Report prepared on behalf of

UK Government

Baringa

UK renewables deployment supply chain readiness study – 2026 update

Executive summary for industry and policymakers

Contents

UK RENEWABLES DEPLOYMENT
SUPPLY CHAIN READINESS STUDY

Executive summary

1. Executive summary

The *Clean Power 2030 Action Plan* sets out an ambitious and important objective to meet all electricity demand in Great Britain by 2030, with at least 95% of generation coming from low-carbon sources. Strong and resilient supply chains will be central to delivering this transition and will depend on continued close coordination between industry and government. There has been a reduction in supply chain risks since 2024, with further action needed to sustain momentum and deliver at scale.

This conclusion is based on an updated supply chain analysis of three renewable energy sectors, including offshore wind, onshore wind, and solar photovoltaics (PV). The previous study included the transmission and distribution network; however, this is excluded from the current study.

This study is based on interviews with 16 renewable energy developers and trade associations, as well as updated supply and demand modelling. The report builds on the 85 interviews with renewables developers, network operators, suppliers, and trade associations from the original renewable energy supply chain readiness study, first published in 2024.[1] Below is an overview of the key components across the three renewable energy technologies facing constraints in 2026.

1 Department for Energy Security and Net Zero, UK renewables deployment supply chain readiness study, 2024.

Overview of supply chain capacity considerations for key renewable components and installation services, informed by stakeholder interviews and supply-and-demand modelling

Supply chain risk	Offshore wind	Onshore wind	Solar PV
High	• **Turbines** ↑ • Floating foundations • Balance of plant (HVDC and HVAC stations) • Cable vessels • Ports	• Balance of plant (transformers, switchgear)	• Balance of plant (transformers and switchgear)
Medium-high	• **Turbine and foundation vessels** ↓ • **Export cables** ↓	• Turbines	
Medium	• **Monopiles and transition pieces** ↓ • **Towers** ↓ • Jackets • Array cables • **Civils** ↑	• Cranes and transport • **Civils (including foundations) and electrical** ↑	• Modules • **EPC design and installation** ↓
Medium-low		• Cables	• Racking • Cables • Inverters
Low			

Key: ↑ **More acute constraint than 2024** ↓ **Less acute than 2024**

Supply chain issues are most severe for the offshore wind sector

According to both interview participants and supply and demand modelling, the components facing the greatest capacity constraints are:

- Turbines.
- Floating foundations.
- High-voltage direct current (HVDC) cables and converter stations.
- Cable installation vessels and ports.

Compared to 2024, developers are increasingly concerned about turbine supply, though there remains limited data on manufacturing capacity to support this concern. It is also noteworthy that many turbine suppliers continue to face significant financial limitations across their offshore and onshore portfolios. This has the greatest impact on floating projects with which turbine Original Equipment Manufacturers (OEMs) are reluctant to engage due to their smaller size and greater commercial and technical uncertainty.

For onshore wind and grid-scale solar PV, supply chain constraints are less severe and largely unchanged since 2024, although planning and grid constraints were reported to have eased a little

The ongoing financial pressure on turbine manufacturers, as reported by interview participants, also raises concerns that they might reduce the number of turbine models offered in their onshore product portfolios, including the Class I-A models in greatest demand in the UK market.

Although securing planning consent and grid connections have reportedly become more prominent constraints, onshore wind and solar PV continue to face shortages of transformers and switchgear due to demand from the grid and industrial and commercial buyers.

All renewable energy sectors face skills-related constraints

According to developers, shortages remain particularly acute for design and commissioning engineers, project managers, and installation technicians. There is intense national and international competition for new and experienced hires with these skill sets.

National and international competition for components and installation services contributes to many supply chain constraints, although uncertainty in the offshore wind market has seen a slight easing of demand

This competition reportedly comes from other renewables sectors, as well as oil and gas, networks, and interconnectors, with suppliers likely to favour customers and markets offering the most certainty, the lowest cost to serve, and the best prices.

Offshore wind developers have highlighted an easing of short- to medium-term demand due to a combination of the withdrawal of two major UK projects, delays to Dutch auctions, and the lack of bids in Danish and German auctions. In addition, further demand reduction has arisen from economic and political uncertainty affecting projects in the USA, which would otherwise have been competing for components from many European suppliers in the short term. This has meant that most of the new US nacelle, blade, tower, monopile, and cable factories announced as part of the Inflation Reduction Act have been cancelled or failed to proceed to construction, potentially limiting supply in the mid- to long-term. This could, in turn, increase US reliance on European component imports, with knock-on effects for component availability within Europe.

Except for commoditised products such as onshore cable, conductors and solar modules, suppliers appear to remain unwilling to invest speculatively in new manufacturing capacity without a concrete pipeline of orders and sufficient certainty about the size of components to be manufactured and installed. This is most acute for offshore wind, where the projects are the largest and most heavily dependent on securing a financially viable Contracts for Difference (CfD) offer as the main route to market. Despite this, unlike in the USA, the majority of new and expanded factories announced in the UK and Europe since the last report have now entered or completed construction. Since 2024, this includes six new and eight expanded factories across cables (5 – 2 in UK), monopiles (4 – 1 in UK), nacelles (2), blades (1) and towers (3), with further blade and cable factories announced.

In addition, a major Chinese turbine OEM, Mingyang Wind Power, has announced potential factories across Europe, but these are subject to stringent legal and regulatory requirements and national security assessments.

Alleviating UK renewables supply chain constraints since the original 2024 study

Since the original study in 2024, the UK Government has announced several key industry initiatives, policy updates, and funding programmes:

- Increases to the Administrative Strike Prices for Contract for Difference (CfD) Allocation Round (AR) 7 for fixed-bottom offshore to £113/MWh, for floating offshore to £271/MWh, for onshore wind to £92/MWh, and for Solar PV to £75/MWh (in 2024 prices), with a total budget of £1.79bn, to reflect increases in input costs and the cost of capital. The capacity weighted average difference between AR7 Clearing and Administrative Strike Prices was 18%.
- The publication of the UK's Modern Industrial Strategy and the UK Government's mission to "Make Britain a Clean Energy Superpower", outlining the vision to boost innovation, skills, and infrastructure by doubling investment levels into clean energy industries to over £30bn per year by 2035.
- The introduction of the Clean Industry Bonus to encourage sustainable offshore wind supply chain investment (and consultation on its potential introduction for onshore wind and to expand the policy to include skills development and workforce protection).
- £1 billion of offshore wind supply chain investment support, consisting of £300m grant funding from Great British Energy, £400m investment from The Crown Estate and £300m industry investment from the Industrial Growth Plan, and a further £700m in clean supply chain investment from Great British Energy.
- The Clean Power 2030 Action Plan and connections reform to accelerate delivery.
- The lifting of the de facto ban on onshore wind in England.
- The publication of the Clean Energy Jobs Plan, which aims to provide greater certainty for employers to invest in skills, training for a pipeline of skilled workers, routes for existing workers to transition into clean energy and high-quality jobs across all nations and regions.
- The establishment of the Onshore Wind Council (formerly Onshore Wind Taskforce) and the Solar Council to support the acceleration of onshore wind and solar PV delivery through industry collaboration and Government-backed initiatives.
- Beyond this, there are further opportunities for standardisation and collaboration across developers, network operators, and suppliers.
- Additional measures include an increase in the Nationally Significant Infrastructure Project (NSIP) threshold for energy projects from 50 MW to 100 MW, effective from January 2026, reducing planning complexity for medium-scale developments.
- Examples of devolved industry support mechanisms include the Welsh Government's £10m renewable energy capital grant programme (2025) and a Scotland-wide offshore wind supply chain support programme, Fit For Offshore Renewables (F4OR), re-launched in 2026 (F4OR was first established in 2019).

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UK RENEWABLES DEPLOYMENT SUPPLY CHAIN READINESS STUDY

Executive summary

Introduction

Offshore wind

Onshore wind

Solar PV

Spotlight on skills requirements

Conclusion

2. Introduction

This is an update to the original 2024 study, which outlined a series of measures to build a more self-sufficient British energy system, enhance the UK's energy security, and accelerate progress towards net zero.

The 2024 report found a limited global pool of suppliers and fierce competition for materials and personnel – not only between sectors but also with European markets, where increasingly ambitious renewable energy targets were driving demand.

Clean Power 2030

The new UK Clean Power 2030 mission is a commitment to fully clean electricity by 2030, with 95% of generation coming from low-carbon sources. This target represents one of the most ambitious clean power goals globally and sits at the heart of the UK Government's strategy to strengthen energy security, and stimulate industrial investment. The Clean Power 2030 Action Plan, published in late 2024, sets out a detailed pathway for transforming the electricity system, including record renewable deployment and major grid upgrades.

Furthermore, the Government's wider decarbonisation pathway is now anchored in the statutory carbon budget framework. In 2021, the Sixth Carbon Budget set a legislated target of a 78% reduction in emissions by 2035 (from 1990 levels). The subsequent Carbon Budget and Growth Delivery Plan (2025) outlines how the UK intends to achieve this trajectory, including updated sectoral pathways and cost assessments.

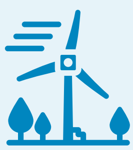
Securing UK renewable energy and network supply chains

Against this background, the Department for Energy Security and Net Zero (DESNZ) has re-commissioned Baringa to update its in-depth investigation and analysis of the supply chains for key renewable technologies, both nationally and internationally. The purpose is to reassess potential supply chain constraints that the UK must address to achieve its updated deployment objectives.

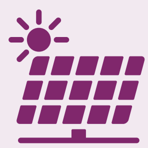
The methodology for our analysis

The Baringa study re-assesses the three main supply chains that support UK renewables deployment:

Offshore wind, including floating offshore wind



Onshore wind



Ground-based and commercial rooftop solar PV

We focused on the manufacture, assembly, and installation of components, accounting for the international nature of supply across the UK, Europe, and the US. Our updated scope of work excluded transmission and distribution grid connection processes, land and planning, development and survey work, operations and maintenance, decommissioning, and regulatory compliance.

In addition to undertaking targeted desktop research, including a review of recent industry publications and news, 16 additional semi-structured stakeholder interviews with major UK-based developers and trade associations that participated in the first study have been conducted. These interviews enabled us to update and build upon the insights gathered through the original 85 interviews, which spanned renewables developers, network operators, component and installation suppliers, and trade associations.

These helped us understand:

- The components and services facing the greatest constraints.
- Potential root causes of those constraints.
- The UK's attractiveness to suppliers (as a customer base and potential manufacturing location).
- Potential industry actions and policy opportunities to address the constraints.

We also updated quantitative modelling of supply and demand for:

- Offshore wind components and installation services in the UK, Europe, and the US.
- Selected onshore wind components in the UK and Europe.
- Polysilicon that has not been produced in Xinjiang, to assess the availability of forced labour-free material for global solar PV deployment.

Then, we validated the constraints and opportunities through review with DESNZ and one roundtable with offshore wind stakeholders.

This report summarises our findings

This report gives a summary of the updated constraints, contributing factors and root causes, and recent Government announcements – as well as potential industry opportunities for addressing them. We look at the three supply chains and then shine a spotlight on skills, which is a common issue for all of them.

