

Written evidence submitted by Siemens Energy (SUP0010)

Siemens Energy

Siemens Energy is a significant part of the UK clean energy technology supply chain. We are active in the generation, storage and transmission of electricity, decarbonisation of heavy industry, and hydrogen. Our wind turbine facility Hull is the largest single investment in the UK energy technology supply chain.

Siemens Energy is one of the world's leading energy technology companies, with around 96,000 people worldwide in more than 90 countries with a turnover of €31 billion in fiscal year 2023. An estimated one-sixth of the electricity generated worldwide is based on technologies from Siemens Energy. In the UK we employ 6,000 people and the UK represents 10% of our global order book.

We would like to give a supply chain view to this inquiry. We believe supply chain is often an afterthought in policy formulation. As a result, the UK has missed significant opportunities.

We note the specific questions from the Committee. We first want to highlight some wider principles which inform our responses. We would be pleased to provide evidence in person to the committee in addition to this written submission.

A supply chain view

Delivering a net zero electricity system by 2035 requires government intervention. Without intervention, the market will not stimulate investment in new infrastructure at the speed and scale required. Government often sees this as a problem to fix rather than an opportunity to be grasped. As Chris Skidmore highlighted in the Net Zero Review, January 2023, Net Zero is the growth opportunity of the 21st Century. Policy should be focused on collaboration and discovery, focused on speed of implementation and simplifying complex models to aid delivery.

Done well, government intervention can bring wider benefits, including the creation of good, sustainable jobs and a positive contribution to balance of payments. This happens when the supply chain opportunity is part of policy framing. The good news is that this need not cost more and can result in faster cost reduction.

Most supply chain investment is made by companies themselves. Government funding can make a difference in some cases, but the main role for government is to create the positive conditions for supply chains to invest. Political focus is often on inward investment and not on growing or retaining companies already here.

Create an opportunity pipeline

The biggest driver for supply chain investment is confidence that there will be a pipeline of work to be won, i.e., that customers will place orders. This applies at all scales, from the SME considering taking on an apprentice to the multi-national looking at the investment case for a new factory.

In the [Chinn Review 2014](#), *The UK Offshore Wind Supply Chain: A Review of Opportunities and Barriers*, written jointly with government, we identified the top cross cutting issue was pipeline.

Most supply chain investments take more than one project to pay back. A series of one-off projects is not a pipeline unless you can see the series in advance.

Faced with a one-off project you employ contractors. At the end of the job, you disband the team, and the lessons are lost. Cost stays high. With a pipeline the whole supply chain can invest for

efficiency, learn iteratively, and hire long term staff. That learning also brings down costs for end customers.

Government needs to recognise its vital role in creating energy project pipelines through, for example, annual CfD rounds. Consistent policy behaviour is key to show government commitment for projects and technology pipelines. It's also necessary to create solid foundations for a strong future market.

Sometimes government adds unnecessary uncertainty, for example by annual budgeting horizons, by expressing targets as 'up to', by releasing projects one at a time, and by moving slowly. Offshore Wind CfD Auction Round 5 was a predictable, self-inflicted failure.

Establish your pipeline first

Supply chains for new technologies grow where a pipeline of work emerges first. With regards to wind turbines, Denmark was first to develop a home market and now benefits from a large share of European wind turbine manufacturing.

The UK had the potential to capture more of the supply chain with the move to offshore wind. However, during the crucial period before 2014, the UK government would not commit to more than one project at a time.

We are proud of the £310M investment Siemens Energy made in the offshore wind turbine blade factory in Hull in 2014 which has been followed by a further £186M upgrade in 2022. However, when we first announced plans for a factory in 2010 it was for a larger investment. Between 2010 and 2014 the UK government ambition for offshore wind reduced several times. Each time we had to review our investment case and scale back plans for Hull.

The 2035 target needs different thinking

In normal times, a strong opportunity pipeline would be enough to trigger investment, but for net zero there are further factors that make supply chain policy even more vital:

- Speed and scale
- Competition
- Match support to maturity
- Ease of doing business
- Skills

Speed and scale

The scale of what is now needed is unprecedented. See our [National Endeavour](#) report in 2022.

The change required in deployment rate for *established technologies* is multiple not incremental. A factor of at least five times for grid and three times for offshore wind. These deployment rates are many times faster than anyone working in the industry today has experienced.

We also need to build whole *new industries* to deploy hydrogen, carbon capture and long-term energy storage. All three are needed, at multi-Gigawatt scale, for a net zero electricity system in under 12 years' time.

Deployment on this scale needs a fundamental change in mindset. The Government's approach has been to announce targets but work incrementally forwards from today at a pace which risks missing

those targets. As stakeholders, we would like to see more visible coordination between areas of policy detail and an overall programme that shows the urgency needed to deliver by 2035.

