FBC - Shore Power at Southampton Port

Solent Prosperity Fund application – Final Business Case (FBC)

Submitted by Associated British Ports

Prepared by Associated British Ports and Ricardo Energy & Environment

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Introduction

This report

This report contains the Final Business Case for the Port of Southampton Shore Power Initiative, to be submitted by Associated British Ports (ABP) to the Solent LEP. It was developed on the basis of the Outline Business Case submitted by ABP on 27 September 2019 and the feedback received from AECOM in January 2020.

The report was developed by ABP and Ricardo Energy & Environment (Ricardo). ABP is the author of the strategic, commercial, financial and management cases, while Ricardo has conducted the analysis and written the economic case, for which ABP provided inputs.

This Final Business Case expands the economic case for the Port of Southampton Shore Power project and includes further details on financial and management cases. The project is shown to be desirable from social perspective, as its benefits exceed its costs more than 4 times. As the economic case shows, Shore Power is expected to result in £266.2m in total benefits (NPV), compared to £7.5m in investment costs (NPV) and a Benefit Cost Ratio (BCR) of 35 to 1. Simultaneously, it would not be delivered without the LEP funding, as the majority of benefits are not enjoyed by ABP or Southampton Port, and a private financing option is not viable as it does not deliver positive returns in the assets' lifetime.

This report is structured as follows. The introductory section summarises the project's key characteristics and funding profile. Section 1 presents the strategic case, section 2 contains a detailed economic case and section 3 contains the information related to the commercial case. Section 4 and Section 5 detail the financial and management cases respectively.

Project summary and funding profile

B1	Applicant Details	
a.	Lead Organisation Name	Associated British Ports
b.	Lead Contact for Project at Lead Organisation	Alastair Welch
c.	Postal address of Lead Contact	Ocean Gate, Atlantic Way, Eastern Docks, Southampton, SO14 3QN
d.	Lead Contact e-mail address	awelch@abports.co.uk
e.	Lead Contact phone number	023 8048 8800
f.	Senior Responsible Officer for Project at Lead Organisation	Alastair Welch
g.	Signature of Senior Responsible Officer at Lead Organisation	
h.	Position of Senior Responsible Person within the Lead Organisation	Director
i.	Name of Financial signatory	Andrew Collingwood
j.	Signature of Financial Signatory at Lead Organisation	
k.	Position/ Job title of the Financial Signatory (e.g. CEO, Financial Director, S151 officer) at the Lead Organisation	Regional Head of Finance

B2.	Applicant Organisation Information	
a.	Company Registration number / Unique Tax Reference Number (if applicable)	ZC000195
b.	Business Structure Legal Entity (see explanatory note)	Limited Company
c.	VAT number (if applicable)	GB 232 425 103
d.	Industry Sector (see explanatory note)	Marine / Maritime - Port Authority
e.	Type of trade (see explanatory note)	Port Service Provider
f.	Length of trading / operation (see explanatory note)	ABP was formed in 1982 after the privatisation of the British Transport Docks Board (BTDB), an independent statutory authority. The BTDB, and its predecessor authority, the British Transport Commission owned and operated various transport undertakings, including many docks, in the UK after nationalisation by the Government in 1948.
g.	Current number of employees in Full Time Equivalents (FTEs) (see explanatory note)	350
h.	Current number of learners (if applicable) (see explanatory note)	We currently have 9 Apprentice posts in our engineering, business administration and marine departments

B3.	Project description and Funding Request Summary

a.	Name of Project	Port of Southampton Shore Power Initiative
b.	What is/are the location(s) of the proposed project (e.g. OS Grid Reference or Postcode or map if applicable)? Are all parts of the project in Solent's LEP's area?	Western Docks, Port of Southampton New Cruise Terminal facility to be opened in 2021 (centred at Grid Reference SU 409115 and shown below) and the existing Mayflower Cruise Terminal, SO15 1HJ 
c.	Provide a brief description of the project (100 words). Your description should make it very clear what the project is (i.e. what will be built and where), what any LEP funding will pay for, and what outputs the project will enable.	This pathfinder project will enable shore power capability for cruise ships. The design scope has altered from the OBC – we are now looking to provide capability at two terminals although power can only be delivered to one terminal at a time given Distribution Network Operator (DNO) restrictions. This would be the first major commercial application of this technology in the UK. Shore power allows compatible vessels to switch off their auxiliary engines meaning zero emissions whilst alongside. The overall costs for the scheme have increased because of this design change. This does mean, however, that the opportunities for shore power use will increase i.e. the number of opportunities to use shore power with two capable terminals will be greater than one terminal. ABP will underwrite the increased costs of delivery. It is not automatically possible to allocate vessels to a specific terminal due to varying infrastructure requirements of each vessel (namely the airbridges connecting the terminal to the ship which are designed for specific ships) at the terminals. The LEP funding will pay for 58% of the infrastructure costs. Operational costs are designed to be cost neutral. In the lifetime of the assets, the project is expected to deliver 35:1 BCR for the Solent

		area, when both economic and environmental benefits are accounted. The cruise sector is worth over £1 billion to the economy and provides for 30,000 FTEs nationally.
d.	What type of Investment are you requesting? (e.g. Grant/ Loan/ Equity)	Grant
e.	Provide the Total Project Cost in £ and date of these prices	£7,633,158 (March 2020)
f.	Provide the total amount of funding sought from the LEP in £	£4,434,350
g.	What proportion of Total Project Cost is the LEP funding request (%)?	58%
h.	How much Match Funding in £ is available?	42%
i.	List the sources of Match Funding?	Associated British Ports
j.	Is each item of match funding now confirmed? If yes, please attach signed letters from appropriate Chief Finance Officer / manager for each item	ABP match funded
k.	When will funding be confirmed by source?	Yes - please see accompanying covering letter from Port Director
l.	How many additional jobs in FTE do you expect to be created due to this project?	At least 17 FTEs, on average, for 26 years: construction (40 in 2020, 54 in 2021), operational (3 in 2021 and 16 since 2022) plus additional jobs due to new calls (since 2022)
m.	What alternative funding plan do you have in the absence of support from this Solent LEP fund?	There is no alternative plan. If funding is not available, the project will not be advanced as it does not meet ABP internal business case criteria with +100 years payback. No other public funding sources have been identified.
n.	Have you received any previous funding support from Solent LEP or other public sector grants (including value of funds received or any other current live bids to support this project?)	No
o.	When does construction of the project start?	Following approval of funding from the LEP, award of contract will be made. Assuming that the LEP notifies that funding will be made available by mid-June, award of contract is likely by 1 July. Project implementation will commence immediately.
p.	When does the project achieve practical completion? (see explanatory note)	The project will achieve practical completion 15 months after contract award. This timeframe is consistent with the OBC made submitted in September 2019.

<table>
<tr><td></td><td></td><td>The LEP delay in timetable has impacted on project deliverability timeframe.

LEP funding however can be completed by 31 March 2021 as much of the expenditure relates to the placement of orders of the electrical equipment. See appendix 2 for further details and timeframes.</td></tr>
<tr><td>q.</td><td>When does the project become operational? (see explanatory note)</td><td>2020/21

See appendix 2 for further details.</td></tr>
<tr><td>r.</td><td>Over what period will the LEP funds be spent or defrayed?</td><td>2020/21</td></tr>
<tr><td>s.</td><td>Have you established the State Aid position with independent advice and attached this advice to this application?</td><td>Yes – see accompanying correspondence from our external lawyers, Clyde & Co</td></tr>
<tr><td>t</td><td>Provide a summary of your company's / organisation's financial performance in each of the last three years (250 words) and supply the following evidence (if applicable)

i. Last Three-Year Financial Statements – audited accounts to be submitted
ii. Next Three-Year Projections</td><td>The table below sets out key financial information for the ABP Holdings Group for the years 2016 – 2018. 2019 results are not available at the time of FBC submission.

Associated British Ports (ZC000195) owns and operates 21 general cargo ports within the UK. The Port of Southampton is one of these Ports. Together with its customers, the company supports around 120,000 jobs in Britain and contributes £7.5bn of Gross Value Added (GVA) to the UK economy every year.

ABP's financial information has been independently audited by EY. Copies of the EY reports for the last three years are available upon request or can be viewed at https://www.abports.co.uk/investor-relations/reports-results-and-presentations

ABP does not release information on future financial projections due to commercial sensitivities.

Table 1 – ABP financial performance (all UK port operations)
<table>
<tr><th>£m</th><th>2016</th><th>2017</th><th>2018</th></tr>
<tr><td>Revenue</td><td>517.9</td><td>540.1</td><td>563.1</td></tr>
<tr><td>Profit before taxation</td><td>168.0</td><td>247.5</td><td>243.7</td></tr>
<tr><td>Profit for the year attributable to the holding company</td><td>129.9</td><td>212.0</td><td>191.2</td></tr>
<tr><td>Net Assets</td><td>2058.4</td><td>2279.9</td><td>2,510.0</td></tr>
</table>
</td></tr>
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Application forms

Declaration

The below declaration is an essential part of the application template and must be completed by all applicants. Failure to complete the declaration will mean that your application cannot be progressed.

A	Have you previously applied for any Solent LEP funding?	Yes	✓	No	

If yes, please fill in the table below with all the details of your previous application(s):

LEP Fund Name	Applicant Name	Business / Organisation Name	Date of Application	Funding Warded (Yes or No)
Solent Prosperity Fund	Alastair Welch	Associated British Ports	25 January 2019	No

B	I have read and understood the information in the Large Project Technical Guidance document, and, to the best of my knowledge, I am eligible to apply.	Yes	✓	No	
C	I have read the information in the Advice to Scheme Promoters on the Development of Business Cases	Yes	✓	No	
D	I declare that the information I provide in this form is, to the best of my knowledge, correct.	Yes	✓	No	
E	I understand that answers may be used in response to Freedom of Information Act 2000 requests and these will be released pending further consultation with me.	Yes	✓	No	
F	I understand that, if successful, my application may be made public with the exception of any information I have indicated as commercial in confidence.	Yes	✓	No	
G	I understand that decisions in relation to my application are final and there is no right of appeal.	Yes	✓	No	
H	I declare that the information I have entered on this application form and submit in the accompanying documentation is correct to the best of my knowledge and belief.	Yes	✓	No	

Applicant Name	Alastair Welch – Director, Port of Southampton
Applicant Signature	[redacted]
Date of application submission	23 March 2020

Data protection

This application form contains information that is personal data for the purposes of the Data Protection Act 1998 and The General Data Protection Regulation (GDPR) (Regulation (EU) 2016/679) and in respect of which the LEP and its Accountable Body are obliged to supply the following information:

The personal data that you have provided will be used for the purpose of administering this application to the LEP. It may be given to any relevant agency, internal or government department for this purpose and will not be disclosed to any other organisation for any other purpose other than in relation to cases of suspected fraud or where there is a statutory requirement for disclosure.

The Solent LEP would like to keep a record of your contact details and will send you further information, notify you of further opportunities and invite you to events organised by the Solent LEP. Your personal and business information will remain confidential and not be distributed to any third-party organisation without your explicit consent. You can read the full details on our Privacy Statement at the following link to our website: https://solentlep.org.uk/data-protection- privacy-notice/

If you wish to be contacted by the Solent LEP for purposes other than this bid, please indicate this here by ticking the box: ☐

Confidentiality

It is the intention of the Solent LEP to be as open and transparent as possible in administering public funding. As such, the Solent LEP will publish the details of all applications that are awarded public funding in this process. However, we are aware that certain information contained in your application will be commercial in nature. If there is any information provided in this application form which should NOT be published in the event of a successful funding award, please state question numbers here:

In addition, please will you provide a supporting statement on why these sections are confidential, in the box below, and confirm that you are happy for us to share with our appointed independent expert due diligence consultants, our Funding, Finance and Performance Management Group and the LEP Board.

We understand that this information is likely to be made publicly available. In such circumstances, we have two requests:

1. Individual signatures should be withheld or redacted; and
2. We also believe that information relating to the tender price breakdown should remain confidential at this stage and is likely to reveal or indicate the name of the preferred contractor. We do not believe that it is appropriate for this information to be made available publicly. We are, naturally, happy that this information is shared on a confidential basis within the LEP organisation, its appointed independent expert due diligence consultants, Funding, Finance and Performance Management Group and the LEP Board.

I confirm that I are happy for us to share with our appointed independent expert due diligence consultants, our Funding, Finance and Performance Management Group, and the LEP Board.	Yes	✓	No	

1 Strategic case

The Port of Southampton is Europe's leading embarkation cruise port, welcoming over 2 million passengers per annum on 500 cruise vessels.

The Cruise Lines Industry Association (CLIA), which represents 95% of the global cruise capacity, notes that 19 new build ships are due to enter service in 2020[1]. Southampton mirrors activity within the global cruise market. ABP's future growth projections indicate that the number of cruise passengers will double by 2040. To accommodate this growth in demand, ABP will be building new, and improving existing, facilities to ensure that Southampton retains its place as a primary embarkation port, and one that is increasingly attractive to [day] calling cruises.

The long-term future for cruises in Southampton is positive. Southampton's geographical location means that it is ideally placed to take advantage of voyages to the Mediterranean and Baltic areas, as well as transatlantic cruises. Over the longer term, ABP anticipates that Southampton will welcome almost 700 call days every year, sustaining existing employment numbers and generating growth in both employment and gross value added (GVA).

CLIA[2] indicates that 88% of the new build cruise ship capacity will fitted with shore power capability. 30% of global capacity (up 10% since 2018) are currently fitted to operate on shore-side electricity in the 16 ports worldwide where that capability is provided in at least one berth in the port. An additional 18% of the current cruise ship capacity is planned to be retrofitted with shore-side electricity systems, representing more than a 300% increase in capacity compared to last year.

However, shore-side power availability is limited geographically, with almost all of the capability on the East and West coasts of North America, the port of Kristiansand (Norway), the Port of Hamburg (Germany), and the port of Shanghai." It is, therefore, inevitable that the cruise lines will be actively looking for more ports that can facilitate this requirement.

The Port of Southampton Shore Power Initiative is an innovative project that effectively tackles emissions of vessels while at berth. The strategic aims of this proposal are:

- To become the first UK port to deliver shore power for a large commercial vessel.
- To deliver a zero-emissions cruise facility at the Port of Southampton.
- Unlock investment in Solent area due to increase in economic activity caused by the project.
- To attract additional cruise lines with leading sustainability criteria to the city of Southampton.
- To continue the Port of Southampton's drive to innovate in its transition to zero emissions in the context of the national Clean Growth Strategy and Southampton's Clean Air Strategy.

Shore power enables a vessel to shut down its auxiliary engines and connect to an onshore power supply, thereby eliminating local emissions of nitrogen oxides (NOx) and particulate matter (PM) from auxiliary engine operation[3]. With the delivery of a shore power facility at the Port, ABP estimates that around 20% of the current annual cruise call schedule and up to 40% of additional call schedule would be able to use the facility.

Having the capability of a shore power facility will ensure that Southampton and the region are attractive places for cruise lines to either base themselves or visit. The port operates in a global market and its competitors are in mainland Europe and other continents. There is no other facility in the UK that has the marine access or shore side infrastructure to match that found in the Port of Southampton. The

[1] CLIA 2019 State of the Cruise Industry Outlook https://cruising.org/-/media/research-updates/research/state-of-the-cruise-industry.pdf

[2] CLIA 2019, 2019 Global Cruise Industry Environmental Technologies and Practices Report

[3] Auxiliary boilers would also run on Shore Power.

project will also have the potential to attract new lines to Southampton and safeguard existing calls by offering a sustainable facility. This will prevent cruise lines seeking alternative facilities at other international ports.

The project will not only respond to key environmental challenges and deliver on innovation criteria (by being the first UK commercial port to deliver shore power capability on a large scale) but will also enable the development of skills required to maintain this facility; and act as an enabler for economic growth and productivity associated with additional cruise ship calls at the Port.

The project is expected to create 290 jobs per year, on average, during the lifetime of the project. These include 40 construction FTE during 2020 and 54 construction FTE during 2021, 1 maintenance direct FTE and 2 indirect in 2021, 5 maintenance direct FTE and 11 indirect from 2022, as well as 296 FTEs associated with additional port calls from 2022 onwards.

It is recognised that our application for 58% funding exceeds the normal 20% funding criteria for private sector funding. Given the environmental and economic benefits to the region, this is a pathfinder and trailblazing exemplar project for the LEP Board to support with a BCR of 35:1 assuming just 10 additional calls per year with respect to the Baseline position.

This pathfinder project will ensure conformity with the following policies and plans:

- ABP's clean air strategy, **Cleaner Air for Southampton**, which aims to be the first UK port to install shore power technology for cruise vessels;
- The Government's **Clean Maritime Plan** for zero emission shipping.
- Southampton City Council's **Clean Air Strategy 2019 - 2025** and its **Green Charter** initiative to deliver improvements in the City's air quality;
- The Government's Environment Strategy, **A Green Future: Our 25 Year Plan to Improve the Environment and its Clean Air Strategy 2019** (paragraph 5.4.2);
- **Commission Recommendation (2006/339/EC)** recommending that Member States should consider offering economic incentives to operators to use shore-side electricity provided to ships; and
- **Article 4 of the Directive on Deployment of Alternative Fuels Infrastructure (2014/94/EU)** states that shore-supply electricity shall be installed as a priority in TEN-T ports by 31 December 2025 …"
- The Department for Transport's **Port Economic Partnership,** of which Southampton is the first designated port.

Southampton City Council (2019) notes "Air quality is a national public health priority. Of all environmental factors, it has the largest impact on health in the UK… Currently, nitrogen dioxide and particulates are the pollutants causing the largest health impacts in the UK… Poor air quality is known to have more severe effects on vulnerable groups including the elderly, children and people already suffering from existing conditions such as respiratory and cardiovascular conditions."

The Department for Transport, in its **Clean Maritime Plan** (2019), notes that to "reach the challenging international targets set for the reduction of greenhouse gases (GHGs) and air quality pollutants, a global transition towards zero emission shipping is required. This will involve a transformation of the shipping industry as well as port and bunkering infrastructure."

The Port of Southampton's market is the global cruise market. There are over 50 cruise lines representing 95% of the global cruise capacity (CLIA 2019) with around 20-25% of the existing global fleet capable of using shore power; however, there are no facilities in the UK that currently offer large scale onshore power provision. Some 85% of UK cruise embarkations use the Port of Southampton, generating in the order of 14,000 jobs in the Solent region. Each cruise vessel call is stated to be worth

£1.5-3m to the economy through passenger and line spend, and more than a half of these benefits are estimated to stay in the Solent area (Deloitte 2019, internal report for ABP).

