

Written evidence submitted by Enoda (IND0035)

1. How can UK plc capture its fair share of the economic potential of emerging or less developed energy technologies?

The UK Government should identify the most important energy technology subsectors by identifying and referring across:

- a) Current UK manufacturing strengths;
- b) UK R&D and IP strengths;
- c) Global growth industries according to demand and market trends and;
- d) Likely future global growth industries according to global policy direction.

As the consultation document identifies, the UK has significant strengths in R&D, innovation and skill making it well placed to capitalise upon emerging technologies, processes and ideas.

Many of the energy technology subsectors with high potential for value add in the coming decades may currently be in R&D and pre-commercial stages, and as noted may therefore have low or negative GVA metrics, as start-up firms may have costs that exceed their revenue. There is a risk that an excessive focus on GVA risks pushing UK firms into areas that are already being commoditised, where other countries that were first movers have already developed a niche and successful new entrants will compete on cost, not quality.

It also leads to policies that encourage start-ups to focus on achieving early profitability at the expense of achieving the scale necessary to grow. The industrial strategy should enable the next generation of major British industrial enterprises, not just the next generation of small businesses. This will be especially important in sectors like grid infrastructure, generation and long-duration energy storage; large, deep-tech propositions with significant industrial needs. Rather than trying to compete on turbines and panels, which are now a cost game, the UK should focus on areas that are earlier in the deployment cycle, where UK's strength in R&D gives a first mover advantage.

Government could conduct a review of global industrial, environmental and security policies, among others, to identify technologies that will be essential to reaching global goals within the next decade and beyond. This will ensure that the industrial strategy enables the UK to be an early mover that can have a major role in the most important industries of the future, rather than focus on attempting to catch-up in areas where other countries have already achieved dominance. This should be triangulated with subsectors where R&D progress is complemented by the beginning of commercial traction, and where there is supporting infrastructure, to avoid investment into sectors for which there may be high ambition but low delivery. Robust and realistic technoeconomic analysis can also help to avoid these high ambition, low delivery sectors.

Other metrics that could be used include amount of capital raised by firms before Series B or amount of capital invested by UK funds. As noted in the consultation document and we have highlighted above, the GVA of some sectors may be negative but the investment demonstrates an amount of due diligence and market confidence that may result in a growth area.

A comparative view should also be taken; where an emerging sector exists in the UK, but other countries have a demonstrable advantage. This can be assessed again on things like R&D progress, intellectual property filings, and levels of investment at pre-Series B stage. Given the current economic and political climate, the UK must also focus on technologies that don't rely on a green premium for long-term success, even if they need support in scaling to commercialization.

The government should also consider barriers to entry for the market, and whether these can be fixed under the UK's legal and regulatory framework. Many of the growth subsectors of the future are in regulated markets, for example energy, and therefore the regulator has an outside role in ensuring that these technologies can deploy in the mass market. Whilst the UK may only be able to amend its own regulatory framework, in many industries UK regulation is viewed as an example of best practice and therefore the regulators are able to take an influential leadership role.

2. What more can the Government do to encourage greater domestic supply chain investment in the energy industry by 2035, including through the Contracts for Difference scheme?

A first step in government promotion of greater domestic supply chain investment could be to clarify the role of Great British Energy. In the founding statement, the Secretary of State Ed Miliband and Great British Energy Chair Juergen Maier promised the organization would 'build the supply chains which will support this new era of clean power, bringing jobs and wealth¹.' The document also promises that Great British Energy will work with institutions like the National Wealth Fund to ensure government's energy investments maximise value for the British public. However, six months on, few details have been shared about the role Great British Energy will play. Anecdotal evidence indicates that uncertainty about how the new structures will work has actually negatively impacted investment in the UK.