Net zero electricity is still possible by 2035 but needs a step change in approach. Government needs to work backwards from the target, based on credible deployment rates and lead times to recognise the vital actions it must take now to give industry a chance to deliver.

There have been recent signs that government is starting to react. For example, the Transmission Acceleration Action plan. This is welcome, but it needs to be recognised that the delays of the last 5 years will not be recovered easily. Some of the supply chain for clean technologies that the UK could have had has already been lost. The task now is to maximise what is still possible.

Importance of firsts of a kind

For new technologies, the first of a kind (FOAK) commercial scale projects are vital to de-risk those that follow. The sooner we can build and start to learn lessons from FOAK projects the sooner we can start to reduce costs, develop skills and grow supply chain capacity. Starting sooner also lowers the peak delivery rate needed to meet the targets.

One example is long duration energy storage. We will need at least eight TWh of long duration electricity storage by 2035 and tens of TWh by 2050. The main technology for this will be hydrogen stored in salt caverns. Drilling and conditioning a new salt cavern takes 5-10 years.

It is proposed to convert one existing salt cavern at Aldbrough to store hydrogen. This project would demonstrate the technology to investors, making future projects less challenging to finance.

However, the Aldbrough project did not meet the criteria for Hydrogen (Production) Allocation Round 1. It must now wait for government to develop a storage business model, a delay of at least 2 more years.

By 2035 we will need another 30 hydrogen storage projects the size of Aldbrough.

Competition for investment

The energy transition is global, and many countries are also ramping up deployment of clean energy technologies. There is fierce competition for existing supply chain capacity and for new investment.

When comparing the UK to its peers, a positive is the Climate Change Act and the mostly nonpartisan approach to climate change. However, remarks by individual politicians can undermine this reputation.

The UK is relatively poor at sending long term signals. One of the reasons the USA Inflation Reduction Act was so lauded was its 10-year time horizon, whereas UK policies and spending commitments typically last for only a single spending review cycle.

Match support to maturity for each technology

New industries face different challenges from mature ones, so need different support. The policy aim should be to encourage early projects and thereby capture more of the supply chain. As the technology matures, both industry and government can learn together. Learning by doing results in a better long-term model than government working out in isolation what a mature industry may need, while that industry is still in its infancy.

The pattern in the UK is for government to try to design a once-and-for-all support for a (future) mature industry and hope this will work for earlier stages. This results in a more complex model, delivered later, that is not appropriate to early needs.

Support often changes with time anyway. For example, Offshore wind began with NOFFO, then RO, then RO v2 then FIDER. The first CfD project was delivered after 38 predecessor projects and some 10GW of offshore wind capacity had been installed. Price discovery and deployment learning began under more direct subsidy systems. Our Hull factory investment was stimulated with the collaborative pipeline certainty of the pre-CfD system FIDER (final investment decision enabling for renewables.)

Growing existing industries

Key to growing supply chain capacity in established industries like offshore wind is to build on existing strengths; see [OWIC 2023 supply chain capability assessment](#) to which we contributed.

The investment case for a 'second' factory is different from capturing and growing the 'first'. Second factory decisions are more strategic and larger scale, with higher expectation of government funding.

Often more jobs and value are created through organic growth by a thriving sub-supply chain. Political focus on inward investment needs balance with growing or retaining companies already here.

Make it easy to do business here

The complexity of UK market models and the duration of key processes makes the UK a harder place to do business. There are more 'unknowns' when bidding multiple competing projects here than negotiating longer term deals for programmes elsewhere.

Now other countries are very active on net zero, the UK approach seems laboured by comparison. Combined with other factors, this can lead to international investors focusing their attention elsewhere.

People and skills

The UK has a longstanding shortage of STEM skills. Parts of our industry, such as offshore wind, are more attractive than most to new entrants, but, as a sector, we still struggle to attract sufficient talent. We need a new, sustained, and coordinated approach to education and training alongside other measures to grow a supply chain. Siemens Energy is represented on the Green Jobs Delivery Group and has been working with the Hydrogen Skills Alliance and Hydrogen UK on the skills and supply chain needs for hydrogen.

In December 2023, Hydrogen UK published its [Supply Chain Report](#) which is a good example.

The scale of the challenge means that even if the supply chain invests in additional capacity, we will need to use it more efficiently.

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

Move fast and *grow* things

Recognize the value of early projects for developing supply chains in new industries. The policy objective is to grow sooner and faster than elsewhere; to have an exciting pipeline of projects that can capture a supply chain.

