

Bill of Works

A review of UK capability & capacity to supply offshore wind steel requirements



Phase 2 report: Executive Summary

The UK offshore wind pipeline will require up to 25 million tonnes of steel between 2026 and 2050. UK steel mills have current capability and capacity to supply up to half of this, and with investment could supply up to 90%. For the UK steel sector to tap into this opportunity will require investment in both fabricators and steel mills

Phase One of the Bill of Works project, reported on overall steel demand for building out the UK's offshore wind pipeline to 2050.

The report identified a pipeline of up to 25 million tonnes, which was equivalent to 20% of annual UK steel production (5.6 million tonnes of steel in 2023).

However, Bill of Works has also identified that very little value from existing steel components such as towers and foundations was coming through the UK. Between 2021-25, less than 2% of steel components have been fabricated in the UK.

However, analysis in Phase Two has confirmed that the UK has actual and potential capability and capacity to deliver more of the fabrication activities required, and also to supply more of the steel required from UK mills.

Any UK Steel Strategy must therefore address how to grow UK fabrication and UK steel supply by investing in new fabrication facilities as well as upgrading existing steel capacity and investing in new steel capacity.

The UK has existing capability *and* capacity to supply all or most of the steel requirements for rebar, tensioning strands and other steel types such as rolled and open sections. It has high capability *and* capacity to supply plate for many offshore wind needs such as steel semi subs & TLPs, anchors and secondary steel. It has medium capability *and* capacity to provide plate steel to meet some of the needs for jackets and towers, but low capability *and* capacity for components such as monopiles and transition pieces. Also, the UK needs to be aware that as turbine sizes grow, design specifications for plate will increase, meaning that UK capacity and capability to supply steel for components such as jackets and towers will reduce.

Overall, the UK has existing capability *and* capacity to supply up to 13 million tonnes of steel (51%) to this 25 million tonne pipeline, including 45% of offshore wind's plate needs. Proposed investments in UK steel casting and mills would enable UK mills to supply up to 86% of offshore wind plate requirements.

The priority for the UK Government, offshore wind sector and steel sectors is to work together to:

- (a) identify opportunities in the short term for growing UK steel supply through supporting UK fabricator growth, as well as by leading the rapid adoption of new welding innovations such as laser and vacuum welding that help cut fabrication cost while also allowing plate joining so that smaller plates can be used in larger components. An important finding from this work is that the biggest constraint on UK steel supply is not lack of UK mill capability but lack of UK fabrication.
- (b) for the medium term, the UK also needs to consider investment into new plate rolling and caster capacity so that demands from offshore wind can be more easily met from the UK. This additional investment is needed as existing mill capacity is a constraint on the supply of UK steel into offshore wind (and indeed other important steel markets).
- (c) Prioritise UK effort to support use of green steel in offshore wind, taking advantage of UK low carbon electricity and electric arc furnace investment to make UK leader in green steel.

Investment in UK steelmaking makes sense not just to secure the benefits from UK offshore wind, but to potentially supply into a global wind market facing significant supply

chain bottlenecks in component fabrication and large plate supply.

The offshore wind sector is a demanding one to supply to. The quality requirements for supply are high, and as a global market, cost pressures are intense. These cost and quality thresholds will be a challenge for UK fabricators and mills alike. Investment in automated volume manufacturing and production, plus building a sustainable pipeline across sectors like energy and defence can enable UK fabricators and steel mills to compete with European suppliers active in this market.

UK success will need coordination between the offshore wind industry and the delivery of its Industrial Growth Plan, as well as wider UK Industrial Policy and the emerging Steel Strategy.

Funding support from the National Wealth Fund and other programmes is expected to prioritise both investment in the offshore wind supply chain and UK steel. This report demonstrates a strong overlap and greater opportunities for addressing jointly the lack of UK fabrication and lack of supply of UK steel into offshore wind.

The UK also needs to better play to its strengths. These include the size of the UK offshore wind market, including significant ambition for floating offshore wind; the early and rapid decarbonisation of our power system as set out in the UK's Clean Growth Plan; and existing technical knowledge in manufacturing and fabrication. All these could help reinforce a virtuous circle of offshore wind powering UK electric arc furnaces producing steel for UK fabricators producing components for wind farms here in the UK and globally.

Version Control

Version	Purpose	Date
A	Draft summary report for client	10/24
B	Draft summary report for advisory group	11/24
C	Final Phase One report for publication	11/24
D	Draft Phase Two report for publication	12/24
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The project utilises Everoze’s SCCA model developed for OWIC & OWGP, updated to provide additional data on offshore wind steel requirements. The model is owned by OWIC/OWGP with rights given to Everoze re. utilisation, and was an input source into the UK Industrial Growth Plan.

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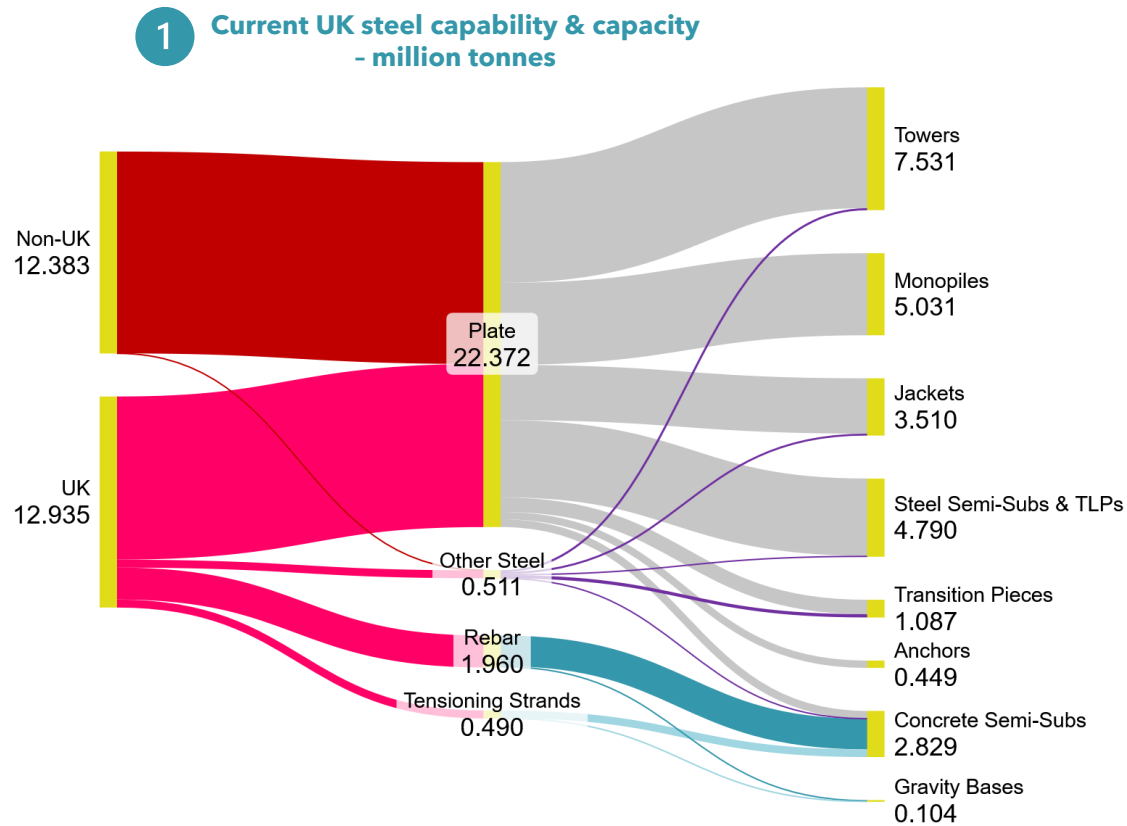
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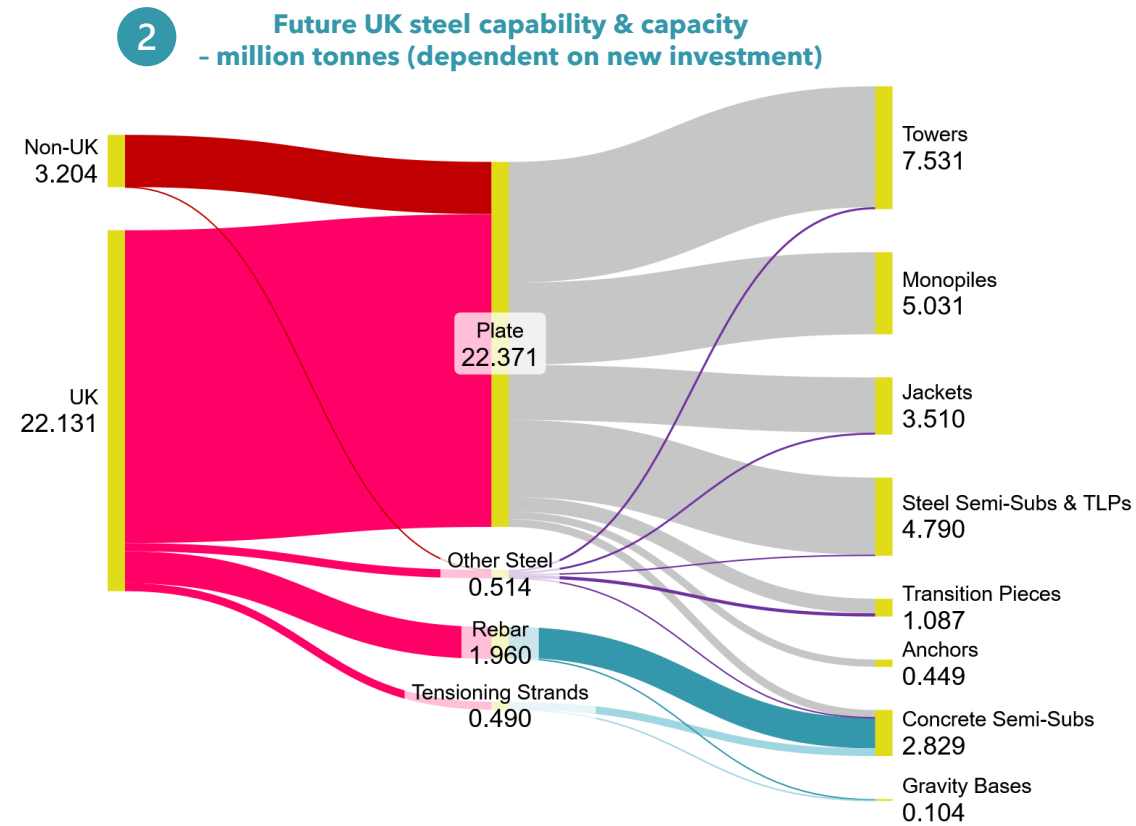
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Summary of UK steel capacity/capability (current & future potential)

