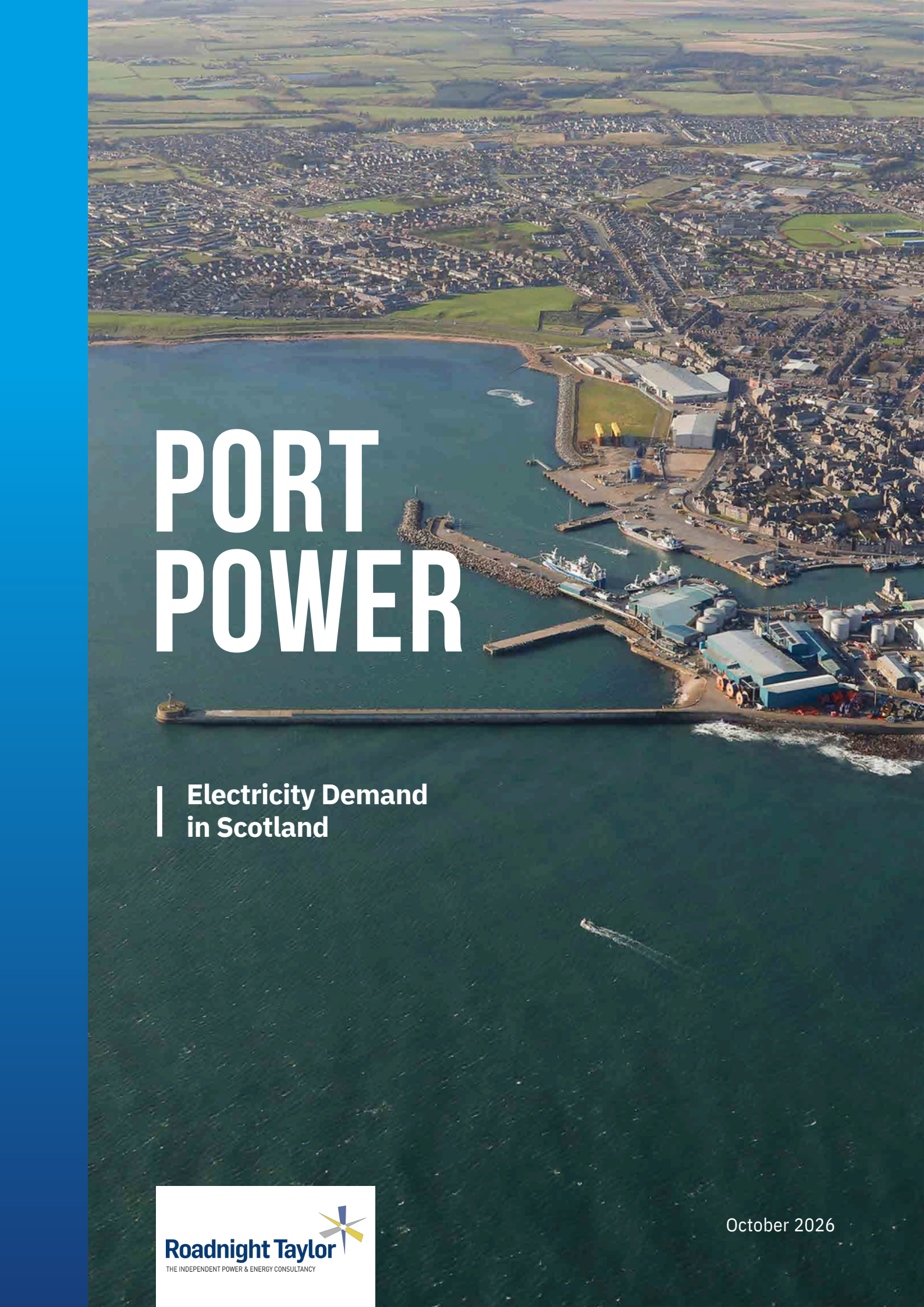
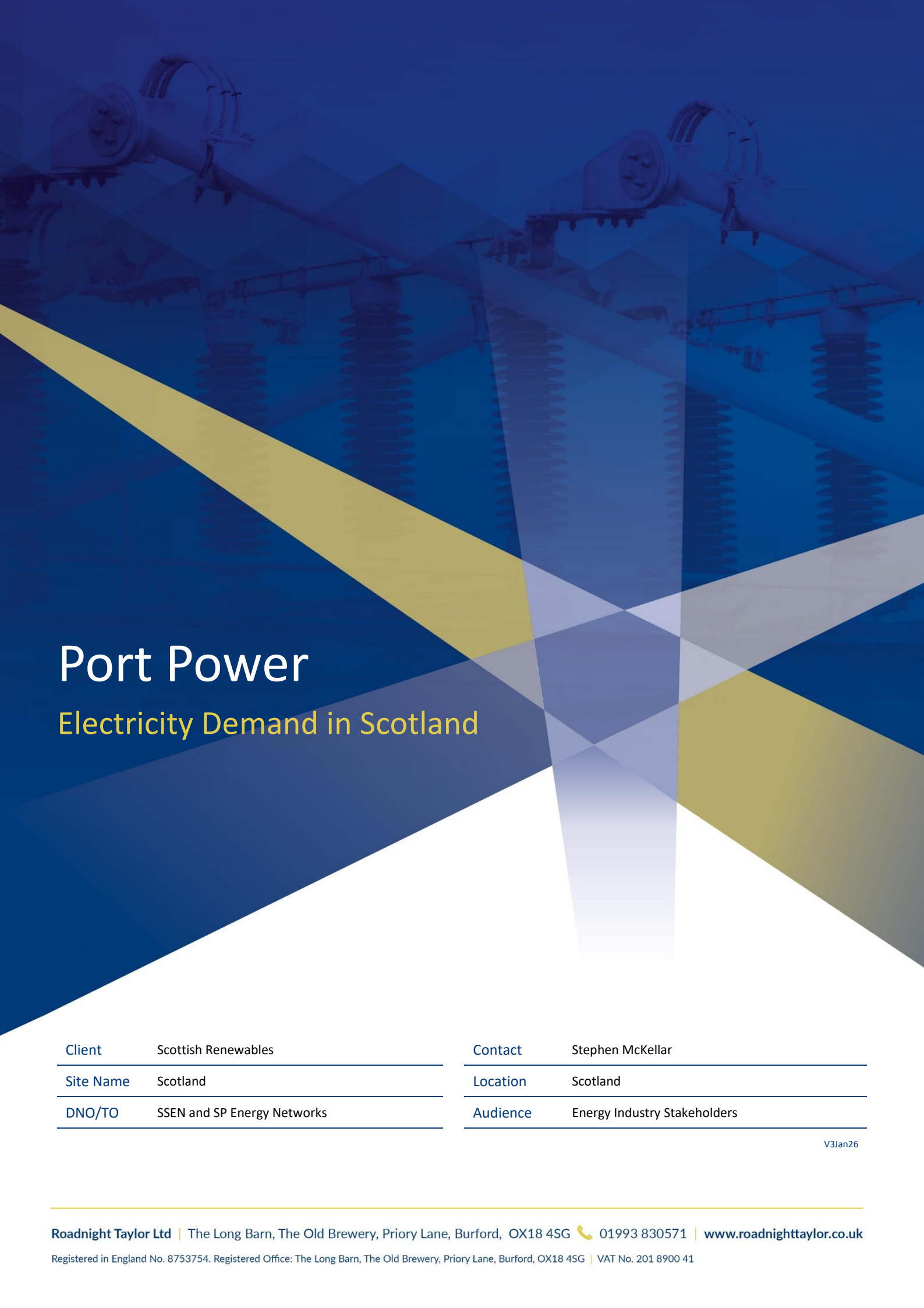