We must continue to innovate and provide world class infrastructure if we are to retain these global brands, the benefits to the local economy and the transition to zero emissions. Currently 46% of the Carnival fleet is equipped with shore power facilities and MSC Cruises state that all its cruise vessels from 2017 will be equipped to receive shore power. This project will be able to capitalise on available technology already deployed on existing cruise vessels as well as on new build vessels which are beginning to enter the marketplace (for example P&O's Iona due to enter service in 2020).

The installation of shore power technology will be a significant start to improving air quality standards; the adoption of new technology in the UK and a step on the pathway to zero emission shipping. We will ensure that the facility is powered by renewable electricity ensuring zero emissions calls.

The cruise sector as a whole is becoming increasingly aware of its environmental footprint and shore power connections are increasingly becoming part of the lines' criteria for deciding to visit or be based out of port cities. Having a shore power capability will maintain and strengthen Southampton's position as a global cruise port.

2 Economic Case

This section summarises the outcome of a cost-benefit analysis of the proposed investment in the Port of Southampton Shore Power Initiative. The assessment considers the economic, social and environmental benefits of the initiative, as well as the costs of fitting and maintaining the facility. The analysis presented in this section was conducted in accordance to the recommendations of HM Treasury Green Book[4] on appraisal and evaluation.

In summary, the findings from this section show that the proposed investment in Port of Southampton Shore Power Initiative is expected to deliver a 35:1 benefit to cost ratio (BCR) and is expected to deliver high value for money even with a minimal increase in calls that are attributed to shore power. All sensitivity analysis scenarios undertaken, show that the project results in at least 4 to 1 BCR, implying that it is desirable from a societal point of view.

2.1 Options considered

A key objective for the project is to reduce emissions from vessels given that these represent negative externalities for the city of Southampton and Solent region (and is a policy promoted by the local and national Government).

According to the Green Book guidance, a long list of options was developed to address this objective:

1. **Shore Power project, power from the grid** represents a recognised technology, with ABP able to guarantee renewable power as the electricity source, and as a consequence achieve the highest levels of emission reduction.
2. **Shore Power project, power from shore-based LNG** was considered as an alternative to grid-based on-shore power. This solution uses generators installed on the quayside typically using Liquefied Natural Gas (LNG) as a fuel source, and as a consequence produces localised emissions and requires additional space within the port which is currently not available.
3. **Shore Power project, power from vessel-based LNG** was considered as another alternative to grid-based solution. Although designs are available for LNG generation from a vessel based in a port, this solution would produce localised emissions and requires berths within the port which is currently not available.
4. **Business as Usual,** or no action taken, would not achieve Government policy and might have negative impacts on existing trade.

Option 1, Shore Power project with power from the grid, was identified as the preferred option, given this is best aligned with Government policy in reducing emissions from vessels, and is more effective in doing so as it does not produce localised emissions and does not require significant additional space within the port. Moreover, although LNG solutions would generate some benefits compared to vessels burning MGO, they would not produce benefits compared to those vessels that are already powered by LNG. These solutions would present decreasing benefits in time, as more ships are LNG-based. ABP expects around 20% of cruise ships to be LNG by 2030.

Detailed social cost benefit analysis (CBA) was conducted for the preferred option, Option 1.

[4] https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/685903/The_Green_Book.pdf

2.2 Methodology for CBA

2.2.1 Methodology overview

Our methodology follows the guidance set in the Green Book (2018) and DEFRA's Air Quality Damage Cost Guidance (2019). The social cost benefit analysis presented below captures the following costs and benefits associated with the preferred option:

- Economic costs and benefits: economic impacts that additional calls bring to the local economy with multiplier effects, fuel cost savings accounting for the shore power price for vessel operators, and the investment itself with its multiplier effects.
- Environmental costs and benefits: CO_2 emissions reductions and air quality improvement due to reductions in NO_x and $PM_{2.5}$ due to lower fuel consumption.

The economic and environmental costs and benefits have been monetised, with their respective assumptions and detailed results presented below. The Net Present Value (NPV) of costs and benefits as well as Benefits to Costs Ratio (BCR) are calculated in and discounted to year 2020.

We compare total costs and benefits under two scenarios:

- **Baseline scenario:** all cruise calls continue burning marine gasoil or LNG when in Port.
- **Shore Power scenario:** a share of cruise ships uses shore power and switch off their engines when in Port. Additional vessels are attracted to the Port due to the fact that it has a shore power facility.

The impacts calculated within this social cost benefit analysis are relative to the Baseline scenario stated above.

Baseline scenario

As explained in section 1, ABP expects the number of cruise ship calls in Southampton Port to increase by 5% each year on average.

Our Baseline scenario assumes a small increase in the number of calls - 10 additional calls (or 2%) from 2022. ABP estimates that on average, one vessel accounts for 10 to 25 calls per year. That is, an increase in annual calls by 10 is equivalent to one vessel adding Southampton to its itinerary. Given the growth of the sector and investment in new terminal in Southampton Port, ABP is confident this is a reasonable assumption.

No investment in shore power is made in the Baseline scenario; all fuel consumed in port is marine gasoil. There is no additional employment assumed.

Shore Power scenario

From ABP's analysis of the future cruise market and discussions with cruise companies who do not currently visit the Port, it is understood that the presence of shore power facilities would be a major incentive for them to add Southampton to their itineraries, as the strategic case discusses. ABP expects that under the Shore Power scenario, the Port of Southampton would increase the number of cruise ship calls, in addition to the growth contemplated in the Baseline.

It is, however, difficult to predict beforehand and with certainty how much of the future increments in calls can be attributed to the introduction of a shore power facility exclusively. The ability to provide shore power in combination with a new additional cruise terminal facility would be an incentive to the cruise operators in the future. That is why a conservative assumption of 10 additional calls, due to availability of shore power, from 2022 is made. That is, an addition of 10 calls with respect to the Baseline, or 20 additional calls with respect to current situation.

This increment in the number of calls is equivalent to one shore power compatible cruise vessel, that is not currently visiting Southampton, adding the port to its itinerary, making 10 calls per year. This assumption is relaxed in section 2.5 when sensitivities are discussed.

The commencement of the shore power facility is assumed to start on 1 July 2020 and last 14 months until 1 September 2021 when the facility becomes operational. A total investment of £7.63m is assumed to be spent uniformly over that period, that is £2.27m in calendar year 2020 and £4.36m in 2021.

ABP estimates that annual maintenance costs of the facility will be £84,000 for servicing the equipment and a salary equivalent for 5 employees needed to maintain it in the port. These costs, together with electricity costs, are assumed to be passed through to vessel operators in the form of price for shore power. In the first year of operation, a proportional fraction of costs is expected to occur as the facility will operate less than a full year.

The facility is expected to be operational for 25 years, until 1 September 2046.

Power draw per hour is assumed to be 12 MVA or 11.2 MW. Electricity will be provided from renewable sources.

20% of current calls and 40% of additional new calls are assumed to have shore power capability, according to ABP's estimations. The calculation for the Shore Power scenario accounts for the average time in the port that is attributed to connection to and disconnection from the shore power. We assume 15 minutes are needed for each operation, that is a total of 30 minutes or 96% of time in port to connect and to disconnect according to the information from shore power providers[5].

The model relies on the assumption that shore power replaces marine gasoil as the majority of cruise ships visiting Southampton Port today use this fuel. Up to 10% of cruise ships visiting the Port today operate using LNG, and ABP expects this share to increase to 20% by 2030, with these new vessels also being shore power capable.

General assumptions

The model is set up using real 2020 prices. Impacts are discounted at a rate of 3.5%, as recommended for social appraisal in the Green Book, and are discounted to the year 2020.

The evaluation period is set to 25 years in operation to reflect the full life of assets, which is estimated to be between 25 and 30 years. That is, the evaluation period is 25 years and 14 months, the latter corresponding to the construction period. Section 2.5 also considers an evaluation period of 30 years and 14 months as a sensitivity.

There are currently around 500 cruise calls at Southampton Port each year, 90% of which are Home Port Calls (HPC). The composition of calls between HPCs and "Port of Call" calls (PC) is assumed to stay constant. An HPC is where a ship will take on or have a high turnover of passengers, while also restocking supplies, whereas, a PC is a mid-journey stop.

Additionality considerations

The following groups of actors are expected to be affected by the project:

- **The Solent LEP**, as the party providing the major part of funding.
- **Associated British Ports (ABP)**, as the party providing the rest of funding and being responsible for annual maintenance costs.
- **Vessel owners/ operators**, as the party who will see their fuel costs affected as marine gasoil is replaced by shore power, and possibly an increase in activity in Solent area.

[5] 10 to 20 minutes on average currently and less for newer vessels was suggested by Schneider Electric.

- **Infrastructure providers**, who will see an increase in demand for their products and services.
- **Suppliers of infrastructure providers**, including construction sector, who will see an increase in demand for their services triggered by the activity of infrastructure providers.
- **The service-oriented economic sector of Solent area,** which would see an increase in its economic activity as a response to more passengers arriving to the region.
- **The City of Southampton,** the citizens of which will experience the effects of improvements in air quality.