Between 2026 and 2050, the UK offshore wind sector will need up to 25m tonnes steel for fabrication of towers and foundations/platforms. Our estimate is that the UK steel sector has current capability & capacity to supply up to half of UK offshore wind steel needs. With planned investment this could be grown to nearly 90%.



Above Left: the UK has capability & capacity to supply up to half of UK steel requirements for towers and foundations, including 45% of plate, and almost all rebar, tensioning strands and other steel.

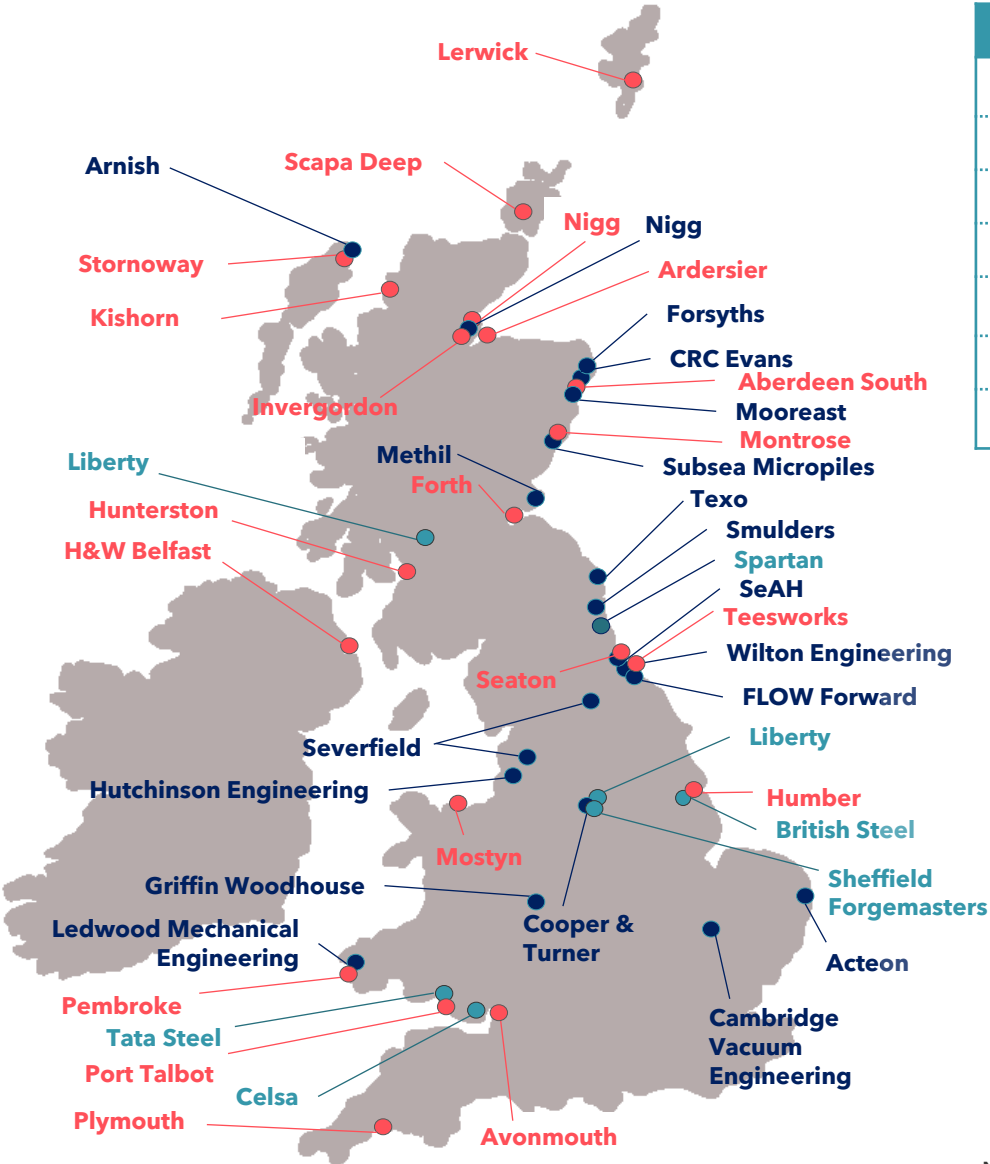


Above Right: planned potential future investments in UK mill and caster capability and capacity would mean that the UK could provide up to 90% of steel needs, including supply of larger plate sizes.

UK fabricator and mill capability

The UK has an existing supply chain to build upon, with existing steel mill and fabricator capacity

Fabricator/Manufacturer	Relevant Capability
Acteon	Anchor manufacture
Arnish (H&W)	Fabrication yard with rolling capability
Belfast (H&W)	Fabrication yard
Cooper & Turner	Bolt manufacturing
CRC Evans	Welding & Coating services
FLOW Forward	FLOW fabrication yard (proposed)
Forsyths	Secondary steel
Griffin Woodhouse	Moorings
Hutchinson Engineering	Secondary steel
Ledwood Mechanical Engineering	Secondary steel
Methil (H&W)	Fabrication yard
Mooreast	Anchor fabrication (proposed)
Nigg (GEG)	Fabrication yard & proposed tubular manufacturing
SeAH	Monopile fabrication (incl. rolling capability)
Severfield	Primary and secondary steel fabrication
Smulders	Jacket fabrication & TP fit out
Subsea Micropiles	Pile Anchors (proposed)
Texo	Fabrication
Wilton Engineering	Secondary steel (previously in TP supply)



Steel Mill	Relevant Capability
British Steel (Scunthorpe)	Casters for slab production from blast furnace
Celsa (Cardiff)	Rebar and tensioning strands
Liberty (Dalzell)	Steel plate mill
Liberty (Rotherham)	Rebar
Sheffield Forgemasters (Sheffield)	Castings and forgings
Spartan (Gateshead)	Steel plate mill
Tata Steel (Port Talbot)	Steel mill for slab production, with new EAF

Left is a map of important fabricator/manufacturer (blue), steel mill (teal) and port (red) locations. Fabricator and mill capabilities are summarised in the accompanying tables.