PORT POWER

| Electricity Demand
in Scotland



Port Power

Electricity Demand in Scotland

Client	Scottish Renewables
Site Name	Scotland
DNO/TO	SSEN and SP Energy Networks

Contact	Stephen McKellar
Location	Scotland
Audience	Energy Industry Stakeholders

V3Jan26



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R0	Kyle Murchie	Initial Release	Catherine Cleary	02/04/2026
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Executive summary

Scotland's ports are gateways for trade, maritime activity and offshore energy; a role they have played for centuries. Today they generate circa £1.9 billion Gross Value Added (GVA), directly supporting the UK economy and employing more than 2% of the Scottish working population. However, with the transition to more sustainable energy sources and a low carbon economy, ports are becoming locations where various net zero transition activities and inward investment converge.

This evolving role has the potential to increase electricity requirements substantially. Shore power is a factor, yet increased clean energy requirements are also driven by the varied needs of port estate tenants, offshore wind manufacturing and assembly, industrial electrification, hydrogen production, storage and distribution, vehicle charging and cold storage. Private electricity networks and local generation can form part of the solution, yet without a coordinated approach and clear strategies upon which investment can be secured, there is a risk Scottish Ports will not be in a position to fully realise the opportunity.

This report establishes a foundation for communicating the changing electricity needs of Scottish ports. It draws together the research proposition, emerging anonymised insights from port interviews and an initial review of public policy and network-planning material. The findings are designed to support industry development, feeding into Demand Reform, Strategic Planning and wider Government strategies.

The emerging interview evidence indicates that ports should not be treated as a single demand category. On one hand, a port may be seeking incremental capacity for buildings, electric vehicles, lighting and plant, potentially transitioning from a low voltage to 11 kV supply. On the other, a prospective tenant or strategic energy project may require connection to the electricity transmission network with a demand peak of circa 1GW quoted. The technical, commercial and policy implications of those cases are fundamentally different and therefore two ports of similar size and traditional functions could have very different energy requirements in the near future.

Commercial uncertainty was evident from the feedback collated with a reliance on Government Strategies, energy industry strategic planning and the outcome of Connections Reform (given investment in several cases was linked to delivery of renewable generation projects). Given ports are not a technology or singular user type, they can rely on a varied set of commercial drivers. While approaches including the UK's Modern Industrial Strategy and National Policy Statement for ports highlight the key role ports play and commit significant investment, they do not fully account for the diversity across Scottish ports. Underlying strategies and frameworks associated with specific industries or technologies are an important step; the Hydrogen Strategy update due in 2026 is one such example. However, there is perhaps an opportunity to develop a tailored suite of tools or initiatives which close commercial uncertainty gaps for ports given their continued national significance.

Even when investment is secured, the route to meeting the additional energy requirement is complex and challenging. With significant proposed generation in Scotland, even post the Gate 2 to Whole Queue (G2tWQ) process in early 2026, meeting the new requirement through greater grid access is an obvious next step. Yet even when the full need is understood, this can take a significant amount of time. Through the port interviews, the timescales discussed were relatively short in current grid terms. While 2030 seems realistic from a port development perspective, the electricity network will not be in a position to facilitate all needs discussed within that timeframe. In Q3 2026 it is not possible to submit a new application for a demand connection to the transmission network and if making an application to increase the capacity of a distribution connection requires a transmission assessment, the port could easily wait 15 months before receiving a complete connection offer. Only at this point would the true timescales and cost estimate become clear. Importantly, this is not the point at which connection is made; while some increases could be facilitated within months others could easily take years due to the network investment required. At transmission level, which is 132kV in Scotland, Security and Quality of Supply Standards mean demand connections can trigger significantly more electricity network infrastructure when compared to an equivalently sized generator and at present the Transmission Owner would be responsible for all works down to the non-transmission voltage. While a Class Exemption to address the latter is actively being considered through Ofgem's proposals associated with data centre connections, it is important to recognise transmission demand connections are currently complex with much of the existing Code and Policy designed for a time when Distribution Networks were the main transmission connected demand Users.

In addition to accessing clean energy, the consents process is also a factor. Although this report centres around electricity grid requirements, planning is perceived as a constraint. The diverse nature of port power requirements, their fixed location and a heavy dependence on investment projects or external tenants that are themselves uncertain creates uncertainty in the consent and grid application process at a time when there is greater scrutiny of readiness and lower threshold for what is classed as a material change.



Strategic Planning arrangements provide an important foundation for growth. The Regional Energy Strategic Planning (RESP) considers all energy vectors across the Scotland Region, underpinned by the Strategic Spatial Energy Plan (SSEP) which sets out high level national goals for energy and a blueprint for each vector. The Centralised Strategic Network Plan alongside network price control periods then sets out the roadmap for electricity, gas and hydrogen network investment (transmission network level). Such could have a significant positive impact on investment signals, so there is a need to consider how port power needs are captured as decisions on demand types are made which can feature at Scottish ports. However, given the latest timing of the aforementioned plans, with the final SSEP in Autumn 2027 followed by the RESPs and CSNP by the end of 2028, these could bring medium term / 2030s benefits.

Interviewees also highlighted the challenges beyond increasing their access to additional electricity capacity. The cost per unit of electricity (kWh) is a present barrier, both to committing to increased electrification and for those using port supplies. This could include tenants, yet there was more discussion around shore power with some vessels opting to remain offshore and using fossil fuels due to the economics. Therefore, Reformed National Pricing and any other electricity cost initiatives such as the reduction in electricity costs for AI Growth Zones is a significant factor which not only impacts investment in new electricity demand capacity, but also the decision on the energy vector mix. While all of those interviewed were somewhere in the process of increasing their electricity demand, there was some discussion on the use of other energy vectors and in particular Hydrogen. The difficulty being a reliance on a UK Hydrogen Strategy focusing on offtakers and infrastructure planning which is yet to be published at time of interview and writing.

Immediate opportunities

Scottish ports are strategically located for maritime and energy activity, but not necessarily for electricity capacity. Their future demand can be understood by source, certainty, scale, timing and wider system value, not simply as a single uniform category or as a potential delivery location for a categorised technology.

Refreshed and clear market signals, with a coordinated delivery blueprint which still encourages competition are recommended. Working closely with ports, port authorities and trade bodies such as Scottish Renewables has the potential to mitigate the present fragmented direction, looking at practical solutions that could be deployed in the shorter term. The investment in our networks is at a scale we have not previously witnessed, therefore where there is no viable way to facilitate the desired grid connection, having this clearly communicated and understood could allow ports to make more informed plans and consider the alternatives; adjusting growth timeline, use of other energy vectors, private wire network connections, onsite generation or some form of combination are a few examples.