UK RENEWABLES DEPLOYMENT SUPPLY CHAIN READINESS STUDY

Executive summary

Introduction

Offshore wind

Onshore wind

Solar PV

Spotlight on skills requirements

Conclusion

3. Offshore wind

Offshore wind faces the greatest supply chain constraints of all the technologies within the scope of this study. This is most severe for the supply of floating foundations, HVDC cables and converter stations, all types of installation vessels, and – because of the financial vulnerability of turbine manufacturers – the turbines themselves. Key constraints include:

Offshore wind	Supply chain risk		
	High	Medium-high	Medium
	• **Turbines** ↑ • Floating foundations • Balance of plant • Cable vessels • Ports	• **Turbine and foundation vessels** ↓ • **Export cables** ↓	• **Monopiles and transition pieces** ↓ • **Towers** ↓ • Jackets • Array cables • **Civils** ↑

Multiple contributing factors for these shortfalls were reported across the interviews, including UK offshore wind projects competing for components with European electricity networks, interconnectors, and the oil and gas sector. Until recently, suppliers have been reluctant to invest in new capacity amid uncertainty about increasing component sizes for manufacture and installation, and whether there will be a sufficient pipeline of profitable, committed customer orders. This reflects the persisting uncertainty faced by their developer customers, such as securing planning permission, grid connections, and a sufficiently profitable route to market via the competitive Contract for Difference (CfD) auction and equivalent European schemes. UK and European suppliers are also facing strong competition from Chinese suppliers, which often have access to lower-cost, subsidised steel.

Participants highlighted that new UK Government policies could address some of these barriers. These include:

- Increases to the Administrative Strike Prices for Allocation Round (AR) 7 to reflect increases in input costs and the cost of capital.
- The introduction of the Clean Industry Bonus to support sustainable offshore wind supply chain investment.
- £1 billion of offshore wind supply chain investment support, consisting of £300m capital grant funding from Great British Energy, £400m investment from The Crown Estate to support new infrastructure and £300m industry investment from the Industrial Growth Plan.
- Great British Energy will invest a further £700m in clean supply chain investment within this Parliament.

Component overview

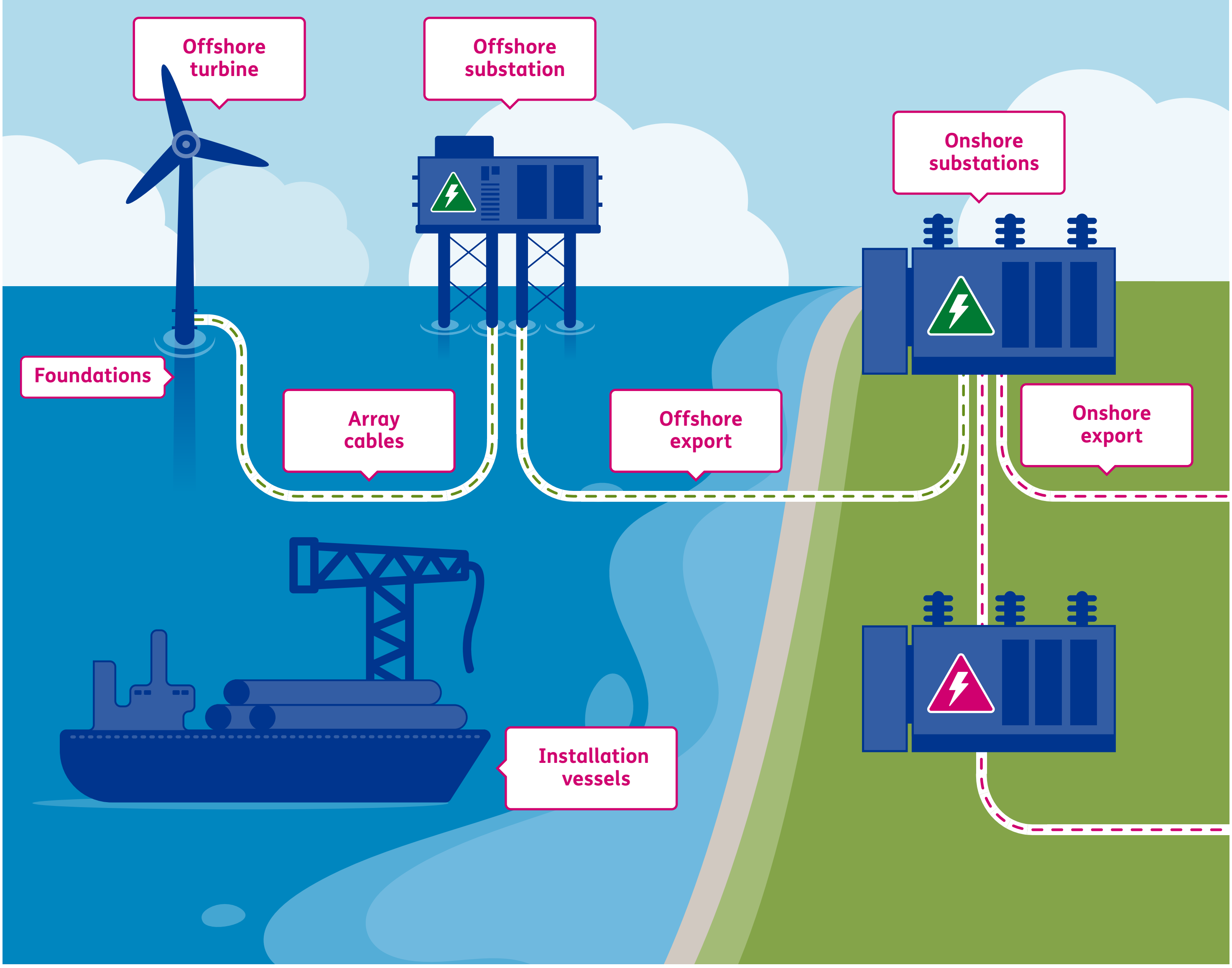
Offshore wind farms consist of turbines mounted on either fixed or floating foundations.

Array cables connect the turbines to an offshore substation or converter station.

Offshore and onshore export cables then connect to a final onshore substation or converter station, which provides access to the national transmission network.

Key elements of the offshore wind supply chain:

- Turbines and towers.
- Fixed and floating foundations.
- Array and export cables.
- Substations and converter stations.
- Foundation, turbine, and cable installation vessels.
- Ports.



3.1 Supply chain constraints

The following analysis is based on updated interviews with developers active in the UK as well as the original interviews with UK and international suppliers and developers, combined with updated modelling of demand and supply across the UK, Europe, and the Eastern US. Given the regional clustering of offshore wind supply chains the Asia-Pacific cluster has been omitted from the modelling given its inability to address the UK market.

Both demand and supply modelling rely on a wide range of assumptions and are subject to significant uncertainty. For each component, we highlight key modelling assumptions, confidence in supply data, and consistency between the modelling and interview findings. The supporting commentary highlights the potential shortfall levels as minor (<25%), significant (<50%), or severe (>50%) across these markets.

We do not attempt to estimate how much supply the UK could secure in the face of international competition, as this will depend on difficult-to-model and access factors, such as demand certainty, suppliers' cost-to-serve, and developers' ability and willingness to offer the most attractive prices.

Reduced competition between turbine manufacturers

We did not re-interview turbine manufacturers, as during our original study, they were unwilling to share manufacturing capacity data (which they consider highly commercially sensitive). However, multiple developers expressed concern about reduced competition and supply across the major European and US manufacturers (GE, Siemens Gamesa, and Vestas).

Financial limitations across the offshore wind portfolio were commonly reported for the 2024 report. The financial performance of the OEMs is slowly improving, thanks in part to:

- Higher turbine prices aligned to ongoing increases in input costs, reflected in higher CfD Strike Prices.
- Strong demand for components, driven by successful CfD auctions.
- Lower competition as GE Vernova is exiting the UK market.
- A potential slowing of the 'turbine size race', which previously reduced product lifecycles, led to increasing investment in new product development, and both delayed and shortened high-volume serial production, which profitable sales rely on. The market appears to have consolidated around the 15 MW market for the time being, although SGRE are testing a 21.5 MW model.

Floating developers are arguably most impacted by the changes in the turbine market, with OEMs reluctant to engage given the higher technical and commercial risk they present. In particular:

- It is unclear to what extent turbines need customising due to the movement inherent in floating substructures. This entails greater loads at the tower-foundation interface and on the rotor and may require changes to the tower design, hydraulics and controls and affect component reliability and lifetime. Some developers stated dedicated floating turbine designs are being developed, whilst others maintain that only control software changes are needed.
- The O&M model for floating turbines is also uncertain, particularly for major component exchange. It is likely that this will require tow back to port, which is costly, subject to weather disruption and can expose the turbine to high loads. Component exchange at sea would be preferable for developers but may be less feasible for direct drive turbines as these have heavier components than geared models. As a result, some OEMs are seeking to exclude O&M from their Turbine Support Agreements.
- The demand for the fixed-bottom market is sufficient to fill order books, and projects are larger in MW/GW, representing more attractive incentives for OEMs to invest resources in FEED studies, compared to FLOW.

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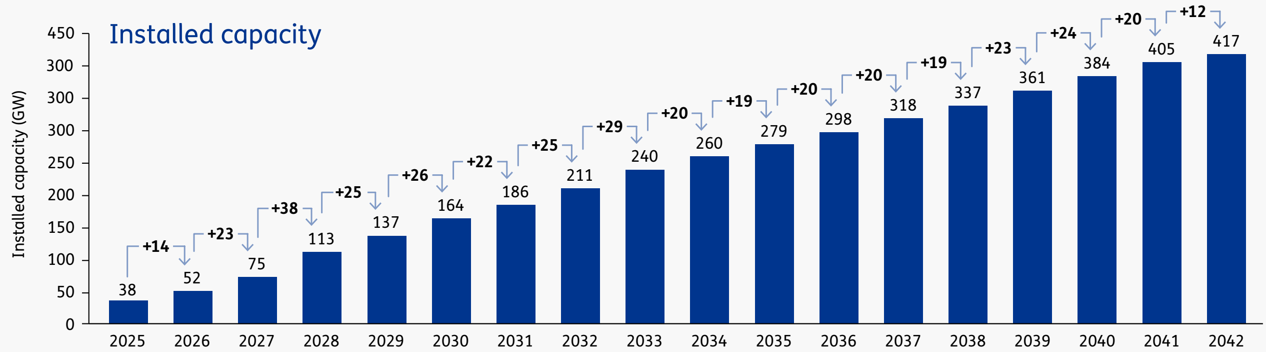
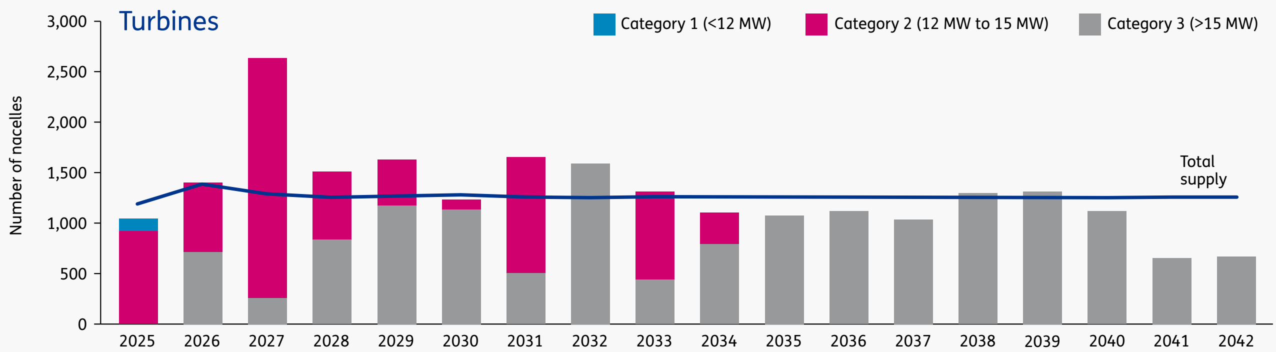
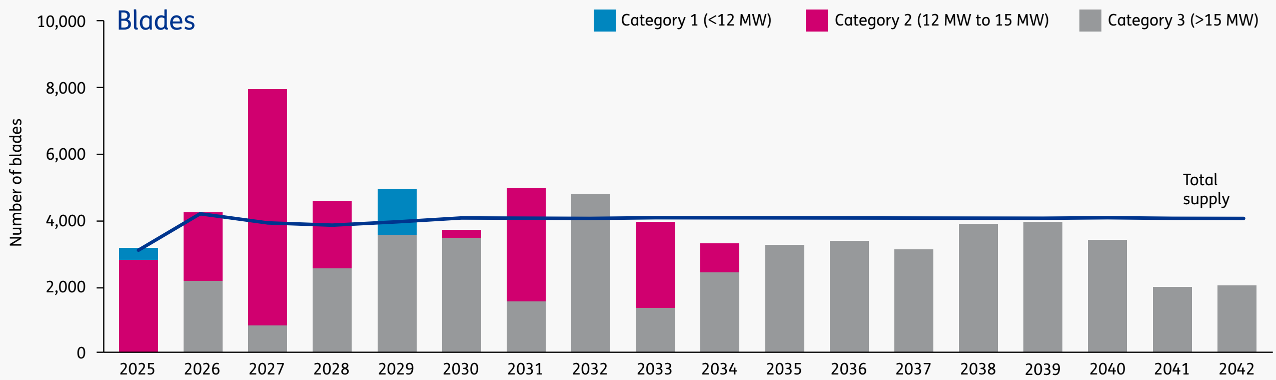
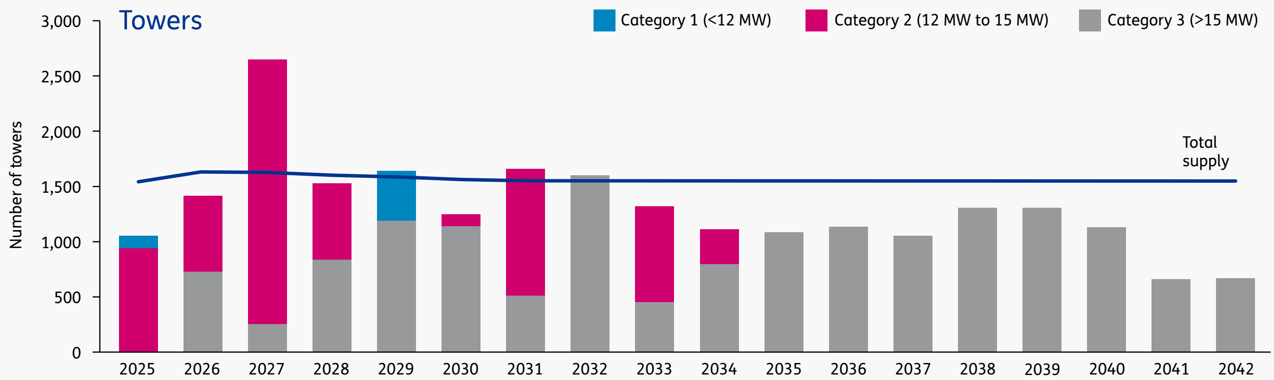
Estimated turbine, blade, and tower demand and supply: UK, Europe, and Eastern US