Note, not all locations involved in (or relevant to) the UK offshore wind supply chain are able to be featured.

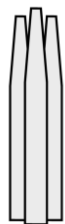
The map demonstrates the breadth of the supply chain, as well as opportunities for strengthening supply links between steel mills, fabricators and ports where much of the large-scale fabrication activity needs to be based.

Not shown but also relevant are emerging wet storage locations for floating offshore wind that are now in development in the Celtic Sea and Scottish regions.

In the UK Capability and Capacity Review section of this report, more information is given on different providers.

UK Offshore wind bill of works components: capability summary

Between 2026 & 2050, the UK's offshore wind pipeline will require between 20m and 25m tonnes of steel, for a range of primary and secondary components



Towers

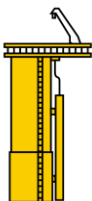
25-90mm plate for a 16MW design increasing in dimensions as turbine scale, plus flanges & bolts

UK fabricator capability? Low

UK steel capability? Medium

Opportunity? UK tower manufacturing a potential investment opportunity, and UK plate mills have capability to produce a proportion of plate required for offshore wind towers, though this will fall over time as tower dimensions increase.

Plate for towers is sourced globally by OEMs. UK wind sector can facilitate engagement between UK plate mills and global steel buyers to confirm UK capability.



Transition Pieces

50-110mm plate for 16MW design, increasing in dimensions as turbine scale; plus flanges, hollow sections, rolled open sections and bars.

UK fabricator capability? Medium

UK steel capability? Medium

Opportunity? Rolling capability at SeAH could be used to secure UK can rolling for TP manufacture. Opportunities for opening up supply of secondary items into this activity. Alternatively UK can secure value through TP-less monopiles with UK secondary steel suppliers supplying into SeAH.

TPs require smaller plate sizes than monopiles and towers, particularly with UK led plate joining innovations, providing supply route to UK mills.



Monopiles

70-130mm plate for 16MW design, increasing in dimensions as turbines scale. No secondary steel unless TP-less monopiles specified

UK fabricator capability? Medium / High

UK steel capability? Low

Opportunity? UK plate mills cannot supply most of range of plate sizes required for new SeAH facility. However, is fast approaching global constraint in supply of largest plate sizes.

Potential shorter-term opportunity for investment in UK plate production for plate sizes up to 80mm thickness, in advance of production of largest plate sizes required.



Jackets

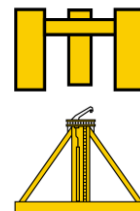
20-100mm plate for primary jacket sections, plus flanges, standard tubulars, bolts, weld material and flux

UK fabricator capability? Medium

UK steel capability? Medium

Opportunity? UK mills can make many of plate sizes required for current generation of jackets. Next generation of larger jackets, and OSS jackets need plate beyond UK current capability.

Investment in plate joining, new casting and plate capability needed to supply larger jacket sizes. UK jacket activity focused on assembly, with little fabrication. Need to facilitate supply of UK secondary steel fabrication into European jacket production.



Steel Semi-Subs & TLPs

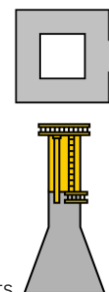
Ship plate and bulb flats required. Dimensions dependent on design but will tend to be <30mm plate, plus standard tubulars for secondary steel and flanges

UK fabricator capability? Potential

UK steel capability? High

Opportunity? Most designs require smaller sizes plate sizes that can be potentially met from existing capability. Clarity re. platform specifications needed to underpin investments.

UK must focus on establishing primary production of primary sub-components to secure value and has opportunity to build UK value through supporting for new hybrid concepts.



Concrete foundations

500-600 grade rebar, plus tensioning strands. FLOW platforms require plate for tower flange

UK fabricator capability? Potential

UK steel capability? High

Opportunity? UK has sufficient rebar and tension strand capacity to supply concrete floating platforms and gravity base market.

Gravity bases offer further supply opportunity for TP primary and secondary steel supply.

UK support around construction and civil engineering will help open up this opportunity to UK rebar suppliers.



Anchors

20-100mm plate dependent on anchor type and design

UK fabricator capability? Yes

UK steel capability? High

Opportunity? UK has high existing capability, and this is a significant export opportunity to supply global FLOW market.

Range of anchor types such as drag and pile anchors can be supplied by UK fabricators, and plate sizes match well with UK capability, along with mooring lines and jewellery from suppliers like GWEC and BBRG.

Defining UK fabricator capability

Low = no or very little existing capability, and market need met wholly by imports

Medium = some existing capability, but market need met mainly by imports

High = high existing capability and significant supply into market

Potential = future market opportunity with reasonable match to existing capacity

Defining UK steel capability

Low = majority of steel products cannot be sourced from UK steel mills

Medium = some steel products cannot be sourced from UK steel mills

High = majority of steel products can be sourced from UK steel mills

Main Findings

The UK's offshore wind pipeline will need to source between 21m and 25m tonnes of steel between 2026 and 2050, and can grow UK steel capability/capacity from 51% to 87% of supply.

1. Between 2026 and 2050 the UK offshore wind pipeline will require between 20 and 25 million tonnes of steel. The UK steel sector has estimated current capability and capacity to provide up to 51% of this steel. Investing in new slab casting and plate production would grow UK capacity and capability to supply up to 87% of this steel.
2. Demand for steel is greatest in the period 2026 to 2035, though the UK offers a longer-term pipeline out to 2050. Demand for components for fixed offshore wind is strong across the 25 years modelled, with a move toward deeper fixed wind sites expected over time. This means that immediate demand is focused primarily on supply into monopile & TP fabrication but will likely shift to supply of jackets for deeper waters.
3. Demand for floating offshore wind components grows rapidly in the early 2030s and is expected to be strong across the 2030s and 2040s. UK efforts are focused on how to secure UK value and competitiveness out of this globally significant pipeline. The UK Floating Offshore Wind Taskforce highlights how floating offshore wind offers an opportunity to anchor a brand-new British industry, creating jobs and catalysing economic activity in all parts of the country.
4. With early demand is from fixed offshore wind, this evolves into supply of both floating and deep water fixed platforms, UK fabrication and steel supply need to be able to organise itself to supply into both these markets rather than seek to pick and choose between them. UK should also support commercialisation of emerging hybrid designs.
5. 88% of steel required for offshore wind components needs to come from plate mills. This plate is needed in a range of sizes, though growth in turbine sizes as well as the use of fixed

foundations in deeper and deeper waters, has pushed further upward the already large plate sizes required by industry. As offshore wind sizes continue to grow, the proportion of plate sizes that the UK can supply will fall. UK plate mills can currently supply 45% of plate needs.

The UK's largest current fabrication opportunity comes from monopile production at SeAH. However, SeAH needs large plate sizes beyond current UK mill capability. The Steel Strategy should investigate what steps are needed to grow UK plate capability and capacity to supply larger volumes of plate of 100mm+ into this important market.

5. After steel plate, the UK needs significant tonnages of rebar and tensioning strands for use in concrete semi-submersibles and barges, as well as gravity base foundations. The UK has the current capability and capacity to meet initial demand and will be able to invest as demand grows. The UK also has opportunities to innovate in supply of rebar - for example supplying higher grades of steel of higher value but lower volume, and better-quality localised steel recycling as a new source of rebar steel supply.
6. As well as plate, rebar and tensioning strands, the UK offshore wind pipeline needs a range of other steel types, including rolled open sections, hollow sections, castings, welding materials and flux and bolts. The UK has strong existing mill and fabricator capability across almost all of these areas. Supporting UK suppliers of these higher value steel types and products should be a part of UK efforts to grow UK supply chain value. Many of these steel types are for secondary steel elements that can be fabricated into the UK, provided that these fabricators are supported in integrating these secondary components with primary ones.



Electric Arc Furnace in operation



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To build a successful steel supply chain into offshore wind needs a shared vision

Growing the UK's ability to secure economic benefit from offshore wind's steel needs will steel require increasing both UK fabricator *and* UK steel mill capacity and capability. This necessitates a joint programme of action between the UK steel sector, UK fabricators and the offshore wind industry

1

To grow UK steel content in offshore wind market, more primary fabrication activity is needed in the UK, backed by initiatives such as the Industrial Growth Plan and Clean Industry Bonus.

