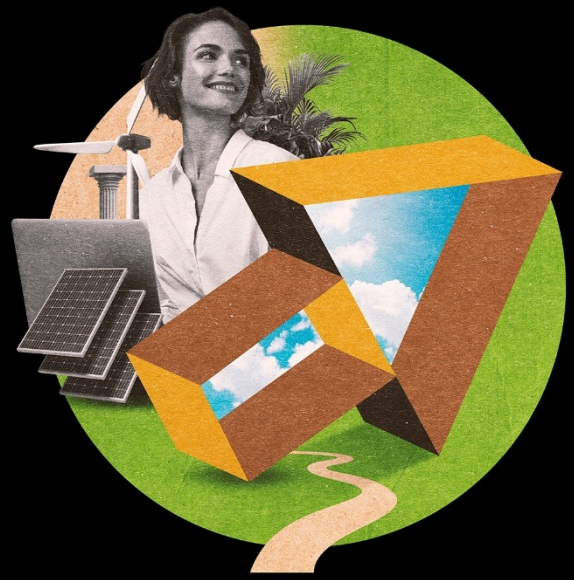
Deloitte.

Turbocharging the UK's Economy in Pursuit of Net Zero

An exclusive, interactive day of learning and debate, where the UK's leaders in business, the public sector, academia and politics will collaborate to drive UK economic growth through sustainability and climate action.

Breakout group conversations are focused on tangible growth opportunities for the UK. This document provides a briefing on the growth opportunity you will be exploring in the breakout out group you have been assigned to during the 13:30 to 15:15 slot.



Accelerate the decarbonisation of industrial processes

- In the UK, **heat** is responsible for approximately **three-quarters of industrial energy consumption**, with low and medium-temperature processes accounting for **70 per cent of this (<400oC)** heat demand, Natural gas is the primary source of heat.
- The UK government has set a target for industry to switch **50 TWh of fossil fuel to low carbon sources by 2035** to decarbonise process heat.
- **The two main options are electrification and hydrogen**, which have the potential to reduce annual industrial emissions by **9.8 Mt CO_{2e} per annum by 2030.**
- This presents a significant economic opportunity. Estimates suggest that net zero industries, of which electrification and hydrogen supply chains and services are a significant component, **could be worth £1 trillion by 2030.**
- The hydrogen supply chain alone – from production to transport and end use – could support over **12,000 jobs and unlock £9 billion in private investment by 2030.**
- **By 2050**, jobs could increase to **100,000 and the sector could contribute £13 billion Gross Value (GVA).**
- **The industrial sector is a key future demand source for hydrogen** and therefore has an opportunity to benefit from and stimulate its growth. Collaboration and integration along the supply chain will be key.
- Moreover, by 2035, industrial **electrification could increase annual electricity demand by between 15 TWh and 44 TWh.** This encourages investment in new renewable generation capacity and grid infrastructure.
- In addition, organisations will increasingly generate their own energy which is predicted to provide **14 GW of flexibility to the grid by 2050.**
- This will reduce the amount of infrastructure needed to meet peak demand – measures which could help reduce system costs by **£10 billion a year by 2050.**
- Beyond its economic and environmental benefits, fuel switching is key to resilience by reducing dependence on an increasingly volatile fossil fuels market.

In your breakout group you will...

- **Discuss the size of this opportunity** for the UK with a cross-industry group of leaders
- **Consider the barriers** that are currently getting in the way of the UK realising this opportunity
- **Explore the levers that** breakout group participants could pull to overcome these barriers
- **Identify opportunities** to work together with other breakout group participants to accelerate progress

Sources: IEA; Enabling Industrial Electrification, DESNZ; Ambienta Environmental Investments; Hydrogen Champion Report, Industrial decarbonisation strategy, DESNZ; MCS Foundation; Smart Systems and Flexibility Plan 2021, DESNZ

Decarbonising industrial process heat is key to achieving net zero by 2050.