Analysing these different groups of stakeholders and their potential intersections, the following additionality concerns have been identified:

1. ABP's position is that the Port of Southampton should not aim at making the project profitable but should aim at covering the variable costs of this new activity. **Shore power maintenance costs are not included as the costs to the Port**. These costs are included in the price the vessel operators pay, so they are part of fuel costs savings calculations. Please see the financial case for more detail on maintenance cost neutrality.
2. One of the key impacts associated with the installation of the shore power terminal is the potential to attract new calls, and the economic benefits that these additional calls could bring to the local area. As noted above, it is difficult to attribute all future increments in calls to the shore power facility beforehand and with certainty. **Our economic case relies on a less ambitious scenario with respect to additional calls** to show that under a conservative assumption on additional calls, with respect to the Baseline, the project is expected to deliver a 35 to 1 BCR. In our sensitivity analysis we test an even stricter assumption of no additional calls with respect to the Baseline and demonstrate that the project still delivers a BCR of 4 to 1 in this case.
3. Total investment in the Shore Power project is equivalent to an increase in demand for products and services of infrastructure providers. Simultaneously, this investment will have knock on positive impacts in the supply chain as the demand increases. As it is uncertain what proportion of supply chain activity will be the true value added, and to avoid double counting and/ or compensations that do not reflect real welfare changes due to the investment, **the economic case does not consider an increase in activity of infrastructure providers and their supply chain effects**. One of the sensitivity checks does include additional effects due to an increase in demand for goods and services provided by suppliers of infrastructure providers (but not infrastructure providers themselves).
4. When economic benefits are expected on both a national and local level our analysis only considers the benefits expected in the Solent area. While it is possible that **leakage, displacement, substitution or deadweight effects** appear at a national (or international) scale if Southampton attracts the vessels that previously were calling at other ports (or businesses from other areas accommodate the increasing demand for goods and services arising from expected additional calls), these effects are not expected to occur locally. Moreover, the risk of displacement is low, as additional calls considered in the Shore Power scenario are less likely to come from other UK ports, and are more likely to represent new demand in an increasing industry or come from abroad (e.g. European ports) according to ABP. No such effects are expected for environmental benefits.

The costs and benefits included in the analysis are considered to be part of the net impacts, as the effects correspond to different agent groups or are not compensated or double-counted. An example of the latter is the service-oriented economic sector of the Solent area that would enjoy different benefits due to: higher economic activity during the construction period, higher economic activity if the Port hosts more cruise calls when the project becomes operational, and also as a part of the City of Southampton who will enjoy environmental benefits of the project.

2.2.2 Economic costs and benefits

As stated above, economic benefits are comprised of three components: economic impacts of additional calls, fuel cost savings and benefits associated with investment.

Economic impacts of additional calls

The main scenario examined includes the assumption that an investment in shore power would lead to additional calls from cruise ships. These calls include both HPC and PC, of which HPCs make up 90% of total calls and PCs account for 10% of calls according to estimations by Associated British Ports. As previously stated, an HPC is where a ship will take on or have a high turnover of passengers, while also restocking supplies, whereas, a PC is a mid-journey stop.

The economic benefit of these additional calls is calculated by applying Gross Value Added (GVA) economic multipliers to the number of additional calls to capture the benefits to local businesses or increased passenger footfall, and the resulting increase in demand. These economic multipliers were calculated on the basis of data on the economic significance of the Port of Southampton, which estimated the direct and secondary impacts of cruise ship calls separately for HPCs and PCs. The HPC GVA multiplier is £3m per call, with 53% of this value estimated to stay in the Solent region. The PC GVA multiplier is £1.5m, with 51% of this value estimated to stay in the Solent region. These multipliers, and estimations of the percentage of the benefit of additional calls accruing to the local area, are based on estimations by Deloitte (2019)[2].

Table 1 Economic impacts general assumptions

Assumption	Value	Source
Home Port Calls		
HPC share of calls	90%	ABP
HPC national GVA multiplier (per call)	£3 million	Deloitte (2019), ABP confidential
Benefit (GVA) accruing to local Solent region	53%	Deloitte (2019), ABP confidential
HPC FTE multiplier (FTEs/call)	60.26	Deloitte (2019), ABP confidential
Benefit (FTE) accruing to local Solent region	53%	Deloitte (2019), ABP confidential
Port Calls		
PC share of calls	10%	ABP
PC national GVA multiplier	£1.5 million	Deloitte (2019), ABP confidential
Benefit (GVA) accruing to local Solent region	51%	Deloitte (2019), ABP confidential
PC FTE multiplier (FTEs/call)	20.12	Deloitte (2019), ABP confidential
Benefit (FTE) accruing to local Solent region	43%	Deloitte (2019), ABP confidential

Upon delivery of the Shore Power project, when the additional calls are realised, supplies for the cruise ship (e.g. food, laundry, flowers, and general consumables) are available within the region for purchase by the cruise line. To account for supply chain effects that do not necessarily take place locally, our calculations assume that only a share of the economic benefits due to additional calls will stay in the Solent area, according to estimations by Deloitte (2019, ABP confidential)[6].

Fuel cost savings

Fuel cost savings are calculated by subtracting the estimated fuel costs under the Shore Power scenario (that is, a combination of marine gasoil and electricity) from the fuel costs estimated under the Baseline scenario, where all ships burn marine gasoil (MGO) in port.

[6] This data was taken from an internal report by Deloitte for Associated British Ports (2019).

Fuel costs for the Baseline scenario are estimated by accounting for a cruise ship's average time in Southampton Port, the average fuel consumption per hour of a cruise ship while in port, and the projected prices for electric power and low sulphur marine gasoil (LSMGO)[7]. Electricity consumption is calculated as the product of power per hour (12 MWA) and a power conversion factor of 93%, as estimated by ABP.

Table 2 Fuel cost general assumptions

Assumption	Value	Source
Average time in port	12 hours	Calculated using the publicly available Southampton Cruise Ship Schedule[8]
Average fuel consumption per hour in port (LSMGO)	2.4 tonnes	ABP
Average power draw per hour (Shore Power)	11.16 MWh	ABP (12 MWA times 93%)
Marine gasoil consumption[9]	2.4 ton/ hour	Assumption for 11480kW aux engine at berth (IMO 3rd GHG study) and fuel consumption 215g/kWh - average of the EEA study (203g/kWh) and of the IMO 3rd GHG study (227g/kWh)

The electricity price paid by vessel operators is assumed to cover the power purchase price plus the maintenance costs of the shore power facility, assumed by ABP, and passed through to the users of the facility.

The marine gasoil fuel price in 2020 is 568 USD per tonne, translated to £445.1 per tonne with an exchange rate of 0.78 GBP per USD[10]. The European average (Rotterdam, Gibraltar, Piraeus) 2019[11] was used for fuel prices in order to avoid using 2020 data, which is highly influenced by the current Covid 19 situation. Prices were uplifted with the average growth rate for oil prices published by BEIS, as part of their Supplementary Guidance, as marine fuel price projections are not available. The proposed forecasted prices for electricity, oil and carbon by BEIS in their appraisal guidance was used[12]. As the prices published by BEIS are in £2018, GDP deflators were used to bring them to the 2020 base year of modelling (1.038 as published by Office for Budgetary Responsibility).

Investment costs and benefits

A total investment of £7.63m is assumed to be spent uniformly over that period, that is £3.27m in calendar year 2020 and £4.36m in 2021. Although these investment costs represent a fixed-price quote by suppliers, one of sensitivities presented in section 2.5 considers a case where investment costs are 10% higher (lower bound for capital expenditure optimism bias adjustment for Equipment/ development, according to the optimism bias guidance in the Green Book).

[7] Following Green Book guidance, Long Run Variable Costs were used for electricity (industrial consumers) in this evaluation. Marine gasoil prices projections were developed by indexing the current marine gasoil price to the projections of oil prices. 2019 marine gasoil prices are used as current prices to avoid using more recent data heavily influenced by coronavirus situation in early 2020.

[8] http://www.southamptonvts.co.uk/Live_Information/Shipping_Movements_and_Cruise_Ship_Schedule/Cruise_Ship_Schedule/

[9] We do not account for the fuel consumption of the auxiliary boilers as they would be operational in both baseline and Shore Power scenarios.

[10] Due to the tightening of legislation by the International Maritime Organisation (IMO) that restricts the mass by mass content of sulphur in fuel oil to 0.50% m/m, the model uses the fuel costs for ships using the real 2020 price of low sulphur marine gasoil (LSMGO).

[11] https://shipandbunker.com/prices/emea/nwe/nl-rtm-rotterdam#LSMGO

[12] https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/602657/5._Data_tables_1-19_supporting_the_toolkit_and_the_guidance_2016.xlsx

In the sensitivity analysis, we also explore the knock-on benefit that this investment will have through the supply chains of the shore power installation. The benefit of the investment in shore power to the local economy is calculated by calculating the GVA multiplier effect to the investment total. These benefits are a result of higher economic activity in the supply chain as a result of investment, including job creation[13]. As the infrastructure providers increase their demand, their suppliers would increase production in its turn, for example producers of the equipment plus their suppliers. Keeping in mind the nature of the project, this investment is assumed to be attributed to the electricity transmission and distribution economic sector, i.e. we use the GVA multipliers for this economic sector to quantify the economic impacts[14].

