

ade
demand



Help Industry to Help Net Zero

ADE REPORT

How electrifying dispersed
industrial sites with co-
location can help deliver net
zero electricity to 2030 and
beyond.

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Executive Summary

The why...

This report is in response to the UK policy gap around decarbonisation of energy use for industrial sites located outside of the six Government recognised clusters.¹ With roughly half of industrial emissions coming from outside of these clusters,² we must give equal support to solutions that work to accelerate local industrial and commercial transitions in what are generally called “dispersed” sites. Furthermore, the UK can save 770,000 jobs³ by decarbonising dispersed industrial sites. Therefore, the ADE has focused on electrification as the most viable long-term pathway to decarbonisation with 78% of all industrial energy demand being electrifiable with technologies that are already established, and 99% electrifiable with the addition of technologies currently under development.⁴ Electrification could cut industrial CO2 emissions by 78%.⁵

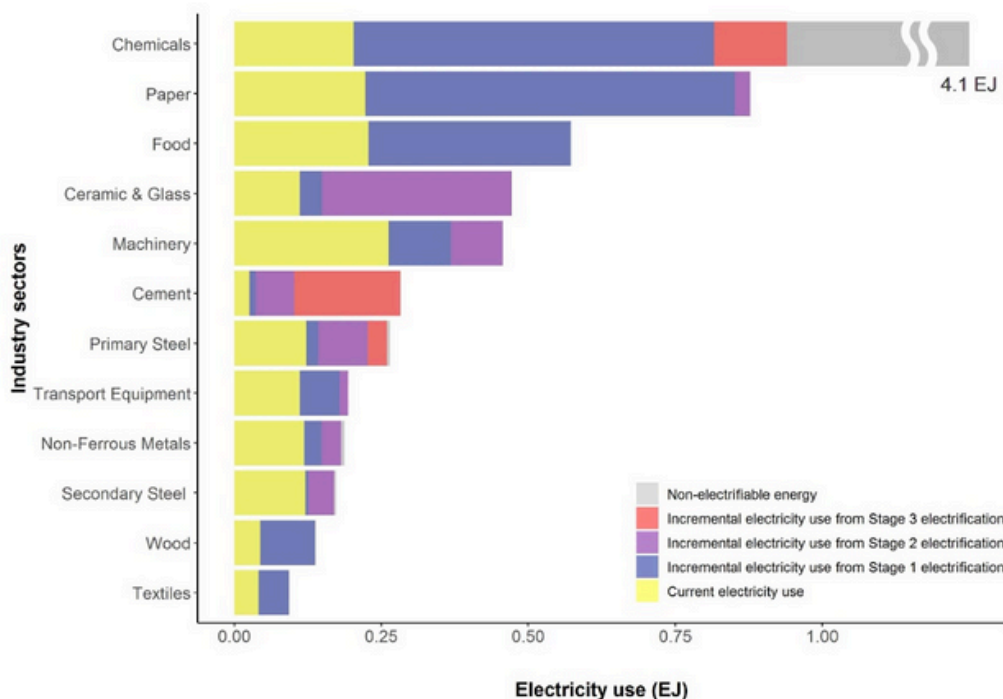


Figure 1: Silvia Madeddu et al 2020 Environ. Res. Lett. 15 124004. (The CO2 reduction potential for the European industry via direct electrification of heat supply (power-to-heat) - IOPscience)

Industrial electrification, within wider, coordinated industrial decarbonisation plans must be a central contributor to meeting our goals for Clean Power 2030, net zero* by 2050 and beyond.

Given the UK is far from achieving electrification at this scale, inside or outside the clusters, the ADE set out to understand why that is and what can be done to enable electrification of industry in dispersed sites. The following report is informed by a series of workshops held with ADE members and other key stakeholders in December 2024 and January 2025, complemented by additional desk research by the ADE policy team.

*Note: In the UK, “net zero” refers to the Government’s commitment to reduce greenhouse gas emissions to a level where they are equal to the emissions removed from the atmosphere. The goal is to limit global warming and mitigate climate change. Achieving net zero means that the UK will no longer be a net emitter of carbon emissions.

What we found...

Up to now, what industry can do to electrify on their own without further support is marginal at best:

1. Electrification is often a non-starter due to the associated energy costs (i.e. the high cost of UK electricity compared to natural gas or even compared to global electricity prices);
2. There is a lack of service providers in the market for (often novel) electric equipment and a lack of skilled labour;
3. While industry can pursue and invest in energy and resource efficiency, significant further investment is only likely to happen alongside decarbonisation; and
4. Configuring a privately owned and operated microgrid (co-locating an energy generator or storage with demand load) may or may not be financially attractive depending on a site's situation.

What we recommend...

From our list of policy recommendations in our “Findings” section, we’ve identified the following as our key asks of Government:

1. Regional Energy Strategic Plans (RESPs), being produced by the National Energy System Operator (NESO) in tandem with their connections team, should identify where co-location / microgrid systems are the optimal solution for dispersed industrial sites (an ideal microgrid would have its own ecosystem of technologies but wouldn't necessarily be self-sustaining, hence the grid connection). From there, policy needs to encourage and support the investment required for their development in these locations.
2. The Department for Energy Security and Net Zero (DESNZ) should put in place an Electrification Business Plan (which would become a core element of the upcoming Industrial Decarbonisation Strategy). This would put electrification (including for dispersed sites) on a par with hydrogen and Carbon Capture, Utilisation and Storage (CCUS).

88% of respondents to DESNZ's call for evidence on electrification stated in 2024 that “private renewable generation” could be an enabler to electrification....but 98% of respondents said the current policy landscape was not sufficient to enable electrification, and respondents were heavily in favour of further intervention to specifically support electrification of industry for the rest of the 2020s and 2030s.⁶

With these recommendations, industrial demand can be harnessed, optimised and deployed to become part of the solution, and not just another problem that needs solving. We need to help dispersed industry help net zero.

Context and Objectives

The genesis of this report began with the new Labour Government coming to power in July 2024. With the advent of new initiatives like National Grid Electricity System Operator (NGESO) becoming public and renamed the National Energy System Operator (NESO), and the commencement of the National Wealth Fund (NWF) and GB Energy, the ADE took this as a cue from Government that now more than ever is the time to commit and get serious about a UK industrial decarbonisation strategy. What might this look like? What have other countries done so far? What does UK industry need to decarbonise? What can UK industry do immediately in the meantime? And what can decarbonised industry contribute to the electricity system of the future?

The idea of “co-location”

To start, the ADE policy team undertook desk research into other jurisdictions and found that most western countries are struggling with these same questions. The consensus, however, is seemingly converging around electrification as the main vehicle for industrial decarbonisation;* but no country has found the “silver bullet” in how to achieve this and indeed countries around the world seem to be confronting the same barriers (see section on barriers below).

And while the concept of co-location of renewable generation and storage or electrolyzers has long been discussed in the UK in relation to avoiding grid congestion, work from the US has more directly applied the concept to industrial decarbonisation.

This idea was elaborated on by Michael Kormos, the former Chief Operating Officer at PJM (the Pennsylvania-New Jersey-Maryland Interconnection in the US) in his report the “[The Co-Located Load Solution](#).”⁷ Kormos focuses on the benefits of co-locating new US data centres at operating nuclear power stations in competitive electricity markets. He argues that by partnering with an existing generator, the demand load avoids the long lead time for grid connection; and equally the generator secures a steady customer, which can be critical for plants needing predictable, long-term revenues to ensure continued operation.

Under a co-location configuration, similar to what we might think of as a power purchase agreement (PPA), a data centre (for example) gets the carbon-free electricity it wants without lengthy delays but must pay for any on-site delivery facilities, and the nuclear plant gets a steady customer (forestalling premature retirement). And with a generator now supplying the demand load next door and not some distant network load, the transmission grid is freed up for other existing and newly connecting resources, such as wind and solar projects.

As the below relates to the UK, instead of pairing existing generation with new demand loads, we wanted to investigate the opposite: pairing new generation with existing (industrial) demand loads. Especially given the [glut of renewable generation projects in the](#)

*Note: Even where industry chooses to decarbonise with green hydrogen and/or CCUS, both options require significant use of electricity. All roads are leading to electrification, hence Government's focus on Clean Power by 2030 (and beyond).

connections queue⁹. Instead of (or perhaps in addition to) data centres, can new generation projects co-locate with existing traditional UK industry? If yes, how would we coordinate this on a national basis?

Grid-supplied front-of-meter configuration

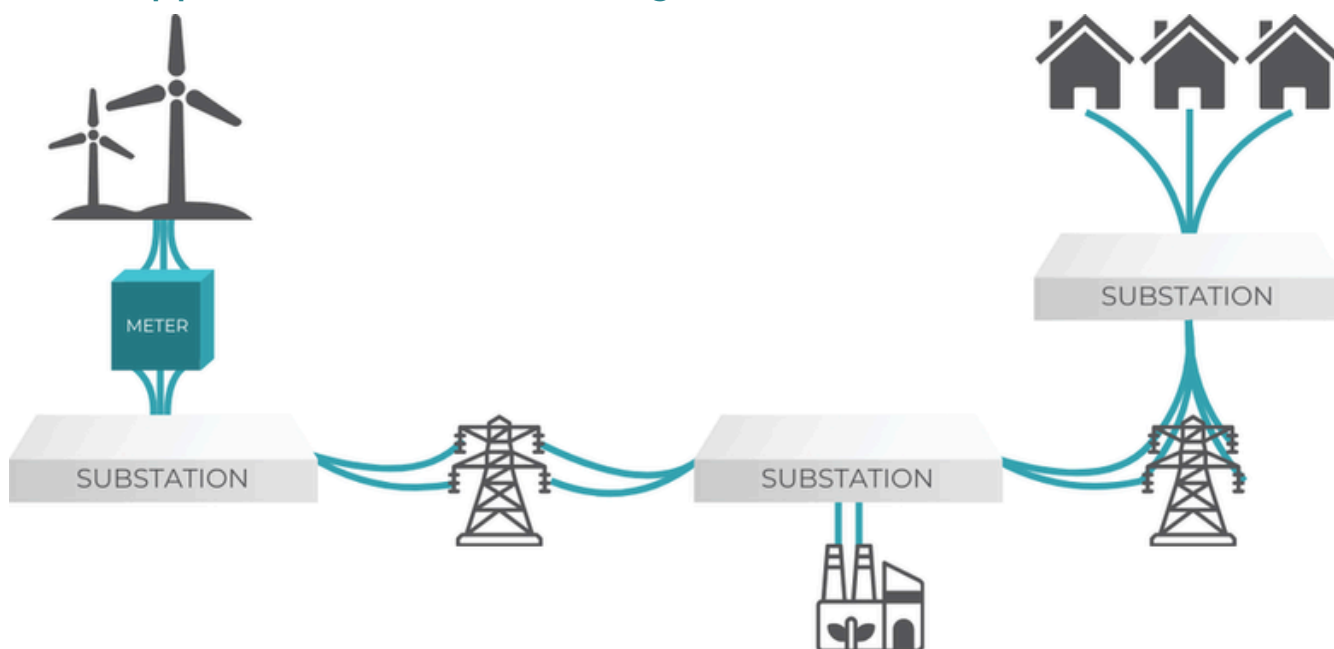


Figure 2: The ADE, inspired by Maryland Public Service Commission, 2024, Senate Bill 1 Co-Location Study The Co-Located Load Solution.

