



Title of meeting:	Cabinet
Date of meeting:	03 October 2023 (Cabinet) 17 October 2023 (Full Council)
Subject:	Sea Change (Shore Power & ZEVl update)
Report by:	Mike Sellers, Port Director
Wards affected:	All
Key decision:	Yes
Full Council decision:	Yes

1. Purpose of report

To discuss the proposal of the SEA CHANGE project at the Portsmouth International Port (PIP) and to seek project approval.

2. Recommendations

2.1 Cabinet and Full Council notes the importance of investing in shore power at Portsmouth International Port (PIP).

2.2 Cabinet and Full Council notes the existing funding for shore power in the capital programme, and the revised funding requirement for shore power.

2.3 Subject to a satisfactory financial appraisal approved by the Director of Finance and Resources & S.151 Officer, Full Council approves to investing in shore power at a capital cost of £26.1m to be funded as follows:

- Grant: £18,474,158
- Prudential Borrowing: £4,625,842
- Corporate resource: £3,000,000

3. Background

3.1 Background on the ZEVl Competition

The Zero Emissions Vessels and Infrastructure competition (ZEVl), was announced in February 2023, funded by UK Government, and delivered in



partnership with Innovate UK. As part of ZEVI, the Department for Transport allocated over £80m to 10 projects supported by 52 organisations from across the UK to deliver real world demonstration R&D projects in clean maritime solutions. Projects will take place in multiple locations from the Orkney Isles to the south-west of England, with the Portsmouth Project being the flagship bid demanding 20% of the overall fund.

ZEVI is part of the UK Shipping Office for Reducing Emission's (UK SHORE).

Focused on clean maritime technologies that can be scaled rapidly to decarbonise the UK's domestic maritime sector. In March 2022, the Department announced the biggest government investment ever in our UK commercial maritime sector, allocating £206m to UK SHORE, a new division within the Department for Transport focused on decarbonising the maritime sector. UK SHORE is delivering a suite of interventions throughout 2022-2025 aimed at accelerating the design, manufacture and operation of UK-made clean maritime technologies and unlocking an industry-led transition to Net Zero.

3.2 Background on SEA CHANGE

The SEA CHANGE (Sustainable Energy and Air Quality Improvement for Coastal Harbours to Achieve Net-zero with Grid Enhancements) project will build and operate a new shore power system serving the 3 largest and busiest berths at PIP.

The system will allow Brittany Ferries vessels and visiting cruise ships to 'plug-in' and therefore switch off their engines whilst at berth. Additionally, the system will support the charging of 2 new hybrid/LNG ferries (provided by Brittany Ferries) that will enter and leave the harbour under electric power, to further reduce CO₂ emissions and air pollutant across the port and wider city.

The challenges of multi-vessel shore powering will be met through smart control of hybrid vessel battery charging and smart control of onshore power systems and batteries, real-time telemetry, and communications as well as wider data exchange facilitated by an ecosystem of interoperable digital twins surfacing data for selective, secure sharing. The interplay of shared data between offshore vessels and onshore power equipment will support dynamic, sustainable, balanced energy provision and carbon reporting over time.

The shore power system will support simultaneous powering of multiple vessels, with different onboard AC frequencies, voltages, and different ship-shore connectors. This will require:

- A new 15MVA grid connection (secured), dedicated to shore power.
- A dedicated shore power substation at the port, with complex power electronics and real-time control.
- A mobile Cable Management System (CMS) at each berth (the plug-in charger).



- Relocating the existing PESO battery system, this battery stowage system was successfully utilised on a previous port project and will be repurposed and used to develop a novel control system, to support shore power operations and the future need the system expansion.
- A digital twin for the shore power system, to enable data exchange with a digital twin for each visiting ferry. Digital twins are virtual replicas of physical assets or systems that can be used to simulate and analyse their behaviour in real-time without investing large amount of resource. Allowing the port to calculate the power requirements for each berth resulting in efficient energy distribution.
- Widespread integration of power systems, operations systems, sensors etc to capture/exchange data between participant systems and stakeholders.
- Dashboards and reporting to attribute CO₂ savings.
- Commercial and operational innovations at the port and new supporting roles.

The resulting smart energy system will be scalable and therefore the solution can be replicated at other ports, once commercialised, and fully demonstrated.

The project will consult with local stakeholders, vessel operators and other UK and European ports. We intend to share knowledge and learning to increase the benefits of our projects and encourage shore power adoption in other ports.

The project will build on and integrate innovative technologies developed by UK SMEs in earlier PESO and SHAPE UK projects at the port. CO₂ savings will be calculated and reported for the port and the vessels. The air quality monitoring system at the port will be enhanced to measure the resulting reduction in pollution.