However, currently the vast majority of steel-based components for UK offshore wind farms are provided by non-UK based fabricators, removing the potential advantage of local supply.

Priorities:

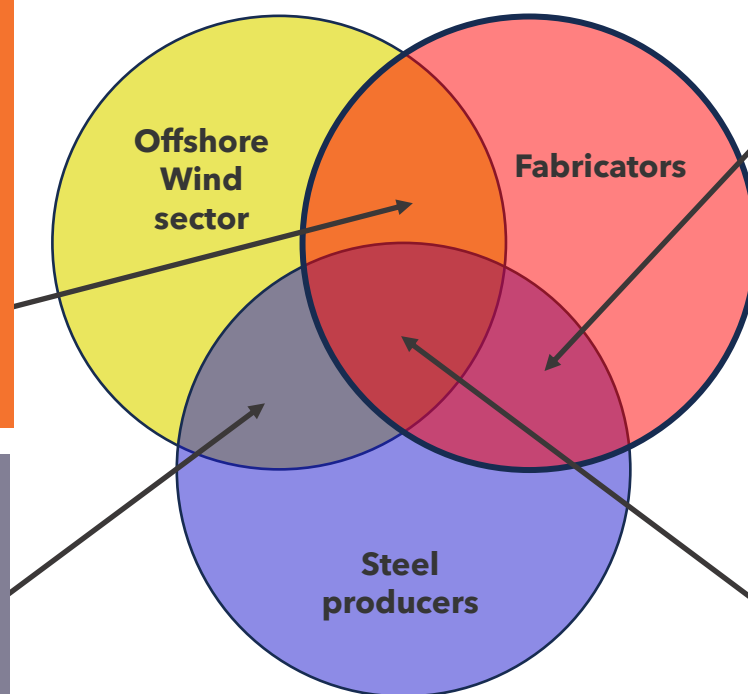
- IGP delivery body and offshore projects (through the Clean Industry Bonus) need to focus UK effort on growing primary fabrication, particularly defending and growing UK ability to roll tubular structures.
- Immediate focus needs to be on fixed wind, including securing greater value from TPs and towers, while defending and growing activity in jacket and monopile production. FLOW capacity can grow out of this.

2

OEMs procure steel for tower supply, but offshore wind developers and EPCs procure fabricated components, not steel. However, UK steel production offers route to lower carbon steel, while offshore wind could help open up routes to lower cost electricity and green hydrogen for UK mills.

Priorities:

- Offshore wind sector to facilitate discussions between steel buyers from OEMs and major fabricators to confirm specification requirements for plate supply.
- UK Steel and offshore wind sectors should work jointly with UK Government and bodies like Great British Energy to explore routes for lower cost power supply into low carbon UK steel.



3

Fabricators currently supplying into offshore wind will source steel from open market. UK steel producers have low incentives to increase capacity given that most fabricator work currently sourced outside of UK so pipeline between UK steel sector and UK fabricators is currently weak / unreliable.

Priorities:

- Supporting fabricators to be early adopters of new innovations such as vacuum and laser welding techniques will build competitiveness within UK fabricators and open up supply of smaller plate sizes into UK market.
- Technical investigation on steel quality requirements for offshore wind stemming from shift to EAFs as well as adoption of new welding requirements. This in turn opens-up UK as supplier of green steel to offshore wind sector.

4

Alignment between offshore wind, fabrication and steel can unlock wider UK benefits including stronger UK fabricator sector (also supplying into other critical sectors such as defence), and a UK steel sector able to invest in new caster and plate mill capacity to supply this long-term market demand.

Priorities:

- Early investment in existing caster and mill facilities to support increase in plate sizes that UK can supply.
- Medium term investment in new plate mill capacity to grow volume of production and enable production of larger plate sizes. Quick decisions on priorities will be needed to bring new capacity on-line to meet offshore wind demand in late 2020s.

Recommendations

The Bill of Works project aims to set out a common evidence base for the steel sector, offshore wind industry and UK fabricators. The data in the report also highlights a number of issues that are worth drawing out.

Data analysis from the *Bill of Works* project identifies a number of challenges and opportunities for the UK, leading to the following recommendations:

1. The UK's IGP identifies towers and deep-water foundations as UK opportunities. UK success in defending and growing UK fabrication value of these major components represents the best route for growing UK primary fabrication. Investment in additional tubular rolling capacity will be necessary for tower production as well as supply into floating offshore wind.
2. The UK's biggest opportunity for steel supply will come from supply of plate. UK steel mills are considering options for investing in new casters and upgrading existing and/or building new plate mill capacity. Existing UK plate capacity better matches requirements from floating offshore wind (steel and concrete semi subs and anchors) rather than fixed offshore wind (where components such as monopiles need larger plate sizes). However, UK steel providers can still provide steel for components such as towers and jackets, but do not have easy access to these markets as these components are not being fabricated in the UK.
3. Given the rapid growth of steel demand in this decade both here in the UK and globally, bottlenecks in the supply of sufficient large plate is a concern for the offshore wind sector. Such a bottleneck could constrain UK offshore wind growth at the point that the UK Government is wanting it to accelerate. A priority for a UK Steel Strategy is how to better utilise existing steel capability through (a) more UK primary fabrication; (b) better supply chain coordination and (c) early adoption of technologies such as laser welding and electron beam welding to help match existing UK plate with offshore wind needs.
4. The UK Steel Strategy also needs to assess investment in additional steel capacity, primarily for larger casters and rolling of larger plate, so the UK is able to supply plate for monopiles, larger towers and larger jacket designs expected in the future.
5. The UK has strong capability to supply steel for floating offshore wind platforms (both for rebar and tensioning strands for concrete designs, and plate and tubular steel for steel designs). However, the constraint will be where the primary fabrication of these components takes place. The UK needs to take seriously securing primary fabrication of floating steel components *and* concrete foundation expertise to increase value to the UK while protecting UK expertise in anchors and moorings.
6. The UK also needs to consider how to align fabrication and steel supply into offshore wind with other critical energy supply chains such as onshore wind, electricity grid infrastructure (pylons, substations etc.). Onshore wind will require smaller plate sizes than offshore, as well as rebar for foundations. The methodology developed here can be adapted to quantify use in these similar sectors.
7. Success will require coordination between programmes such as the Industrial Growth Plan and UK Steel Strategy and wider Industrial, Infrastructure and Defence Strategy work. As the IGP works to treble UK manufacturing it also needs to help connect industry steel buyers with UK steel providers. An early priority is to connect OEMs with UK mills to identify opportunities for supply of plate into tower fabrication.



Steel sampling at Electric Arc Furnace, Rotherham

UK Capability & Capacity Review

Bill of Works has assessed the capability and capacity of both UK based fabricators and the UK steel sector to supply the required steel into the UK offshore wind pipeline. We have mapped current supply of UK fabricators into the offshore wind supply chain across 2020-25, and also mapped known capability and capacity of both UK fabricators and UK steel mills. Using data on specific steel needs we have mapped specific steel requirements to UK steel production to accurately quantify what current proportion of different components could potentially be fabricated from UK steel products today and into the future after investment.



Prime Minister Sir Keir Starmer MP visiting Hutchinson Engineering in Widnes, July 2024

UK capability & capacity assessment - summary

Existing studies such as the IGP and supplementary reports, plus UK Steel's own Capability Analysis provide a strong evidence base of UK strengths to focus on

For *Bill of Works* we have reviewed the capacity and capability of UK fabricators and UK mills. We have utilised existing work from the UK's IGP and accompanying SCCA, plus UK Steel's own annual Capability Report.

For UK fabricators, overall supply into offshore wind remains very small in comparison to import of finished components. However, the UK has technical and commercial capabilities, and some physical capacity that can be nurtured. The UK's most significant gap is in primary fabrication, which needs to be addressed if the UK is to deliver on the IGP commitment to treble UK manufacturing capacity.

Right is a summary map of what we assess as the main locations of UK mill, fabricator and port capacity and capability. It should be noted that there is a strong overlap between ports and fabricators, though we have tried to draw out distinctions. Overlap exists primarily where existing UK yards such as Nigg and Arnish can or wish to act as both fabricators and host ports. Where ports are mainly expected to be focused on hosting other activities such as assembly, we have classed them solely as ports.

Note, while we have sought to identify some of the main UK locations, these maps are not intended to be exclusive, but illustrative.

These maps highlight existing capacity and capability across the UK that can be nurtured and invested in. The UK has strong clusters of activity in ports and fabrication which UK mills could potentially supply into.