Clarity on the connection application windows (under CMP434) is also key. Ports, like other stakeholders seeking additional electricity demand are not engaged with the energy industry in the same way that most generation and storage developers have been traditionally. Therefore, **additional support is recommended with one of the first requirements being clear timescales for transmission demand applications (next two windows) and an agreed published timescale for DNOs Modification Application submissions following a DNO Offer signed acceptance.**



Introduction

Ports are enablers of Scotland's clean energy future, building on their historic role and remaining key to the energy sector and economic growth as we continue the energy transition. The next chapter for ports will see energy requirements increase yet there are currently many hurdles to navigate such as economic feasibility, varying investment signals, grid capacity, the role of other energy vectors and the environmental impact of change.

Shore power is a critical enabler of port decarbonisation, allowing maritime infrastructure to actively participate in the clean energy transition by reducing emissions of vessels at berth, which on average account for approximately 16% of a vessel's carbon footprint¹. This proven solution also improves local air quality and eliminates noise and vibration from auxiliary engines—benefiting both port communities and maintenance teams. Despite its benefits, uptake of shore power remains limited due to several challenges, including high upfront capital costs, constrained energy network capacity, high electricity costs and limited demand from vessels.

While shore power is a common focus given it is often part of the first phase of further electrification, many ports have plans for a generational change to their operation. Changes vary but can include electrification of vehicles such as forklift trucks through to much more significant demands, with investment in onsite solar, behind the meter storage making for a varied and complex picture. Ports are not only driven by their own direct operations, but by those of tenants who have their own energy needs and investment drivers. Importantly, the two are believed to be highly linked with the ports acting as industrial centres and facilitators of local economic activity which is often linked to the energy transition (UK and Europe).

The British Ports Association suggests 70% of UK ports are already at or near to their maximum import capacity¹. To further understand port intentions, perceived challenges and their experiences to date with a greater focus on Scottish ports, Scottish Renewables commissioned Phase 1 research to better understand the need and how this fits into the context of network investment, electricity grid connections and the developing policies and reforms.

Research approach

The research undertaken was designed to collate an initial view from port stakeholders, considering findings in the context of grid in 2026. For the purposes of this report, network investment, electricity grid connections and the developing policies and reforms have been considered.

Roadnight Taylor initiated the research through half an hour interviews with representatives for 12 Scottish ports and harbours. This was a cross section of the Scottish ports with active growth strategies and provided the baseline upon which this report is built. All discussions were individually confidential with only the amalgamated and anonymised data used directly. This has been complemented by publicly available information, particularly for other ports and harbours who have supported the research while unable to conduct an interview at the time of request.

Findings were shared with Scottish Renewables in Spring 2026, used to inform engagements and consultation responses during the Summer. A refresh of the report has been undertaken by Roadnight Taylor to better align with latest industry developments and highlight the opportunities.

¹ https://www.britishports.org.uk/content/uploads/2022/07/bpa_shore_power_paper_may_20201.pdf



Scotland's ports

Scotland has more than 200 ports and harbours around the coastline, a coastline which is widely reported as more than 60% of the GB total. Scotland has 11 major ports as reported by Crown Estate Scotland², with the definition of a major port is one which “regularly handles more than 1 million tonnes of per year”. Care should be taken when using this term in relation to growth and in particular the percentage increase in sought electricity demand capacity as it is not necessarily these ports which are seeking the greatest increases in electricity capacity.

Port Classifications

Terms Major, Minor and Strategic can have very different meanings depending on the specific context³. As an example, one of the ports defined as “Other” by the Scottish Government Scotland’s Environment department, had an 11kV connection and is proposing a demand that would likely require a transmission connection by 2030. Similarly, a “Major” port under the same classification criteria is also expecting to see an increase by 2030, but with a third of the electricity demand requirement.

The reasons for this are varied and is not a sign of energy usage given other vectors and private generation also play a factor. However, like most other factors when describing ports, care must be taken not to draw conclusions based on definitions or classifications based on very specific and potentially unlinked criteria.

² <https://www.crownestatescotland.com/scotlands-property/coastal/ports-and-harbours>

³ <https://marinescotland.atkinsgeospatial.com/nmpi/default.aspx?layers=23>



Emerging findings

All those interviewed were able to share a wealth of information; able to share information freely in the knowledge that all sensitive information was protected and only aggregated and anonymised views would be shared. However, no two discussions were the same, which was unexpected as some commonality had been anticipated. The differences were not simply in the load types and electricity demand requirements; the history of each site, land availability and location all seemingly influencing the proposed development strategy. The interviewees were all very knowledgeable, yet their understanding of the energy industry varied considerably with some able to talk in voltage levels but not power (MW / MVA) and others actively feeding into the transitional RESPs and having a more active knowledge of the National Energy System Operator (NESO). Yet even those more informed will not generally sit on industry Code Modifications, Working Groups or Task Forces hence it is important to appreciate that for most demand consumers, electricity is a base commodity and is a cost like any other, not something their business is designed to make money from. While there are revenue streams, these tend to be considered to potentially offset some of the unit cost and use of system charge. The demand user's business model is reliant on something other than the energy market, although it is noted their revenue may be linked to the energy transition and associated supply chain. This is very different to a generator for example where the business model is predominately based on the energy market and the selling of energy or delivery of services.

During the interviews, a number of common phrases and topics were noted. These are presented below, with Shore Power, Heavy Industry and Hydrogen Electrolysis the terms that were most common which had a significant impact on projected demand growth. Note data centres and AI Growth was not identified as a primary driver, although the use of AI and the need for such capabilities was identified as an emerging interest while not a factor that could be quantified at time of interviews. Floating Data Centers were also noted, yet given their concept is to largely generate electricity offshore to self supply, the technology has not been included in demand growth figures.

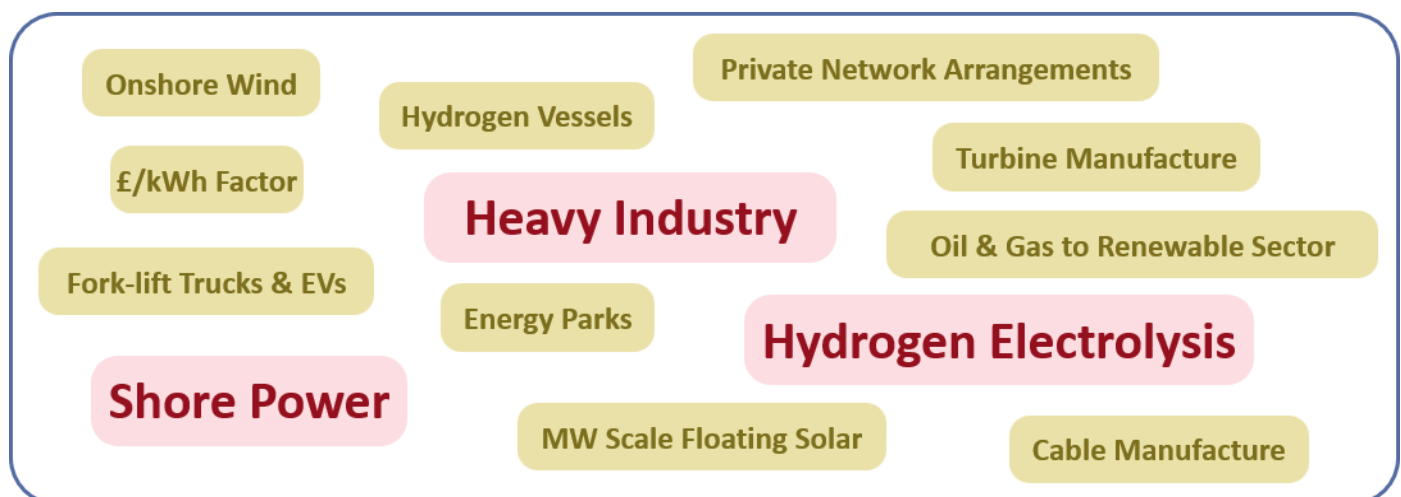


Figure 1: Common phrases and topics noted during port interviews

The key messages coming out of the port interviews are as follows:

1. **Unique Needs** – Significant variation in port ambitions, scale and power requirements, reinforcing that ports cannot be treated as a single, uniform demand category.
2. **Large Demand** – Definition of “high power demand” or “large demand” varied significantly. Some ports are seeking an increase that will see them move from an LV connection to an HV (11kV) connection while others discussed tenants that would require connection to the 400kV transmission system.
3. **Short Timescales** – In the vast majority of cases, timelines were short. While in port development terms 2030 seems realistic with time on their side, the electricity network will not be in a position to facilitate all needs within that timeframe.
4. **Demand Drivers** – Port needs can be categorised into those largely within their control and others that are dictated by their tenants. RESPs and SSEP will need to differentiate as likelihood of demand being necessary or influenced by other strategies is dependent on what could be very isolated factors.



5. **Commercial Uncertainty** – Commercial uncertainty was evident. Shore Power expansion should be the easiest to forecast, yet it is driven by the wider market and has to be economically viable at time of investment. This can vary in year with wholesale prices and geopolitics.
6. **Principal Demand is On-shore** – The highest energy demands are typically from on-shore, tenant driven industrial projects. Therefore, while shore power and electrification of traditional port functions is a driver for Stage 1 increases in demand, it is typically tenant or investor driven projects which drive Stage 2; particularly the upper end of this category.
7. **Government Strategies** – Clear link between port needs and Government strategies including the Hydrogen Strategy and to a lesser extent the AI Growth Zones strategy.
8. **Chicken and Egg** – A number of ports will see energy demand increases driven by the offshore wind industry and expanding transmission infrastructure. Hence in some cases the port land could be used for functions that will enable new infrastructure and generation yet may themselves sit behind works that they could help alleviate.
9. **Ripple Effect** – Most ports interviewed were not actively considering the impact their current and planned operations may have on the wider electricity network. Yet reviewing some publicly available proposals, this appears to back the findings of the SSEN led SeaChange project and UKPN Electric Thames project. SeaChange centred on specific ports in the north of Scotland and south of England, but some parallels can be drawn. If a port expands to become an industrial hub, the cycle of particular deliveries or supporting industry / enterprises it facilitates could all have a ripple effect. This can lead to cyclic load increases elsewhere on the network or drive increased demand requests in the areas surrounding the port. This impact is not well understood with an opportunity for further investigation.
10. **RIIO-ED3** – DNO Strategic Planning does not fully capture need and diversity of needs, although it is recognised there has been significant development through RIIO-ED2. DNOs can capture what is presented, yet unlike other industries the range in demand needs is significantly greater with several more factors to consider and a wider reliance on independent technology strategies / policy decisions.
11. **Reduced Headroom** – Those interviewed highlighted past load growth with many eating into traditional headroom between their contracted maximum import capacity and peak demand. This is significant as it not only highlights increases in demand over time and the potential bottleneck being reached, but also the real time impact on electricity networks. Demand in particular has often been assumed to stabilise over time, so a peak demand could be significantly less than the authorised capacity with new demand being added based on the actual peak of the relevant section of network and asset ratings. Not the total of all contracted demand, particularly at the lower voltages. Thus, such natural load growth can have a knock-on impact until network reinforcement is completed. Not isolated to ports, but a factor to consider.

To allow a comparison, loads as of 2023/2024 were considered as “Existing”. In some cases, ports may have recently contracted an increase in demand capacity, yet this may not be fully utilised at present or could skew the figures given this is not the traditional requirement for the site and would be a step change. Any increases in 2025/2026 or planned before 2030 were then categorised as “Pre 2030”. Some exceptions were made where the expectation was 2030, but this was deemed highly ambitious or unrealistic by the interviewer. Everything else was categorised as Beyond 2030. For clarity, the ranges themselves have not been modified, only the category they sit within may have been adjusted based on professional insight. These ranges take an aggregated port or harbour view given many have more than one metered connection.

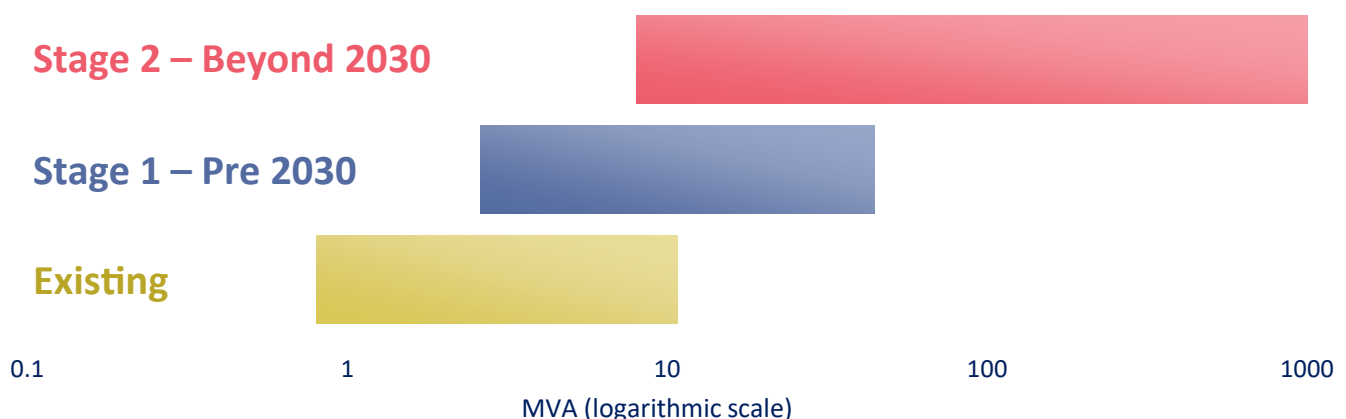


Figure 2: Electricity Demand need from ports interviewed



The UK Department for Transport's (DfT) call for evidence results published 28 August 2026 align with the findings in many cases, noting that they received responses for 17 port companies. They found the median grid capacity for UK ports was 5.5MW with a mean grid capacity of 11.73MW. This generally fits the "Existing" profile as shown in Figure 3. Interestingly, the estimated future energy demands then reached 91MW, again close to the findings of this study which saw significant variation yet a notable overlap in Stage 1 and Stage 2 (more enduring requirements) between 10MW and 80MW.