Co-located behind-the-meter configuration

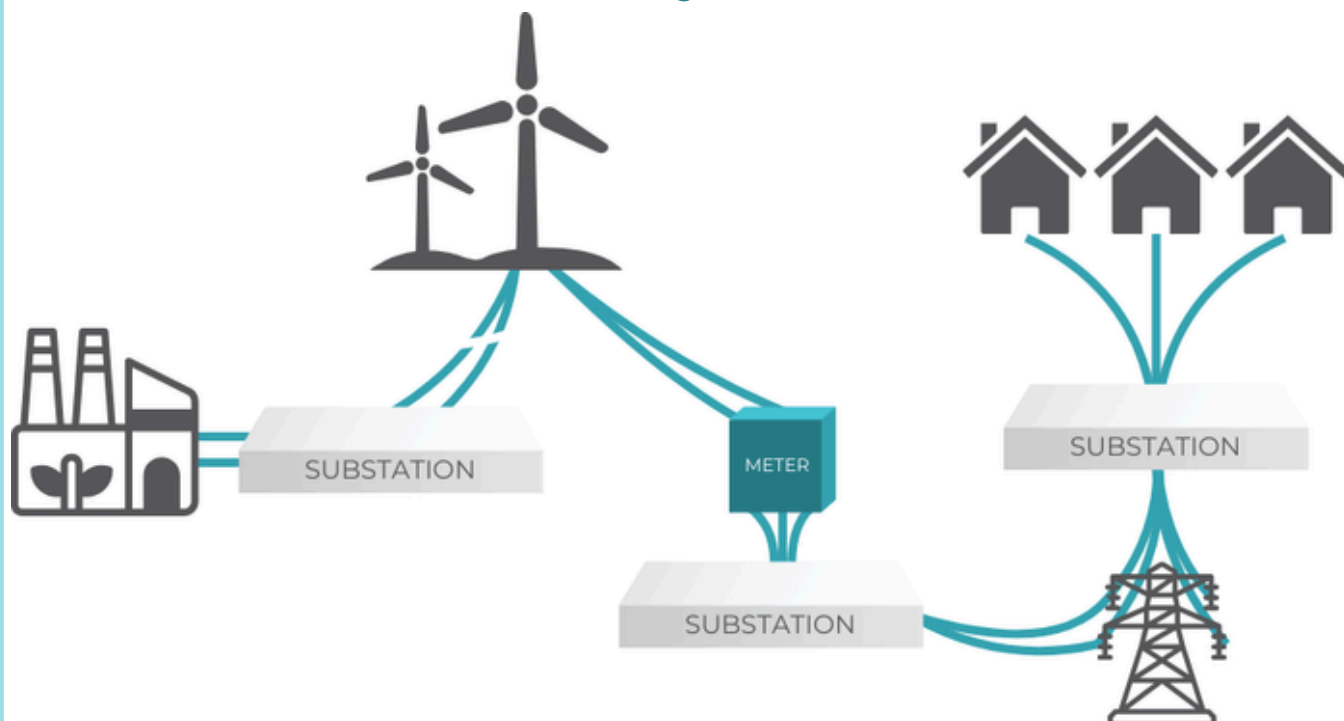


Figure 3: The ADE, inspired by Maryland Public Service Commission, 2024, Senate Bill 1 Co-Location Study The Co-Located Load Solution.

“co-location could involve the pairing of any type of power plant with any large load”⁸

Existing barriers to electrification in the UK

Toward the end of 2024, DESNZ released a [summary of responses](#)¹⁰ to 2023's call for evidence on industrial electrification. DESNZ identified six “key themes” as to why industry is not electrifying:

1. Electricity costs are too high relative to natural gas;
2. Grid connection delays;
3. Technology gaps, especially for high-heat processes;
4. Low confidence in novel electrification equipment;
5. Further clarity needed on the availability of and relative support for both hydrogen and electrification across all industry (clusters and dispersed sites); and
6. Four different “archetypes” of industrial sites (low versus high heat requirement combined with classification as a dispersed versus cluster site) facing different hurdles and thus needing different support from Government.

Knowing the main barriers to electrification, could co-location pose a possible solution?

Methodology

To investigate these questions further, and to gather more primary sources and research relevant to industrial users in the UK, we turned to ADE members, Government and other key stakeholders. Over the course of December 2024 and January 2025, the ADE hosted four workshops with different focuses. The workshops were designed to explore a range of aspects of industrial electrification but related to the idea of co-located load solutions. The following findings were informed from those workshops. Please refer to Appendices A and B for a list of workshop questions and participants.

Findings

What industry can do to encourage electrification now, on their own

1 Because of the cost of electrification...not much

Given the relative cost of electricity in the UK, the answer to “what can industry do to electrify on their own?” is – “not much.” This is not a shocking conclusion to reach, but an important answer to acknowledge nonetheless. As a general rule, unless mandated by law, industry will only make decisions that they believe are commercially advantageous to them (either increasing revenue or decreasing costs), this is the definition of a for-profit business. Without commercial viability, private businesses will not switch their energy consumption to electricity (as opposed to natural gas, for example) unless they are mandated by Government, or the relative price of electricity comes down dramatically.

Unsurprisingly, the number one issue that came up across all four workshops was the high cost of British electricity. It was the number one barrier to electrification as identified by DESNZ. Given the discussion during the ADE workshops, costs could be broken down in a number of ways, all of which point to electrification being a non-starter for most businesses. First there is the initial investment cost, in new process assets and also in a new / upgraded grid connection. Second, there is the increased operating cost from the difference between gas and electricity prices (see discussion of fuel prices below), which can make even more efficient electrical technologies uneconomic to operate.

Fuel Prices

Electricity prices for industrial users are higher than gas prices, per kWh. Unless electricity-based process technologies are significantly more efficient than the gas-based technologies they are replacing, currently the switch will increase production costs for firms.