How to use these maps:

In the following pages are three maps, one for mills, one for fabrication and one for ports. In each map are the locations for ports (**red**), fabricators/manufacturers (**blue**) and steel mills (**teal**) with names given on the relevant map.

In each we set out to summarise the relevant capability and capacity of the different companies and locations. We also use a key to denote (a) the activities likely to go on at these locations (e.g. plate rolling or marshalling), as well as the types of fabrication that are able to go on at these locations.

Figure 22: summary map of capability



UK mill capability

The UK has an existing steel mill capacity able to supply into a number of offshore wind needs (data derived from UK Steel Capability Report)

Liberty (Dalzell): Liberty in the UK supplies a wide range steel products. It's Dalzell mill produces hot rolled steel plates, and has capacity to produce up to 400,000 tonnes of plate per year

Can supply: small and medium sized plate steel for supply into offshore wind. Cannot meet requirements for larger plate sizes due to a constraints on rolling capacity and slab sizes available. It can make plate suitable for semi-subs and anchors, as well as some plate needed in jackets and towers, but not monopiles .

Spartan (Gateshead): Spartan supplies heavy plate from 12mm to 200mm up to 2.1m width and 22m length and has capacity to roll 230,00 tonnes per year.

Can supply: small and medium sized plate steel for supply into offshore wind. Cannot meet requirements for larger plate sizes due to a constraints on rolling capacity and slab sizes available. These plate sizes better suited to applications like anchors, pin piles and smaller foundation plates

British Steel (Scunthorpe): British Steel in UK can supply wide range of steels and currently supplies slab from its blast furnace. Potential new electrical arc furnace will enable low carbon slab steel production able to be cast to supply into plate mills.

Can supply: slab steel for other steel mills, including plate mills. Slab sizes more suited to plate for anchors and smaller plate for FLOW platforms and jackets rather than monopiles & towers

Sheffield Forgemasters (Sheffield): Capability is focused on heavy and technically challenging forgings & castings, plus consultancy services, design for manufacture & technology transfer.

Can supply: high grade steel for rolling into castings forgings (e.g for towers); nodes for steel semi-subs & TLPs and jacket designs for larger next-gen turbines

Liberty (Rotherham): produces steel long products, particularly steel reinforcing ba.

Can supply: Can supply rebar and tensioning strands to different steel grades required from its electric arc furnace for supply to gravity base and concrete FLOW foundations

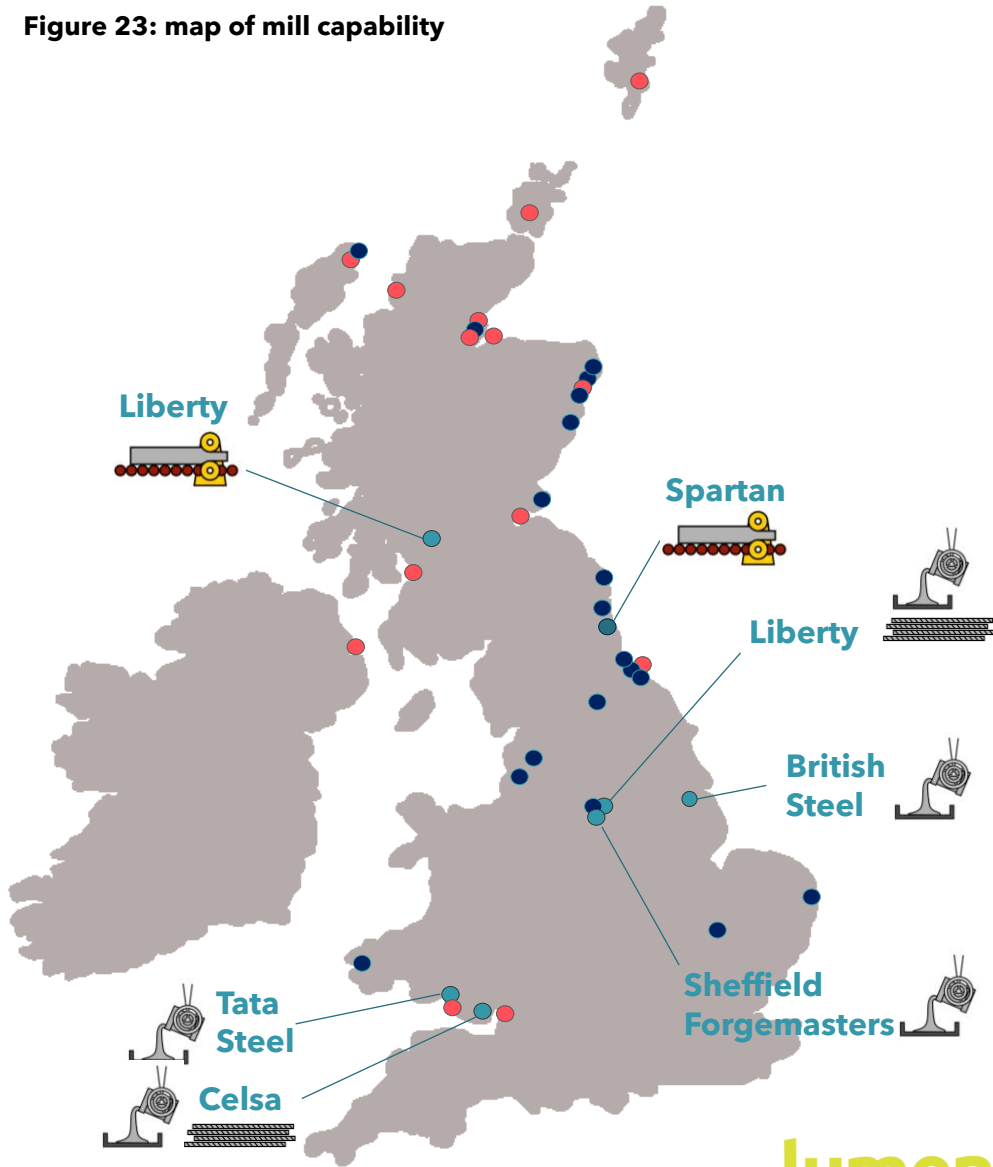
Celsa (Swansea): produces steel long products, particularly steel reinforcing bar & tensioning strands.

Can supply: Can supply rebar and tensioning strands to different steel grades required from its electric arc furnace for supply to gravity base and concrete FLOW foundations

Tata Steel (Port Talbot): Tata Steel in UK can supply wide range of steels. New electrical arc furnace will enable low carbon slab steel production able to be cast to supply into plate mills.

Can supply: low carbon steel for supply to other steel mills, including plate mills

Figure 23: map of mill capability



Note: Map and list of companies illustrative. Map seeks to show major steel producers and ports and fabricators. It is not an exclusive list, and the UK has wider capabilities beyond that shown.

UK fabricator capability

The UK has a network of UK based fabricators able to supply into a number of offshore wind needs (data derived from IGP and SCCA)

Acteon: Norfolk based anchors and moorings specialist, able to design, supply and install anchors



Ledwood Mechanical Engineering: Experienced energy fabricator based in Pembroke Port (freeport)



Arnish: tubular rolling capability, suitable for smaller primary and secondary items, now operating as Navantia UK (which also runs the **Methil** yard)



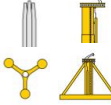
Mooreast: proposed manufacturing facility in Aberdeen for subsea foundations and assembly of mooring components



Cambridge Vacuum Engineering: Innovative welding process allowing rapid plate joining. Successful demonstrated on TPs with SIF



Nigg (Global Energy Group): experienced UK fabrication yard. Currently focused on securing tower and tubular capabilities



Cooper & Turner: Global bolt manufacturer with Sheffield HQ, and India, China & USA factories. Experienced supplier to offshore OEMs



SeAH: world's largest monopile facility. Currently under construction. Will have capacity for up to 150 monopiles per year



CRC Evans: Welding and coatings specialist. OWGP funded for mechanised welding solutions for floating offshore wind



Severfield: UK fabricator supplying secondary steel for Hornsea 3 wind farm, with planned NE assembly facility



FLOW Forward: Proposed manufacturing facility for mass production of components for different floating platform designs



Smulders: UK base used fabrication of jacket bottom sections and fit out, plus fit out of TPs using cans imported from Holland or Spain



Forsyths: Experienced fabricator, with proposed secondary steel fabrication facility. Currently within SIM process in Scotland



Subsea Micropiles: Proposed Montrose site for micropile fabrication. Montrose offers wider mooring and anchor handling expertise



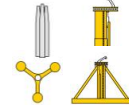
Griffin & Woodhouse: Experienced oil and gas mooring provider, now active in engagement with floating offshore wind developers



Texo: Blyth based fabricator and installer traditionally focused in oil and gas, and now with offshore wind experience



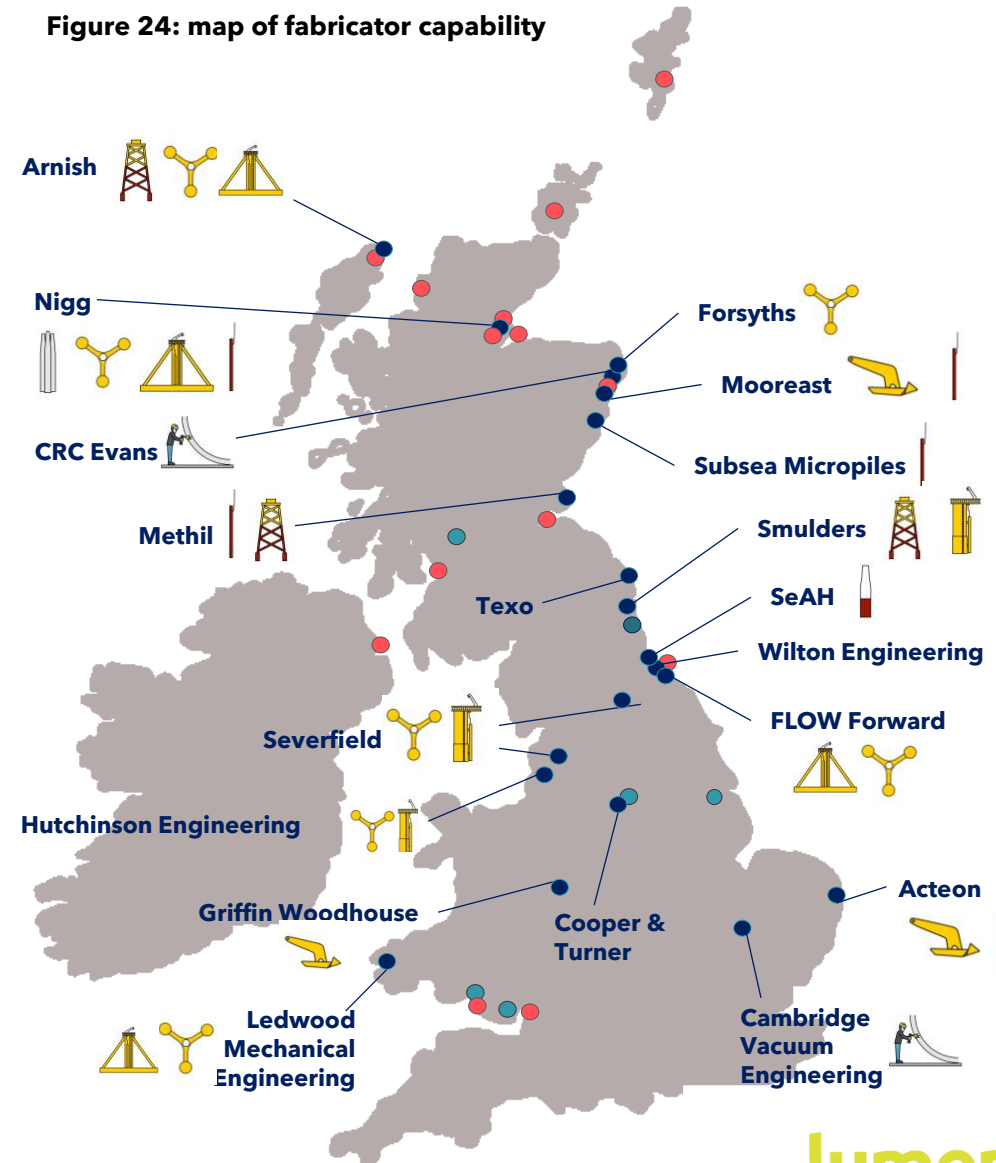
Hutchinson Engineering: Experienced UK fabricator with strong track record of supply of secondary steel into wind sector



Wilton Engineering: Previously coordinated TP contracts. Currently focused on defence and other markets



Figure 24: map of fabricator capability



Note: Map and list of companies illustrative. Map seeks to show major steel producers and ports and fabricators. It is not an exclusive list, and the UK has wider capabilities beyond that shown.

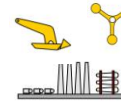
UK port capability

The UK has an existing network of ports active or looking to move into offshore wind activities. Capital letters show Freeport locations

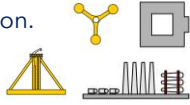
Aberdeen South Harbour: New harbour development. Potential location for Mooreast, plus other activities



Lerwick: Site for proposed offshore hub, well suited for supporting delivery of cluster of Shetland offshore wind projects



Ardersier: Site currently under construction. Suited to concrete platform manufacture, as well as wider offshore hub.



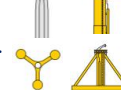
Mostyn: Experienced marshalling port, looking at future Irish Sea contract opportunities



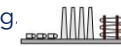
Avonmouth: Port currently active as concrete supply base for Hinkley. Potential to bridge to concrete FLOW supply



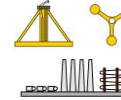
Nigg: Significant marshalling and assembly experience, plus ongoing fabrication capability. Site of proposed Sumitomo factory.



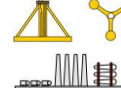
Belfast: Port has experience of fixed marshalling. H+W (Navantia owned) site offers fabrication expertise, though focused on defence contracts.



Port Talbot: Currently in FLOWMIS. Site has potential for manufacturing, and is adjacent to steel capabilities.



Forth: Burntisland, Leith and Rosyth Ports, offering scope for manufacturing, assembly for fixed and floating offshore wind



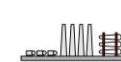
Scapa Deep: Proposed offshore wind hub with access to deep water facilities and storage



Humber: Hull is experienced marshalling port, adjacent to Siemens blade factory, while Grimsby provides significant O&M capability



Stornoway: Site for proposed offshore marshalling, assembly and integration activities. Adjacent to H+W Arnish facility



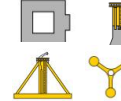
Hunterston: Site of proposed XLCC cable factory. Also deep water access making suitable as FLOW offshore wind hub



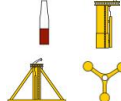
Seaton: Experienced marshalling site for offshore wind



Invergordon: Experienced marshalling site. FLOWMIS funding secured to develop as FLOW offshore wind hub.



Teesworks: Site of new SeAH facility and other fabrication expertise.



Kishorn: Large dry dock suitable for ship repair, decommissioning and concrete FLOW market. Site adjacent to quarrying activity



Figure 25: map of port capability



Note: Map and list of companies illustrative. Map seeks to show major steel producers and ports and fabricators. It is not an exclusive list, and the UK has wider capabilities beyond that shown.

Current UK steel capability & capacity

Assessing UK capability & capacity involved mapping different steel requirements against different UK mills using data from UK Steel and sector interviews

Figure 26: Steel market by steel type based on UK current capability - upper estimate (t)

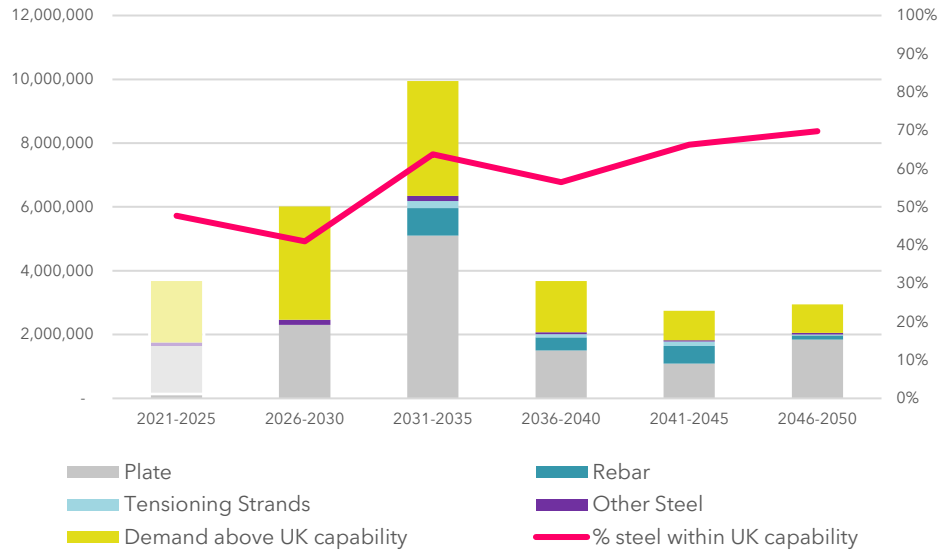
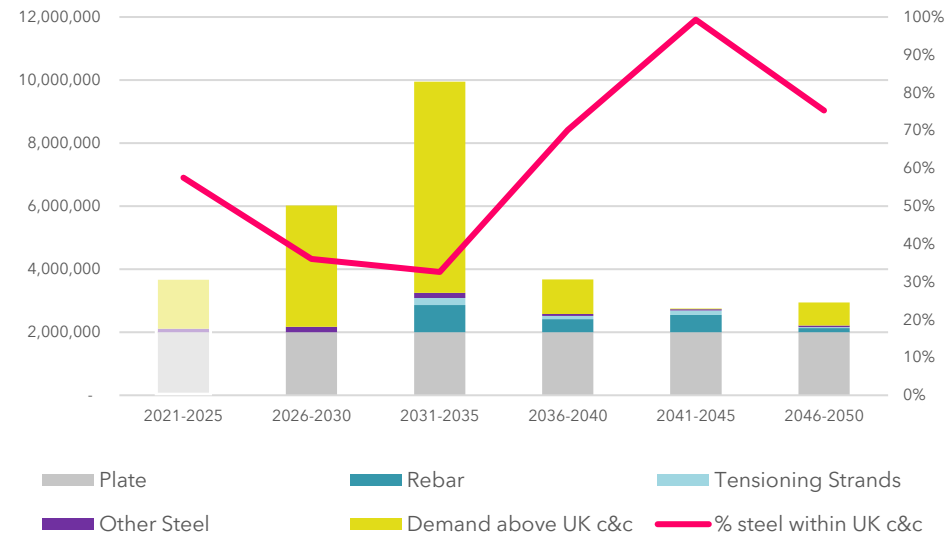


Figure 27: Steel market by steel type based on UK current capability & capacity - upper estimate (t)



Bill of Works Phase One undertook a review of steel demand in the UK offshore wind pipeline. In Phase Two, we reviewed “capability” & “capacity” of steel mills – to quantify what percentage of steel needs can be provided by UK mills.

Left: Figure 26 shows the modelled capability – i.e. the types of steels that UK mills could potentially supply.

Centre: Figure 27 shows modelled capability and capacity – i.e. the types of steel that UK mills could potentially supply up to existing production limits.

Our assessment shows that the **UK has high capability and capacity for rebar, strands and other steels** (tubulars, sections etc), **and medium capability and capacity for plate supply.**

Reviewing “capability” means assessing at the ability of UK mills to supply the sizes of steel required. For example, with plate this means an assessment of what sizes can be produced (which is dependent on mills themselves and also maximum UK slab steel sizes currently available for supply into UK mills).

A mill might have high capability, but limited production volumes that would limit capacity. For a sector like offshore wind which has significant tonnage requirements (particularly for large plate), it is therefore important to also assess capacity.

Overall, UK mills have **capability** to supply **58%** of steel requirements for the period 2026-2050, but this varies across the five-year periods modelled due to the mix of different plate sizes required.

At its lowest (2026-30) UK capability is 41% due to the predominance of monopile foundations in this period. **These figures highlight the importance of investing in plate joining technology** in the short term to align UK plate production with the larger plate sizes needed in offshore wind.

Comparing Figures 26 & 27 shows that the UK’s main constraint is not capability but capacity with limits in production capacity of UK plate mills being the greater limit on supply into offshore wind. Our estimate, based on figures provided by the UK steel sector is that the UK mills, *if fully utilised*, have combined **capability and capacity** to provide **51%** of steel requirements of the UK offshore wind sector for the period 2026-50. If plate mills are focused on other markets this figure will be necessarily lower.

Figures show variation over time, falling as low as 33% for 2031-35 due to (a) the high volumes of steel required and (b) the large volume of monopiles still required.

By the early 2040s this figure grows to 99% as jackets and FLOW platforms dominate (particularly due to modelled growth of concrete platforms) but falls again in the late 2040s as larger turbine sizes (and thicker plate in FLOW towers) lead to larger tower and jacket sizes requiring plate sizes beyond the capability of UK mills. **These figures highlight the importance of investing in new plate mill capacity** in the medium term to enable UK mills to supply a higher percentage of UK offshore wind steel (and to avoid full mill utilisation).

Current UK steel capability & capacity

Assessing both UK capability and capacity shows that UK steel providers could currently provide up to 51% of UK offshore wind steel needs between 2026 & 2050

Figure 28: Current UK Steel Capacity and Capability (mt)

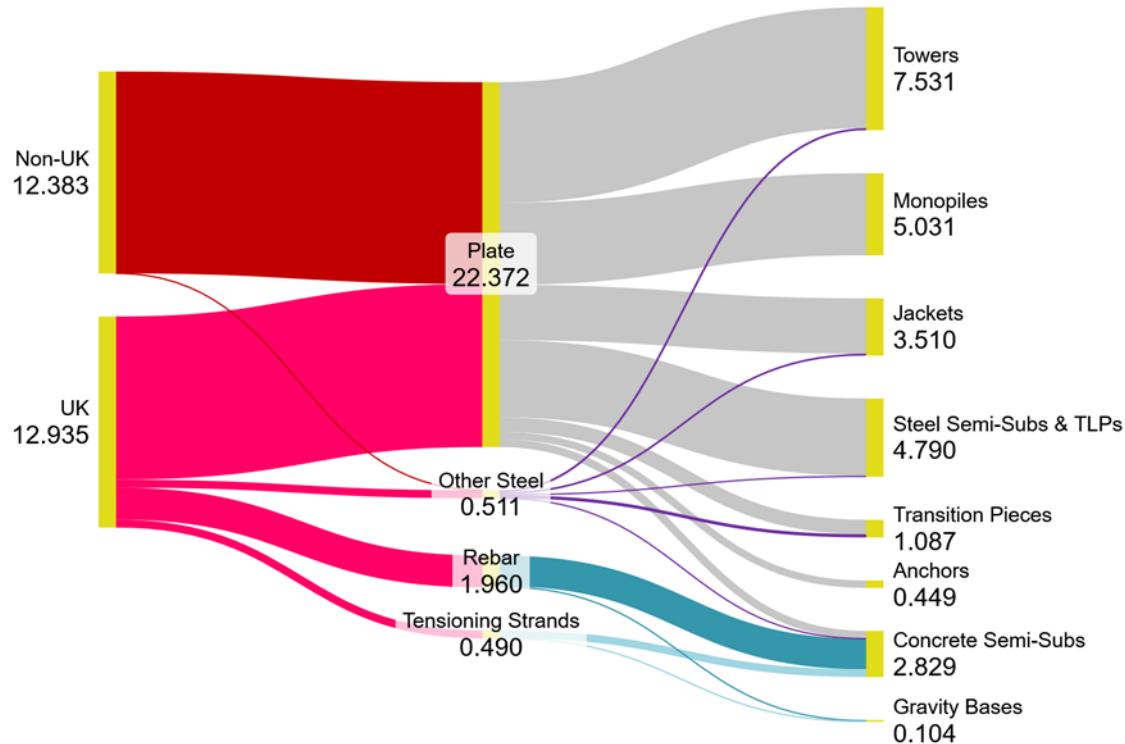


Figure 28 maps the data from Figure 27 into a Sankey diagram to help demonstrate what proportion of offshore wind steel needs UK mills could provide based on their capability and capacity. The diagram shows the maximum current potential of the UK steel sector to supply steel into the UK's offshore wind pipeline rather than actual levels of supply.

If UK steel mill current capability and capacity is fully utilised, the UK would be able to secure 51% of steel requirements. This would include 45% of plate required, though as Figures 26 & 27 show, these percentages change over time due to the changing mix of foundation types and the longer term shift to larger turbine sizes.