However, beyond 2030 was extremely varied due to the high number of layers required to reach the peak demand figure, with some including tenant demand (such as a hydrogen electrolyser) which saw capacity required reach 1GW. As discussed, tenant demand can significantly impact the estimate and could also be captured elsewhere from a strategic planning perspective. Hence it is important to log but recognise there is a risk of double counting. Port-managed demand growth can often be planned with greater confidence. Tenant demand on the other hand may be much larger but can remain uncertain until land, finance, power availability, policy support and commercial agreements align. This can create a circular dependency: network investment is difficult to justify without firm demand, while inward investment may not be secured without credible access to capacity.

The following table provides a comparison between the key take aways from the port interviews conducted under this study and the UK Department for Transport's call for evidence – Net zero ports: challenges and opportunities.

Area of alignment	Scottish port power (this research)	UK Department for Transport's call-for-evidence
Scale and diversity of demand	Ports cannot be treated as a uniform demand category. Requirements range from incremental LV to 11 kV growth to transmission connected tenant or strategic energy projects approaching 1GW.	The DfT evidence directly considers <i>"the current and future electricity requirements at ports"</i> , supporting the report's finding that port demand varies substantially in scale and future trajectory.
Shore power benefits and delivery barriers	Shore power is a proven first stage decarbonisation measure with air-quality and noise benefits, but uptake is constrained by network capacity, capital cost, electricity price and uncertain vessel demand.	The source considers <i>"the case for an at-berth requirement for ports to reduce shipping emissions"</i> , supporting the narrative that shore power can contribute to decarbonisation but requires an effective delivery framework.
Grid connections as a critical bottleneck	Connection processes, transmission assessments, reinforcement requirements and uncertainty over application windows can make 2030 delivery unrealistic. A complete offer may take many months and physical connection may take years.	The government's next steps focus on <i>"ensuring that ports can access the energy they need to support maritime decarbonisation"</i> , directly reinforcing the finding that grid access and connection delivery are critical bottlenecks.
Mismatch between port and network planning cycles	Port development decisions are commonly required before RESP, SSEP and CSNP outputs can provide mature investment signals. Ports need earlier visibility and clearer interim pathways, particularly for Post 2030 demands.	The summary states that its next steps focus on <i>"ensuring that ports can access the energy they need"</i> , supporting closer alignment between port development requirements and energy-system planning.
Commercial uncertainty and the cost of electricity	Electricity unit costs, use-of-system charges and uncertainty over market uptake weaken investment cases, especially for shore power, and can influence the choice between electricity and other energy vectors.	The call for evidence sought information on the <i>"challenges and opportunities associated with decarbonising ports"</i> , supporting the narrative that commercial condition (including electricity cost) can either enable or constrain investment.
Investment ahead of demand	The report identifies a circular dependency: networks need credible demand before investing, while ports and tenants need credible capacity before committing land, finance and commercial agreements.	The DfT summary addresses <i>"growth opportunities for ports, and wider sectors, in decarbonising ports"</i> , supporting the case for investment that enables future demand while recognising uncertainty over when that demand will materialise.
Onsite generation, storage and private networks	Private wire, onsite generation, storage and coordinated use of different energy vectors are identified as complementary options where grid capacity cannot meet the full requirement.	The source explicitly includes <i>"onsite energy generation"</i> and <i>"the deployment of decarbonising infrastructure"</i> , supporting consideration of local generation, storage and private-network solutions alongside grid connections.
Ports as energy and industrial hubs	Ports increasingly act as industrial centres supporting offshore energy, tenants and regional	The summary considers <i>"the role ports can play in enabling their tenants and the shipping sector to decarbonise"</i> , directly supporting the report's



	supply chains; the wider ripple effect on local electricity demand is not yet fully understood.	treatment of ports as energy and industrial hubs rather than standalone consumers.
Fragmented coordination and information	Ports have different levels of energy-market knowledge and are not routinely represented in industry codes and working groups. Better coordination, clearer market signals and targeted support are recommended.	The call invited evidence on <i>“activities, challenges and developments at these ports”</i> and <i>“issues faced, both now and in the future”</i> , supporting the need for better information sharing and coordination across ports, networks and government.
Need for clearer government direction	The findings call for coordinated electricity, hydrogen, maritime and industrial policy, explicit recognition of ports in strategic planning, and clearer routes for strategically important demand.	The Maritime Decarbonisation Strategy includes the commitment to <i>“Support future energy demand at ports”</i> , providing direct support for clearer government direction on port electricity demand, strategic planning and connection delivery.

Table 1: Scottish Port Power vs DfT Call for evidence

Port demand categories

To aid future discussions and development of underpinning strategies and policy, it is recommended that port demand requirements be separated out into the following categories, or equivalent, based on the findings of this research and the call for evidence undertaken by the Department for Transport.

- Decarbonisation of existing functions
- Expanding core port operations
- Tenant led industrial demand
- Opportunity led demand



Policy and regulatory context

Energy planning

Strategic Planning and Demand Reform could transform the way in which ports, harbours and their partners access electricity connections and increases in demand. They provide an important foundation for growth yet neither are in a final form at time of writing, offering little certainty in the short term while Connections Reform, aimed at Generation and Storage, still creates investment uncertainty and effects the traditional demand connections process.

The Regional Energy Strategic Planning (RESP) considers all energy vectors across the Scotland Region, underpinned by the Strategic Spatial Energy Plan (SSEP) which sets out high level national goals for energy and a blueprint for each vector. Despite significant progress in 2025, the scale of the task became clear with the timeline extended resulting in a final SSEP due in Autumn 2027 and RESPs by the end of 2028. Hence, while strategic planning will offer important investment signals, their effect is on the medium term and into the 2030's.

Interviewees also flagged concerns with wider energy policy. A ports electrification needs are driven by several factors and users with decarbonisation of existing functions such as forklift trucks a relatively small percentage of sought demand. Shore power requires vessels to commit to the supply and use of electricity, or the alternative low carbon fuel agreed. New electric crane loads and heavy industry rely on accurately forecastable timelines and a more transparent market; something Connections Reform and Data Working Groups should improve but not evident at time of interview and writing. For tenants, they may themselves rely on innovation / new technology funding support and technology specific strategies. Hydrogen is a key example given the anticipated Hydrogen Strategy refresh and Hydrogen Allocation Round 3 (HAR3).

Opportunity

To provide greater regulatory direction in the shorter term, underpinning development in the late 2020's and early 2030's which need investment signals now. This is particularly true where network reinforcement is required or where the port or harbour may not yet know the Enabling Works (including Distribution Network reinforcement).

Strategic energy plans can continue to build on this baseline with enhanced collaboration with ports, harbours and their prospective tenants to create greater alignment between emerging policies.

National strategies

Away from strategic energy plans and vector or technology specific strategies, there are a number of other national documents which discuss the future of ports and harbours with their link to the energy industry and wider economy noted. Yet there is an opportunity to define a clearer timeframe and target end scenarios to create certainty.

UK's Modern Industrial Strategy

"Ports are one of the five sectors to which the NWF has committed at least £5.8 billion of its capital. This will be complemented by direct support for specific ports, with £55 million already awarded to the Port of Cromarty Firth, and up to £80 million made available through the Spending Review..."