Estimated turbine, blade, and tower demand and supply: UK, Europe, and Eastern US (continued)

Capacity constraints

- **Blades and nacelles:** severe shortfall in 2027 due to a spike in demand, caused by the European 2030 installation targets. After 2027 there are intermittent minor shortfalls thereafter.
- **Towers:** severe shortfall in 2027 due to a spike in demand, with intermittent minor shortfalls thereafter.
- **Note:** Installation demand (the annual increase in installed capacity) doubles in 2028, causing a spike in turbine orders in 2027. This is due to significant demand from Poland in 2028.

Confidence in supply data

- Turbine suppliers did not share or publish factory capacity, and there are limited third-party sources, so this is challenging to assess.

Consistency with interviews

Model optimistic: assumes financial recovery and no scaling back of Western OEMs in Europe.

Modelling notes:

- Installed capacity is based on public offshore wind deployment targets for the UK, Europe, and Eastern US; the profile for the UK is drawn from the Dynamic Dispatch Model (DDM) Planned Scenario, and for Europe and Eastern US it is based on the Baringa Central Reference Case.[2]
- Component demand is 'offset' by one to three years before installation (varying by component) to reflect build schedules.
- Split by Category 1 (<12 MW), 2 (12-15 MW), and 3 (>15 MW) turbines using the annual profile for relevant regions until 2037. After this, it is assumed all WTG demand will be for Category 3.
- Assumes a Category 3 turbine nacelle uses 15% more manufacturing capacity than a Category 2.
- Assumes a Category 3 turbine blade uses 15% more manufacturing capacity than a Category 2 (30% length increase is partly offset by manufacturing efficiencies).
- Assumes a Category 3 turbine tower uses 30% more manufacturing capacity than a Category 2 (30% length increase requires 30% more cans; manufacturing efficiencies offset the diameter increase).

2 European Commission, News announcement: Member States agree new ambition for expanding offshore renewable energy, 19 January 2023.

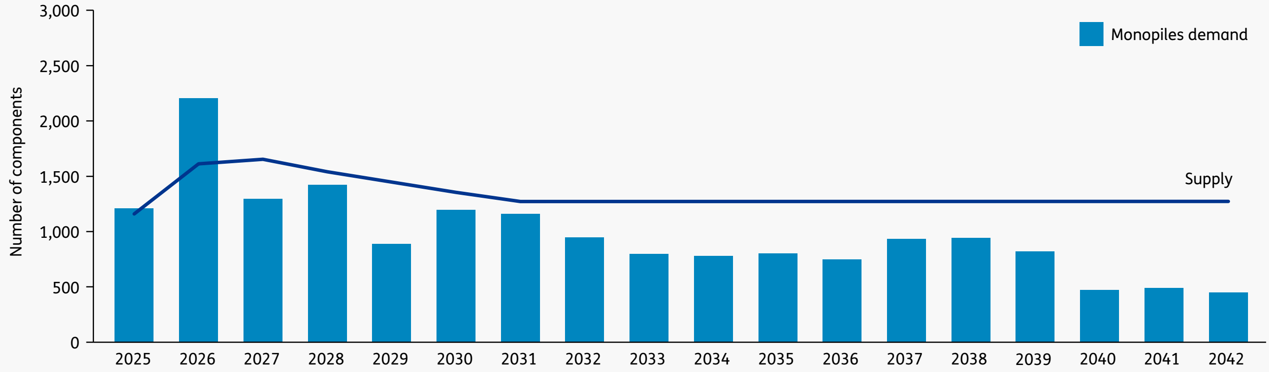
Improvement in monopile supply but ongoing lack of a floating supply chain

According to interviews and modelling, monopile availability has been improving as a result of short term reductions in demand discussed earlier, and the opening of new and expanded factories (one of which had not been announced at the time of our original study). In addition, a number of Chinese manufacturers have supplied or are competing to supply UK and European projects. Only three to five steel mills globally can provide the widest, thickest, thermo-mechanically rolled heavy steel plates – for which there remains very limited availability. There is concern that Chinese monopile suppliers have access to lower cost steel than their European counterparts.

Currently, there remains no established floating supply chain, and the existing (limited) manufacturing capacity can only deliver for small-scale pilot projects. Despite this, there are some encouraging developments:

- Whilst uncertainty remains over which floating foundation concepts will ultimately dominate, and with transitional water depths still potentially serviceable by fixed turbines, there is a growing convergence among developers around triangular steel semi-submersible designs. However, this may reflect what is available rather than what is optimal for the FLOW market.
- There are also several credible candidate UK ports for floating assembly and integration, including Cromarty Firth, Ardersier and Nigg in Scotland, and Port Talbot and Bristol for the Celtic Sea. Cromarty Firth already received a £55m UK Government grant for a port expansion, while Port Talbot will also receive floating offshore wind support.

Estimated monopile demand and supply: UK, Europe, and Eastern US



Capacity constraints

- Significant shortfall in 2026 due to spike in demand, sufficient capacity thereafter.
- Capacity falls as demand shifts to foundations for larger turbines.

Confidence in supply data

- Many foundation suppliers publish factory capacity.

Consistency with interviews

Consistent: Interviewees noted improvements in monopile capacity.

Modelling notes

- Split by depth to inform foundation choice, using the annual profile for relevant regions until 2030. After this, the average is applied.
- Assumes a Category 3 turbine monopile uses 30% more manufacturing capacity than a Category 2 (monopiles are 30% heavier, a combination of greater length and larger diameter, with heavy plate limiting manufacturing efficiencies).

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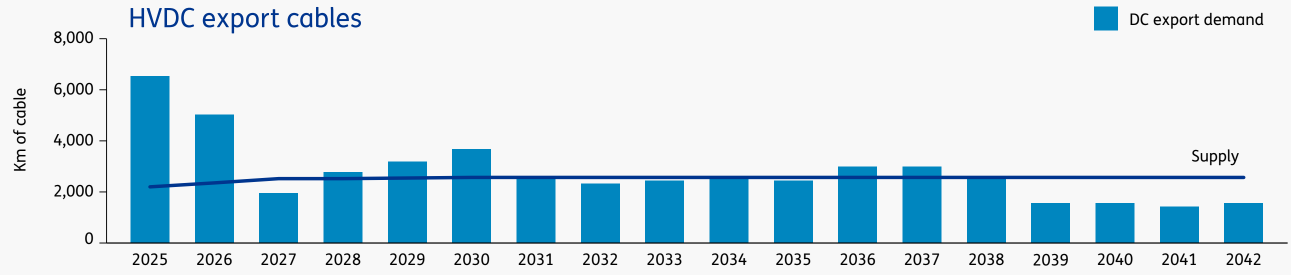
HVDC cable shortages

Constraints around high-voltage direct current (HVDC) export cable have eased slightly due to investment in new manufacturing plants in Europe and Asia. Lead times remain lengthy – and modelling suggests they cannot meet the combined demand from offshore wind, grid, and interconnectors.

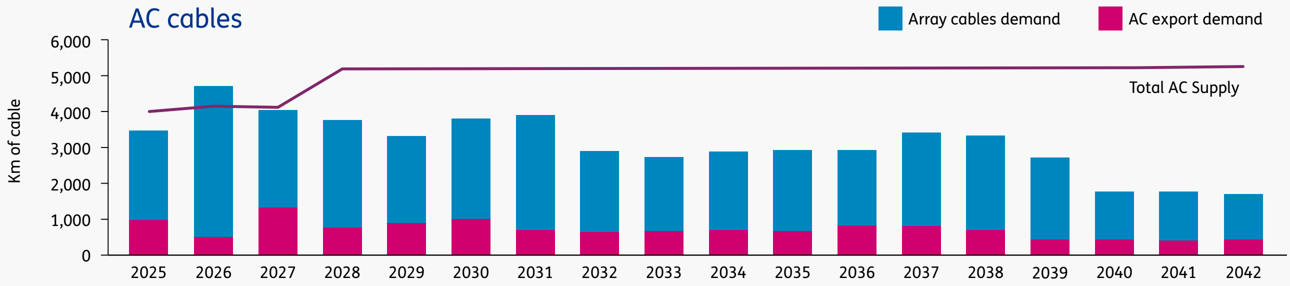
Other offshore wind markets have a more centralised approach to procurement than the UK. For example, interviews still highlighted that the Netherlands and Germany have TenneT, which promotes standardisation and has the purchasing power to secure a significant share of supply.

Estimated export and array cable demand and supply: UK, Europe, and Eastern US

HVDC export cables



AC cables



Capacity constraints

- Severe HVDC shortfall in 2025–26.
- Intermittent minor HVDC cable shortfalls thereafter (significant in 2030).
- Sufficient HVAC cables throughout and just one year with a minor shortfall of array cables in 2026.

Confidence in supply data

- Good third-party sources on cable supplier capacity.[3]

Consistency with interviews

Model optimistic for HVDC: Interviewees were concerned about availability and increasing competition.

Modelling notes

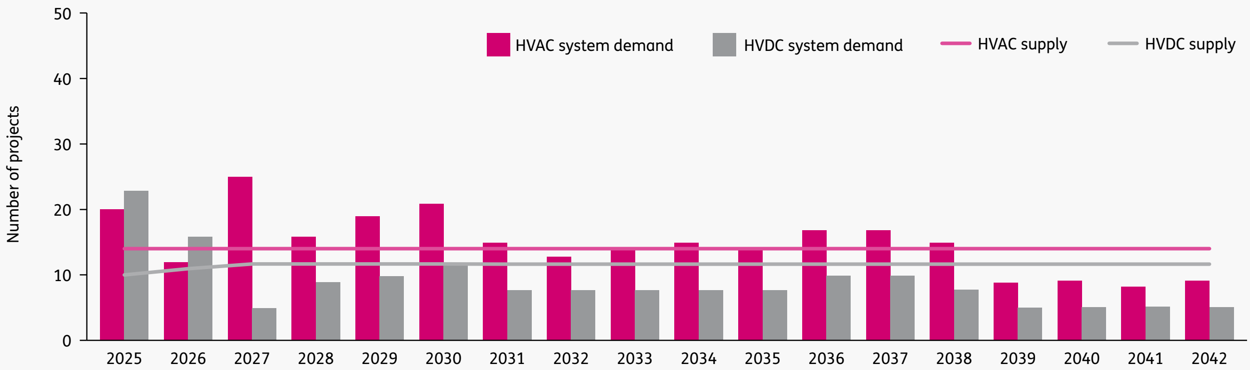
- Split by distance from shore to inform export cable choice using the annual profile for relevant regions until 2030. After this, the average is applied.
- Export cable length is based on 1.5x distance from shore, with HVDC used for lengths >80 km.
- Array cable length is based on 7x turbine rotor diameter.
- Average windfarm is ~895 MW; HVDC export cable pair is rated at 1,400 MW.
- 50% of HVDC and 90% of HVAC supply is used by offshore wind; the remainder is shared by interconnectors and the grid.

3 Informed by analysis of TGS, 4COffshore's Offshore Transmission and Cables Intelligence Database.

Shortage of balance of plant components

Developers continued to report long lead times for HVDC and, to a lesser extent, high-voltage alternating current (HVAC) stations. This is because there is not enough manufacturing or test capacity for key components like transformers and converters. As with HVDC cables, there is significant competing demand from offshore grids, interconnectors, and TenneT's centralised procurement. In addition, there is a lack of engineers for design and commissioning, which is complicated by bespoke designs as assets are value engineered to ensure full recovery of costs when sold to Offshore Transmission Owners (OFTOs). Developers remarked that significant design work is needed during the tender process, leading some suppliers to refuse to participate in competitive tenders unless they are streamlined.

Estimated HVDC and HVAC system demand and supply: UK, Europe, and Eastern US



Capacity constraints

- HVDC severe shortfall in 2025, significant shortfall 2026, after which capacity improves through increasing engineering resources and standardisation.
- HVAC intermittent significant and minor shortfalls up to and including 2038.

Confidence in supply data

- Suppliers did not share / do not publish factory capacity data, so this is difficult to estimate and has not been updated since our original study. Analysis is based on the number of projects supplier design teams can support.

Consistency with interviews

Model is optimistic for HVDC and pessimistic for HVAC: Interviewees were most concerned about availability and lead times for HVDC due to their greater significance in the UK.

Modelling notes

- Split by distance from shore to inform export cable choice using the annual profile for relevant regions until 2030. After this, the average is applied.[4]
- Export cable length is based on 1.5x distance from shore, with HVDC used for lengths >80 km.
- Average windfarm is ~895 MW; HVDC export cable pair is rated at 1,400 MW.

4 H-BLIX, PWEA, and WindEurope, Offshore Wind Vessel Availability Until 2030: Baltic Sea and Polish Perspective, June 2022.

Vessel shortages

Operators anticipate a global vessel shortage in the next one to three years, particularly for those suitable for the largest turbines and foundations. Since our original modelling based on WindEurope's[5] analysis and additional desk research, the number of vessels capable of installing foundations exceeding 2,500 tonnes has increased from 6 to 15 (although those with the highest lifting capacity may also be in demand for installing offshore platforms), and the number capable of installing turbines over 15 MW has increased from 16 to 21. This may be a highly optimistic analysis for foundations, which could exceed 3,000 tonnes.

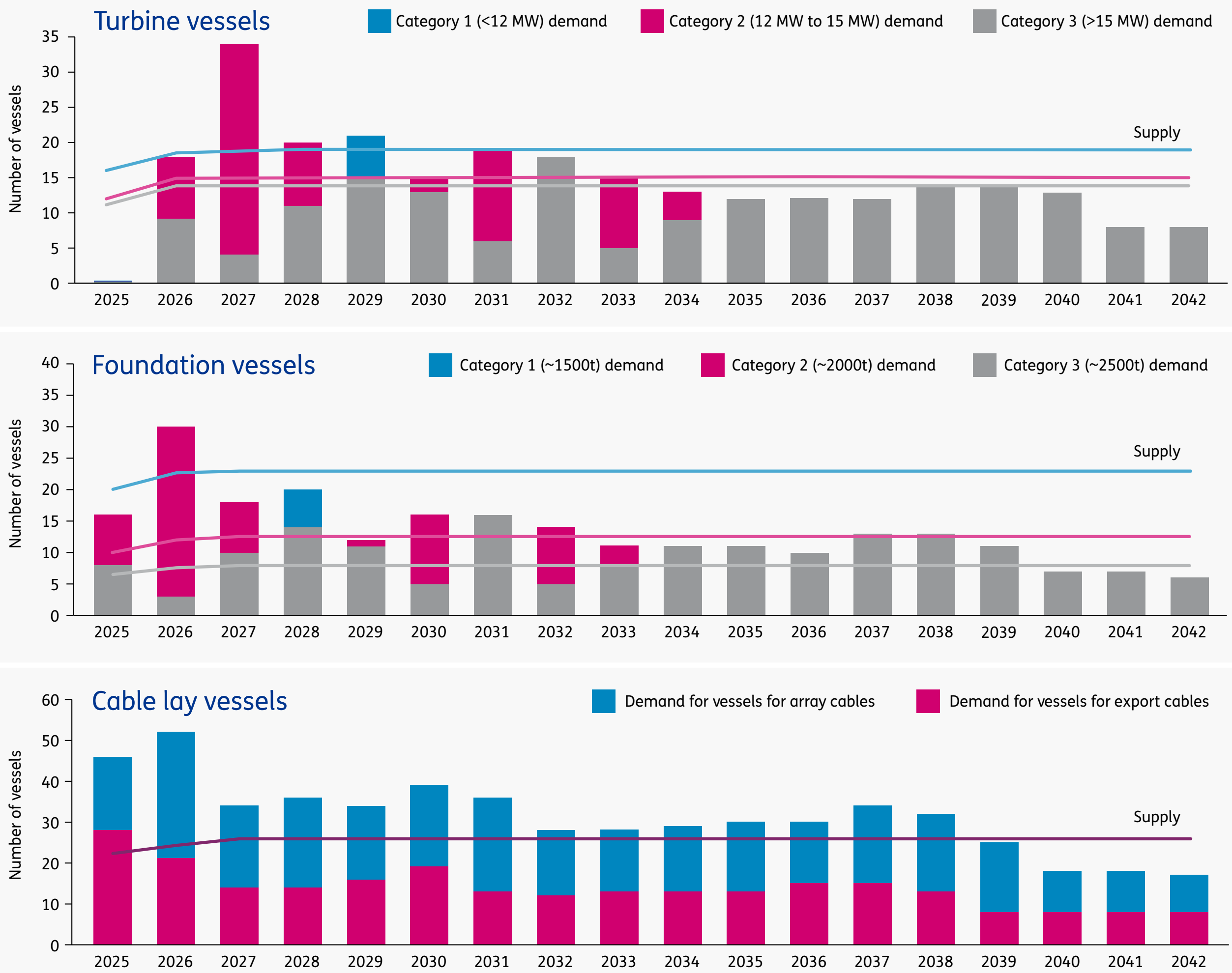
As crane ratings are based on capacity at a 30-metre boom extension, which may be insufficient for monopile installation, one operator claimed in our original study that only five to seven vessels would be able to install foundations for 15 MW turbines by 2025, and only two vessels on the market could install the very largest turbines. We previously reported only a single Japanese foundry supplies the largest hammers for monopile pile driving, which were limited to an 8-metre diameter. Since our original study, however, hammers suitable for 11-metre diameter monopiles are now available.

A final factor contributing to vessel shortages is that, although 270 installation days are expected per vessel, in reality it is much lower. It can take two to three months to change mission equipment and sea fastenings.

There is a similar shortage of cable installation vessels driven by increased demand from offshore wind, interconnectors, and offshore grid.

5 H-BLIX, PWEA, and WindEurope, Offshore Wind Vessel Availability Until 2030: Baltic Sea and Polish Perspective, June 2022.

Estimated turbine, foundation, and cable installation vessel demand and supply: UK, Europe, and Eastern US



Capacity constraints

- **Turbine vessels:** Severe shortfall for Category 2 in 2026-28 and significant shortfall in 2031.
- **Foundation vessels:** Severe shortfall for Category 2 in 2026-27 and severe shortfall during 2027 peak. Intermittent significant shortfalls for Category 2 and 3 up to 2032 and 2038 respectively. Category 3 has frequent minor shortfalls until 2039.
- **Cable vessels:** Severe constraints expected up to and including 2026, intermittent significant and minor constraints thereafter up to and including 2038.
- Initial surplus of small turbine and foundation vessels, which become redundant.
- New turbine vessels become available from 2028.

Confidence in supply data

- Good third-party sources on vessel fleet except for uncertainty around installation rate and for foundations' 'real-world' lifting capacity.

Consistency with interviews

Consistent: Reflects concerns about availability of all vessel types.

Modelling notes

- Assumes turbine and foundation vessels are dedicated to offshore wind.
- Turbines and foundations are assigned to the most appropriate vessel based on hook height and crane capacity.
- Where vessels are capable of installing either component, their capacity is split 50/50.
- 70% of vessel capacity is used by offshore wind; the remainder is shared by interconnectors and the grid.
- A scaling factor of 0.65 has been applied to the crane loads to represent a more realistic capacity view.

Lack of port infrastructure and investment strategies

Although not modelled, according to the interviewees, the UK is still facing a shortage of deep-water port capacity, which puts offshore wind asset deployments at risk. To meet expected fixed and floating demand, significant and well-coordinated investment is required to increase quayside and laydown area size and load capacity, as well as channel depth and width. This is particularly critical for floating offshore wind due to the larger dimensions of floating foundations. Offshore wind will also be competing for port capacity with projects decommissioning and constructing offshore oil and gas infrastructure.

There has been progress on ports since our original study, with several credible candidates for floating assembly and integration – including Cromarty, Ardersier and Nigg in Scotland and Port Talbot and Bristol for the Celtic Sea. The UK Government has also announced over £55 million in grant funding for the Port of Cromarty Firth, as well as up to £80 million of investment to develop new port facilities to support floating offshore wind activity at the ports.

3.2 What causes those constraints – and potential opportunities to address them

Competition from grid, interconnectors, and oil and gas

Interviewees noted significant competition with other industries for key components and installation vessels, notably:

- Jacket foundations, topsides, and umbilical cables (oil and gas).
- HVDC export cables and converter stations (interconnectors and offshore grid).
- Substations (grid).
- Heavy lift and cable vessels (oil and gas, interconnectors, and offshore grid).

When demand is high relative to supply, suppliers tend to focus on customers and markets that offer strong price signals, scale, and efficient delivery. This highlights the importance of aggregating demand and maintaining project attractiveness for individual UK offshore wind developments.

Potential industry opportunities for becoming more attractive to suppliers

- Developers, transmission operators, and suppliers could standardise designs for offshore grid connections. This would reduce the engineering workload for tendering and delivery. This is now happening to an extent with convergence around 1.2 GW and 2 GW (the latter the TenneT standard).
- Developers could streamline and coordinate procurement with transmission operators to aggregate demand across multiple projects, underpinned by a suitable regulatory framework. Care would be required to ensure dependencies were not created between projects, and that cancellation or delays in one project would not affect others.

Lack of funding for anticipatory investment

Although capital is available, interviewees noted component suppliers, vessel operators, and ports hesitate to invest ahead of committed customer demand – they view it as high risk. The risk is more severe when suppliers rely on a relatively small number of large projects, as with offshore wind.

Recent UK Government announcements for encouraging anticipatory investment

- The introduction of the Clean Industry Bonus to support sustainable offshore wind supply chain investment.
- £1 billion of offshore wind supply chain investment support, consisting of £300m capital grant funding from Great British Energy, £400m investment from The Crown Estate to support new infrastructure and £300m industry investment from the Industrial Growth Plan.
- Great British Energy will invest a further £700m in clean supply chain investment within this Parliament.

The CfD process has disincentivised collaboration

The highly competitive nature of CfD auctions has discouraged collaboration among developers in areas such as supplier development and procurement of components, including HVDC converters and floating foundations. It would also apply to merchant projects, absent a CfD mechanism. This can reduce the forward visibility of demand for elements of the supply chain and make it harder to aggregate demand to underpin investment cases for new factories and ports.

Specific initiatives to improve collaboration in supply chain development could help mitigate the competitive dynamics of CfD allocations.

Potential industry opportunities for reducing margin pressure and fostering collaboration

- Developers, ports, and floating foundation manufacturers could collaborate more on aggregating demand and agreeing on shared designs and manufacturing locations. This has happened to a limited extent through the ScotWind Strategic Investment Model initiative.

Uncertainty around CfD success and alignment with procurement timelines

Auction-based processes (such as the CfD and equivalent European schemes) are competitive by nature, which means developers do not know whether they will secure a route to market in any given round. Interviewees noted developers are reluctant to commit to contracts until after the CfD award, which means suppliers generally hold off investing where additional capacity may be required. Then, there may not be enough time to build new factories or vessels before they are needed for construction. Following the absence of offshore wind bids in AR5, AR6 awarded c. 5.34 GW of offshore wind capacity (c. 4.9 GW fixed-bottom and 0.4 GW floating), supported by an uplift in the fixed-bottom administrative strike price (price ceiling) to £102/MWh and the floating strike price to £245/MWh (2024 prices); however, awarded fixed-bottom projects cleared below this ceiling at £75.56/MWh to £82.02/MWh (2024), while the floating project cleared at £194.97/MWh (2024).

Furthermore, the CfD process fixes the price for offtake at a point in the development lifecycle when not all project costs have been fixed. In a world of elevated and volatile input costs and interest rates, project margins have reduced – and without sufficient management of these risks, some projects may fail. This, in turn, can limit what generators can pay for key components – squeezing supplier margins.

The solution to CfD timing is not simple. An earlier award would increase developers' confidence to place orders but would exacerbate the aforementioned margin risk due to greater cost uncertainty ahead of the final investment decision (FID) and construction. If this risk cannot be effectively managed between developers and suppliers, there is an increased risk of project failure. Furthermore, changing the timing of UK CfD auctions can increase project cost uncertainty at the point of bidding. Developers are likely to reflect this higher uncertainty by incorporating larger risk premia into their strike price bids, thereby increasing the overall cost of support and, ultimately, costs to consumers.

Experience from the last few years has meant all parties are more attuned to what commodity and interest rate risks they face – and how those risks should be managed.

Recent UK Government announcements and potential industry opportunities for reducing CfD-related uncertainty

- Government significantly increased the Administrative Strike Prices for AR7 (equivalent to £113/MWh in 2024 prices) and provided flexibility to increase the CfD budget if there is a strong pipeline, meaning individual projects are more likely to secure routes to market.
- Developers could explore alternative routes to market, such as combining one or more corporate power purchase agreements (PPAs) with a CfD for part of the capacity.
- The CfD contract length has been extended from 15 to 20 years.

Wider policy and regulatory uncertainty

Overall, interview participants highlighted that uncertainty around regulation, planning consent, and grid connection contributes to further risk for developers and suppliers across the value chain, worsened by the breakdown in the cross-party consensus on Net Zero since 2023.

The current UK framework does not yet provide a fully integrated, long term deployment plan that clearly links capacity targets with key delivery processes such as seabed leasing, consenting, and CfD budget allocation, although this is expected to be partially addressed through the Strategic Spatial Energy Plan.

In addition, beyond the Clean Power 2030 ambition to decarbonise the power system by 2030, there is limited clarity on post 2030 deployment trajectories. Existing long-term signals are largely confined to an indicative 2050 capacity range of 96–103 GW, derived from NESO's 2025

Future Energy Scenarios under net-zero-aligned pathways. This creates some uncertainty around longer-term demand visibility for components, with potential implications for sustaining manufacturing and installation capacity over time.

Recent UK Government announcements for reducing policy and regulatory uncertainty

- Government's *Strategic Spatial Energy Plan (SSEP)* will support a more actively planned approach to energy infrastructure across England, Scotland and Wales, land and sea between 2030 and 2050. It will do this by assessing and identifying the optimal locations, quantities and types of energy infrastructure required for generation and storage, as well as relevant hydrogen assets, for GB, to meet our future energy demand with the clean, affordable and secure supply that we need.

Components are getting bigger, and technology is developing rapidly

Rapid technology development timeframes place significant pressure on supply chains. In particular, the 'turbine size race' has effects that cascade through the supply chain, as noted by many interviewees.

Vessel operators must upgrade or replace their vessels. Turbine blade and foundation manufacturers must upgrade their factories to accommodate larger components. Shorter product lifecycles shorten serial production, which manufacturers rely on to optimise costs and maximise output and profitability. And more frequent product launches increase development costs and the risk of reliability issues, which can further erode margins.

This has stabilised to an extent since our original study, with financial pressures on turbine OEMs slowing the development of larger turbines, resulting in some convergence around 15 MW capacity. However, this may be temporary as larger models have been announced for testing by a number of OEMs. It is possible this would be less disruptive for floating than fixed wind projects, as the former avoid the need for monopile fabrication and for foundation and turbine installation vessels, which are most impacted by size increases.

Potential industry opportunities for reducing technology risks

- Developers and suppliers could enter a voluntary moratorium on further increases in turbine capacity or tip height (a 'turbine size cap'). This would reduce disruption to suppliers and vessel operators and improve profitability and reliability. It is likely this would need to include both the UK and European markets to be effective. Although this could impact the overall trajectory of the levelised cost of electricity. The Dutch NWEA has proposed a North Seas Standard[6] along these lines.

6 NWEA, The North Seas Standard: Enable Growth with Wind Turbine Standardisation, 29 September 2023.

Onshore wind

4. Onshore wind

Our interviews suggest supply chain constraints for onshore wind appear to remain less severe than for offshore wind – and are still overshadowed by greater constraints around securing planning permission and grid connections. This is because onshore wind farms do not require complex foundations, installation vessels, or HVDC cables and converter stations. In addition, lead times for onshore turbines are shorter than for their offshore counterparts.

The most significant supply chain constraints remain:

- Uncertainty regarding the ongoing availability of the Class I-A turbines required for the UK's high wind speed conditions and smaller turbines for sites where planning permission limits tip height.
- Long lead times to secure transformers and switchgear.

As onshore turbines increase in size, there is also some concern about the availability of sufficiently large installation cranes.

Onshore wind	Supply chain risk			
	High	**Medium -high**	**Medium**	**Medium -low**
	• Balance of plant (transformers, switchgear)	• Turbines	• Cranes and transport • **Civils (including foundations) and electrical**	• Cables

The availability of IEC Class I-A turbines may depend on whether turbine manufacturers seek to reduce the number of turbine models offered in their product portfolios to improve their financial performance. In part, this will be based on the attractiveness and certainty of projects demanding these turbines, which is determined by how likely they are to secure planning permission, grid connections, and a profitable route to market. Transformer availability is a result of increasing demand from renewables projects, electricity networks, and industrial and commercial sectors. There has historically been a reluctance to source transformers from non-European suppliers due to perceived reliability concerns but developers are becoming more open to this due to the lower costs and lead times they offer.

The lifting of the de facto ban on onshore wind in England and continued alignment of Contract for Difference Administrative Strike Prices with broader cost increases should help address several of these issues. Developers could also benefit from the transformer sourcing expertise of electricity networks, which conduct significant factory visits and type testing to source transformers from a more global supplier base. Some onshore wind developers already benefit from this, where they are subsidiaries of larger organisations which have electricity network operators as business units.

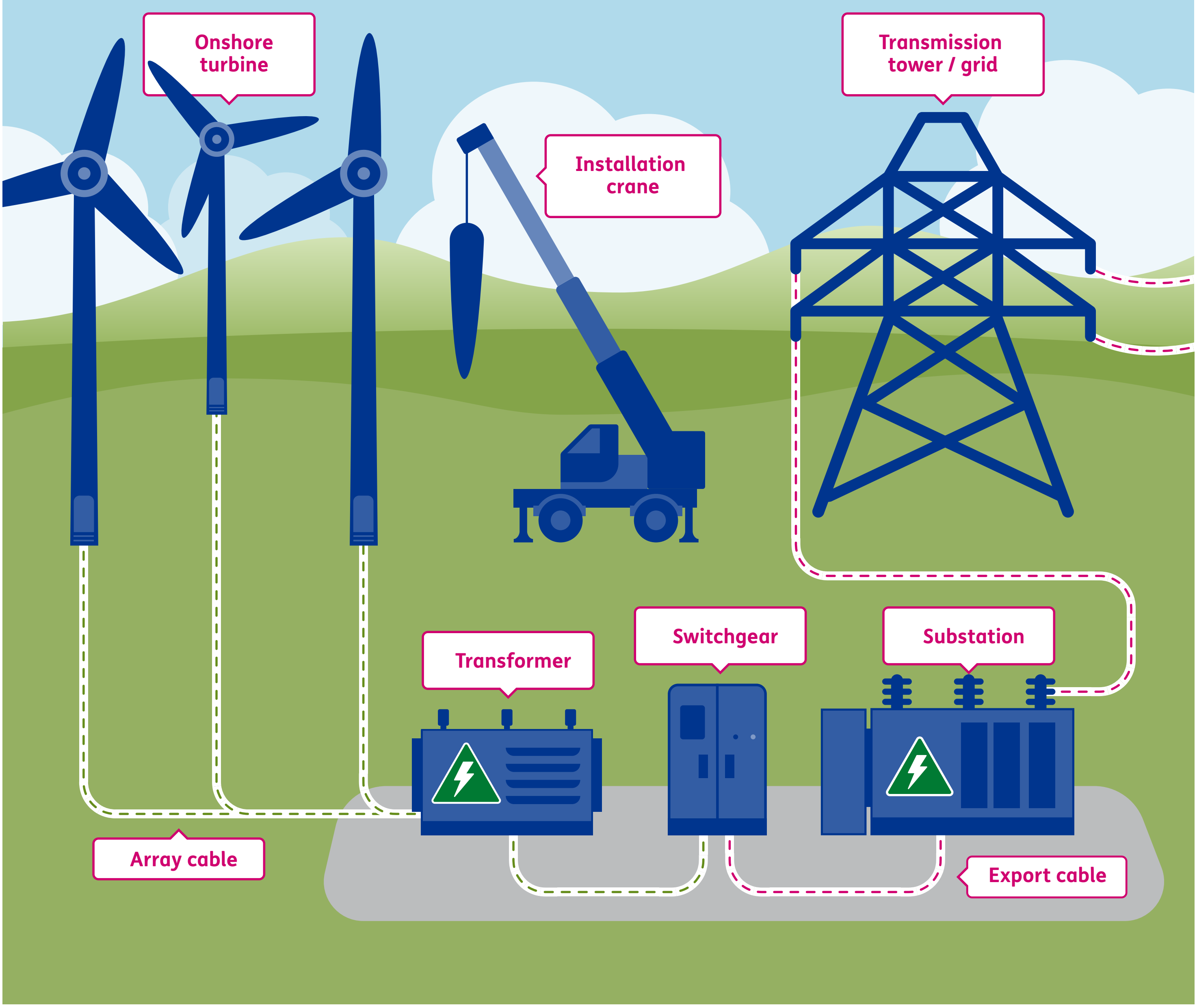
Component overview

Onshore wind farms consist of turbines mounted on reinforced concrete foundations or rock anchors.

Array cables connect turbines to transformers and switchgear, which connect to the nearest transmission or distribution substation via an export cable.

Key elements of the onshore wind supply chain:

- Turbines (consisting of nacelles, blades, and towers).
- Foundations and civil works.
- Transport and installation.
- Balance of plant (transformers, switchgear, and SCADA systems).
- Array and export cables.



4.1 Supply chain constraints

Availability of UK-specific Class I-A and smaller turbines

Interviewees advised that the majority of turbines deployed in Scotland are Class I-A models, which can withstand extreme wind conditions. However, these models are more expensive than alternatives and are not common in other European markets. Onshore wind turbines also continue to increase in size, with new models reaching 6 to 7 MW. These are becoming the default in the UK – except for sites where objections to larger turbines are more likely or pre-existing planning consent was granted on the basis of smaller 4 to 5 MW turbines. However, these increases are less disruptive for onshore wind supply chains than offshore ones.

There are several reasons for this:

- Manufacturing and operating turbines of this size are already well-proven for offshore wind, where the latest turbines are twice as large.
- Onshore foundations are generally reinforced concrete poured in situ, which can more easily be scaled up than factory-made offshore foundations.
- Offshore installation requires specialist turbine and foundation installation vessels rather than the multi-purpose cranes used onshore.

Onshore wind turbine OEMs are under financial pressure and are streamlining their product portfolios to reduce costs. Therefore, there is a risk that some could cease manufacturing Class I-A turbines or smaller 4–5 MW units, which would constrain supply for UK projects.

Transportation restrictions in Scotland

Scotland's abnormal load transport policy and regulatory regime still require a police escort for large turbine components like towers, blades, and nacelles. Interviewees explained that abnormal loads must be transported at off-peak hours, and that there are a limited number of available police officers to provide the required escort. These restrictions delay onshore wind component transport and lengthen project timescales. The Onshore Wind Strategy recognised this issue and DESNZ is working alongside the Scottish Government to consider resolution.

Extended transformer lead times

Increased lead times of 24 months for 132 kV transformers and four years for 400 kV units were reported in our original study. In more recent interviews these were reported at 18 months to 24 months respectively, but this was a small sample size and included some large developers.

Previously some onshore developers highlighted an unwillingness to source transformers from non-European markets due to reliability concerns. Transformers represent a single source of failure for wind farms, and a defective device can cause significant financial losses. However, there was increased openness to non-European supply in our recent interviews. This was particularly where the developers had links to network operators with the resources for testing and factory visits.

The market continues its transition away from the use of sulphur hexafluoride (SF6) in switchgear, as it is an extremely powerful greenhouse gas. This is also constraining supply, extending lead times, and increasing costs.

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Reduced crane availability

While the crane shortage was not highlighted as a significant constraint during our interviews, it had previously been noted onshore turbine size increases – requiring even larger cranes – could constrain future crane supply.

4.2 What causes those constraints – and potential opportunities to address them

Planning difficulties and grid connection delays

Developers still indicated that planning and grid constraints remained greater barriers to onshore wind deployment than supply chain constraints. Whilst the lifting of the de facto ban in England was welcomed, the impact on the development pipeline is still playing through.

In the original study, interviewees raised concerns about the limited experience of local authority planning staff to accommodate an increasing number of onshore wind planning applications in England. Notably, in July 2024, the UK Onshore Wind Taskforce committed to delivering an advanced training package and improved data to accelerate the local authority planning process.[7]

Developers also remained frustrated by the uncertainty and delays around grid connection dates. Whilst Connections Reform is seen as positive, the 6 month delay on Gate 2 decisions was highlighted and there is uncertainty regarding the timing of subsequent application windows.

More polarised political attitudes towards onshore wind

Previously, there was concern about the lack of clear political support for the onshore wind industry in England. The lifting of the de facto ban in England has materially addressed this, but there are new concerns regarding the more polarised political landscape, with some new councils strongly opposed to renewables. There was also previous concern that there was no onshore wind deployment target in the British Energy Security Strategy, launched by the previous Conservative Government, resulting in uncertainty for investors. This was exacerbated by unresolved issues with planning restrictions. This has been partly addressed through the ambitions set out in Clean Power 2030 for a combined 27-29 GW in Scotland, England and Wales by 2030, increasing to 37 GW by 2035 – although some interviewees felt this underestimated the potential for onshore development in Scotland.

Uncertainty around CfD success and profitability

As with offshore wind, the competitive nature of CfD allocation creates uncertainty as to whether a developer will be successful in each round. In our original study, despite a successful AR5, many interviewees remained concerned about the Administrative Strike Price. This did not increase in AR5 from the £73.85/MWh (in 2024 prices) in AR4, and it was feared during the interviews for the 2024 study that it might not reflect input cost inflation and therefore reduce margins for developers and suppliers. Since then, the AR6 Administrative Strike Price was

7 UK Government, Onshore Wind Taskforce strategy (accessible webpage) – GOV.UK, July 2024.

increased to £89, but onshore wind still cleared below the previous strike price at £70.92/MWh, showing it remained competitive (in 2024 prices). Additionally, one developer highlighted that Transmission Network Use of System (TNUoS) charges limited the size and competitiveness of onshore wind projects in Scotland.

Despite these concerns, onshore developers were less likely to report issues with the CfD contract and process than offshore developers. This is likely due to a combination of factors, such as the more widespread use of alternative routes to market for onshore wind projects (like power purchase agreements selling power to corporate customers) and the shorter lead times for onshore wind components and projects (which reduces uncertainty).

Recent UK Government announcements for reducing CfD-related uncertainty

In common with offshore wind:

- Government has continued to update Administrative Strike Prices for AR7 (equivalent to £92/MWh in 2024 prices) to reflect increases in input costs and the cost of capital. Recent AR7 results were able to secure almost 15GW of wind and solar generating capacity. These outcomes are expected to influence strike price expectations and project pipelines.

Non-European transformers are becoming more accepted

Transformers represent a single point of failure for onshore wind farms. Developers have been hesitant to invest in non-European transformers because they are perceived as less reliable than European equivalents, but are becoming more open to supply from other markets.

Potential industry opportunities for opening up transformer procurement

In common with solar PV:

- Network operators could support developers with procuring transformers and switchgear beyond sharing approved equipment lists. Potential ideas include promoting standardisation and sharing type testing and site visits.

Developers still have limited leverage when sourcing transformers and switchgear

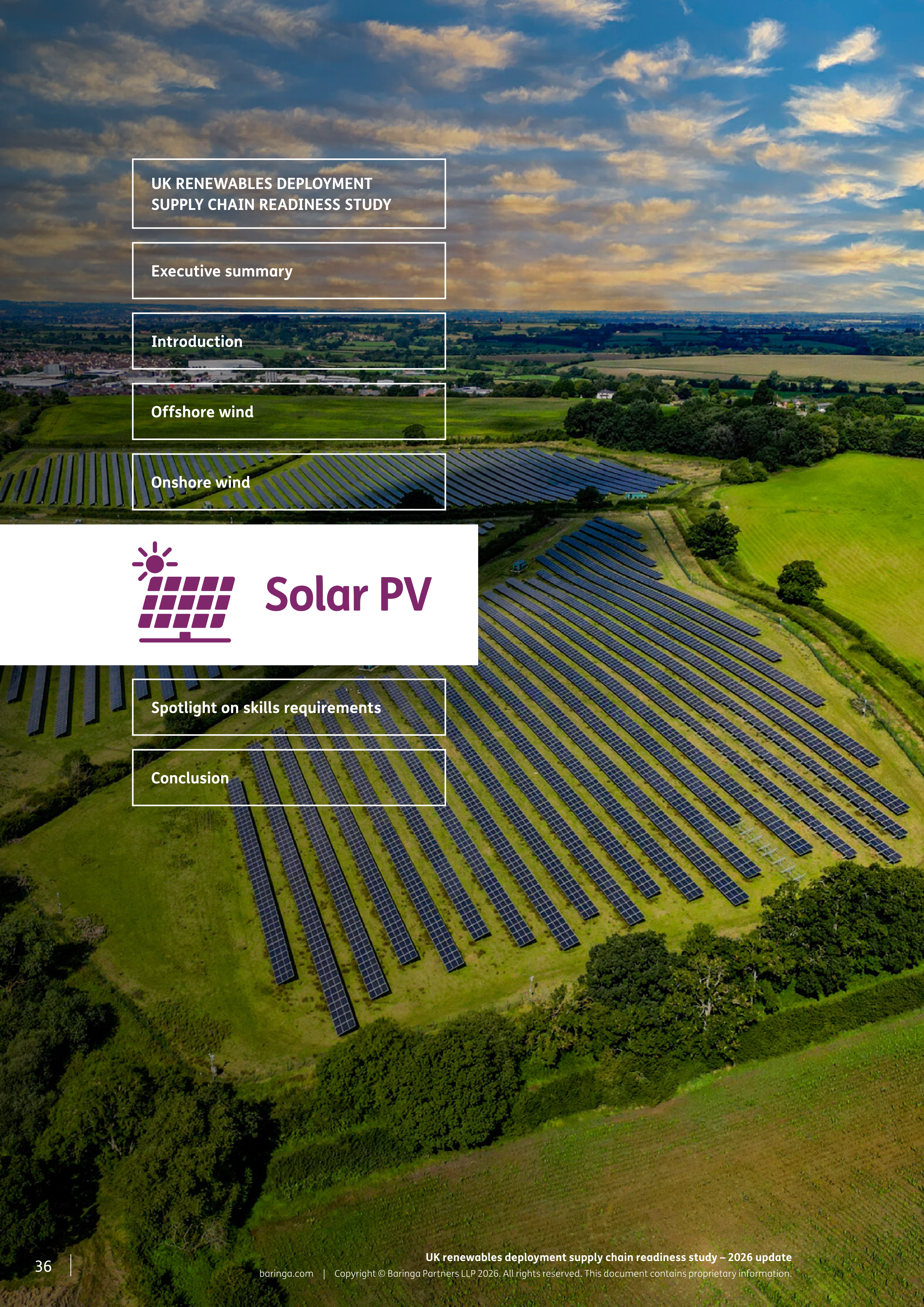
Distribution network operators (DNOs) can ensure a consistent and secure pipeline of transformers and switchgear because they share forward-looking plans with approved suppliers, which are underwritten by regulated returns.

Onshore wind developers cannot give suppliers that same certainty because projects have shorter timescales and lower, non-recurring demand. Onshore developers also make less use of frameworks and approved supplier lists. It is therefore more complex and costly for them to source balance-of-plant components.

Potential industry opportunities for increasing transformer and switchgear purchasing power

In common with solar PV:

- Network operators could open up frameworks and potentially offer centralised procurement and delivery. They could also pool replacement assets in case of failures.



Solar PV

5. Solar PV

Our original modelling and interviews were less extensive for solar photovoltaics (PV) than for other technologies, and module manufacturers declined to participate.

However, our research showed that supply chain constraints for solar PV appear to be less severe than for other technologies and are generally overshadowed by greater constraints around securing grid connections. This is because many solar components such as modules, cables, and inverters are more commoditised, and there has been significant investment in new manufacturing capacity (albeit the vast majority in China). Our updated interviews and modelling suggest this remains largely unchanged today.

The most significant supply chain constraints remain the increased lead times for securing transformers and switchgear (in common with onshore wind). And although there is expected to be sufficient module supply to meet rising demand, there remains uncertainty regarding any impacts of potential forced labour in the polysilicon supply chain. Availability of design and installation labour has reportedly improved slightly since 2024 (this is discussed in the skills section on page 45).

Solar PV	Supply chain risk		
	High	**Medium**	**Medium-low**
	• Balance of plant (transformers and switchgear)	• Modules • **EPC design and installation** ⬇	• Racking • Cables • Inverters

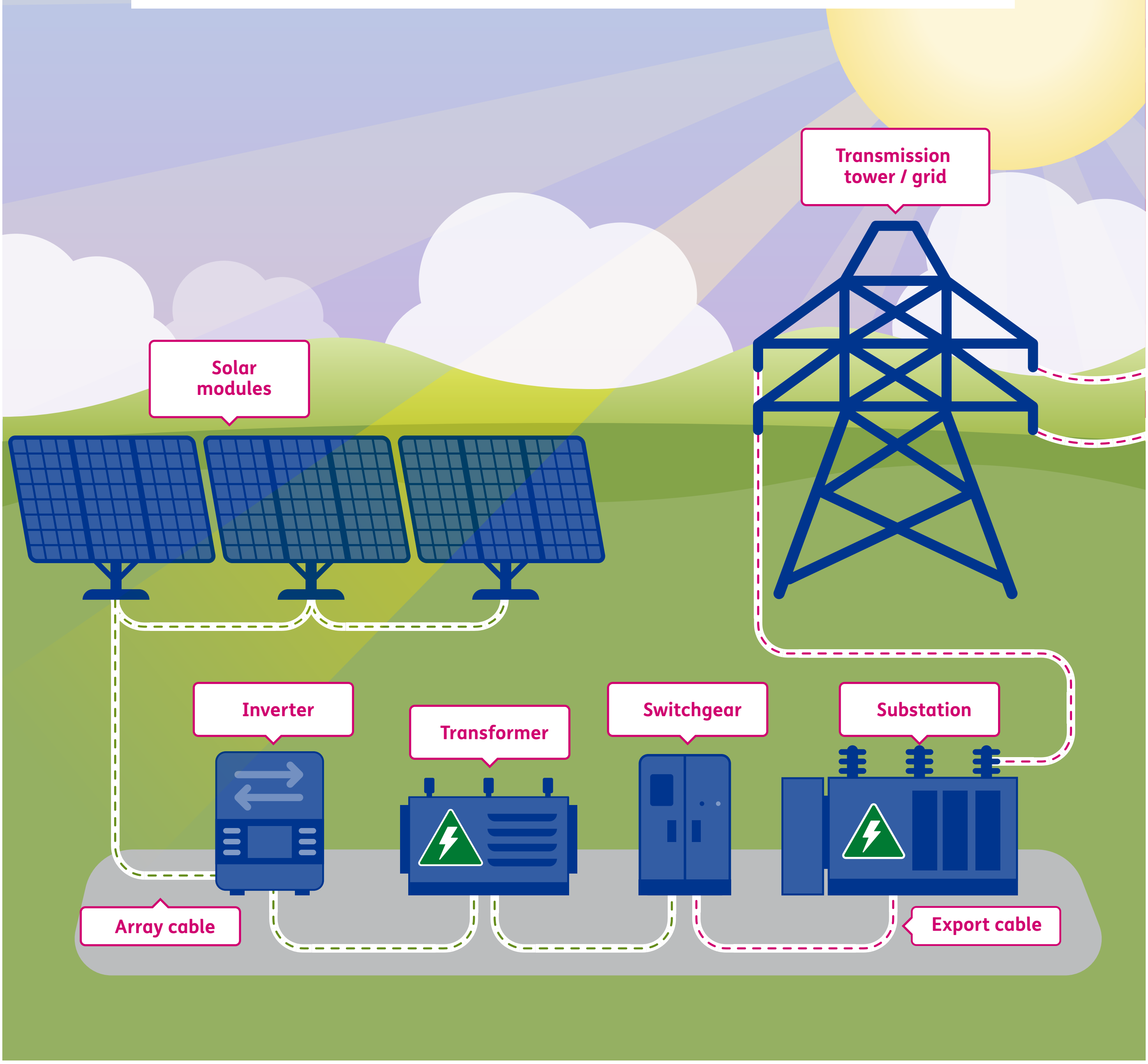
As with onshore wind, solar developers could also benefit from the transformer-sourcing expertise of electricity networks, which conduct significant factory visits and type testing to procure transformers from a broader global supplier base. The Solar Stewardship Initiative also provides a platform for improving labour standards and traceability in the polysilicon and module supply chains. While full coverage will take time as independent site audits progress, the SSI is now a maturing initiative with 18 manufacturers, 37 developers and buyers participating. Buyers can already source modules from SSI-certified facilities, and the Government has publicly signalled its support for the SSI through the Solar Roadmap.

Component overview

Ground-based and commercial rooftop solar installations consist of photovoltaic modules mounted on racks or frames and connected by string cables to inverters, transformers, and switchgear. An export cable connects them to the nearest transmission or distribution substation.

Key elements of the solar PV supply chain:

- Silicon PV modules.
- Balance of plant (inverters, transformers, and switchgear).
- Array and export cables.
- Racking.
- Engineering, procurement, and construction.



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5.1 Supply chain constraints

Potential shortages of modules without the risk of forced labour

As anticipated by the International Energy Agency (IEA), global solar PV manufacturing capacity has now surpassed 1,000 GW, with 550 GW new capacity in 2024[8] adding to the pre-existing capacity of 450 GW[9] in 2023. This significantly exceeds the IEA's predicted 2030 annual global demand of 650 GW in its Net Zero 2050 scenario.

Sheffield-Hallam University estimates that Xinjiang accounts for around 35% of global polysilicon supply (the main raw material for solar cells). This is down from 45% two years earlier, indicating that China is bifurcating its supply chains (i.e., Xinjiang polysilicon used in domestically consumed Chinese panels, polysilicon from wider China used for exported panels).[10] Therefore, widespread concerns remain about the availability of PV modules without the risk of Uyghur forced labour.

In the US, the Uyghur Forced Labor Prevention Act prohibits the import of goods produced in Xinjiang using forced labour, and it names specific polysilicon suppliers alongside other raw material suppliers.[11] The European Commission, with the US regulation-aligned Regulation 2024/3015, prohibits products made using forced labour and imports of modules from the Xinjiang region. In the UK and Europe, interviewees noted that investors and developers are setting their own anti-forced labour requirements and undertaking their own supplier audits, often with third-party support.

Our updated analysis suggests there remains sufficient non-Xinjiang polysilicon production to meet module demand in North America and Europe (including the UK), but this would be dependent on effective segregation and traceability across the PV supply chain.

Transformer and switchgear shortages

According to some solar developers, lead times are between 12 and 36 months for transformers and from six to 12 months for switchgear. Lead times have been kept high by increasing demand from renewables, grid upgrades, and industrial and commercial customers.

It is noteworthy that developers did not perceive inverter supply as a constraint.

8 IEA (2024), Advancing Clean Technology Manufacturing, IEA, Paris https://www.iea.org/reports/advancing-clean-technology-manufacturing, Licence: CC BY 4.0

9 IEA (2023), Renewable Energy Market Update – June 2023, IEA, Paris https://www.iea.org/reports/renewable-energy-market-update-june-2023, Licence: CC BY 4.0

10 IEA, Solar PV Global Supply Chains, July 2022.

11 UK Government, Clean Energy Jobs Plan, October 2025

5.2 What causes those constraints – and potential opportunities to address them

Limited visibility into the Chinese polysilicon supply chain

Developers face challenges in demonstrating that their module supply chains are free from forced labour. The Solar Stewardship Initiative (SSI) was established to improve transparency and raise standards across the value chain, ultimately requiring ESG and Traceability Standard certification from polysilicon through to ingots, wafers, cells, and modules.

As of November 2025, SSI implementation is still progressing. Among its 18 manufacturer members:

- Six have sites certified to the ESG Standard, meeting the initial commitment of two certified sites each (10 of these 12 sites are module facilities).
- Certification to the Traceability Standard has not yet been achieved, though this is expected as rollout continues.

Tracking and evidencing polysilicon origin therefore remains complex. In response, we understand that some Chinese suppliers have begun bifurcating their supply chains – separating production lines for export markets to exclude polysilicon from Xinjiang. Verification, however, can be complex, and many developers continue to undertake their own audits until SSI coverage expands.

Since the previous study, SSI has undergone a notable step-change in maturity, including strengthened internal systems, improved governance processes, and the introduction of local-language guidance and Chinese-speaking staff to support supplier onboarding.

SSI also confirmed that both its ESG Standard and Supply Chain Traceability Standard are now fully launched, with auditors for the Traceability scheme onboarded and trained, and the first assessments completed and awaiting certification decisions, allowing the scheme to scale more quickly than before.

Market adoption has also improved materially, with the SSI reporting that more than 120 GW of module manufacturing capacity is now certified, driven by strong commercial incentives for module manufacturers to maintain access to European markets.

However, uptake among upstream suppliers such as wafer and polysilicon manufacturers remains significantly lower, with SSI noting that these suppliers face weaker commercial incentives and more complex ownership structures, limiting the depth of traceability.

SSI also highlighted that rapid shifts in the Chinese manufacturing landscape – including site relocations, closures, going under construction, and new builds driven by overcapacity, technological advancements, and reshoring to India, Turkey, and the Middle East – delay audits, as sites ask for extensions, and complicate audit scheduling. This is further complicated by increased due diligence burden due to layered parent/child corporate structures in China, extending due-diligence timelines.

Looking ahead, 2026 will mark the first year in which SSI publishes its external annual report. This represents a major step forward in transparency and accountability, providing developers, investors, and regulators with clearer visibility of certification uptake, non-conformance trends, and audit outcomes.

Potential industry opportunities for increasing supply chain visibility:

- Collaboration between government, developers, and suppliers could be strengthened in the UK and internationally to accelerate uptake of the Solar Stewardship Initiative.
- Industry could also leverage SSI's expanding maturity and market penetration to reduce duplicative or parallel audits and streamline due diligence processes as the scheme becomes more widely adopted.

Non-European transformers are considered less reliable

As with onshore wind, transformers represent a single point of failure for solar farms. If a transformer does not work properly, the solar farm cannot feed electricity into the grid. This leads to significant financial losses for asset owners. Therefore, developers and engineering, procurement, and construction companies (EPCs) previously advised that they are hesitant to source transformers from markets outside Europe, with several interviewees expressing doubts about the quality of non-European transformers. In comparison, network operators are willing to source from a wider range of suppliers because they invest in type testing and factory visits.

