

Thought leadership by the World Economic Forum's Electricity Industry Strategy Officers in collaboration with Accenture and Aurora Energy Research



# Accelerating Clean Industrial Electrification in the EU

BRIEFING PAPER  
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## Introduction

The future of energy will be based on an integrated energy system, highly electric and designed to achieve net zero. The system will interconnect networks of electricity and gas (including hydrogen, syngas and biogas), heating and cooling, and also all types of data (wired and wireless communication). Energy, data and financial markets will be designed around this net-zero integrated energy system. The system will be underpinned by increasing digitalization and multistakeholder collaboration. Clean electrification will be a key characteristic of this future system.

The purpose of this high-level paper is to highlight the urgency required by policy-makers and industry as the European Union pursues clean electrification.

## Industrial electrification

Industry accounts for 25% of the EU's energy consumption.<sup>1</sup> Most of that energy is currently supplied by fossil fuels. However, 50% of this demand is in the form of heat at low temperature (under 200°C), for which there are electrification options available.

Depending on energy efficiency gains in the coming decades, industrial power demand in the EU could increase by at least 25% by 2050 due to industrial electrification alone.<sup>2</sup> This figure could be potentially much higher considering additional demand from hydrogen electrolyzers. The challenge is how to produce enough clean electricity to meet this demand.

## A call for action

On 14 July 2021, the European Commission (EC) adopted a package of proposals (Fit for 55) to make the EU's climate, energy, land use, transport and taxation policies fit for reducing net greenhouse gas emissions by at least 55% by 2030, compared to 1990 levels.

Just days earlier, a coalition of CEOs from the chemical, cement, transport and energy sectors (in collaboration with Members of the European Parliament) submitted a request<sup>3</sup> to the EC to support industrial electrification by accelerating the build-out of renewables and through the development and modernization of grid infrastructure.

The request inspired this follow-up piece of thought leadership, which focuses on how to accelerate industrial electrification through grids, renewables and demand in the EU context.

## What is needed to enable clean electrification?

### No grids, no party

The electrification of industrial demand will require a substantial and timely expansion and reinforcement of power grids at all voltage levels. Priority actions to support this expansion and reinforcement include:

- 1. Optimize grid infrastructure build-out through integrated forward planning in supply and demand**  
Careful forward-looking planning based on expectation of demand and alignment with climate commitments is advised. Waiting for market shortages to indicate a need to build out infrastructure will already be too late, given the long build times. Taking a holistic approach to the connection of renewables could reduce individual, point to point connections, optimize the overall infrastructure increase and save consumers money.
- 2. Foster increasing digitalization of grid and network assets**  
Transmission grids and distribution networks are playing a greater and more pivotal role in enabling the shift to a more flexible climate-neutral energy system. The focus on increased digitalization of distribution networks, combined with the ongoing digitalization of transmission grids, will be essential to accommodate this transformation. Cyber resilience considerations must remain front and centre throughout.

1. "EU's energy consumption" – [https://ec.europa.eu/commission/presscorner/detail/en/fs\\_21\\_3675](https://ec.europa.eu/commission/presscorner/detail/en/fs_21_3675)  
2. Aurora Energy Research in-house estimate based on net-zero scenarios  
3. [https://www.politico.eu/wp-content/uploads/2021/07/08/Joint-RES-industry-MEP\\_-2021.pdf](https://www.politico.eu/wp-content/uploads/2021/07/08/Joint-RES-industry-MEP_-2021.pdf)

3. **Increase use of transmission-line capacity and avoid localized, as well as regional, constraints**  
Plan and promulgate actions to realize efficient, optimized transmission grids that minimize constraints while adhering to existing [directives and regulations](#). Increase the level of interconnection of each member state's installed electricity production capacity to [at least 15% by 2030](#), subject to [system value analysis](#).
4. **Policy and regulatory enablers can help reduce time taken to build grid infrastructure**  
Policy-makers, regulators and businesses can collaborate to make available a full suite of options for achieving efficient approvals. Options could include route optimization engines, comprehensive stakeholder engagement plans and even compulsory land acquisition solutions to build the infrastructure needed to accelerate the path to climate neutrality. Actions to improve social acceptability could alleviate delays with achieving necessary permits.
5. **Encourage increased interaction and cooperation between TSOs and distribution system operators (DSOs)**  
This can enable enhanced management of variability by optimizing investments in grid infrastructure to manage growth in renewables while supporting security and consumer affordability. Both ENTSO-E and the new EU DSO entity will play pivotal roles here.
6. **Where viable, deploy flexibility solutions or implement non-wires alternatives**  
Projects using non-traditional transmission and distribution solutions include storage, demand optimization and grid software and controls. These can be used to defer or offset the need for new infrastructure builds and to enable the matching of clean generation patterns with industrial consumption needs.