National Wealth Fund

"Opportunities linked to the offshore wind sector are dependent on the progress of the government's Contracts for Difference scheme supporting renewable energy projects ..."

National Policy Statement for Ports

"The ports sector is fundamental to the UK's success as a trading nation..." and "Ports have a vital role in the import and export of energy supplies... and in the construction and servicing of offshore energy installations."

Maritime 2050: Navigating the Future

"Our highly successful commercial ports have constantly evolved, investing billions in their operations to ensure they remain at the fore of new patterns of trade." and "The government and the maritime industry are clear that maritime has an integral role to play in the future of the UK."

Figure 4: Small selection of quotes from national policy and strategy documents linked to port investment



Demand consultations

Ofgem and UK Government launched Demand Reform in 2026, designed to tackle the challenges facing parties seeking new demand connections and / or capacity in GB. In late 2024 the demand queue sat at a notable 41GW, with 24GW in the queue to connect to the Distribution Networks. To put this in perspective, the system saw a peak of circa 61GW in the late 2000's with this trending downwards during the 2010's as more energy efficient appliances were connected and usage habits shifted. While there is now an upward trend, the annual peaks in 2024 to 2026 have been between 45GW and 48GW. Between late 2024 and the connection application freeze (for transmission connected demand) in June 2025, the queue grew significantly from the aforementioned 41GW to 125GW, an 80GW increase in the contracted capacity at transmission level. This sharp rise has compounded an already challenging path to connection where well progressed, needed projects are met with long lead times due to required network investment, generation build or projects ahead in the queue which have stalled / non-viable.

Ports interviewed have been caught up in this, although not all fully appreciated the scale of the queue and upcoming challenges. Those yet to seek the larger uplifts in capacity (Stage 2) had not entered the queue and were basing timelines on much smaller connections delivered in the late 2010's or early 2020's. Importantly, some of the dramatic shift from 41GW to 125GW in the queue has been driven by port needs and in particular the capacity sought by prospective tenants, particularly manufacturing and Hydrogen related industry.

To alleviate some of the congestion, Demand Reform has been built around three core pillars:

- **Curate** – Seeking to introduce new or strengthened queue entry and membership criteria to ensure viable projects progress to connection.
- **Plan** – Support the Government's prioritisation of 'strategic projects' and development of a strategic plan for data centres which make up a significant percentage of the demand queue.
- **Connect** – Develop new approaches and connection arrangements to accelerate and increase the number of connections and maintain a secure system.

Since launching the concept in early 2026, there have been significant progress with a number of ways in which stakeholders have been able to feed into development. The most accessible of which include:

- Demand connections reform – Call for Input (Ofgem, March 2026)
- Accelerating electricity network connections for strategic demand (DESNZ, April 2026)
- Proposed data centre connection reforms (Ofgem, September 2026)
- Distribution Network Operator Strategic Development Plans – Pre RII0-ED3 Business Plan submission in Q4 2026

Policy Direction

Across NESO, Ofgem, DESNZ and DNOs, consultations and engagement in 2026 shows a clear and consistent policy direction:

- Electricity demand is no longer assumed to be automatically connectable.
- Large or speculative demand (especially data centres) is now seen as a system risk if unmanaged.
- Flexibility is being positioned as a primary tool for accommodating demand growth.
- Connection rights for demand are increasingly being linked to readiness, system value and strategic importance, moving away from a first come first served model.
- Increasing focus on evidence of project maturity, financial commitment, delivery capability and credible end user demand.
- Strategic importance is becoming a key factor in connection prioritisation, although with most demand growth linked to a policy or strategy, prioritisation criteria is not straightforward.
- Data centres have emerged as the primary focus of demand reform due to their scale, rapid growth and concentration within the existing demand queue.

The present direction will impact ports and harbours, in many cases for the better. Yet an initial focus on data centres could have unintended consequences on other demand types, hence recommended care is taken in the design of measures for Data Centres and the implication this has on other key demands, appreciating these may not be obvious. Due to connection lead times, entering the queue when mature with full financial backing and a contracted tenant is challenging. The readiness criteria applicable to generation and storage is not directly transferable with some significant differences between load types. Flexibility can unlock opportunities, yet ports interviewed highlighted the inconsistency in terms used by Networks and lack of clarity around what level of access their port would ultimately have.



Charging

The Government's conclusion of the Review of Electricity Market Arrangements (REMA) in July 2025 with a decision to stick with a national wholesale market had shifted the focus towards Reformed National Pricing (RNP). Put simply, RNP maintains a national wholesale market and associated price while introducing some reforms to tackle the following three challenges:

- Challenge 1 - Stronger locational investment signals to drive efficient siting of new assets whilst protecting investor confidence and enabling investment at pace.
- Challenge 2 - Reforms to balancing and dispatch arrangements to improve operational efficiency.
- Challenge 3 - Improvements to constraint management to reduce volume and cost of resolving network constraints.

Reformed National Pricing Call for Input (NESO, April 2026) has collated a number of views and adjusted the position based upon the feedback and evidence provided. Yet while there were 81 respondents, more than 50% were generators, storage / flexibility providers or vertically integrated companies. Electricity Demand was represented in part with Trade Bodies also in a position to communicate a wide range of views, it is important to recognise that the bar for contributing to many of the industry consultations and working groups is relatively high with underrepresentation of the varied demand types.

The direction of travel is particularly relevant for Scottish ports because they represent large, fixed electricity demands that cannot easily relocate in response to price signals. However, there are potential benefits given ports often have an opportunity to bring together a holistic collection of technologies, supporting low carbon generation delivery, industrial decarbonisation, alternative fuels and of course electrification of port activities and shore power.

The key challenge for Scottish ports is ensuring their future electricity requirements are visible within strategic planning processes. As network investment, charging arrangements and connection reforms become increasingly driven by strategic need, ports must be recognised as critical enablers of the low carbon economy if they are to secure the infrastructure needed to support future investment.



Network planning and investment

Unprecedented is a word deliberately used sparingly in the context of the present energy industry, yet it is hard to avoid when it comes to planned network growth and investment⁴. The Centralised Strategic Network Plan alongside network price control periods sets out the roadmap for electricity, gas and hydrogen network investment (transmission network level). The RIIO-ED3 Business Plans expected in late 2026 will help clarify the level of proposed electricity Distribution Network between April 2028 and March 2033, a window in which all ports interviewed anticipated load growth.

Electricity transmission network investment alone is set to reach circa £35 billion by 2035 and set to support around 50,000 jobs in Scotland. Impressive statistics with the resulting network significantly expanded and better able to facilitate new energy projects. Yet such change also relies on a strong supply chain with the demand for Supergrid transformers, switchgear (particularly non SF6 filled), subsea AC and DC cables, Flexible AC Transmission System (FACTS) devices and the specialist engineering, environmental, consenting and safety support limited. Importantly, such assets are also required by connecting generators with the market not confined to just the UK meaning we are competing in an international market.

Large transmission projects require extensive planning approval, environmental assessments and stakeholder consultation. Some proposed projects have and will continue to face significant public opposition and increasingly complex environmental scrutiny as the portfolio of projects in the system increases with greater need to communicate the aggregated impacts, noting many of these are positive. Delays to consenting can have significant knock-on impacts across entire investment programmes, altering the connection dates offered further.

For Scottish ports, the network investment programme should be viewed as a significant long-term opportunity with strong support for investment, yet there is a call for more coordinated solutions in the shorter term to enable key projects and provide investor confidence. Given no two ports and harbours are the same, care has to be taken not to make assumptions before mapping out the unintended consequences and any conflicts of interest that need to be understood. We have a 'chicken and egg' situation where ports are expected to facilitate delivery of low carbon generation projects alongside many of the network investment projects while themselves sitting behind constraints or protracted connection times. The next steps outlined within the Department for Transport (DfT)'s call for evidence on net zero ports output largely align with the responses collated through this short piece of research. Yet the timeline and objectives of each are yet to become clear with an ask for more accessible options, including the Connections Accelerator Service which is undergoing reforms but remains largely opaque.

⁴ <https://www.nao.org.uk/wp-content/uploads/2026/09/Upgrading-the-electricity-transmission-network.pdf>



Connection considerations

Process

The connections process is the lens a number of the port representatives interviewed view the electricity industry through. An uplift in capacity or new connection is one of the many assets, systems and services they procure with the DNO and increasingly the transmission connections process is one of the first stages encountered. Many ports and harbours, including those interviewed, are active in various forums and more recent policy discussions yet many arrived via the connections process. Ahead of preparing an application, the port may have mapped out need but there is often an opportunity to refine and revisit based on various factors such as the rating of proposed user equipment or trigger points on the network.

While some DNOs offered assessments of up to three different generation capacities in the past, this was not offered to demand at the time, hence when making an application it is recommended that you have reviewed the basic network parameters to identify any more obvious tipping points. DNO portals and analysis tools are helpful yet there is a limitation in the data with much of the demand queue currently hidden. At transmission level there is no consistent source presenting the demand queue. Ofgem are running a consultation on “Transforming connections Data” with new datasets considered being a Demand Capacity Register and Distribution Works Report. Important progress has been made, although in practice changes proposed will take some time to be introduced in their entirety. The first dataset likely to be available is the Demand Capacity Register with the statutory consultation covering this from early 2027 (subject to confirmation), with implementation during 2027 possible.

The application process itself is changing, with new minimum information requirements for demand connections of 5MVA and greater being introduced in June 2026 with the guidance document at the time of this report being Version 2, published in July 2026⁵. Applications to a DNO can be made at any time so long as the minimum requirements can be met, however if the DNO assesses a need to trigger an assessment (no consistent clear threshold) by the relevant Transmission Owner, a distribution offer will be issued on the caveat that further assessment is required to understand whether there are any transmission works triggered at the transmission and distribution network boundary (or further upstream) that the project will be dependant upon. Importantly the DNO will not submit a Modification Application until after the distribution connection offer has been accepted. While no statutory timescale, most DNOs are working to a submission within three months of a signed acceptance (and acceptance payment being confirmed). The results of such an assessment can be considerable, from no additional works required to the triggering of new infrastructure that could take 5+ years to complete. Importantly the process is different for generation connections; with interviewees commenting on the use of generation to supplement their grid supply and offset costs it is important to appreciate that for majority demand users, the deviating processes are a complication with potentially unintended consequences. Therefore, a recommendation that there is greater consideration of co-located generation and demand where the primary use of the connection is electricity demand in future methodology revisions of applicable code modifications and policy. A worked example of the application process for distribution connected demand where a transmission impact assessment is triggered can be found in Appendix A.

Acceleration

Acceleration of connections has been the subject of numerous industry discussions, with a variety of interventions possible, albeit to varying degrees of access and often being location, network and case specific. One intervention introduced by the UK Government is the Connections Accelerator Service (CAS). It is Government led and designed to improve coordination and navigate through connection challenges for those strategically important demand projects that are deemed eligible. The application route and eligibility criteria is somewhat opaque at time of writing, yet it is understood the service is being dynamically improved in line with the wider reforms. One key change through 2026 is the link between the CAS and Project Designation. The CAS will identify eligible projects with the mechanism to integrate into the connections queue facilitate through the NESO Project Designation Methodology. However, it should be noted that neither CAS nor Project Designation offer an automated fast track route. Improvements to connection and access dates could be the result, but it is important to appreciate network investment cannot be avoided. An improvement in relative queue position may not actually result in a significant improvement (if any) of the forecasted connection date.

Recommended that additional guidance is developed for the Connections Accelerator Service alongside a separate guide on viable interventions, likely via the Electricity Networks Association (ENA). Interventions could be a flexible connection option, DNO

⁵ [https://www.energynetworks.org/assets/images/2026/ena-demand-queue-entry-requirements-\(5mva-and-above\)-guidance-document-v2.0.pdf?2026-06-25-12:22](https://www.energynetworks.org/assets/images/2026/ena-demand-queue-entry-requirements-(5mva-and-above)-guidance-document-v2.0.pdf?2026-06-25-12:22)



capacity reallocation or Timed Construction Planning Assumptions that a transmission study is based upon, to name only a few. Networks have innovated and made useful steps, yet there is an opportunity to better align terminology, base parameters and identify opportunities to improve the experience and remove perceived barriers.

Costs

The cost to connect is often a key factor when investing, particularly if the cost of doing nothing also changes as grid costs increase and cost of alternatives fluctuate. Use of System charges are a factor, yet for those ports and harbours interviewed the cost of the physical connection and unit price of electricity appeared to be the greatest concerns.

The cost to connect or increase assets has continually increased ahead of inflation, with the COVID pandemic, UK market changes, Geopolitics and increased international demand for specialist services, equipment and assets commonly used as justification. This is compounded when changes to the scope of works are identified as projects move through the design phase. More than a 100% increase between the cost estimated at time of offer and the actual cost of delivery is not unheard. When including the queue of generation projects is estimated 10%⁶ or more of the total queue have or could see increases of 100% or more. While cost increases are inevitable, there is an opportunity to improve forecasts and develop robust mitigating measures. Networks are known to have opened up procurement routes, accepting assets from the same suppliers but different factories while also considering alternative manufacturers and asset types. Greater visibility of such processes is welcomed, allowing ports and other users to map out cost risk and better forecast an appropriate contingency. Through transparency, additional approaches can be considered, drawing on the wealth of experience across the energy industry. Numerous other cost mitigation measures can be explored; this is simply one example, and it is noted the Ofgem Connections End to End Review is leading some such initiatives. For ports and harbours to secure the required investment and remain competitive there is an ask for greater cost certainty at time of the final investment decision.

The cost per unit of electricity (kWh) is also a communicated barrier, both when committing to increased electrification and for parties using port energy supplies. This could include tenants, yet there was more discussion during the interviews conducted around shore power with some vessels opting to remain offshore and using fossil fuels due to the economics. Therefore, Reformed National Pricing and any other electricity cost initiatives such as the reduction in electricity costs for AI Growth Zones is a significant factor which not only impacts investment in new electricity demand capacity, but also the decision on the energy vector mix. While all of those interviewed were somewhere in the process of increasing their electricity demand, there was some discussion on the use of other energy vectors and in particular Hydrogen. The difficulty being a reliance on a UK Hydrogen Strategy focusing on offtakers and infrastructure planning which is yet to be published at time of interview and writing.