To capture the impact on the Solent area only, these benefits were then adjusted to reflect the expected proportion of the economic benefits that would remain in the local economic area. In this sense, the calculations assume that 90% of the suppliers would come from the local area.

This assumption needs to be made, as provision of shore power facilities will be subject to a tender process, and the supply chain structure is not known yet. Given the nature of the project, it is likely that the provider of the technology will be a multi-national company. For example, one potential provider, Schneider Electric, fabricates the necessary equipment within the UK. It is possible, but again, subject to tender, that the ground works element of the project could be undertaken by a local/ regional provider.

2.2.3 Environmental costs and benefits

The environmental costs and benefits included within this economic case can be divided into two categories: climate change mitigation benefits and air quality impacts.

Climate change mitigation benefits

The value of the reduction in CO_2 emitted is a function of the number of ships that use shore power, that would have otherwise used LSMGO, and the monetary damages avoided as a result of this.

The impact of using shore power in port compared to the use of marine gasoil is considerably lower. It is important to note that there are no emissions of CO_2 by a ship's auxiliary engines running on shore power. The emissions associated with its use, instead, are attributed to the site of electricity generation if the electricity is produced from resources such as fossil fuels.

Electricity consumption is assigned a zero-emission factor, as ABP aims at purchasing 100% renewably generated electricity. We relax this assumption in the sensitivity analysis and assume the power comes from the grid. Following the Green Book guidance, the electricity CO_2 emission factor corresponds to projections of long-run marginal factors (consumption bases), as published in BEIS' Supplementary Green Book guidance[15]. The emission factor applied to the use of marine gasoil is 3.206 t CO_2 per tonne of fuel[16].

The monetary damage avoided by not emitting a tonne of CO_2 is expressed through carbon price projections in £ per tonne of CO_2e also published by BEIS. Non-traded carbon prices are applied to emissions from burning marine gasoil, as the maritime sector is not a part of the emission trading scheme, while traded prices are applied to electricity consumption in those scenarios where the electricity emission factor differs from zero (electricity is sourced from the grid).

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[13] Employment opportunities resulting from investment in Shore Power is examined in section 2.4.2..

[14] Sector 35.1 in United Kingdom Input-Output Analytical Tables, 2015, consistent with UK National Accounts Blue Book 2018 & UK Balance of Payments Pink Book 2018.

[15] https://www.gov.uk/government/publications/valuation-of-energy-use-and-greenhouse-gas-emissions-for-appraisal

[16] The emission factor is based on the carbon content of the fuel. Source for the emission factor: IMO (2015) Third IMO Greenhouse Gas 2014 study.

Air Quality Benefits

The most important pollutants emitted from cruise ships are nitrogen-oxygen compounds (NOx) and Particulate Matter ($PM_{2.5}$). Reducing air pollutant emissions will have a range of subsequent benefits, on human and environmental health, productivity and amenity.

The approach used to value the impacts associated with reductions in NOx and $PM_{2.5}$ emissions is as follows:

- Calculate **quantities** (tonnes) of NOx and $PM_{2.5}$ emissions that are reduced by the reduction in fuel use in the shore power scenario compared to the baseline scenario. This is done by applying NOx and $PM_{2.5}$ emission factors to total marine gasoil consumption under each scenario. Power generation is assumed not to generate air quality impacts in the Solent area in those scenarios where power source is specified as 100% renewables.
- Identify the relevant **damage cost** that expresses the cost of air pollutant emissions on human health, productivity and amenity. These costs are based on the emission damages from shipping published by DEFRA and the methodology on how to project these costs in the future from the same source[17].
- Calculate the total expected benefit from reducing air pollution from cruise ships by multiplying the total quantity of emissions with the damage cost factor.

Emission factors for marine gasoil are presented in the table below.

Table 3 Emission factors or marine gasoil used for evaluation

Parameter	Unit	Value	Source
LSMGO Emission factor	tCO_2/ tMGO	3.206	Ricardo
MGO NOx emission factor	g/ kgMGO	39	Winnes, Fridell (2009)[18]
MGO PM2.5 emission factor	g/ kgMGO	1.8	Winnes, Fridell (2009)

Table 4 Damage costs for PM2.5 and NOx, ships

Parameter	Unit	Value	Source
PM Damage Cost - Lower	2017 £/ tonne	7,443	DEFRA
PM Damage Cost - Central	2017 £/ tonne	33,739	DEFRA
PM Damage Cost - Higher	2017 £/ tonne	97,124	DEFRA
NOx Damage Costs - Lower	2017 £/ tonne	350	DEFRA
NOx Damage Costs - Central	2017 £/ tonne	2,506	DEFRA
NOx Damage Costs - Higher	2017 £/ tonne	8,592	DEFRA
Annual uplift	%	2%	DEFRA

Central damage costs are used for this assessment, with a lower and higher scenario being tested as sensitivities. Damage costs for ships published by DEFRA are presented in table below. As the prices are in £2017, GDP deflators were used to bring them to the 2020 base year of modelling (1.063 as published by Office for Budgetary Responsibility).

[17] The methodology and 2017 values are taken from Air quality damage cost guidance, January 2019, published by DEFRA.

[18] Hulda Winnes & Erik Fridell (2009) Particle Emissions from Ships: Dependence on Fuel Type, Journal of the Air & Waste Management Association, 59:12, 1391-1398, DOI:10.3155/1047-3289.59.12.1391

2.3 Methodology for job creation

As mentioned in section 2.2.2 , the local economic benefits that arise due to investment in Shore Power include the creation of additional employment opportunities that would not have existed under the Baseline scenario. These jobs include those jobs created *directly* as a result of investment in Shore Power, including construction jobs and maintenance jobs, and jobs created *indirectly*, due to the multiplier effect of the investment within the local economy.

Job creation was estimated for each year separately and then averaged out and expressed as FTE per year for presentation purposes. Only jobs based in the Solent area are considered for this analysis. That is, the project will have a higher impact on employment, if this indicator is viewed on national scale.

Construction jobs

The number of construction full-time (FTE) jobs created is estimated for this business case according to the assumption stated in the Explanatory Note included in the Solent Prosperity Fund's *Technical Guidance: Large Projects and Programmes*[19]. The guidance states that projects should estimate that for every £1 million invested, this will result in 12.5 construction jobs (FTE).

The number of indirect construction jobs is the product of multiplying the number of direct jobs and the FTE multiplier[20] for the electricity transmission and distribution sector, provided in the UK Input-Output tables, minus direct construction FTEs. This figure is then adjusted to reflect only the share of these jobs likely to occur locally, assuming 90% of these jobs are in the Solent region, similar to the assumption on supply chain of infrastructure providers for GVA in section 2.2.2.

It is uncertain at this stage which supplier will be chosen to do the work, so the exact proportion of local jobs is unknown too. For a project of this nature it is expected that the jobs are local, however the 90% local jobs assumption is made to reflect a possibility that some jobs will leak away from the region.

Maintenance jobs

The number of direct jobs (FTE) related to the ongoing maintenance of the shore power facility is estimated to be 5 FTE per annum by ABP. This estimation is based on the information available at this stage and ABP's understanding of the project.

Additional jobs that are an indirect result of the investment in Shore Power are calculated by applying a multiplier to the FTE maintenance jobs estimated to be created by the investment, according to the average maritime sector FTE multiplier for Solent area[21]. The resulting additional jobs are then adjusted to reflect the expected percentage that will remain within the area assuming again 90% of local jobs.

Additional call jobs

Additional calls will not only bring a higher economic activity to the Solent area, but also additional jobs to support this additional activity. According to the number of additional calls considered, the jobs that arise from these additional calls are calculated by applying FTE per call multipliers for Home Port Calls and Port of Call separately, as published by Deloitte. Only Solent area jobs are accounted for.

These jobs are not classified as direct and indirect and are presented jointly in a single indicator.

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[19] https://solentlep.org.uk/media/2724/spf-large-projects-tech-guidance.pdf

[20] Sector 35.1 in United Kingdom Input-Output Analytical Tables, 2015, consistent with UK National Accounts Blue Book 2018 & UK Balance of Payments Pink Book 2018. https://www.ons.gov.uk/economy/nationalaccounts/supplyandusetables/datasets/ukinputoutputanalyticaltablesdetailed

[21] The multiplier is taken from "The economic role and contributions of the maritime sector in the Solent LEP area", a report for the Solent LEP and Maritime UK published in May 2018.

