

## Grid constraints and industrial decarbonisation

Preliminary findings from IDRIC evidence gathering, October-November 2023

### Main take aways

- In addition to electricity generation, grid connection delays present a significant risk for demand side decarbonisation measures, including electrification, hydrogen, CCUS, energy efficiency, onsite renewable generation and electricity export.
- Many companies reported they had to wait several years for new grid connections, with some connection date offers extending well into the 2030s. Such delays are set to increase costs, as well as risk critical investment and lost opportunities to tackle industrial emissions.
- Grid delays may also have an impact on the decarbonisation of businesses and sectors downstream in the supply chain, due to delays to the supply of low carbon and sustainable fuels.

### Grid constraints and Net Zero

Access to adequate electricity grid infrastructure currently represents a major constraint on UK Net Zero efforts. While the prevailing discussion to date has focused on delays to connecting large scale renewable projects, it is crucial to recognise the impact of grid connection issues on the demand side, where new or upgraded grid connections are required to enable industrial users to deploy a range of technologies critical for reducing fossil fuel use, and therefore greenhouse gas emissions, in industrial and manufacturing sectors.

IDRIC is currently gathering evidence on experiences of grid constraints among industrial users, and the implications for their decarbonisation plans. This briefing presents preliminary findings from the first 26 responses to an ongoing survey of industrial energy users. IDRIC will publish a more detailed analysis later this year.

### Who have we heard from?

- We have received evidence from companies across the UK, ranging in size from less than 100 to up to 8,000 employees. This included energy companies, general manufacturing, and foundation industry sectors including cement, ceramics, chemicals, food and drink, paper and pulp, and metals, among others.
- Among respondents were representatives from large projects, critical to enabling the decarbonisation of wider industrial clusters, as well as a diverse range of dispersed industrial sites.

### Which decarbonisation pathways require new or upgraded grid connections?

- **Electrification:** Many respondents highlighted their plans to directly electrify previously fossil fuel-driven processes, requiring extensive upgrades to existing grid connections due to increased electricity requirements. In one reported case, an increase of over four times existing capacity is required to enable electrification of a large energy intensive site.
- **Onsite electricity generation:** Many respondents are seeking to generate electricity on site to supplement or replace grid electricity supply. The availability of adequate connection arrangements to export this electricity off site can be a critical element of overall viability for such projects, both to export to other sites within the same organisation or to sell back to the grid.
- **Hydrogen and CCUS:** Along with electrification, the requirement for new and/or upgraded grid connections for hydrogen generation and storage, as well as carbon capture and storage was widely reported. This includes electricity requirements for electrolysis as well as for air separator units, compressors, pumps and heaters required as part of the process.

- **Energy efficiency:** Responses included cases in which industrial energy efficiency measures also require new or upgraded connections, as the deployment of new equipment to reduce overall energy demand can increase electricity use relative to other fuel sources.
- In many cases, companies are planning a combination of multiple decarbonisation routes and technologies, often with interdependencies and careful sequencing of deployment.
- We have received evidence industries looking to secure new and upgraded, transmission and distribution connections, or a combination, with required capacities ranging from 30 kVA to over 250 MVA. Reported connection or upgrade costs ranged from around £100k to 75m, with the many ranging in the several millions of pounds.

### What issues do companies face?

- Delays for connections and upgrades range from 2 to 12 years, the latest quoted date being 2037 in response to a requested date of 2025. Reasons given to industry by network providers for delays have included:
  - The need for wider distribution or transmission upgrades, including long lead in times for critical infrastructure elements such as sub-stations and super-grid transformers.
  - Lengthy planning and public consultation timelines for necessary works.
  - Large number of applications in the queue and the lack of mechanisms for prioritisation.
  - Suggestions from industry stakeholders that resource constraints among grid developers are limiting their capacity manage applications.
- Industry respondents raised concerns that there is insufficient regional strategic planning for grid development.
- While some industry respondents reported very positive experiences of engagement with grid developers, others experienced a lack of communication, complex and opaque processes and documentation for companies to navigate.

### How do grid constraints affect decarbonisation plans?

- There is clear evidence that grid connections are delaying or otherwise impacting businesses decarbonisation plans, risking critical investment and abandonment of plans. In some cases the expectation of distant connection dates from network operators has introduced delays to plans, or prompted businesses to explore alternative routes.
- For those seeking alternative decarbonisation routes due to connection delays, these are often suboptimal, leading to increasing costs for businesses and significantly reduced emissions saving opportunities.
- Some respondents looking to export excess renewable electricity produced onsite back to the grid or to other sites, but who are forced to curtail generation.
- There is emerging evidence that grid connection delays may have broader impacts on the decarbonisation of other companies within supply chains, as well as the wider economy due to restrictions in the supply of low carbon fuels and CCS services. This includes multiple-year delays to the delivery of critical low carbon hydrogen and CCS projects in the industrial clusters, extending well beyond their 2030 targets, as well as delay to a local authority project looking to produce hydrogen to supply a public vehicle fleet, among others.

### Contribute to the IDRIC evidence gathering:

- If your company's decarbonisation plans have been affected by grid constraints, please take part in our Industry Survey [HERE](#)
- If you're working with industry and have general insights into grid connections you can share, please contact [policy@idric.org](mailto:policy@idric.org)

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