The project consortium consists of PIP, Brittany Ferries, IOTIC Labs, Barter for Things, University of Portsmouth, Marine Southeast, and Swanbarton. Total project cost for the consortium amounts to £24.733m and grant totals £19.858m.

The project aims to avoid more than 20,000 tonnes of CO₂e (well-to-wake) emissions per year from 2027.

This project provides an exceptional opportunity to accelerate the green transition within the UK's maritime operations and aligns with the UK government's Clean Maritime Plan. We will contribute to saving tens of thousands of tonnes of CO₂e and will improve air quality in the city of Portsmouth.



4. Reasons for recommendations

4.1 Importance of ZEVl funding

- This, along with CMDc4, is the last funding available from the government focused on decarbonising maritime until the next spending review.
- As noted above, £80m has been allocated to 10 projects, which means the port's project accounts for almost 25% the total grant. PIP has been identified already as the flagship project for this fund, which was announced at the London International Shipping Week on 11 September.

<https://www.gov.uk/government/news/80-million-boost-for-coastal-communities-and-green-shipping-as-london-international-shipping-week-gets-underway?s=09>

4.2 Innovation

- Berth 2 will serve either a cruise ship or ferry with both variable voltages (6.6KV or 11KV) and frequencies (50Hz or 60Hz) up to 12MW. Berths 3 and 4 will serve ferries up to 6MW (11kV only). Simultaneously serving 3 berths, with different vessel types and voltage requirements is novel and will be a UK first
- The Digital Twin ecosystem will enable data exchange between partners (especially innovative between the port and vessel digital twins) to facilitate efficient operations and reporting. This will be visualised in a dashboard with reporting tools. This will help vessel owners and port operators to easily understand emissions metrics, port/vessel attribution, shore power utilisation and air quality improvements over time.
- Real-time power control between the vessel and shore power station will adhere to ISO 80005 standard and the system will be complimented with a dedicated battery. It will monitor the shore power schedule and electrical load to provide power during periods of high load. It will recharge during periods when the grid electricity has low associated emissions. This is something that will be beneficial to other ports who are not on a fully green energy tariff and want a battery to complement and expand their shore power system.

4.3 Environmental

- The project aims to avoid more than 20,000 tonnes of CO₂e (well-to-wake) emissions per year from 2027.
- Brittany Ferries has a schedule of refitting all its fleet of vessels, with all Portsmouth calls capable of taking shore power by 2030.
- The port and the Council have made ambitious plans to become carbon neutral by 2030 and emissions free by 2050. The vessels that visit the port may not be under our financial control, but we have great influence when it comes to reducing emissions whilst at berth.

- It should be noted that UK regulations around vessels accounting for emissions whilst at berth in UK ports are set to change. We anticipate that vessels will need to account for emissions whilst at berth at increasing increments under the proposed UK ETS and we have had meetings with Department for Transport and Department for Energy and Net-zero regarding these changes. Having shore power available at our port would enable these vessels to reduce their emissions and comply with possible future regulations.
- Reducing emissions by over 20,000 tonnes per year is a huge achievement and contributes to the global effort of combating climate change. We have a responsibility to reduce GHG emissions wherever possible, for the benefit of ourselves, our local community, and the rest of humanity. The SEA CHANGE project gives us an excellent opportunity to play our part.
- It is acknowledged that Brittany Ferries have already made changes in providing cleaner ships, as they welcomed 2 vessels (the Salamanca and Santana) running entirely on LNG. This has improved outcomes for local air quality and reduces air pollutants considerably (but it is understood that more can be done to reduce CO₂ emissions on vessels fuelled by LNG). The remainder of their fleet however run on a variety of Heavy Fuel Oil (HVO) and Marine Gas Oil (MGO). These are heavily polluting fuels which contribute to global GHG emissions. Cruise vessels that visit the port run on similar fuels, therefore enabling them to switch off their engines whilst at berth will contribute significantly to improving air quality in the port and wider Portsmouth community.

4.4 Social

- Improved air quality will have a positive impact on local communities. Charles Dickens Ward, which along with the Nelson Ward shoulder the port, these significant improvements will be hugely beneficial to the health of residents in the city.
- The work that we are doing within our digital twin ecosystem will surface public and industrial data about the use cases and their context, giving partners the ability to share data selectively and securely for other purposes. For example, teams at the University of Portsmouth have already identified data reuse opportunities to further research across faculties and disciplines, both through ongoing research strands and through time-banded hackathons.

4.5 Green skills

- Within the project partners, the following new roles have been identified as a result of this project:
 - The University of Portsmouth will recruit a research fellow (~£40k p.a.) and research associate (~£30k p.a.) to assist with different

aspects of the project, working alongside the academic team and wider consortium.