In the short term, this is an issue but, in the longer term, as carbon targets drive decarbonisation, the more pertinent comparison is between the cost of low/zero carbon fuels in the UK and the cost of these same fuels elsewhere.

In 2023, the UK had the highest industrial electricity prices across all IEA countries where data was available with prices 46% higher than the IEA median.¹¹ Electricity prices for industrial users are also the highest in the EU: in the second half of the year, for small energy users (less than 500 MWh/year), the prices were nearly 70% higher than the EU median; for medium energy users (less than 20,000 MWh/yr) they were 78% higher; for large users (20,000-69,999kWh), they were nearly 87% higher and for very large users they were 71% higher.¹²

In contrast, UK industrial gas prices in 2023 were 7% lower than the IEA median¹³ and, in the second half of the year, 12% lower than the EU median for the smallest users, 0.9% higher than the median for medium users, and 9.9% higher for large users.¹⁴ In all cases, gas prices for industrial energy users placed the UK somewhere mid-rank in the given group of countries.

Hence, in all cases, switching from gas to electricity would put industrial energy users at a relative competitive disadvantage to sites located in other countries.

2 Technology service providers could step up

A key theme that emerged from the workshops was around technologies needed for industry to decarbonise. The flavour of this theme in the workshops was different to what DESNZ identified in their summary of responses, however. Instead of discussing technology gaps and distrust of novel technologies, workshop discussions were more around the lack of energy services in the market.

The investment and development needed for electrification technologies is not just for the technology itself (e.g. electric furnaces), but for companies that provide and service this technology (manufacturers, installers, maintenance service providers and flexibility aggregators/optimisers, etc.).

Relatedly, in-house expertise in new electric technologies is not a given and will not be supplied overnight or without planning. The sheer scale of switching from natural gas to electric goes far beyond the technology required to do it, there is an entire

economy of knock-on services that needs adequate time and investment to develop. Industry, and the companies that service industry, can start this work now with a mind towards electrification in the future.

Other, more expected comments around technology focused on the availability of electric options (and/or their lack of scale for industrial processes) and the capital investment needed being prohibitive. On this front, industry can help policymakers understand where there is technical risk arising from a potential need for product R&D if electrification of the production process may affect the end product, and how this risk can be mitigated and managed.

3 Continue to pursue and invest in energy and resource efficiency

From the workshop discussions, we believe there is scope for more efficiency, which will impact total demand and in many cases on peak demand, but industry is uncertain as to the magnitude of impact.

With an approximately 20%¹⁵ reduction in peak electricity demand over last 15 years, driven in part by efficiency improvements, it is unclear to stakeholders whether this suggests the potential for continuing benefits, or alternatively whether most of the 'easy wins' have already been accessed.

Some themes and ideas however, centred around addressing and reducing heat demand as the priority and upgrading industrial and commercial transformers to improve efficiency.

4 Investigate co-location and microgrids

First, when discussing the topic of microgrids, it quickly became clear there isn't necessarily a universal definition and not many stakeholders have real-world experience with microgrids. However, there was general agreement that in the UK, an ideal microgrid would have a grid connection and would not be "stand-alone." An ideal microgrid would have its own ecosystem of technologies but wouldn't necessarily be self-sustaining (hence the grid connection).

Drawing from answers from workshop participants, the ADE have settled on a definition of microgrids in the UK context, "a location-specific collection of technologies (with both generation and storage) working together to provide lowest cost, lowest carbon, highest security energy to a group of end users." Microgrids could provide flexibility from a grid perspective, especially when the on-site industrial processes are themselves not flexible (e.g. refining); and hence, microgrids enable electrification when the local grid would otherwise not be able to support it.

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Beyond the above definition, a microgrid can cover a small to medium geographic area, it can vary significantly in the size of energy flows it incorporates (e.g. from four to five houses with solar and EV charging, to a new AI data centre that will be requiring 4-5x the energy flows of a current data centre). More complicatedly, a microgrid can be private or communally owned and the assets within the microgrid may be owned by several different entities at the same time.

Examples of key technologies in a microgrid would be small modular reactors (SMRs), CHP, solar, wind, thermal storage and battery energy storage systems (BESS). One participant stressed that regardless of the technology mix in a microgrid, it is essential for there to be a control system, to optimise all of the technology on site.

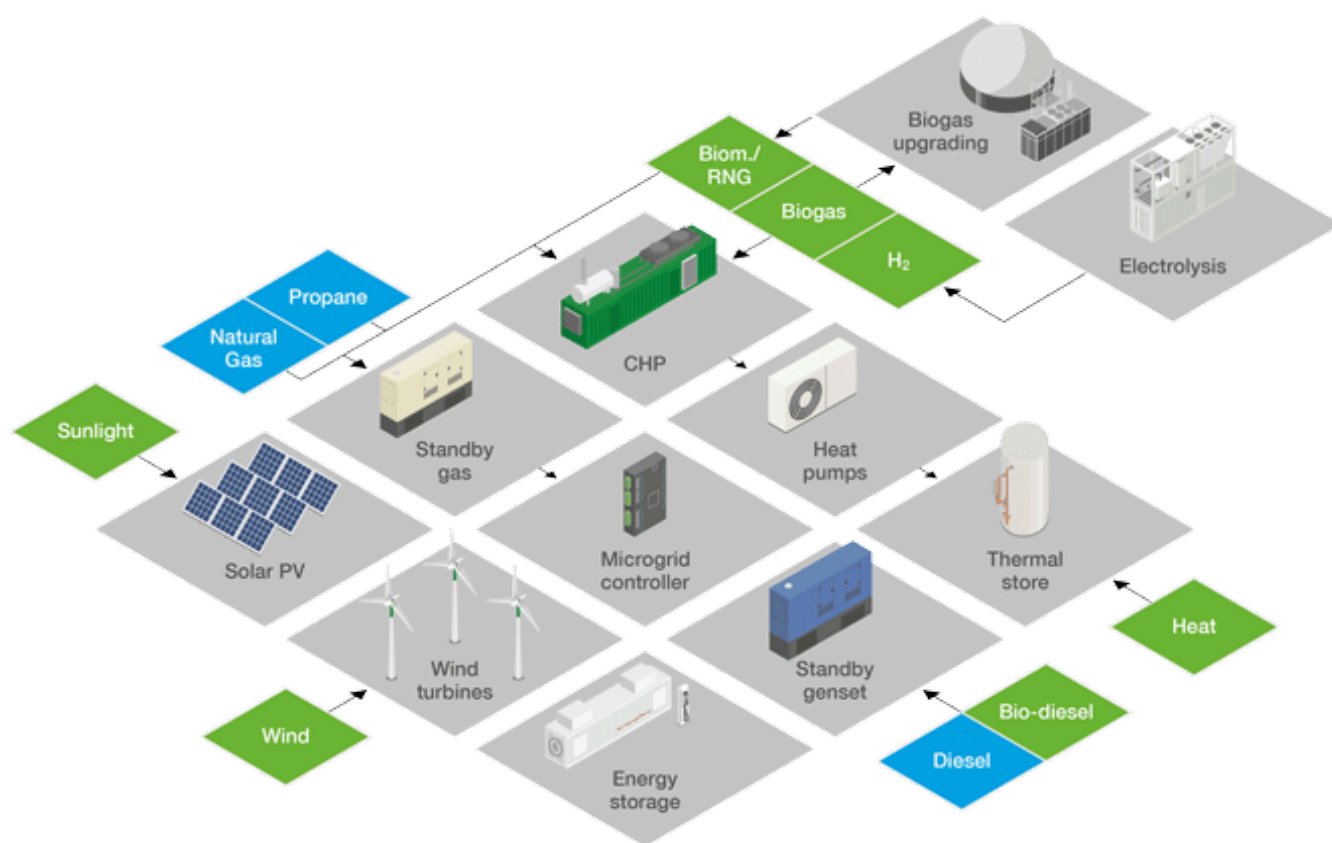
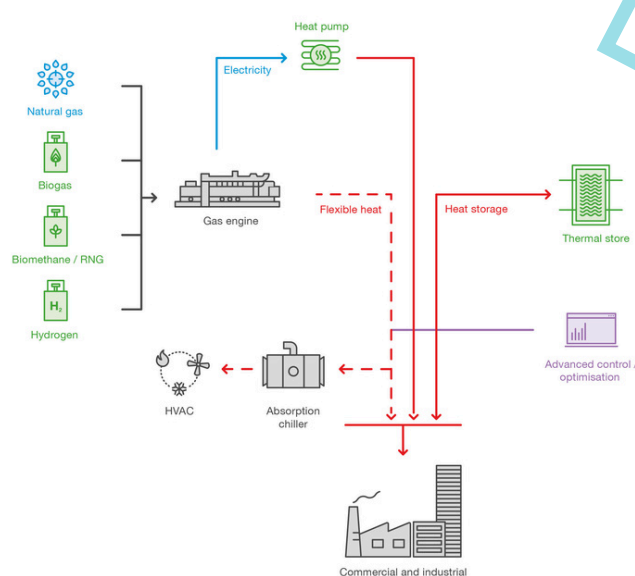
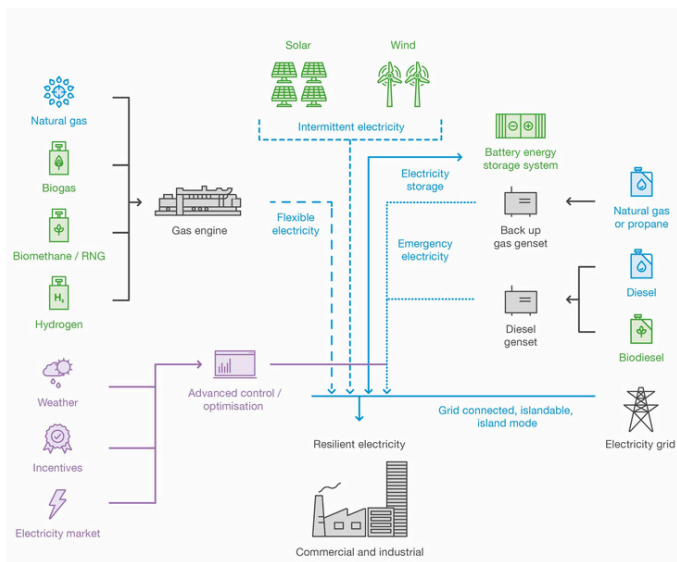


Figure 4: <https://www.clarke-energy.com/microgrids/>



Figures 5 and 6: <https://www.clarke-energy.com/microgrids/>

The role of CHP in microgrids

Could CHP function as an “anchor” technology for a microgrid, providing rapid payback that could support knock-on investment in solar, heat pumps, and storage?

One potential business model: optimising the potential lifetime of a CHP unit. The asset lifetime of a CHP engine can be extended if, after the early years when it pays back on capital investment while being used as the primary energy source for the site, it can then be used as a back-up* and for dunkelflaute** periods, the end result being a significant lifespan of 30, 40 or even 50 years.

Indeed, NESO are researching potential flexibility for dunkelflaute periods from decarbonised heat networks with back-up CHP and thermal storage and wonder if there may be an equivalent for industrial sites and/or microgrids. NESO are also looking at the economics of CHP operating at low load factors but when electricity prices are high.

But mostly, use of CHPs in a microgrid will be site specific; in some cases, CHP still makes commercial sense to use as stand-alone; in other cases, CHP will be better as part of a microgrid system. Factors influencing the decision will include overall efficiency, value of provision of grid services, whether or not there are suitable or affordable alternatives for some process energy needs, and the potential to decarbonise CHPs.

On potentially decarbonising CHPs, biomethane is available for use in CHPs now, and significant potential for UK biomethane production to increase. There is also the potential for carbon capture from biomethane manufacture or use, resulting in net negative emissions (although it could be difficult to make the business case for CCUS outside of clusters). However, biomethane is not viewed as commercially viable by industry as it is currently not recognised as a carbon neutral fuel within the UK Emissions Trading Scheme (ETS) or within the Greenhouse Gas (GHG) reporting scheme. This is a point of policy the ADE has and will continue to advocate for (recognition of biomethane as carbon neutral for all certification and accounting purposes, including Scope 1 and 2 reporting).

Workshop discussion views on hydrogen were mixed. On the positive side, there are already CHP units that could burn hydrogen, and if we’re going to burn such an expensive energy intensive fuel, surely, we should burn hydrogen in a CHP. On the negative side, however, physical and chemical properties of hydrogen potentially limit its usefulness.

* Back-up meaning for low hours but provision of heat, electricity and payment for grid services.

** Dunkelflaute is a German word referring to when little or no energy can be generated with wind and solar power, because there is neither wind nor sunlight, usually during the winter months.

Storage in microgrid systems

When we think about storage for electricity systems we naturally tend to think about batteries, but the presence of thermal storage, both low and high temperature and linked to electrified heat demand, can be equally valuable to the system. Indeed, thermal energy storage can enable resource efficient electrification by reducing the need for network reinforcement in the first place.

Issues with grid connection availability may make the case for investment in storage stronger, and storage costs are decreasing, but nonetheless storage needs to provide returns for investors other than from load shifting, as this doesn't cover the initial capital investment. Workshop discussion illustrated that it remains difficult for industrial users to monetise network support and unfortunately it is too expensive to invest in an asset that will only be partially used. See our "Findings" section further below for discussion on how this may be addressed with policy.

Benefits of microgrids

For users, there are potential financial benefits in hedging against the volatility of energy markets (i.e. microgrids offer greater cost control and predictability for users). There is also the ability for users to share excess power, similar to sharing excess heat via a heat network, or to optimise across cost, carbon and security aims.

The main benefit of co-location to the grid is that of pre-optimising the balance of supply and demand "behind the meter;" therefore, offering stability, resilience and a solution for grid constraints. In theory, microgrids would enable quicker connection for other assets in the queue and greater use of embedded renewable generation assets, helping deliver Clean Power 2030 and, beyond this, the UK's 2050 net zero target.

In tandem with the Clean Power Action Plan, industry should work with their relevant Regional Energy Strategic Planners (RESPs) to identify optimal co-location solutions. Trade bodies (like the ADE) should also work with NESO to identify where (which sectors, processes and geographies) industrial flexibility can be tapped into.

Limitations and barriers to microgrids

The misconception that a microgrid must be stand-alone without a grid connection is off-putting to potential investors, developers and users; being off grid entirely is too capex intensive and also loses the potential for revenue from offering grid services. On the other hand, the current issues with connections at transmission and distribution level may make the commercial case for reliance on a microgrid more attractive.

Additionally, similar to CCUS projects, contractual issues around asset ownership/leasing can be difficult to navigate and coordinate in a timely manner, depending on the scale of microgrid.

On a more practical level, grid operators treat demand, storage and supply assets separately; it is not clear how a microgrid system and the grid should negotiate with one another. **Without regulatory clarity, the full economic case for a microgrid may be difficult to realise.** Relatedly, because of the multiple technologies on one site, there is a potential for "stacked" regulatory burdens for each technology which may discourage the optimal mix of technology. Insurance and fire safety issues linked to battery storage were mentioned in one of the workshops.

Connections and flexibility

Grid connection capacity is one of the key issues for electrification as it relates to the availability of electricity for industry and capacity scarcity leading to rising costs.

Consumer-led flexibility can help to overcome grid capacity constraints by reducing peak loading on the network and therefore enable electrification; furthermore, microgrids unlock more industrial flexibility as well.

That said, the potential for flexibility is not fully explored in grid connection conversations or applications. Demand, supply and storage assets are all viewed separately and have different connections processes. In the spirit of a “whole system approach,” how can we model and recognise them as a single ‘load’ on the system? See our policy recommendations in our summary matrices below.

Findings

What industry needs from Government to make electrification a reality

To summarise the above discussion, what industry can do to electrify on their own without further support is limited:

1. Electrification is often a non-starter due to the associated energy costs (i.e. the high cost of UK electricity compared to natural gas or even compared to global electricity prices);
2. There is a lack of service providers in the market for (often novel) electric equipment and a lack of skilled labour;
3. While industry can pursue and invest in energy and resource efficiency, significant further investment is only likely to happen alongside decarbonisation; and
4. Configuring a privately owned and operated microgrid (co-locating an energy generator or storage with demand load) may or may not be financially attractive depending on a site's situation.

This brings us to what industry needs from Government to make electrification a reality. At the moment, the barriers cited above and throughout this report can feel interconnected in how they affect each other, but simultaneously disjointed in how we approach solving them. Together these barriers can feel overwhelming and intimidating to the point of paralysis. What we need is a clear, coordinated and comprehensive plan that takes a “whole system” approach that tackles each barrier in turn. Nick Winser, in his capacity as Government's Electricity Networks Commissioner, published a [report](#)¹⁶ in August 2023 that laid the groundwork for such a plan (or plans plural, as it were).

In his report, Winser recommends the UK install a Strategic Spatial Energy Plan (SSEP); a Centralised Strategic Network Plan (CSNP); and Regional Energy Strategic Plans (RESPs).