2.4 Main results

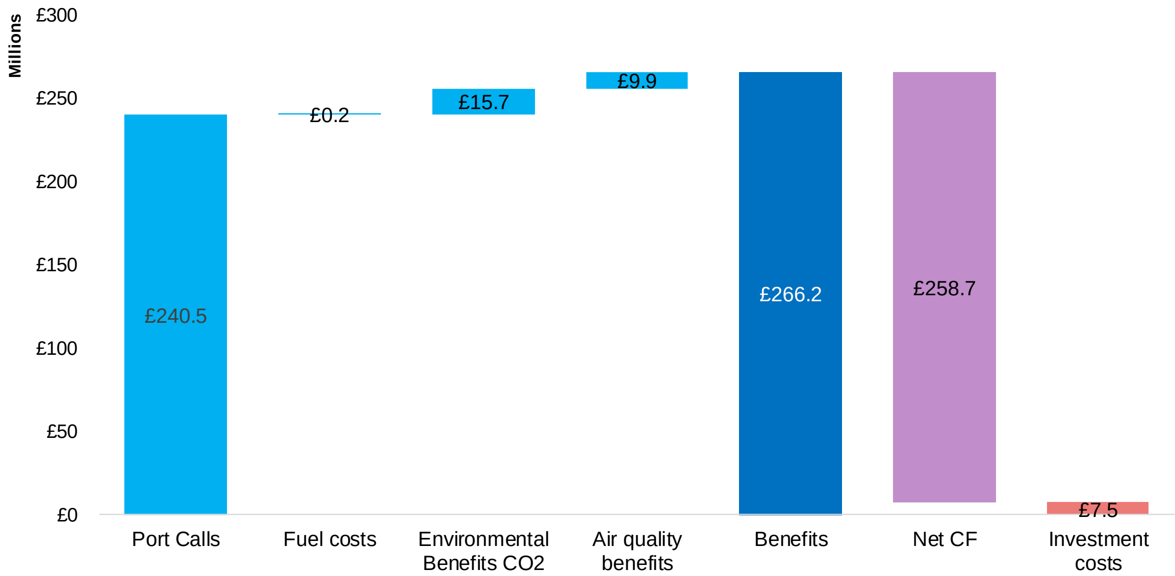
2.4.1 Social Cost Benefit Analysis

In this section we present the NPV of costs, benefits and benefit to cost ratios (BCRs) for the project. As noted above, the central assessment assumes that only one additional vessel adds Southampton to its itinerary as the result of shore power availability. We assume this vessel conducts 10 calls per year from 2022. We discuss more optimistic and restrictive scenarios in section 2.5.

An additional cruise ship visiting Southampton in the Shore Power scenario would result in £266.2m in total NPV of benefits, compared to £7.5m in NPV of investment costs. This creates a BCR of 35 to 1, as the figure below shows.

- Additional calls are expected to bring £240.5m in economic benefits to local businesses during the lifetime of the Shore Power project ("Port Calls" bar on the graph).
- CO_2 emissions savings are expected to bring £15.7m in benefits ("Environmental benefits CO_2" bar on the graph).
- Air quality improvements are expected to be equivalent to £9.9m in benefits ("Air quality benefits" category).
- An additional £0.2m is expected in fuel savings[22] ("Fuel costs" category on the graph below) due to expected differences in electricity and marine gasoil prices.
- Net benefits NPV ("Net CF" on the graph) is expected to reach £258.7m.

Figure 1 NPV for costs and benefits under one additional vessel (10 calls per year) with respect to Baseline since 2022



Source: Ricardo

In total, 8,631 tonnes of CO_2, 105 tonnes of NOx and 4.8 tonnes of $PM_{2.5}$ are expected to be saved per year when the shore power facility will become operational.

[22] This category includes maintenance costs and salary payments for 5 FTEs needed to maintain the facility. These costs are included as a part of electricity price paid by the vessels that consume Shore Power.

When more calls are considered, total benefits will go up and BCR will increase: 20 additional calls in the Shore Power scenarios delivers 67 to 1 BCR and 30 additional calls – 99 BCR.

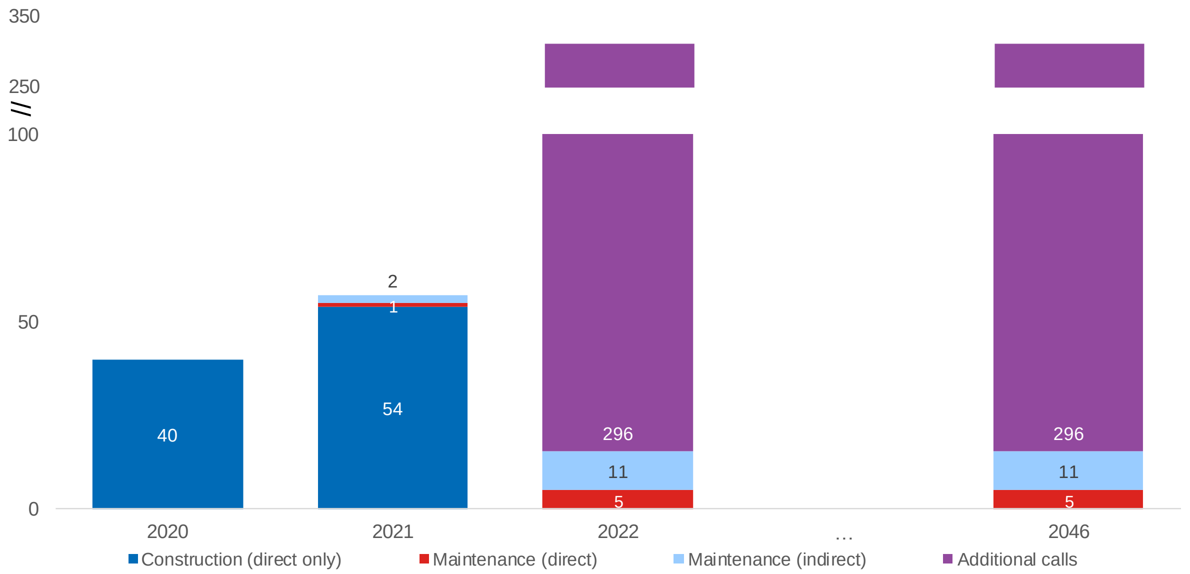
Economic and environmental benefits are not always aligned, as more cruise calls would deliver incremental economic benefits, but concurrently will negatively influence the environmental benefits. This is due to the fact that even if a higher proportion of new calls uses shore power, the more ships that visit Southampton Port, the higher their overall emissions will be.

2.4.2 Job creation

The project is expected to create 290 jobs per year, on average, during the lifetime of the project: 40 in 2020, 57 in 2021 and 312 starting in 2022. These are shown on the graph below and include:

- 40 construction FTE during 2020 and 54 construction FTE during 2021,
- 1 maintenance direct FTE and 2 indirect in 2021,
- 5 maintenance direct FTE and 11 indirect from 2022,
- 296 FTEs due to additional calls also from 2022 onwards.

Figure 2 FTE under one additional vessel (10 calls per year) with respect to Baseline since 2022 assumption



Source: Ricardo

As in case with benefits, additional calls account for the majority of FTEs created in the Solent area as the result of the Shore Power project, while construction and maintenance FTEs represent only 5%.

2.5 CBA sensitivities

Having considered our main case with 10 additional calls, this section considers how the benefits and BCR are affected by changes in some of the assumptions.

Sensitivity analysis shows that in all scenarios considered the BCR is 4 to 1 or higher, approaching 100 to 1 in some cases. Even if investment in Shore Power does not result in additional cruise calls at Southampton Port, the project achieves a 4 to 1 BCR.

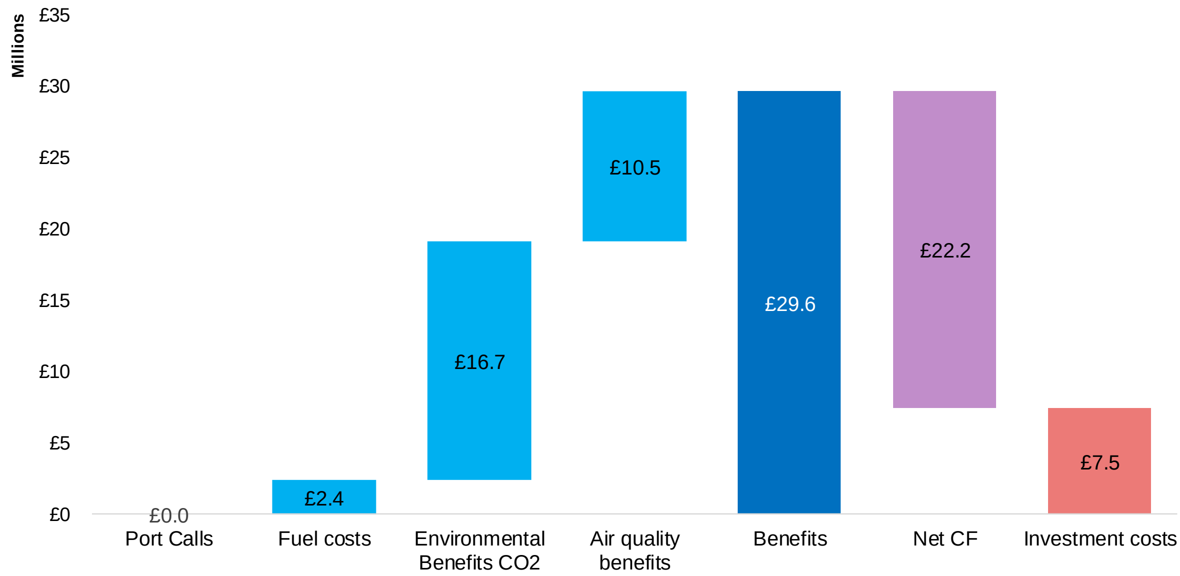
The NPV of the benefits and the BCRs for the sensitivity analysis are presented in the table below.

Table 5 Sensitivity analysis for CBA

Case	Description	NPV costs	NPV benefits	BCR
Main case	**10 additional calls starting in 2022**	**£7.5m**	**£266.2**	**35.6 to 1**
Higher investment, adverse prices, power from the grid	Investment costs are 10% higher than expected, high electricity, low LSMGO prices, power from the grid with high emission factor, high CO_2 traded price, low damage costs and low non-traded CO_2 price	£8.2m	£245.1m	29.8 to 1
No additional calls can be attributed to Shore Power	10 additional calls in both, Baseline and Shore Power scenario	£7.5m	£29.6m	4.0 to 1
Investment multiplier effect	Supply chain effects of investment are included as benefits	£7.5m	£279.0	37.3 to 1
30 additional calls	ABP expected number of additional calls using SP	£7.5m	£739.3m	98.8 to 1
30 years lifetime	Shore Power facility has a lifetime of 30 years and the evaluation period is set to 30 years too	£7.5m	£295.9	39.5 to 1

The figure below shows NPV of costs and benefits for a scenario with no additional calls attributed to shore power.

Figure 3 NPV for costs and benefits under no additional calls with respect to Baseline



Source: Ricardo

The total costs correspond to investment costs and reach £7.5m, while the benefits are £29.6m. More than a half of the benefits correspond to CO_2 savings (£16.7m), a third to air quality improvements (£10.5m) and the rest to fuel cost savings (£2.4m).

3 Commercial case

3.1 Procurement route

Public Procurement (Utilities Contract) Regulations 2016, also known as OJEU, apply to projects and activities relating to developments for the purpose of the provision of airports or maritime or inland ports or other terminal facilities to carriers by air, sea or inland waterway.

Our standard procedure is to tender the works on a design and build basis. The majority of the costs will be the supply of equipment. The works will be procured on a complete end to end design.

3.2 Procurement framework

In accordance with the OJEU Regulations, the following steps have been undertaken -

1. Prior Information Notice (PIN): started on 30 August 2019, completed on 2 October 2019.
2. Notification of results of PQQ Evaluation completed 8 October 2019.
3. Issue Invitation to Tender 15 November 2019.
4. Tender return date on 14 February 2020.
5. Review of tenders undertaken between 15 February to 20 March 2020.
6. Contract award to take place following LEP approval of funding- estimated June 2020.

4 Financial case

4.1 Project cost breakdown

The details of the project cost breakdowns are presented below.

Since the OBC, ABP has been working on optimising the Port's capability for delivering shore power capability for cruise vessels. The original design catered for the installation of cabling and infrastructure at a single terminal. The new design now caters for the installation of cabling and infrastructure for the appropriate electrical supply for two terminals although given the power demand from vessels (which is more than the rest of the port combined) only one vessel will be able to make use of the facility at a time. This limitation is currently due to the Distribution Network Operator (DNO). In time, if the available grid power limitation can be overcome, it may be that the facility could be used by two vessels simultaneously.

The upgraded scheme has a cost implication – an increase of £1,319,986 – which will be covered by ABP. The following cost breakdown information has been received from the preferred contractor following competitive tender:

	Costing component	Cost (£) excluding VAT	Cost (£) Including VAT
1	Preliminaries	946,785.97	1,136,143.16
2	DNO Works	167,567.43	201,080.92
3	West Bay Road Substation Works	602,861.12	723,433.34
4	11KV 50Z Cabling Between WBR to Converter Substation	138,488.98	166,186.77
5	Converter Substation 11KV 50Hz Distribution	123,738.10	148,485.71
6	Converter	1,746,542.49	2,095,850.99
7	Converter Substation 11KV 60Hz Distribution	501,464.91	601,757.89
8	Converter Substation Building	389,575.91	467,491.09
9	Supply and installation of Scada System	579,615.29	695,538.34
10	11KV 60HZ and 400V Site Distribution	1,326,827.19	1,592,192.63
11	Cable Boom Transfer Vehicle	473,638.64	568,366.37
12	Verification and Testing	609,051.93	730,862.31
13	Provisional Sums including removal of asbestos, PCBs, UXO Survey etc	27,000.00	32,400.00
	Overall Total (to be carried forward to the Form of Tender) (£)	**7,633,157.95**	**9,159,789.55**

Although the question has not been specifically asked during this process, the operational costs are expected to be cost neutral for the cruise companies. Whilst vessels cannot be compelled to use shore power, we need to ensure that we create a suitable market to maximise the use of an onshore power supply. If the cost of shore side electricity is significantly higher than using conventional fuel oil, then there is a reduced chance that an operator would choose to use the facility.

The costs of supplying power plus the maintenance of the equipment and the ABP network infrastructure will be at best cost neutral to the cost of a vessel using conventional marine fuels whilst alongside.

4.2 Funding contribution and request

At a previous application (2019), ABP requested 50% of funding. In the OBC that quantum increased the share to be funded by the LEP to the maximum 70%.

As outlined in section 4.1, ABP has optimised the project specification which has resulted in a cost increase of £1,319,986 – an increase which will be underwritten by ABP – with the increased benefit of ensuring greater availability of shore power for capable vessels. The request for funding of £4,434,350 now represents 58% of the total project costs.

The project has a conventional payback period of more than 100 years. It would not, therefore, meet ABP's internal business case criteria. We are unaware of any other commercial onshore power supply installation commissioned globally that has not benefitted from state or government aid.

ABP is committed to contribute the remaining 42% (please see covering Letter from Port Director) to cover the total costs of the project as outlined in section 4.1. A cash forecast profile is attached in Appendix 2.

	Year 2020	Year 2021	Total
LEP Funding Required (Capital)	40%	18%	58%
ABP Contribution (Capital)	4%	38%	42%
Total	44%	56%	100%
£	3,365,212	4,267,945	7,633,158

4.3 Project finance risks

Cost overruns will be minimised by closely defined project specification informed by port engineering specialist knowledge and expertise. ABP has gone out to tender on a fixed cost basis and the risk of any cost overruns will be borne by the main contractor.

The main project risks and their impact on project finances is presented below.

Risk	Likelihood	Impact on Cost	Mitigation / Control Measures
Project costs are higher than previously estimated	Low	None	Detailed specification provided within tender documents. Contractor to bear cost overruns – fixed price tender
Exchange rate fluctuations have a bearing on tender prices	Unknown	Unknown	Fixed price contract
Increased costs during installation	Unknown	Unknown	Fixed price contract; Cost Control Manager; variance analysis; audit process; defined change approval process; alignment of contractual commitments with project costs and schedule

5 Management case

5.1 Project plan

The project has been subject to a competitive tender process. The key project milestones as a result of that tender process are presented in the table below. A delay in the LEP programme to announce the outcome of the OBC led to a subsequent delay in the tender programme which has now been further affected by Covid 19 issues.

The overall suggested timeframe of 17 months presented in the table below is based upon our discussions with potential suppliers. As discussed above, it also takes account of the very latest information associated with supply chains that are being affected by Covid 19. We have, therefore, had to apply a precautionary approach which is correct at the time of writing, to our submission. Clearly, every opportunity will be taken to reduce the time frame as matters become clearer.

One of the main criteria during the tender process was identified as a requirement to spend any LEP funding allocation by 31st March 2021. The completion date will be 17 months after award of contract.

Project Milestones/ Key Stages	**Summary Description**	**Start Date**	Milestone / Completion Date
Contract Award	Award of contract to successful tenderer	15 June	
Design work	Document preparation and approval of specification	15 June	31 July
Order of long lead items	Placement of order for quayside cable management system and converter substation		17 August
Manufacturing of cable management system and vehicle	Quoted supplier timeframe	17 August	30 May 2020
Manufacturing of substation and electrical equipment	Quoted supplier timeframe	17 August	30 June 2020
Installation of civil works	Supply and installation of cabling (ground works)	1 October	1 February 2020
Installation of electrical works	Supply and installation of 11kV/400V cabling, quayside connection boxes	1 April 2020	30 July 2020
Commissioning	Testing and commissioning of infrastructure	1 July 2020	30 September 2020
Site Acceptance Tests	Testing and commissioning of infrastructure and electrical systems	1 September 2020	30 September 2020
Trial Running and operator training	Commercial trials with cruise lines and training for operatives	1 September 2020	30 September 2020
Handover and project completion			1 October 2020

I confirm we are ready to implement the project as outlined in the schedule above, have the appropriate resources in place and where relevant have client-side plans for managing relationships including contract management with suppliers	
Signature of Senior Responsible Officer	
Position of Senior Responsible Person	**Director**

5.2 Project management structure

A dedicated Project Manager will be assigned by ABP to manage specification and contractor supervision to ensure the project is delivered on time and on budget.

We have considerable experience of managing and delivering large scale port infrastructure projects including capital dredging, container terminal quays, new warehousing and large-scale solar installations.

Alastair Welch as Director of the Port of Southampton has a thorough knowledge of the cruise market and cruise customer requirements for supporting operations in Southampton. Alastair joined ABP in May 2016 and is a member of the main ABP Board. His degree is in mechanical engineering after which he studied accountancy. Prior to joining ABP he held a number of roles in the airport industry in areas such as corporate strategy, operations, engineering and finance at a number of major UK airports.

Reporting to Alastair is Mark Thompson, Head of Asset Management for the Port of Southampton. Mark is formerly of Southern Water who joined ABP in October 2017. As Head of Asset Management, Mark's focus is to ensure plans and solutions are in place to ensure the appropriate investment, maintenance, resilience and operation plans are derived to meet business needs.

James Chase is ABP's Senior Electrical Engineer, having previously enjoyed appointments with BAE Systems. James has responsibility for delivering electrical solutions for capital projects, asset management and maintenance / resilience planning. James will be the scheme's Project Manager working alongside the appointed contractor. James will be supported by a cost centre manager.