- B4T group will recruit two FTEs for a senior £55k p.a. and a junior software developer £35k p.a.
- The port will recruit for four FTEs. Three high voltage approved persons (~£40k p.a.) and one high voltage senior approved person (~£60k p.a.) and a part time Authorising Engineer.

4.6 Economic

- The implementation of the SEA CHANGE project will create new local jobs, as detailed in the green skills section above.
- The project will help the port achieve key milestones in the ambitious plans it set out in its 20-year master plan, published in early 2022. These projects were based around four key themes, including:
 - Environment and sustainability
 - Society and economy
 - Resilience and security
 - Innovation and technology
- We intend to deliver this project alongside growth plans that were set out in the master plan, seeking to increase:
 - Our national economic impact from £390m to £739m,
 - Our local economic impact from £189m to £375m
 - And our total employment from 5,590 to 10,448.
- We are at heads of terms with Brittany Ferries over a new long-term agreement which includes the commitment to taking shore power.

4.7 Local/national impact

- The economic local and national impact of this project has been detailed in the above economic section.
- The funded period of this project is from October 2023 – March 2025, then followed by a three-year demonstrator phase. This means we will receive over 4 years of publicity and support for this project from central government. As we have already been identified as the flagship project of ZEVI, it provides the port and city with a great opportunity to help increase awareness of our combined decarbonisation ambitions on a local, regional and global level.
- We have received a huge variety of letters of support for this project, 14 in total. This included 11 vessel operators (made up of the titans of the cruise and ferry industry), cross party support from our local council and MPs, our local DNO and major regional employers such as the Royal Navy.

5. Integrated impact assessment

As attached.

6. Legal implications

- 6.1 The grant shall be subject to ZEVl and Innovate UK's (on behalf of the Department for Transport) standard funding terms and conditions - to be reviewed by PCC Legal and commissioner to ensure project is and shall continue to be compliant.
- 6.2 Subsidy control analysis to be undertaken to ensure grant and match funding adherence to the Subsidy Control Act 2022 and associated legislation.
- 6.3 Ensure Council's constitutional rules are followed (including Full Council decision) and Financial Rules (see Director of Finance comments below).
- 6.4 Collaboration Agreement currently being negotiated with the project consortium.

7. Director of Finance's comments

- 7.1 The main body of the report has set out the strategic need for investing in shore power. £23m of funding has already been included in the capital programme for shore power. Further work has identified that forecast cost of the project has increased to £26.1m. Grant funding has increased to £18.5m. The funding position is summarised in the below table:

Funding Source	Approved Capital Programme £	Revised Funding Requirement £	Movement £
Grant	17,500,000	18,474,158	974,158
Prudential Borrowing	2,500,000	4,625,842	2,125,842
Corporate Resources	3,000,000	3,000,000	0
Total	23,000,000	26,100,000	3,100,000

PIP has been successful in securing £18.474m of capital grant from the Zero Emission Vessels and Infrastructure fund and £18,000 of revenue grant. Taking this into account, together with the increased cost of the scheme, the prudential borrowing requirement has increased to £4.6m.

The project consists of two key phases as set out below:

- **Phase 1 costing £3m.** This involves SSE upgrading their infrastructure to provide increased electrical capacity to PIP. PIP has paid a deposit to SSE for this upgraded supply and spend to 30 June 2023 totals £290,000.
- **Phase 2 costing £23.1m.** This involves infrastructure investment within PIP to enable ships to plug in and accept electricity. There has been zero phase 2 spend to 30 June 2023.



Cabinet and City Council

Future project spend is subject to a satisfactory financial appraisal approved by the Director of Finance and Resources & S.151 Officer. This will need to demonstrate that borrowing costs can be met from income arising from the scheme.

- 7.3 To recover the cost of shore power investment, PIP has identified a charging structure. This will allow PIP to levy a charge to cover fixed and semi fixed costs associated with the scheme to include borrowing costs, supply standing charges, and connection / disconnection costs. Customers will also pay for the electricity they consume, and this charge will be based upon the unit rate paid by PIP to the electricity supplier plus an admin fee.
- 7.4 PIP has estimated future demand for shore power, which has fed into the costing calculation. If usage is less than estimated this would mean PIP will not recover all its shore power cost for a given period. To mitigate the risk of non-recovery, costs and usage will be monitored on a regular basis and future period charges to customers adjusted as appropriate. Any difference between the cost of shore power provision and associated income will be financed by PIP's cash limit.

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Signed by:

Appendices:

Background list of documents: Section 100D of the Local Government Act 1972

The following documents disclose facts or matters, which have been relied upon to a material extent by the author in preparing this report:

Title of document	Location

The recommendation(s) set out above were approved/ approved as amended/ deferred/ rejected by on

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Signed by: