a competitive, open environment: Europe rightly supports its technology base in microelectronics for strategic reasons, while being extremely open to international trade and competition in that sector.

From an economic perspective

Large-scale PV is already the cheapest source of electricity. An energy system based on PV and wind not only promises to be the cheapest way to decarbonisation, but it would also result in lower costs than the current system[2].

The transition cannot be taken for granted

To reach the overarching objectives of climate and environmental protection, energy security and economic prosperity, PV, wind and hydrogen all deserve an adequate support. Indeed, displacing incumbents takes more than cost-competitiveness in a system that is by and large designed for and around these incumbents. In addition, the scale of the transition is historic. A cost-optimal, climate-neutral energy system in Europe would rely on about 9 TW of installed PV capacity by 2050, 70 times the current level. This multiplication in only 30 years is achievable and challenging. It will require substantial innovation in terms of PV technologies, products and processes.

Helping hydrogen to help

Since the value hydrogen can deliver for Europe is conditioned on PV and wind delivering the bulk of energy production, support for the former should not come at the expense of support for the latter. This support should only go to applications of hydrogen that are aligned from the start with climate, environmental, energy security and economic objectives. Since the Commission's stated rationale for supporting hydrogen is to support the integration of renewables, a concrete measure can be to condition any support to hydrogen technology deployment to a verifiable impact from the start of operations on the integration of PV and wind.

Making PV and wind strategic supply chains

Conversely, no matter how energy will be stored and distributed, the proven climate, environmental, energy security and economic value of PV and wind make them the central technologies to the future European and global energy system. Together they are forecast to provide 80% of the global energy needs by 2050. Can Europe accept to be only a user and buyer of such strategic technologies? We believe it is high time the EU recognised them as strategic supply chains in their own right and gave them the prominence and support that go with it.

[2] SolarPower Europe and LUT University (2020): 100% Renewable Europe: How To Make Europe's Energy System Climate-Neutral Before 2050.

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