Also assisting James on project delivery will be RMS Consulting who were appointed as part of the team to deliver Portsmouth Royal Navy's shore power system for the new carriers.

5.3 Stakeholder management

We have engaged with the following stakeholders during the process:

- Solent LEP: to inform the Partnership about the scope and potential of the project;
- Southampton City Council: to inform local authority about the project.
- MSC Cruises: to inform and involve cruise line operator in the case development.
- Carnival UK: to inform and involve cruise line operator in the case development.

5.4 Statutory consents and legal agreements

The project will be delivered by virtue of general permitted development powers under Part 8 of Schedule 2 of The Town and Country Planning (General Permitted Development) (England) Order 2015 SI 2015/596.

No external consents or approvals are required.

5.5 Risk management and risk register

The main risks of the project are summarised in the table below. A comprehensive risk register including detailed descriptions of on-site construction and operational risks, will be developed when a contractor is appointed.

The following risks have been identified by ABP and are agreed by the Project Sponsor, Alastair Welch, Port Director.

Risk	Likelihood	Potential Impact	Responsibility	Mitigation Measures
LEP Funding Risk	Unknown	If LEP funding is not secured, the proposal will not be delivered.	ABP / LEP	Partnership working with the LEP; submission of FBC
Delivery Schedule cannot be met	Low	Delay of installation	ABP / Contractor	Scheduling of works; Project Meetings with the contractor to identify risks at an early stage.
Cost Increase	Low	Increased costs of installation	ABP / contractor	Fixed price tendering
Design Risk	Low	Unsuitable facility; Delay of installation and increased costs	ABP	Detailed preparation of specification; Design and Build contract Fixed price contract
Build Risk		Delay and increased costs of installation	ABP / Contractor	Project Meetings with the contractor to identify risks at an early stage.
Environmental Risk during Construction	Low	Potential localised emissions during ground works	ABP / Contractor	Dust suppression measures, wheel washes, construction plant switched off when not in operation
Disruption to Port activities during construction	Low	Disruption to port operations	ABP / Contractor	Forward planning and engagement with port operational planning team
Service Risks	Low	Disruption to operations and capability	ABP	Regular maintenance, servicing
Operational Handling Risk	Low	Personal injury, Disruption to operations	ABP	Full training will be provided to port operatives to facilitate equipment with vessels
Performance / Volume Risk	Unknown	Underutilised facility Effects of Covid 19 on cruise passenger confidence and take up of cruises	ABP	Careful preparation of specification; Discussions with existing and potential customers reveal that shore power capability is a principle consideration in new build vessels
Maintenance Risk	Low	Disruption to shore power operations	ABP	Equipment to be maintained in accordance with OEM instructions; Full training for operatives to be delivered
Technology Risk	Low	An international standard for the use of shore power facilities is in place.	ABP	Previous experience of shore power installation specified in tender criteria; Equipment to be maintained in accordance with OEM instructions and training
Regulatory Risk	Low	Change in government policy		The proposal is wholly consistent with Government and local authority ambitions and plans
Contractual Risk	Low	Delay of installation and cost increase		Detailed preparation of specification; Design and Build contract
Covid 19	High	Delay in scheme delivery due to manufacturing supply chain and available personnel		Geopolitical issues are unfolding rapidly at the time of writing. We anticipate that the holiday cruise market will recover. The situation is being monitored constantly at the time of submission.

Following installation by the supplier, the system will be tested to ensure compliance with positioning and pre-commissioning of equipment including:

- Positioning of equipment onto pre-prepared plinths / plant rooms.
- Mechanical installation of equipment.
- Site testing and pre-commissioning.

The limitation of this technology is the wider application of Shore Power across the wider Port. This is as a result of the large power consumption of the cruise vessels combined with a restriction on available power from the grid.

This constraint may be overcome in the future by new power solutions and optimisation of port operations. If cruise vessels become more efficient and reduce power demands despite of the trend in increasing capacity, this issue would become less relevant. ABP will continue to monitor to assess the ongoing potential for application.

5.6 Monitoring and evaluation

The outcomes to track in our monitoring framework and evaluation framework are presented in the tables below.

Desired output/ outcome	**Indicator**	**Anticipated timeframe**	**Named owner responsible**
Award of Contract	According to Programme	By 1 July 2021	ABP Project Manager
Commencement on Site	According to Programme	TBC by Tenderers	ABP Project Manager
Go Live	According to Programme	End August 2021	ABP Project Manager
Zero emission calls	No. vessels per annum using facility	Annual basis	ABP
Zero emission calls	Estimated tonnes saving per annum	Annual basis	ABP

Following installation by the supplier, the system will be tested to ensure compliance with positioning and pre-commissioning of equipment including:

- Positioning of equipment onto pre-prepared plinths / plant rooms.
- Mechanical installation of equipment.
- Site testing and pre-commissioning.

During operation, the scheme's success will be monitored and evaluation by:

- Number of vessels per annum using facility.
- Estimated emissions savings per annum.

ABP's Project Governance aligns with the Association of Project Management guidelines, whereby:

- A Project Sponsor will be identified from the outset (a Director or member of the senior management team) who will be accountable for the project achieving its intended objectives.
- A Project Manager will be assigned from the outset responsible for leading the project team.
- Minimum monthly updates are scheduled to review programme, cost control, quality, risk/issues and H&S.
- A clear change control procedure

All major capital projects within the ABP Group are subject to the company's project governance procedures which provide for:

- Planning, costing and scheduling expertise with, where appropriate, independent challenge from ABP's group resource.
- Structured sourcing and tendering.
- Contract management capability.
- Careful control of contractual correspondence.

ABP will work with the LEP to meet any necessary audit requirements.

Appendices

Appendix 1: Economic case, quantitative model

Appendix 2: Cost profile

Appendix 1 – Economic case

The model (Microsoft Excel spreadsheet) is being submitted as a part of this application.

Appendix 2 – Cost profile

	Cost item	Cost (£)	Jun '20	Jul '20	Aug '20	Sept '20	Oct '20	Nov '20	Dec '20	Jan '21	Feb '21
			2	3	4	5	6	7	8	9	10
1	Preliminaries	944,964	188,992	94,496	94,496	94,496	94,496	94,496	94,496	94,496	94,496
2	DNO Works	167,245									
3	West Bay Road Substation Works	601,701		90,255.17	90,255.17	90,255.17	90,255.17	90,255.17	90,255.17	60,170.11	
4	11KV 50Z Cabling Between WBR to Converter Substation	138,223	13,822	13,822	13,822						27,645
5	Converter Substation 11KV 50Hz Distribution	138,223		13,822	13,822	13,822	13,822	13,822	13,822	13,822	13,822
6	Converter	1,743,182	261,477	130,739	130,739	130,739	130,739	130,739	130,739	130,739	130,739
7	Converter Substation 11KV 60Hz Distribution	500,500									
8	Converter Substation Building	398,771	49,846	49,846	49,846	49,846	49,846	49,846	49,846	49,846	
9	Scada	578,500		57,850	57,850	57,850	57,850	57,850	57,850	57,850	57,850
10	11KV 60HZ and 400V Site Distribution	1,324,274								331,069	331,069
11	Cable Boom Transfer Vehicle	472,727				47,273	47,273	47,273	47,273	47,273	47,273
12	Verification and Testing	589,748									
13	Provisional Sums	35,100	1,755	1,755	1,755	1,755	1,755	1,755	1,755	1,755	1,755
	Total, £	7,633,157	515,893	452,586	452,586	486,037	486,037	486,037	486,037	787,020	704,648
	Total, %		7%	6%	6%	6%	6%	6%	6%	10%	9%
	Total, % (cumulative)		7%	13%	19%	25%	31%	38%	44%	54%	64%

	Cost iteam	Cost (£)	Mar '21	Apr '21	May '21	Jun '21	Jul '21	Aug '21	Sept '21	Oct '21	Total
			11	12	13	14	15	16	17	18	
1	Preliminaries	944,964									944,964
2	DNO Works	167,245			41,811	41,811	41,811	41,811			167,245
3	West Bay Road Substation Works	601,701									601,701
4	11KV 50Z Cabling Between WBR to Converter Substation	138,223	27,645	27,645	13,822						138,223
5	Converter Substation 11KV 50Hz Distribution	138,223	13,822	13,822							138,223
6	Converter	1,743,182	130,739	130,739	174,318						1,743,182
7	Converter Substation 11KV 60Hz Distribution	500,500	125,125	125,125	125,125	125,125					500,500
8	Converter Substation Building	398,771									398,771
9	Scada	578,500	57,850	57,850							578,500
10	11KV 60HZ and 400V Site Distribution	1,324,274	331,069	331,069							1,324,274
11	Cable Boom Transfer Vehicle	472,727	47,273	47,273	47,273	47,273					472,727
12	Verification and Testing	589,748		88,462	88,462	88,462	88,462	88,462	88,462	58,975	589,748
13	Provisional Sums	35,100	1,755	1,755	1,755	1,755	1,755	3,510	3,510	3,510	35,100
	Total, £	7,633,157	735,277	823,739	492,567	304,426	132,028	133,783	91,972	62,485	7,633,157
	Total, %		10%	11%	6%	4%	2%	2%	1%	1%	100%
	Total, % (cumulative)		73%	84%	91%	94%	96%	98%	99%	100%	

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