UK steel mills have high capacity and capability to meet almost all offshore wind steel needs except for plate. UK steel mills can provide up to 51% of offshore wind plate needs at present.

The UK steel sector is able to supply rebar, tensioning strands and other steel types such as section and tubular steel. These types of steel are required for concrete foundations and some secondary steel requirements, respectively.

However, the offshore wind market's main requirement is for plate. Based on UK restrictions due to steel slab sizes and plate rolling capacity, we estimate that UK mills could supply up to 45% of the UK's offshore wind needs. However, this would require UK mills to dedicate available capacity to offshore wind component supply, so in likelihood the figure will be lower dependent on volume requirements.

Significant however is that UK has high capability to supply plate for structures such as steel semi-sub, TLPs and anchors which generally require smaller plate dimensions than other components. It has reasonable plate capacity to supply into towers and jackets, but low capability to supply plate steel for monopiles and TPs. Overall the UK's ability to supply plate for components like towers and jackets will reduce over time with the continued shift to larger turbines. A shift from fixed to floating offshore wind will also require thicker plates for tower production..

To grow UK plate supply into offshore wind, there are requirements for the UK steel industry to look at options to grow its capability. In the medium to longer term the UK should look to invest in new plate rolling and larger casters that can supply offshore wind needs. However, demand in the offshore wind sector is highest towards the end of the 2020s and in the early 2030s, meaning that there is a narrow window of opportunity for the UK to invest and be ready to supply into this market.

This closing window necessitates **a parallel focus on short term actions to explore how to make more use of existing UK plate capacity** in offshore wind. This can be done firstly by prioritising fabrication of fixed components requiring smaller plate sizes (jackets, towers and TPs), and also by investing in new technologies like laser welding and electron beam welding. These technologies enable rapid high-quality welding, and also enable smaller plate sizes to be quickly joined together to make equivalent larger plate sizes). In addition, the UK needs to look at logistics and supply opportunities to build stronger relationships between mills, component designers and fabricators.

Future UK steel capability & capacity

If actioned, potential steel mill investments under consideration could provide up to currently provide up to 87% of UK offshore wind steel needs between 2026 & 2050

Figure 29: Potential future UK Steel Capacity and Capability (mt)

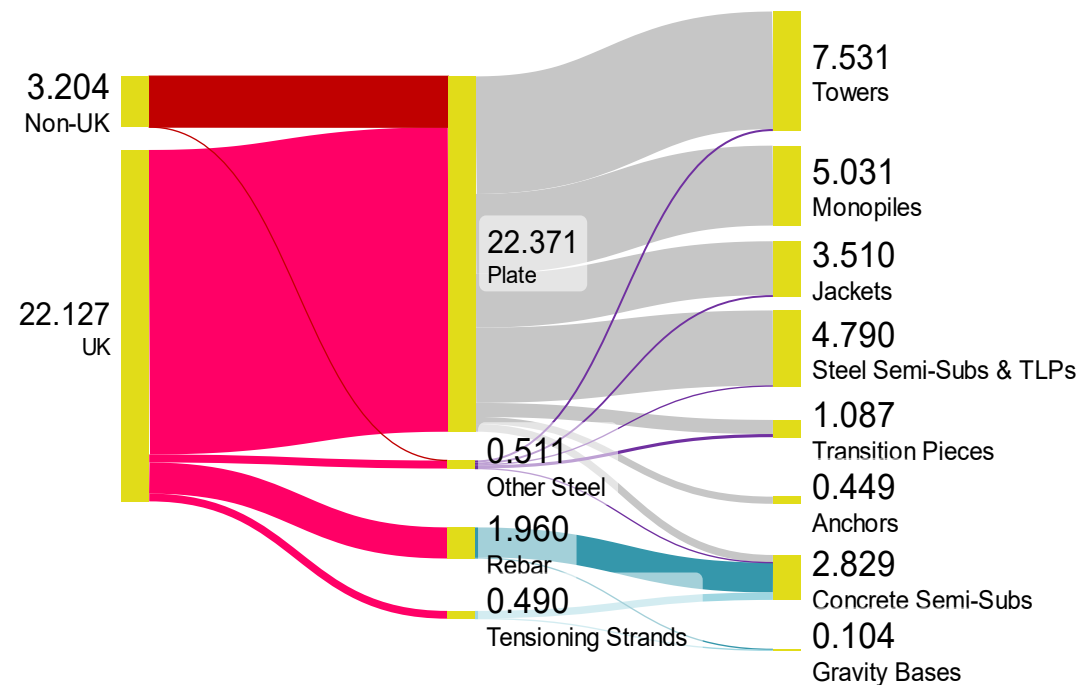
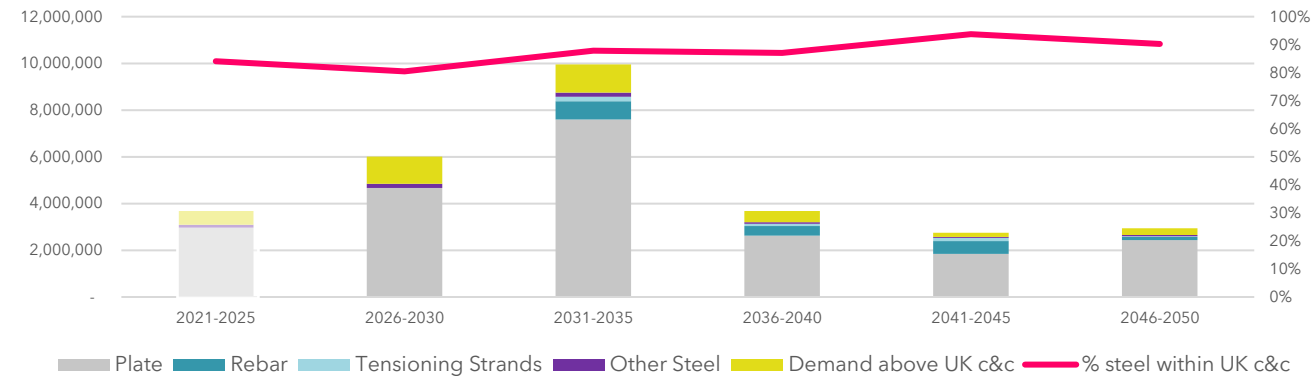


Figure 29 shows what proportion of UK offshore wind’s steel needs the UK could produce based on known proposed investments.

Based on proposed investments in additional caster and plate rolling capability, the UK could potentially increase its supply of steel plate from 45% to 86%. Overall UK mills would be able to meet 87% of overall needs (as the UK already has high capability for other steel types).

This data is also set out right in Figure 30 broken across five-year periods out to 2050.

Figure 30: Steel market by steel type based on UK potential future capacity - upper estimate (t)



Our assessment of future capacity/capability of UK steel mills is based on a discussion with UK steel producers and Steel UK over future potential investment options for investing in (a) new and/or refurbished casters able to make larger steel slab sizes, and (b) new plate mill capacity able to handle these bigger slabs and producer thicker bigger plates increasingly favoured by the market.

These investments could work alongside investment and adoption of technologies such as laser welding and electron beam welding which allow smaller plate sizes to be joined effectively together. As well as allowing a wider range of plate sizes to be used by fabricators, this technology potentially helps open up supply options, as there are only a few mills globally able to supply the largest plate needed by offshore wind, and they also cannot do this through continuous casting, which means that costs tend to be higher.

There are opportunities for the UK to facilitate discussions between developers, component designers, plate providers and welding experts such as CRC Evans and Cambridge Vacuum Engineering, to look at routes for early adoption and roll out of such approaches.

Finally, it is worth re-emphasising that while investment to increase UK steel sector capacity, this needs to be accompanied by growing UK fabricator presence, to provide a ready market within the UK.

Any work on a UK Steel Strategy must therefore factor in not only how to grow capacity at UK mills but also to support UK fabrication.

Glossary

Term	Definition
BCSA	British Construction Steel Association
CIB	Clean Industry Bonus
DBT	Department for Business & Trade
DESNZ	Department for Energy Security and Net Zero
EAF	Electric Arc Furnace
GOES	Grain-oriented electrical steel
IGP	Industrial Growth Plan
mt	Million tonnes (steel)
mtpa	Million tonnes (steel) per annum
NGOES	Non-grain-oriented electrical steel
SCCA	Supply Chain Capability Analysis
TLP	Tension Leg Platform
TP	Transition Piece



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Anchor installation at Kincardine wind farm