SSEP = national level, defines the optimal mix and locations for generation and is the first stage of the CSNP

CSNP = also on the national level, a plan for transmission network infrastructure

RESPs = does what both the SSEP and CSNP set out to do, but at the distribution level

From work to date on strategic spatial energy planning, it has become clear to the ADE that the RESPs should be the vehicle by which we coordinate and address barriers to dispersed industrial electrification. In particular, **(1) RESPs should help the electricity system meet its Net-Zero targets by identifying and facilitating co-location of supply, storage and demand in optimised, grid-connected microgrids (e.g. industrial energy parks)**. In this way, industrial demand can be harnessed, optimised and deployed to become part of the solution, and not just a problem that needs solving. Government needs to meet the moment, rise to the occasion and commit; we cannot blink with every passing Government at home or abroad. A change of this scale necessitates **(2) a massive capital investment from Government in the form of an Electrification Business Plan for all industry (in and outside the clusters), to the same tune of support for CCUS and hydrogen**.

This does not mean that we should neglect other necessary actions, including around fuel and electricity prices, technology development and energy and resource efficiency. Industrial electrification plans should be designed within a framework of system efficiency and being able to optimise generation, storage and demand together. And we need to stop thinking about electricity and heat in separate policy silos.

What industry needs from **DESNZ**

NO.	TOPIC	POLICY NEEDED	RATIONALE
1	Industrial Electrification Business Plan	Have a fund with application rounds for projects across the UK (but equally split for clustered and dispersed sites given emissions are split 50/50 between them).	Electrification faces similar barriers to hydrogen and CCUS, namely it is too capital intensive and the current relative prices of gas and electricity mean that running costs of electrified processes are uneconomic; hence creating a disincentive that is not aligned with the need to decarbonise (see section above on barriers to electrification). We should treat electrification and development of microgrid systems/co-location in the same way as hydrogen or CCUS. Current Government incentives (e.g. Climate Change Agreements) tend to encourage marginal investments, but companies are increasingly looking to the next big step change in investment that will be linked to the transition from gas to electricity and do not want to invest in new, more efficient equipment now which might not be used in 5-10 years. Investment in decarbonisation and investment in efficiency are likely to be combined, and both should be included in the Plan. At this point, the scale of investment may be in the tens or hundreds of millions of pounds, so Government must provide incentives at an appropriate scale. See also our discussion on technology service providers and skilled labour above.

2	The role of hydrogen and CCUS in dispersed sites	Government needs to clarify whether hydrogen and/or CCUS will be available outside of the clusters. If yes, a clear pathway needs to be provided. If not, industry needs to know this as soon as possible.	The uncertainty surrounding hydrogen and CCUS in dispersed sites is having a dampening effect on investment and delaying important investment (i.e. growth) decisions on industrial decarbonisation in these areas.
3	Supporting carbon neutral fuels	Certification and recognition of alternative fuels like biomethane in the UK Emissions Trading Scheme (UK ETS) and the Greenhouse Gas (GHG) reporting framework.	Without this recognition, industry has no incentive to switch to biofuels, if biofuels could at least be recognised that would be a first and easy step.
4	Supporting heat storage	A new cap and floor regime for thermal storage, similar to the cap and floor regime for long duration electricity storage (LDES). Alternatively, including thermal storage within the LDES scheme.	We need sufficiently long-term incentives to justify upfront investment in thermal storage which bolsters flexibility options and is far less capital intensive than many forms of electricity storage. We also need support for low utilisation assets (i.e. thermal storage that will only be fully used during dunkelflaute periods).
5	Repurpose the CHP Quality Assurance (CHPQA) scheme	CHPQA has been a great tool to ensure we are getting the most out of CHPs efficiency-wise, but we need to take CHP to the next level by whole-sale decarbonising CHP. CHPQA could be a tool to measure and certify this process of switching CHPs to renewable fuels.	CHPQA is an accepted and trusted way of ensuring the UK is rewarding good quality CHP (where a given CHP engine is producing electricity and heat at some set ratio illustrating efficiency). Repurposing CHPQA and extending its reach would provide a clear pathway to dispersed industry that relies on CHP; and would discourage the uptake of traditional gas boilers which would be a step backwards.

What industry needs from **Ofgem and/or NESO**

NO.	TOPIC	POLICY NEEDED	RATIONALE
1	National strategy for microgrids (Ofgem and NESO)	Ofgem needs to set out why there has been an historical reluctance to accept or encourage “private wire” when there are clear benefits to microgrids and co-location. Given the clear benefits and willingness of industry, Government should implement and assign responsibility for an industrial co-location strategy. We propose this be done via the NESO and the RESPs.	Without clarity from Ofgem on the feasibility of private wire, investment is suppressed. The NESO RESP team will be best positioned to identify and communicate where and when an industrial microgrid would be ideal. This will likely need to be an input for the new connections queue (also run by NESO). A centralised (yet regional) public body would have the resources and stature to coordinate/negotiate the various asset owners in a microgrid.
2	Data gathering on carbon intensity across the UK	Investment into robust data gathering at the local level to allow for optimal decarbonisation planning. RESP teams should already be doing this, but the point remains vital.	There is a dire lack of detailed data on industrial energy use outside of the clusters. We need a good handle on what actual net demand and supply would look like at peak times across the networks, with and without co-location, storage and flex. From there, network operators can accurately value co-location; and industrial energy users will be able to know how the economics stack up.
3	Utilising microgrids for industrial flexibility	The amount of industrial flex that can be made available will depend on the amount of time it is needed for, the amount of notice that can be given and the speed of response needed. We can use optimised microgrid systems as a partial solution to some of these issues, and system operators can help facilitate.	To alleviate pressure on the grid and prevent unnecessary build-out.
4	Requiring an energy efficiency audit during connection applications	The potential for energy efficiency and the resulting reduction in peak demand is not currently considered in connection conversations. We should include evaluation of efficiency potential as part of the connection applications process through a robust energy audit, which would incentivise investment in	To modernise the grid with every new connection, alleviate pressure on the grid and prevent unnecessary and costly build-out in the long term.

		efficiency at the point of connection (e.g. system upgrades like new transformers).	
5	Improve flexibility markets	Increase market access and remove barriers for flexibility via NESO reform and swift implementation of the Market Facilitator.	In order to encourage industrial flexibility (alleviating pressure on the grid and preventing unnecessary build-out).