To achieve this, new electricity supply chain need to be built and a hydrogen economy needs to be established. In return, these will boost the country's energy resilience by reducing reliance on imported – mainly fossil – fuels.

However, realising this requires overcoming barriers in technology, cost, supply infrastructure and policy.

Barriers to the decarbonisation of industrial processes

Technology

Adopting industrial decarbonisation technology can be challenging:

Complexity: Most industrial processes have unique requirements that could necessitate a range of different solutions. Retrofitting can also introduce further challenges such as additional space requirements and the introduction of new equipment in the production process.
Supply chain and skills: There is a limited number of companies with experience in industrial decarbonisation technology. A shortage of skilled people to install, maintain and operate the equipment, as well as the supply chain to support repairs could also deter interest.
Timing: It is challenging to know when the best time is to electrify your operations given the complexities around cost, policy, technology and energy supply. Long industrial equipment lifecycles (25-40 years) adds another layer of complexity as the right decisions need to be made when existing equipment reaches end-of-life.

Cost

Introducing new low-carbon technologies into well-established existing processes is likely to come at a cost. Key barriers are identified below:

Cost of fuel: Electrifying industrial processes could result in a three-fold increase in energy costs due to the price differential between natural gas and electricity. This could discourage electrification, particularly as many companies are competing in a global market where other businesses have access to cheaper energy (for example, in the US). Until a global, liquid hydrogen market is established, the price of hydrogen fuel is expected to be higher than fossil fuel alternatives without substantial government subsidies.
Access to finance: Electrification or hydrogen technology can be more expensive than natural gas alternatives with consequently longer payback periods. The financial services industry may be more hesitant to engage with these types of investments.
Disruption: Installation and integration of new technologies into existing manufacturing processes will be time consuming and create inefficiency through potential plant shutdowns.

Supply

To facilitate industrial decarbonisation, electricity and hydrogen supply would need to expand significantly, which introduces some challenges:

Electricity generation and supply expansion: Building new electricity generation capacity has been stalling due to high inflation and the cost of raw materials. Additional network access for increased electrification can often have long timescales and high costs. There has also been a failure to invest strategically in grid capacity, leading to long lead times to connect generation. Large transmission projects – which will transport electricity over long distances to demand centers – are also inherently slow and challenging, with historical development times of up to 15 years.
Hydrogen lifecycle development is in its infancy. Scaling it to meet industrial demand is likely to be a challenge.
Security of supply: Continuous energy supply is critical for industrial companies as disruptions can cause damage to equipment and loss of revenue. Electricity will increasingly be produced using intermittent and inflexible generation technologies which creates an obstacle for large-scale industrial electrification. Industrial consumers will need assurance that the supply of hydrogen fuel will be uninterrupted.

Policy

A robust policy environment is key to facilitating growth in any new industry. However, there are some key policy barriers preventing industrial decarbonisation:

Ambiguity: Fuel switching policy is technology agnostic. The market for hydrogen is nascent both in terms of production, transport and supply. Ambiguity over the role of hydrogen and clarity over access to networks – particularly outside industrial clusters – means that many operators are reluctant to choose a technology.
Support: The Climate Change Committee (CCC) states that there is not a clear plan to support industrial electrification. Support has been targeted at clusters and scaling hydrogen and CCUS which have clear government initiatives and industry organizations designed to support it.
Low-carbon goods market: Differentiating industrial products produced with low emissions is a promising way to justify increased production costs. However, these markets are nascent and require further policy and regulatory support from government.

In room facilitators:

Sponsor: James A Williams, *UK Lead for Industrial Products & Construction*

SME: Bharath Krishnan, *Director, Consulting, Energy Transition*

SME: Netti Farkas Mills, *Growth, ER&I*

SME: Keith Hagyard, *Consulting*

Insights Lead: Carlota Terraza, *Consulting*

Additional Resources:

Where is the UK on its energy transition?, Deloitte 2023

Hydrogen opportunities for industrial products companies, Deloitte 2023