As detailed in a report from Flint Global, a useful function of Great British Energy could be to 'underwrite the centralised procurement of key energy network components²'. A distinction can be drawn with the role of the National Energy System Operator (NESO), which will play a strategic planning function across the energy market, whilst GB Energy could then translate this plan into delivery. This could focus its activities on playing a role to unlock private sector capital, a stated aim of the government, for example by scaling supply chain orders. As discussed in the answer below, large multinational companies considering manufacturing operations in the UK are looking for a degree of certainty and direction, which such a role for GB Energy could provide. This may allow for government to leverage limited public

¹ [Great British Energy founding statement - GOV.UK](#)

² [Great British Energy: What would a publicly owned energy company actually do? - Flint Global](#)

capital to unlock significant private funds and attract investment into UK manufacturing. Such an approach is supported by NESO, which suggested that ‘Over the medium term, greater strategic coordination can enable delivery while supporting the growth of domestic supply chains and a skilled workforce to meet the growing pipeline of projects³.’

Secondly, the government must align Clean Power 2030 and Invest 2035. The industrial strategy has identified both advanced manufacturing and clean energy industries as growth-driving sectors. Given the priorities the industrial strategy aims to realise—Net Zero, Regional Growth, and Economic Security and Resilience, as well as the strengths the UK already has—there are a number of subsectors and technologies that the UK government should focus on.

We recommend a focus on innovative subsectors including but not limited to:

Long Duration Energy Storage (LDES)

Long-duration energy storage is critical to ensuring the stability and reliability of the electricity grid as the UK transitions to a decarbonized energy system. As more intermittent renewable sources, such as wind and solar, come online, the ability to store energy for extended periods—hours, days, or even weeks—will become increasingly important.

Current battery technologies, while effective for short-term storage, face limitations in duration and scalability. Long-duration storage solutions including innovative technologies offer significant potential to address these challenges. Both iterative development of established technologies, like pumped hydro, and innovative technologies, like flow batteries, need to compete to reach the best outcomes for society.

The UK government should focus on incentivizing the development and deployment of LDES technologies to:

- Ensure grid resilience during times of low renewable output
- Facilitate the integration of renewable energy without compromising grid stability
- Provide a solution for rural and regional areas where renewable generation potential is high but infrastructure investment is needed

By investing in LDES, the UK can reduce dependence on fossil-fuel-based backup generation, reduce the need for costly grid upgrades, and position itself as a leader in next-generation energy storage solutions.

Grid Enhancing Technologies (GETs)

Grid enhancing technologies (GETs) are innovative solutions that improve the performance of the existing grid infrastructure. These technologies can significantly reduce the need for costly new transmission lines and substations, enabling more efficient use of the current grid while facilitating the integration of renewable energy.

³ [Clean Power 2030 - NESO](#)

Key GETs include:

- Dynamic line rating (DLR): This technology enhances the capacity of overhead transmission lines by adjusting real-time ratings based on environmental conditions, thereby increasing their power-carrying capacity without the need for additional infrastructure.
- Smart grid technologies and advanced power electronics: These enable more flexible, efficient, and resilient operation of the grid, including better load management, fault detection, and integration of distributed energy resources (DERs).

By prioritizing investment in GETs, the government can increase the capacity of existing infrastructure, reduce transmission losses, and improve grid reliability without the high costs and long timelines associated with building new infrastructure.

It should be noted that whilst we have pulled out sub-sectoral examples of areas in which the UK may have a competitive advantage, it is worth noting that we have defined both of these subsections in a functional, technology agnostic way so as to encourage innovation. Whilst there are examples of existing technologies within these categories, any regulation or public support should focus on the benefits that can be offered to the system, rather than the technical specifications of any one product.

Thirdly, public financing arrangements should be reviewed, not only for investment in the manufacturing sector, but also in enabling the customers, energy networks and developers, to provide certainty. The UK's financial services sector is globally recognized as a leader in green finance, with significant expertise in sustainable investing, risk management, and green bonds. The City of London has long been at the forefront of financing large-scale infrastructure projects, and this strength can be mobilized to support the transition to net zero. The government should leverage these capabilities and also complement them. For example, UK innovators need early capital and regulatory support to enable them to grow to the point where The City can finance them as infrastructure rather than innovation plays. The UK has a world class financing environments for both early stage companies (seed and Series A) and clean energy infrastructure, but financing options to take companies from one pool of capital to the other are lacking, limiting the growth of the most innovative companies or forcing them to leave the UK.

The government should focus on scaling green finance for capital intensive sub-sectors. By creating favourable policy frameworks and providing targeted incentives, the UK can encourage private investment in clean energy technologies, particularly in sectors such as long-duration storage, grid enhancements, and renewable energy. The financial sector's leadership in green finance can unlock significant investment, enabling the rapid development and scaling of clean energy technologies while ensuring that the UK remains a global leader in sustainable investment.