Why this matters

Industrial electrification, in particular for sites outside the major clusters, is a topic that is exercising many minds right now. At the time of writing (March 2025), MakeUK has just formally launched ‘Electrify Industry’, building on their [2024 report](#) that described the economic opportunity offered by electrification;¹⁷ Energy UK has recently published a ‘[Review of policies to drive commercial and industrial decarbonisation](#)’ which highlighted, amongst other things, the need for quicker connections for electrifying industries, more competitive electricity prices, and encouragement of flexibility; and Green Alliance¹⁸ has published a [briefing](#) on the risks to foundation sectors from decarbonisation and deindustrialisation, which called for government to match financial support for electrification with that given to hydrogen and CCS.¹⁹

The Climate Change Committee’s [7th Carbon Budget](#) was published in February 2025, and suggested that electricity could be meeting over 60% of industrial energy demand by 2040, compared with around 26% today.²⁰ The scale of the challenge involved in delivering this increase is illustrated by work from the UK Energy Research Centre on [electricity network capacity requirements for industrial decarbonisation in Great Britain](#). They suggest that over 70GW of new electricity network capacity will be needed by 2050 and if network constraints aren’t addressed, around 65% of larger industrial sites would be constrained by 2040.²¹

It is tempting therefore to present industrial decarbonisation a challenge to be met; indeed, the National Infrastructure Commission’s report on electricity distribution networks focuses on the need for investment in these networks so that they can ‘keep pace with rising demand.’²² But we should be presenting it more as an opportunity for industry to contribute to the electricity system of the future: NESO’s [advice to Government](#) on achieving clean power by 2030 clearly acknowledges the need to do things differently, including by harnessing the value of flexibility.²³

A core driver for the current Government is [economic growth](#)²⁴ and industrial decarbonisation (via electrification) is vital to support this, while also saving [770,000 jobs](#)²⁵ by doing so. By co-locating new generation and storage assets with electrifying industrial demand, it can also contribute significantly to the flexibility and optimisation needed to deliver an efficient net zero electricity system that in turn also supports international competitiveness and growth. As set out here, this must be considered in the development of Regional Energy Strategic Plans (RESPs) and supported by significant policy backing, not least through an Electrification Business Plan.

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Appendix A: Workshop Questions

Informed by ADE policy desk research, the questions posed to guide workshop discussions were:

The role of Combined Heat and Power (CHP)

- Will CHP be a main energy source for decarbonising industrial sectors, or a back-up to enable electrification?
- Is CHP best used within a microgrid or also to provide services to the grid?

Microgrids

- What does a “microgrid” mean in the UK?
- When is a microgrid a better option than a grid connection alone?
- Is there a default technology mix that is optimal for a microgrid?
- What are the barriers to microgrids and how might they be overcome?

The role of flexibility

- How much industrial demand is flexible?
- How viable is battery or thermal storage to support flexibility?
- What incentives would make flexibility worthwhile?

The role of Energy and Resource Efficiency

- How much can resource and energy efficiency reduce peak demand?
- Is the value of energy efficiency recognised in grid connection conversations?
- How can resource and energy efficiency help make electrification financially viable?

Appendix B: All Workshop Participants

Stuart Reid	AMP Clean Energy
George Fowkes	BasePower
Steven Jeffers	BasePower
Dan Poulson	BasePower
Greg Ascough	British Sugar
Philip McNaughton	British Sugar
Luke Hindlaugh	Cargill
Samuel Railton	Centrica
Alan Beech	Clarke Energy
Andy Cooper	Clarke Energy
Chris Marsland	Clarke Energy
Jennifer Clements	DESNZ
Abbie Foster	DESNZ
Anca Mihalache	DESNZ
Jack Morgan	DESNZ
Rhys Oliver	DESNZ
Lily Tozer	DESNZ
Beena Bhattoa	e.on
Jagdeep Dhaliwal	e.on
Jordan Glossop	e.on
Matthew Rodgers	e.on
Craig Thurling	e.on
Holly Walton	e.on
Iain Nicoll	Elxon
Marcus Rondé	Exergy3
Stuart Pace	ExxonMobil
Richard Price	ExxonMobil

Andrew Langlands	Flexitricity
Alastair Martin	Flexitricity
Laura Myers	Flexitricity
Emma Piercy	Food and Drink Federation
Suneel Appan	Future Biogas
David Maxwell	Future Biogas
Anna Crosby	Hermetica Black
Adrian Minihan	Hermetica Black
Simon Branch	Innovatium
Charlie Hill	Manchester City Council
David Joffe	Mission Control Clean Power 2030
Damien Kelly	NESO
Rachel Lee	NESO
Ian Tanner	NESO
Ian Hasztrakiewicz	P3P
Manny Morales	P3P
Joe Murphy	P3P
Francesca Wiggins	P3P
Sean Fitzpatrick	Pure World Energy
Guy Robertson	Ramboll
Alex Howard	UK Power Networks DSO
Hilal Ozdemir	UK Power Networks DSO
Ian Meyer	Vattenfall
Andrew Yuill	Vattenfall
Emiel Van Vlaenderen	Veolia
Paul Thompson	VPI Immingham

Further Reading & Endnotes

Further Reading:

- [Future Opportunities for Electrification to Decarbonise UK Industry - GOV.UK](#) (2024)
- [Plugging Into Industrial Electrification - Green Alliance](#) (2025)
- [Review of Policies to Drive Commercial and Industrial Decarbonisation - Energy UK](#) (2025)
- [The Seventh Carbon Budget - Climate Change Committee](#) (2025)

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