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1 INTRODUCTION

1.1 Background

This report has been prepared at the request of the Irish Maritime Development Office (IMDO) which is a statutory office within the Marine Institute and operates under the aegis of the Department of Transport.

The IMDO is a partner on the EALING project (European flagship action for cold ironing in ports) that is co-financed by the Connecting Europe Facility of the European Union.

The EALING project aims to study, promote and accelerate the effective deployment of Onshore Power Supply solutions (OPS) in the EU maritime ports.

The requirements regarding the deployment of OPS solutions in EU ports are outlined in current and expected EU Legislation. In this regard, the IMDO have selected the Port of Corks Ringaskiddy Port as a case study to establish the key considerations in the provision of OPS at Irish ports.

1.2 Scope

This report will look at the following:

a. Current and expected regulatory requirements relating to the provision and use of OPS
b. Electrical load associated with the use of OPS
c. The impact of OPS provision on the existing electrical infrastructure
d. The impact of OPS provision on the existing civil infrastructure
e. Capital cost associated with the deployment of OPS
f. Operating cost associated with the deployment of OPS
g. Conclusions and recommendations

1.3 Benefits Resulting from the use of OPS

The 'fit for 55' package, presented by the EU in July and December 2021, is designed to realise the European Climate Law objectives: climate neutrality by 2050 and a 55 % reduction of net greenhouse gas (GHG) emissions by 2030, compared with 1990 levels.

The use of OPS in port settings is one of a number of measures put forward for the maritime transport sector to help meet the aforementioned objectives. These measures are summarised as follows:

- Measures to ensure that the greenhouse gas intensity of fuels used by the shipping sector will gradually decrease over time, by 2% in 2025 to as much as 80% by 2050.
- A special incentive regime to support the uptake of the so-called renewable fuels of non-biological origin (RFNBO) with a high decarbonisation potential.
- An exclusion of fossil fuels from the regulation’s certification process
- An obligation for passenger ships and containers to use onshore power supply for all electricity needs while moored at the quayside in major EU ports as of 2030, with a view to mitigating air pollution in ports, which are often close to densely populated areas.
- A voluntary pooling mechanism, under which ships will be allowed to pool their compliance balance with one or more other ships, with the pool as a whole, having to meet the greenhouse gas intensity limits on average.
- Time limited exceptions for the specific treatment of the outermost regions, small islands, and areas economically highly dependent on their connectivity.

- Revenues generated from the regulation's implementation ('Fuel EU penalties') should be used for projects in support of the maritime sector's decarbonisation with an enhanced transparency mechanism.
- Monitoring of the regulation's implementation through the Commission's reporting and review process.

While the primary objective of utilising OPS is to assist in the drive for climate neutrality, their use has the following additional benefits.

- The improvement of air quality within and around the port through reduction in ship-generated pollutants including carbon dioxide (CO_2), nitrogen oxides (NO_X), sulphur oxides (SO_X), particulate matter (PM) or other substances associated with onboard combustion processes.
- Reduction in CO_2 emissions (if the OPS electricity is mostly sourced from blue / green electrical production sources (including biomass, hydro or renewables).
- Noise reduction onboard, within the port and the surrounding area.
- Improved working conditions both onboard and within the port area.
- Competitive advantage towards sustainable shipping and ports.

2 REGULATORY REQUIREMENTS

2.1 OPS Regulations

The following is a summary of the regulations and directives relating to the provision and use of OPS.

- FuelEU Maritime Initiative - Regulation (EU) 2023/1805 of the European Parliament and of the Council of 22 September 2023 on the Use of Renewable and Low-Carbon Fuels in Maritime Transport, and Amending Directive 2009/16/EC.
- Fit for 55 Package (Dec. 2021): Incorporating 13no Interlinked Proposals to Revise Existing EU Climate and Energy Laws, and 6no Proposals for New Legislation
- 2014/94/EU (Oct. 2014): Directive of the European Parliament and of the Council on the Deployment of Alternative Fuels Infrastructure.
- MSC.1/Circ. 1675 (June 2023): International Maritime Organisation – Interim Guidelines on Safe Operation of Onshore Power Supply Service in Ports for Ships Engaged on International Voyages
- IEC/IEEE 80005-1 (2019): Utility Connections in Port – Part 1 – High Voltage Shore Connection Systems – General Requirements
- IEC/IEEE 80005-2 (2016): Utility Connections in Port – Part 2 – High and Low Voltage Shore Connection Systems – Data Communication for Monitoring and Control

2.2 Current Regulations – Summary of OPS Related Requirements

The following are the key requirements of the current regulations in relation to OPS.

a. FuelEU Maritime Initiative: Provisional Agreement to Decarbonise the Maritime Sector

The FuelEU maritime initiative is part of the Fit for 55 package. Presented by the European Commission on 14 July 2021 and finalised on 13 September 2023, the package aims to enable the EU to reduce its net greenhouse gas emissions by at least 55% by 2030 compared to 1990 levels and to achieve climate neutrality in 2050.

The new rules will apply from 1 January 2025, apart from articles 7 (Monitoring Plan) and 8 (Modifications to the Monitoring Plan) which will apply from 31 August 2024.

The initiative notes "*an obligation for passenger ships and containers to use on-shore power supply for all electricity needs while moored at the quayside in major EU ports as of 2030, with a view to mitigating air pollution in ports, which are often close to densely populated areas".*

b. Regulation (EU) 2023/1805: Regulation of the European Parliament and of the Council on the Use of Renewable and Low-Carbon Fuels in Maritime Transport, and Amending Directive 2009/16/EC

The following paragraphs relating to OPS are copied from Regulation (EU) 2023/1805. Where applicable, exemptions from the requirement to use OPS are shown high-lighted.