The government should also use innovative financing instruments using public money. We note that applications for the government's new Clean Industry Bonus mechanism officially opened on the 13th February⁴. Whilst we commend the use of alternative

⁴ [New industry bonus opens to support good jobs and low carbon manufacturing factories - GOV.UK](#)

financial instruments for the support of investment, especially the focus on supporting those in the most deprived regions, tying the support to the CfD scheme unnecessarily focuses on specific technologies. As explored within this submission, electricity infrastructure is a key bottleneck to the energy transition, that can be in part addressed by bolstering the UK supply chain, and creates highly skilled jobs such as coil winders. A support scheme that focuses only on one industry within the transition risks under developing other parts of the ecosystem, sacrificing possible growth, UK advantage, and the transition.

The National Wealth Fund has a part to play, not only in directly supporting manufacturing but in providing support for customers. We recommend supporting Distribution Network Operators (DNOs) in making extra price control investments to expand grid capacity, drawing lessons from Tauron's EU-backed grid modernisation programme funding in Poland, or PG&E's LPO supported project portfolio in the US.

Last year the National Energy System Operator suggested that achieving clean power by 2030 would cost up to £60bn of network investment to build onshore and offshore networks⁵. Strengthening the grid will enable industrial electrification and renewable energy growth.

Tauron, a Polish energy company, secured a loan of \$2.7 billion late last year, to finance the development and adaptation of the power grid. The funds came from the National Resilience and Recovery Plan, the post-Covid EU financing vehicle, and represented a record amount – the largest ever financing of an investment supporting the energy transformation in Poland⁶.

The loan will be used to finance expenses incurred by TAURON's DNO arm, TAURON Dystrybucja SA, for the development and adaptation of the power grid to the needs of energy transformation and climate change. This increases the possibilities of connecting additional generation sources to the power grid while improving the flexibility of the grid and ensuring reliability of supply. Due to the origination of the loan in public funding, the loan terms are attractive to the distribution network operator, and the long, 25-year repayment period will significantly extend the average maturity of the TAURON Group's debt.

In the US, PG&E were awarded a \$15bn loan guarantee from the DOE for grid modernisation projects. The loan unlocks investment in the transmission network, infrastructure investments including refurbishing the operator's hydropower fleet, and supporting storage capacity. In total, the projects are also expected to create approximately 3,900 construction and operational jobs over the loan's lifespan⁷.

By leveraging public funding with similarly favourable loan conditions, the UK can accelerate grid upgrades, and other large infrastructure projects in regulated industries, to meet its energy transition and growth goals. An EU.DSO paper demonstrates some other support mechanisms for DNOs beyond the price control, that use public finance to leverage private financing. We have previously engaged with officials at the National Wealth Fund to discuss the topic, and remain committed to advancing the conversation.

⁵ [Clean Power 2030 - NESO](#)

⁶ [Poland's TAURON secures €2.6bn loan for grid development | Smart Energy International](#)

⁷ [DOE finalises \\$15bn loan guarantee to PG&E for grid modernisation projects](#)

Finally, given the movements in global trade policy, government must be live to the fact that many of the commodities discussed within the boundaries of a so-called ‘trade war’ are integral components of the energy transition. There may be an opportunity for significant export promotion of UK domestic industry, but government must also focus on strengthening trade partnerships to ensure favourable terms for energy infrastructure imports and exports.

3. Does the UK have the supply chain capacity to deliver the required energy infrastructure by 2035, including an expanded electricity network?

Despite initiatives to source UK parts and services for the UK electricity transition, such as the £5.4bn supply chain and jobs boost announced by SP Energy Networks in the UK last year, the UK’s supply chain is not sufficiently developed to deliver the required energy infrastructure by 2035⁸. In Clean Power 2030, NESO states ‘Acute supply chain and workforce challenges must be overcome across nearly all generation, storage and network projects. Policy certainty, visibility of the future market and swift funding decisions are needed to ensure developers can mobilise the supply chains and workforce needed⁹.’