⁶ Use of various sources including direct feedback to Trade Bodies and values discussed within industry working groups.



Recommendations

The findings point to a need for coordinated action across strategic planning, network investment, connections, charging and wider energy policy rather than a single intervention. Ports have different requirements, timescales and commercial drivers, while later sections of this report highlight substantial network-build constraints, limited connection data, increasingly complex application processes, evolving acceleration routes and continued uncertainty over connection and electricity costs. The following recommendations and next steps are therefore proposed.

1. **Use a consistent port demand framework.** Categorise demand by source, certainty, scale, timing and system value, separating port-managed and tenant-led requirements to avoid double counting.
2. **Embed ports in strategic planning.** Ensure port requirements inform SSEP, RESP, CSNP and RIIO-ED3, recognising reinforcement, consenting and supply-chain constraints. Further network innovation could offer medium to longer term benefits, informing strategic planning and improving forecast models.
3. **Coordination and ownership.** Recommend greater coordination and importantly clear and transparent ownership of actions across UK Government, Government Departments, DESNZ, Ofgem, NESO and Networks.
4. **Improve connection clarity and support.** Publish CMP434 application window dates as soon as practicable, make DNO Modification Application timescales public (aggregated) and provide accessible demand queue data. Develop clear guidance on the Connection Accelerator Service, flexible connection options while considering alignment between networks where there is the greatest user / consumer value, while recognising that interventions cannot remove essential network works and the need for network investment.
5. **Transmission Assessment threshold.** Create a threshold for transmission assessment. In England and Wales, there is a threshold for generation, but not demand. Opportunity to create thresholds in Scotland; particularly if there a level under which no assessment is required and another where it is at the DNOs discretion.
6. **Optimise requirements before application.** Phase demand against realistic development needs and network trigger points, considering flexible access, private wire, onsite generation, storage and other energy vectors where full capacity is unavailable. Noted this relies on information and engagement, thus required network and system operator support.
7. **Adapt reform to port realities.** Treat co-located generation, storage and demand together where practicable and ensure readiness tests recognise that ports may need credible capacity before tenants and finance can be secured.
8. **Improve cost and policy certainty.** Increase transparency of connection costs and contingencies, while aligning electricity, hydrogen, maritime and industrial policy. Charging reform should recognise ports as fixed-location users.
9. **Maintain coordinated evidence.** Refresh the evidence base as port plans and reforms develop, including investigation of wider network demand created by port-led industrial growth.
10. **Build on National Audit Office findings⁷.** The National Audit Office report published in September 2026 outlines a number of key findings with some blunt conclusions. The recommendations are broad, but many could have an impact on ports with “assess and prioritise projects according to their impact” having the potential to make a material change.

Conclusions

Research has highlighted the criticality of ensuring ports and harbours have clear investment signals to commit to projects which themselves facilitate or support the development of low carbon generation, energy storage and network investment projects. Opportunity for greater collaboration, removing inconsistencies and developing tangible solutions to identified barriers.

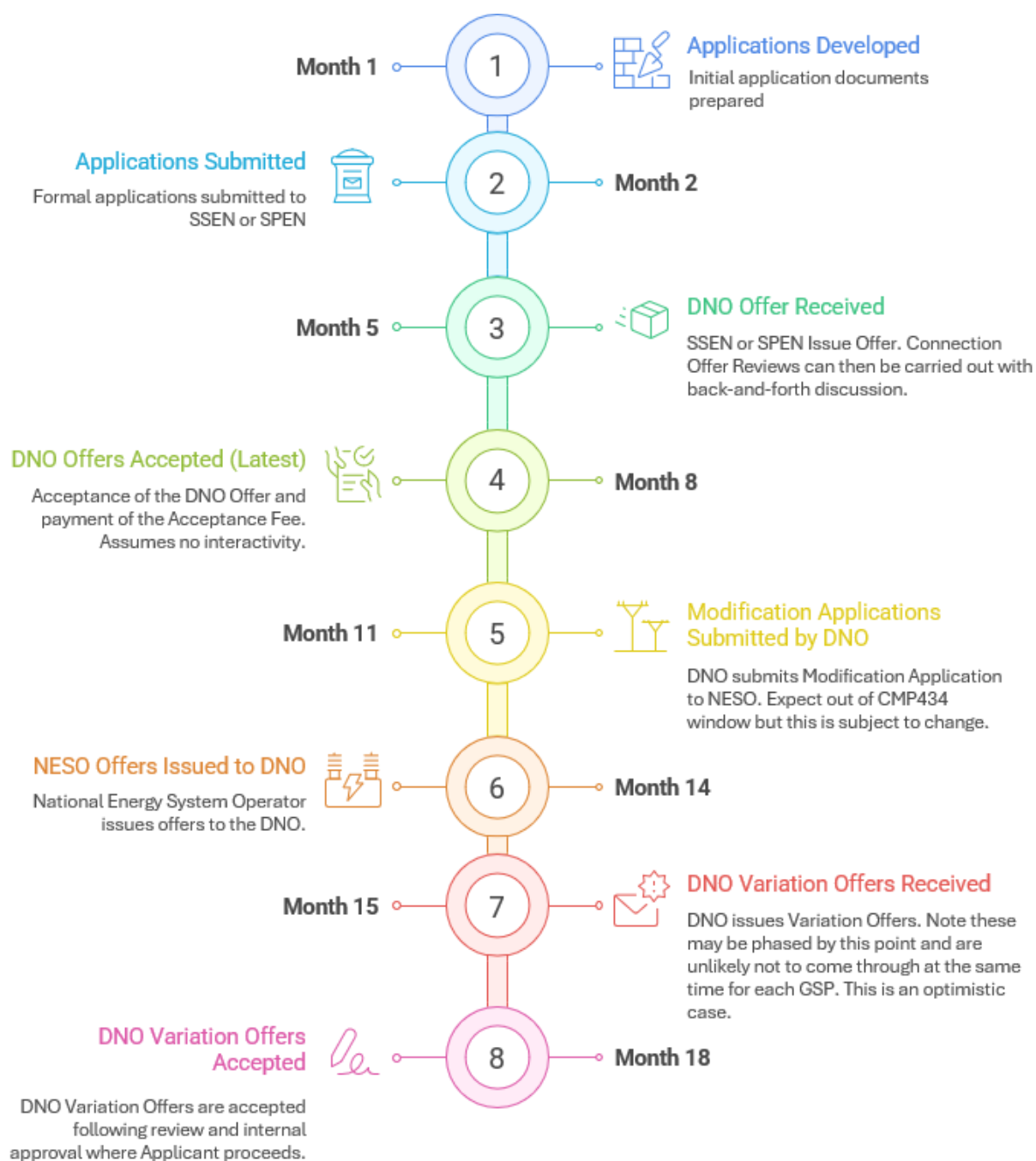
Scottish Renewables and Roadnight Taylor would welcome direct engagement on the topics raised and look forward to working with key stakeholders on the recommendations raised.

⁷ <https://www.nao.org.uk/wp-content/uploads/2026/09/Upgrading-the-electricity-transmission-network.pdf>



Appendix A – Application Process

Example where transmission assessment is required



END