Although UK developers and their EPCs are becoming more open to new sources of supply, they still routinely exclude a wide range of possible global suppliers, reducing component availability and indirectly extending lead times.

Potential industry opportunities for opening transformer procurement

In common with onshore wind:

- Network operators could support developers with procuring transformers beyond sharing approved equipment lists. Potential ideas include promoting standardisation and sharing type testing and site visits.

Developers and EPCs have limited leverage when sourcing transformers and switchgear

DNOs and transmission owners (TOs) have a much higher demand for transformers. This limits the buying power of solar PV developers and EPCs and increases transformer prices. Additionally, DNOs and TOs can give suppliers five-year demand plans, which builds confidence and secures their pipeline. In contrast, there is uncertainty around individual solar farm projects being cancelled or delayed.

Potential industry opportunities for increasing transformer and switchgear purchasing power

In common with onshore wind:

- Network operators could open frameworks and potentially offer centralised procurement and delivery. They could also pool replacement assets in case of failures.

Spotlight on skills requirements

6. Spotlight on skills requirements

Skills gaps and shortages exist across renewables and electricity networks. These range from electrical design, test, and commissioning engineers for cables, transformers, and converter stations to project managers and installation technicians.

A more detailed, holistic skills assessment examining the skills pipeline and demand across these sectors would help inform how secondary and higher education and employers should respond.

Our study found that skills-related constraints affect all three sectors, causing issues across their value chains. From engineering and design professionals to the commissioning and installation workforce, personnel shortages may still limit the UK's ability to meet deployment targets.

6.1 Skills supply constraints and their causes

It was not possible to obtain detailed headcount information from interviews with developers, network operators, or suppliers during this or the previous study. Therefore, our key findings are qualitative rather than quantitative. Since our previous report, there have been a number of industry and government publications that cover renewables workforce issues. Those that contain estimates of current and future requirements include:

- *The Clean Energy Jobs Plan,*[12] published as part of the UK's Modern Industrial Strategy, estimates that meeting the twin targets of Clean Power 2030 and accelerating the transition to net zero could almost double the UK clean energy workforce from around 440,000 in 2023 to around 860,000 jobs supported across clean energy sectors and their supply chains by 2030. This includes jobs increasing from 31,000 to 100,000 for offshore wind, from 13,000 to 45,000 for onshore wind and from 20,000 to 35,000 for solar between 2023 and 2030.
- OWIC's 2025 *Offshore Wind Skills Intelligence Report*,[13] which estimates that the current UK offshore wind workforce of almost 40,000 (increased by 8,000 since 2023) and onshore wind workforce of over 15,000 will need to increase to almost 95,000 and 19,000 respectively by 2030 to achieve the 52 GW of offshore and 27 GW of onshore wind. The roles with the greatest shortfalls were identified as Wind Turbine Technicians, Export Cable Engineers, Fabrication Engineers, Electrical Managers, Commissioning Engineers, Design Managers, Back Office Support, Installation Engineers and Civils Contractors.

12 UK Government, Clean Energy Jobs Plan, October 2025
13 Offshore Wind Industry Council, Offshore Wind Skills Intelligence Report, June 2025

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Engineering and design personnel

Although the UK has excellent engineering universities, there are ongoing shortages of design, test, and commissioning engineers across mechanical, electrical, and power systems. Although the number of UK engineering students has increased over the last decade, there is fierce competition for graduates across developers, suppliers, networks, and other industries. To supplement domestic shortages, there is a reliance on overseas workers.

Three to seven years of experience is required post-university to become a fully qualified power networks engineer, with the most skills and experience required at the highest voltage levels. There is also significant competition for these engineers across developers, suppliers, the international market, and outside the power sector. Senior authorised person roles, the skilled specialists responsible for safety, are in particularly high demand, and engineers frequently change roles to secure the best pay.

These shortages of power systems engineers are compounded by the bespoke designs required for sectors like offshore wind, where converter stations and substations are value engineered to ensure full cost recovery at sale. Additionally, significant design work is needed during tender processes, meaning some suppliers refuse to participate in competitive tenders because they lack resources.

Installation technicians

Previously some solar developers and EPCs interviewed noted that they have historically relied on low cost and experienced installation crews from Southern and Eastern Europe – who were finding the UK less attractive because Brexit reduced international mobility. Our most recent interviews suggested this trend had reversed slightly, with some European crews returning to UK customers. Other developers reported that they had collaborated with suppliers to develop new UK-based installation capabilities.

The ending of the UK's offshore wind workers visa concession for workers on construction, operations, and maintenance vessels remains an issue, complicating installation and risking delays in projects within UK waters.

Skilled trades

OEMs, DNOs/TOs, and renewables are demanding more skilled labour as the energy sector decarbonises and electricity networks expand. However, not enough new people with technical skills are entering the market. There are significant shortages across a wide range of roles – project managers, cable jointers, transformer installers, overhead linesmen, electricians, and senior authorised persons, as well as unskilled labour.

6.2 Recent UK Government announcements and potential industry opportunities for addressing skills constraints

- Government published the Clean Energy Jobs Plan, which aims to create greater certainty for employers to invest in skills, train a pipeline of skilled workers, provide routes for existing workers to transition into clean energy and provide high quality jobs across all nations and regions.
- Trade associations could conduct a holistic skills gap assessment for the renewables and transmission and distribution sectors.
- Schools, colleges, and universities could encourage interest in engineering degrees and technical qualifications – particularly among women and traditionally under-represented demographics.
- Developers, network operators, suppliers, colleges, and universities could incorporate more applicable technical skills into post-secondary curricula so they remain relevant and attractive.
- Developers, network operators, and suppliers could increase the number and uptake of apprenticeships across manufacturing and installation.
- Developers, network operators, and suppliers could reskill more workers from other industries (like oil and gas) to fill labour gaps.
- Government also published the 2025 North Sea Future Plan, setting out the goal to amend employment legislation to extend rights to certain offshore workers to reduce discrepancies between the offshore oil and gas and renewables industries, including on key rights such as the National Minimum Wage.

Conclusion

7. Conclusion

Our study identified a range of constraints, causes, and opportunities across renewable energy and network supply chains. Although each sector has its own challenges, there are notable overlaps in what is required to achieve the Clean Power 2030 deployment targets. Here, we end by summarising the supply chain constraints facing the three sectors, as well as the Government announcements and opportunities for industry to tackle them.

Components and technologies experiencing the greatest supply chain constraints

This infographic outlines the components and technologies facing the tightest supply-and-demand conditions, both today and in the future. It illustrates priority areas where interventions can further support supply chain resilience and readiness across the three sectors.

Overview of supply chain capacity constraints for key renewables components and installation services based on interview participant reports and supply and demand modelling

Supply chain risk	Offshore wind	Onshore wind	Solar PV
High	• **Turbines ↑** • Floating foundations • Balance of plant (HVDC and HVAC stations) • Cable vessels • Ports	• Balance of plant (transformers, switchgear)	• Balance of plant (transformers and switchgear)
Medium -high	• **Turbine and foundation vessels ↓** • **Export cables ↓**	• Turbines	
Medium	• **Monopiles and transition pieces ↓** • **Towers ↓** • Jackets • Array cables • **Civils ↑**	• Cranes and transport • **Civils (including foundations) and electrical ↑**	• Modules • **EPC design and installation ↓**
Medium -low		• Cables	• Racking • Cables • Inverters
Low			

Key: **↑ More acute constraint than 2024** **↓ Less acute than 2024**

Recent UK Government announcements and potential industry opportunities for addressing the causes of supply chain constraints

Based on the findings in the current study, what Government announcements and industry interventions could help alleviate those constraints? This infographic summarises the efforts policymakers, those operating within the sectors, and supporting stakeholders are currently undertaking and should consider in future. Many of these have an impact across multiple sectors and therefore play an important role in streamlining the journey to achieving the Clean Power 2030 Action Plan deployment targets.

Make renewables more attractive to suppliers

Manage competition from other industries and markets

Developers, ports, and floating foundation manufacturers could collaborate more on aggregating demand and agreeing shared designs and manufacturing locations.	• Offshore wind
Developers, network operators, and suppliers could collaborate on standardisation (for example, offshore grid connections for wind and transmission, and transformers and switchgear for wind, solar, and networks).	• Offshore wind • Onshore wind • Solar PV
Network operators could centralise procurement and delivery of grid connections, transformers, and switchgear.	• Offshore wind • Onshore wind • Solar PV
Developers and transmission networks could streamline and coordinate procurement to aggregate demand across multiple projects, underpinned by a suitable regulatory framework.	• Offshore wind
Networks could pool replacement assets (transformers and switchgear) in case of failures – and support developers with sharing type testing and site visits.	• Onshore wind • Solar PV

Make renewables more attractive to suppliers

Encourage anticipatory investment

Government has announced £1 billion of offshore wind supply chain investment support consisting of £300m grant funding from Great British Energy, £400m equity investment from The Crown Estate, £300m industry investment from the Industrial Growth Plan and a further £700m in clean supply chain investment from Great British Energy.	• Offshore wind
Developers and suppliers could enter a voluntary 'turbine size cap'.	• Offshore wind
Government has introduced the Clean Industry Bonus to encourage offshore wind supply chain investment and has recently expanded it to include onshore wind, from AR9.	• Offshore wind • Onshore wind

Increase supply chain visibility

Government, developers, and suppliers could collaborate in the UK and internationally to drive stronger uptake of the Solar Stewardship Initiative.	• Solar PV

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Improve the policy and regulatory climate

Signal political support and provide long-term certainty

Government's Strategic Spatial Energy Plan (SSEP) will support a more actively planned approach to energy infrastructure across England, Scotland and Wales, land and sea between 2030 and 2050. It will do this by assessing and identifying the optimal locations, quantities and types of energy infrastructure required for generation and storage, as well as relevant hydrogen assets, for GB, to meet our future energy demand with the clean, affordable and secure supply that we need.	• Offshore wind • Onshore wind • Solar PV

Reduce CfD-related uncertainty

The UK Government has continued to increase the Administrative Strike Prices for AR7 to reflect increases in input costs and the cost of capital. While this improves revenue expectations for projects, it does not guarantee individual projects will secure a route to market. Recent AR7 results were able to secure almost 15 GW of wind and solar generating capacity.	• Offshore wind • Onshore wind • Solar PV
Developers could explore alternative routes to market, such as corporate PPAs, which are more common in onshore wind.	• Offshore wind

Address skills shortages

Government published the Clean Energy Jobs Plan, which aims to create greater certainty for employers to invest in skills, train a pipeline of skilled workers, provide routes for existing workers to transition into clean energy and provide high quality jobs across all nations and regions.	• Offshore wind • Onshore wind • Solar PV
Schools, colleges, and universities could encourage interest in engineering degrees and technical qualifications.	• Offshore wind • Onshore wind • Solar PV
Developers, suppliers, colleges, and universities could incorporate more applicable technical skills into post-secondary curricula.	• Offshore wind • Onshore wind • Solar PV
Developers and suppliers could increase the number and uptake of apprenticeships across manufacturing and installation, including providing clear career pathways from entry-level jobs to higher-skilled roles.	• Offshore wind • Onshore wind • Solar PV
Developers and suppliers could reskill more workers from other industries (like oil and gas) to fill renewable energy labour gaps.	• Offshore wind • Onshore wind • Solar PV
Trade associations could conduct a holistic skills gap assessment.	• Offshore wind • Onshore wind • Solar PV

UK renewables deployment supply chain readiness study – 2026 update

Executive summary for industry and policymakers

This publication is available from
www.gov.uk/government/publications/uk-renewables-deployment-supply-chain-readiness-study-2026-update

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