A recent Financial Times investigation found that the material constraints in the supply chain for transformers and converters were a major risk to the UK’s Clean Power by 2030 goal. Within the article, Baringa partners noted that the lead times for such equipment had doubled, and in some cases tripled, in the last decade, and Wood Mackenzie estimates cited suggest prices have also climbed 40-60%¹⁰.

There are however, moves to meet demand. GE Vernova is expanding its Stafford factory, and at Enoda we are bringing manufacture of our innovative Prime Exchanger devices, a drop-in replacement for transformers and other substation equipment, back to the UK, with a new manufacturing facility planned for Scotland.

There are barriers to situating manufacturing in the UK: skills, the wider raw materials supply chain and certainty in government policy. Hitachi Energy are quoted in the Financial Times article as needing an offtake commitment. ‘If customers and Government would team up and say, this is what we need for the next five or 10 years, dedicated to that asset, then of course [we would consider siting manufacturing in the UK¹¹]. This quote reflects our earlier assertion that a coordinating role from government, through GB Energy, that gives long-term certainty, could be incredibly attractive to manufacturers.

4. To what extent would growing the domestic supply chain bolster UK energy security?

⁸ [SP Energy Networks has unveiled 19 businesses as preferred partners to its record £5.4bn supply chain contract programme - SP Energy Networks](#)

⁹ [Clean Power 2030 - NESO](#)

¹⁰ [How years of waiting for parts is holding up the UK’s energy transition – Financial Times](#)

¹¹ [How years of waiting for parts is holding up the UK’s energy transition – Financial Times](#)

Growing the domestic supply chain would bolster UK energy security, in that it could insulate against some of the worst excesses of the current global trade policy turmoil. Global supply chains are vulnerable to geopolitical tensions, and so expanding domestic production could reduce exposure to those risk. It may also insulate the UK from volatile international commodity prices and shipping costs, making maintaining cost-effective energy infrastructure development more feasible. Growing the domestic supply chain could also help to ensure the UK utilities are priority access to the equipment that they need to deliver the energy transition.

Following the UK's exit from the European Union, the passage of goods and equipment between the UK and EU has become further complicated, as we have experienced in growing our own business. By onshoring larger amounts of the UK energy transition supply chain, UK businesses could cut significant costs and complexity, in turn bringing down the cost of the transition. This would have the secondary impact of improving energy security, allowing the faster and cheaper deployment of infrastructure and generation. The gas price crisis sparked by Russia's invasion of Ukraine demonstrated that energy security in a fossil-based energy system cannot exist. The only secure energy system is grounded on home-grown renewables; no longer held hostage to the price of fossil resources.

5. What are the key concerns with respect to the availability of raw materials in the supply chain and how might those be addressed?

A key concern that we are focussed on within our business is the availability of steel. The recent tariffs on steel in the US has the potential to derail not only the US's transition to clean energy, but put global markets into turmoil. A Brookings study¹² (published ahead of the most recent steel and aluminium tariffs) found that North American trade attacks and counterattacks alone would reduce U.S. exports nearly 10%, with metals, machinery, motor vehicles and electronics hit the hardest. Tariffs will not only raise prices in the US but, in the event of retaliatory tariffs such as China is already implementing, globally. Higher costs will slow the construction of energy generation and grid modernization¹³. These will inevitably be passed on to consumer bills.

Industrial policy requires a long-term view and stability, and businesses need predictable conditions to make investments. Whilst trade policy needs to be responsive to changing conditions, rhetoric around retaliatory tariffs from other countries risks manufacturing industries becoming collateral damage in an unwinnable trade war.

At a specific level, we are concerned both about our ability to serve US customers from UK production facilities and our ability to import steel to the US to produce products there for reexport. The UK could secure a favourable position for its network operators if a future trade agreement with the US allowed US manufactures to import steel and other raw materials without tariffs provided that the resulting product were subsequently exported to the UK.

The UK should also be realistic about its own domestic production capacity. For example, a requirement that UK manufacturers use UK steel, which is limited in both

¹² [Trump's 25% tariffs on Canada and Mexico will be a blow to all 3 economies](#)

¹³ [America Needs More Power Now: Tariffs Will Make It Harder To Build](#)

volume and variety, would undermine the viability of UK manufacturers of clean energy technology.

February 2025