### The renewables revolution

The EU's [proposed Renewable Energy Directive revision](#) aims for an increased target to source 40% of energy demand from renewables by 2030. In achieving this, it is estimated that 55% of electricity would need to be sourced from variable renewable sources (onshore wind, offshore wind and solar). This would equate to expanding the current renewables capacity installed by a factor of approximately 2.5x; i.e., from about 300-350GW currently to 800-900GW.

Access to sufficient renewable power (RES) for the European industry will thereby be important to enable existing electricity needs of the industry to become 100% green, and to electrify traditional industrial processes.

The priorities to ensure that existing RES targets for 2030 to 2050 in Europe can be met, include:

1. **Revamp permitting processes to accelerate RES deployment.** These processes should include renewable energy zones where land is identified for the construction of new assets, prioritizing already converted lands. Target completion dates, repowering and lifetime extension requests should also be prioritized in these zones. In general, assessment of socio-economic and environmental impacts could be streamlined and permitting eased.

2. **Where caps exist on the build-out of RES, they should be increased (or removed, where feasible) to ensure the country can meet the 2030 and 2050 RES targets.** The caps should consider system-value opportunities (economic, social, environmental and technical) from wind and solar build-out, combined with the need for more renewables as demand from commercial, domestic and industrial users becomes electrified.
3. **Ensure a swift build-out of RES with a constructive coexistence between support schemes and opportunities outside support schemes.** Ensure that support schemes do not cannibalize market-driven build-out and that their design reflects the low marginal costs of renewables to avoid high levies and charges for end consumers.

### The demand evolution

In addition to the complex and fundamental technical challenges of adapting industrial processes (substituting direct fuel combustion or process use with an electricity source), the industry faces the challenge of gaining commercial access to sufficient green electricity for existing and increasing future power needs.

Due to remaining high shares of carbon-emitting electric power in the national energy grids in the short to mid-term, enabling broader and deeper industrial participation in green power markets will be key – for example, via power-purchase agreements (PPAs), or on-site renewable assets.

Priorities include:

1. **A clearer understanding of the current electricity market design is required**  
Industry stakeholders look for the market to provide stable power and predictable prices to avoid long periods of market tightness with peaking prices. An assessment of the benefits and drawbacks of the current wholesale electricity market design to be delivered in April 2022 by the EU Agency for the Cooperation of Energy Regulator (ACER) will be appreciated.
2. **Markets need to evolve to adequately valorize demand-side assets in a similar way to generation**  
Demand and flexibility actions are not currently effectively valued or priced, particularly if compared with supply alternatives.<sup>4</sup> Policy, regulation and regulated utilities could evolve to consider demand actions and assets equal to supply assets.
3. **Alternatives could be considered to replace unfavourably high taxes and levies on green power** in some countries, also for off-grid/on-site solutions.
4. **A clear definition and EU-wide system on acceptable certification of green power for industrial electrification is needed** to reduce uncertainty for industry stakeholders.<sup>5</sup>
5. High requirements for off-takers of green PPAs (most importantly creditworthiness) are shielding access to PPAs for a large part of the industry. **Governments can support by enabling small industrial companies to access industrial PPAs through credit guarantees or off-taker pooling mechanisms** (e.g., [as implemented in Norway](#)).

4. <http://www.challenging-ideas.com/wp-content/uploads/2021/02/FINAL-DOC-HR-1.pdf>

5. This should be in conjunction with similar efforts by other sectors, where synergistic.

6. **Enable further acceleration of virtual cross-border PPAs** subject to clarification on requirements of regional correlation, ensuring no double charging of taxes and levies in the origin and the destination country.
7. **Clarification is needed on regional and time correlation between production and consumption**  
Does the power source need to be in regional proximity of the location of power consumption (affecting cross-border PPAs)? How much time correlation is acceptable between the production of power and consumption? Is more precise documentation (15 minutes granularity) required in Guarantees of Origin (GO)? For example, should a three-year-old GO from a hydro asset in the Nordics continue to be valid as a green power certificate for a German corporate?

**Additionality should be optimized to protect industry from unnecessary costs**

Additionality is the degree to which industry is procuring green power from an additional/new source(s) in contrast to sourcing existing green power from the grid.

## Conclusion

Urgent action is required globally to meet net-zero commitments from governments. The EU is moving towards a climate-neutral integrated energy system – a system based on a backbone of electrification – which can be leveraged by both light and heavy industries. To achieve this, a holistic approach to policy, financing, technology and even partnerships will be key.

Seamless integration will be essential to ensure that generation, demand and the enabling grids and networks infrastructure required to facilitate widespread clean electrification are in place and are driving broader system value.



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