Government should work with industry to deliver FOAK projects in parallel with developing enduring models and make the pipeline as visible and continuous as possible.

Hydrogen example

It has taken the UK nearly four years to develop a hydrogen business model that is widely seen as inappropriate for electrolytic hydrogen. Other countries used simpler models to start their projects sooner.

The result is that we are falling behind. Between 2020 and 2022, 460MW of projects (greater in size than 5MW) globally reached FID. A quarter of these were in Europe. Not one was in the UK. [Source: [Hydrogen Insights May 2023](#), Hydrogen Council, McKinsey & Company.]

The announcement of HAR1 in December 2023 is welcome. Unfortunately, none of the larger 'world scale' projects are included. The UK is now competing with larger projects in countries with more experience and simpler business models. The UK has missed the first mover position and will need to work much harder to create an attractive pipeline.

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 CfD is not the answer to everything, and it is the wrong answer for less mature technologies such as green hydrogen.

The private law 'contract' with a bankable counterparty is valuable. The 'difference' part is valid for wind farms producing electricity for sale into an established market. However, linking the Hydrogen Business Model to the price of natural gas adds another dimension of risk and complexity to an electrolytic hydrogen project, compared to a feed in tariff or tax credit available in other countries.

Further, the CfD auction process already causes significant issues for the wind supply chain. It delivers certainty of investment too late for large infrastructure commitment, imposes lengthy validity periods and makes workforce and factory planning difficult. Interaction with OFTO requirements creates further difficulties for grid connections and limits collaborative working with supply chains.

Proposals to introduce 'Sustainable Investment Rewards' to the CfD are well intended but difficult to deliver and could undermine the transparency of the CfD process. CfD changes are not sufficient. For industrial outcomes you need an industrial policy. We support the soon to be published [Industry Growth Plan](#) emerging from the Offshore Wind Acceleration Taskforce.

See Siemens Energy response to the [DESNZ Call for Evidence on introducing non-price factors into the Contracts for Difference Scheme](#) May 2023.

Investment in wider infrastructure

A key enabler for offshore clean energy is ports. With them factories, hubs, clusters, and centres of specialization can emerge especially for floating offshore wind. Without, that manufacturing will not come to UK and even the projects may be jeopardized. We are proud of our £500m investment with ABP in Green Port, Hull, but recognise that in this rapidly evolving sector, even this port now requires expansion. It is key to understand that investment like this is needed across our country's

network of ports to ensure they can handle offshore energy technologies, and requires to be a continuous process of investment and upgrade.

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

Not yet.

The UK's need for grid is part of a ramp up across Europe and beyond. The existing supply chain is starting to grow but will inevitably be constrained by capital and confidence. It takes time to train new people. It is unlikely that every country will get what it needs on time. The UK needs to make itself more attractive for supply chains.

Even then there will not be enough capacity to continue delivering in ways that suit others but push costs on supply chains. We need to deliver differently to enable whatever resource the supply chain can muster to deliver even more. This point is made by Nick Winser, Electricity Networks Commissioner in his recommendations: [Accelerating electricity transmission network deployment](#)

- Programmes not projects
- Standard solutions
- Collaborative working
- Early engagement
- Securing capacity early

The government response [Electricity networks: transmission acceleration action plan](#) was published in November. Although specific to onshore electricity transmission, similar changes will be required for other elements of the net zero electricity system.

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

Timely delivery of infrastructure projects is more vital for energy security than where the work was done.

Local supply chains can also improve resilience and contribute to energy security, but the main benefits are jobs, balance of payments, and rebalancing the economy.

We will still depend on international trade for some things – we don't have all the natural resources here. (see next answer)

Established energy technologies have mature supply chains that are complex and international. In many cases manufacturing has consolidated such that a handful of large factories now supply a whole continent.

E.g., the UK used to manufacture large power transformers at several sites. These devices weigh c100tonnes and cost c£100M and are vital building blocks for the national grid. HSPT (Walthamstow) closed in 2003 and Peebles (Edinburgh) closed in 2004. Today most large

transformers come to the UK from Europe and some from further afield. Future additional capacity could choose to locate anywhere in Europe, so the UK needs to be competitive for inward investment.

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

The availability of critical minerals is a known unknown. It is an issue that is both significant and being addressed. There will be other bottle necks that could emerge, for example, the Russian invasion in 2022 highlighted how reliant Europe was on transformer steels from Ukraine.

Ways to manage constraints include:

- Creating diverse supply chains
- Using ESG to protect from some risks
- Encouraging recycling
- Reducing quantities by improved design and manufacturing processes

As constraints arise, markets will respond at a speed they can manage. Availability will increase and substitutes will be found. This will take time and short-term shortages will likely happen. This will impact lead times.

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