(37) *The obligation for ports to provide on-shore power supply (OPS), laid down in Regulation (EU) 2023/1805, should be matched by a corresponding obligation set out in this Regulation for ships to connect to OPS infrastructure while moored at the quayside, in order to ensure the effectiveness of that infrastructure and avoid the risk of stranded assets.*

(38) *The use of OPS abates air pollution produced by ships and reduces the amount of GHG emissions generated by maritime transport. OPS represents an increasingly clean power supply available to ships, in view of the growing shares of renewables and fossil-free energy sources in the Union electricity mix. While only the provision on OPS connection points is covered by Directive 2014/94/EU, the demand for, and as a result the deployment of, that technology have remained limited. Therefore, specific rules should be established to mandate the use of OPS by containerships and passenger ships, since those are the ship categories that produce the highest amount of emissions per ship while moored at the quayside, according to the data collected within the framework of Regulation (EU) 2015/757 in 2018.*

(39) *In addition to OPS, other technologies might be capable of offering equivalent environmental benefits in ports.* ***When the use of an alternative technology is demonstrated to be equivalent to the use of OPS, a ship should be exempted from the obligation to use OPS****.*

(40) *Different OPS projects and solutions have been tested for ships at anchorage, but there is currently no mature and scalable technical solution available. For that reason,* ***the obligation to use OPS should be, in principle, limited to ships moored at the quayside.*** *Nevertheless, the Commission should regularly reassess the situation, with a view to extending that obligation to ships at anchorage, when the necessary technologies are sufficiently mature. In the meantime, Member States should be allowed to impose, in certain cases, the obligation to use OPS on ships at anchorage, for example in ports that are already equipped with such technology or are located in areas where any pollution should be avoided.*

(41) ***Exceptions from the obligation to use OPS should also be provided for a number of objective reasons,*** *subject to verification by the competent authority of the Member State of the port of call or any duly authorised entity, after consulting relevant entities where appropriate.* ***Such exceptions should be limited to unscheduled port calls, which are not made on a systematic basis, for reasons of safety or saving life at sea, to short stays of ships moored at the quayside of less than two hours as this is the minimum time required for connection, to cases of unavailability or incompatibility of OPS, to the use of onboard energy generation under emergency situations and to maintenance and functional tests.***

(42) *In ports falling under the requirements of Article 9 of Regulation (EU) 2023/1805, exceptions applicable in the event of unavailability or incompatibility of OPS should be limited after shipowners and port operators have had sufficient time to make the necessary investments, in order to provide the necessary incentives for those investments and avoid unfair competition. Ship operators should plan carefully their port calls to make sure that they can carry out their activities when moored at the quayside without emitting air pollutants and GHG, in order to protect the environment in coastal areas and port cities. A limited number of exceptions applicable in the event of unavailability or incompatibility of OPS should be provided for to cater for situations where OPS was not provided, for reasons beyond the control of the ship operator. In order to mitigate the risk of stranded assets, incompatibility of OPS infrastructure on board and at berth as well as alternative fuel demand and supply imbalances, frequent consultation meetings between relevant stakeholders should be organised to discuss and take decisions on requirements and future plans.*

43) *The requirement for ports to provide OPS, laid down in Regulation (EU) 2023/1805, takes into account the types of ships served and the respective traffic volumes of maritime ports. The requirement for ships to connect to OPS should not apply to ships when calling at ports that are not covered by the OPS requirement set out in that Regulation, unless the port has OPS installed and available at the visited quayside, in which case the ship should be required to connect to OPS from 1 January 2035.*

(44) *Considering the positive effects of the use of OPS on local air pollution and the need to incentivise the uptake of that technology in the short term, the carbon intensity of the production of the electricity supplied at berth should be counted as zero. The Commission should envisage the possibility to take into account the actual GHG emissions related to the electricity delivered through OPS at a later stage.*

(45*) The implementation of this Regulation should take due account of the diverse governance models for ports across the Union, in particular as regards the responsibility for issuing a certificate exempting a ship from the obligation to connect to OPS.*

(46) *Coordination between ports and ship operators is crucial to ensure smooth connection procedures to OPS in ports. Ship operators should inform the ports they call at about their intention to connect to OPS and about the amount of power needed during the given call, in particular when it exceeds the estimated needs for that ship category.*

47) ***From 2035, the number of exceptions granted under this Regulation from the obligation to connect to OPS, which apply to certain cases where the ship is unable to connect to OPS, should be limited per ship during a reporting period. To ensure fair treatment of ships and to reflect the differences in their operating profiles, the number of exceptions should reflect the frequency of their port calls but should never amount to more than ten port calls per reporting period****. However, a ship should not be penalised and port calls should not be counted against the maximum number of exceptions where, prior to arrival to a port, the ship has requested to connect to OPS and that request has been accepted by the port or the duly authorised entity, but*

the ship is unable to connect to OPS, and it is able to demonstrate that it could not have reasonably known it would be unable to connect to OPS.

(48) *A robust and transparent monitoring, reporting and verification system should be put in place by this Regulation in order to trace compliance with its provisions. Such system should apply in a non-discriminatory way to all ships and require third party verification in order to ensure the accuracy of the data submitted within that system. In order to facilitate achieving the objective of this Regulation, any data already reported for the purposes of Regulation (EU) 2015/757 should be used, when necessary, for verifying compliance with this Regulation in order to limit administrative burden imposed on companies, verifiers and competent authorities.*

(61) *A FuelEU penalty should be imposed also for each non-compliant port call. That FuelEU penalty should be proportionate to the cost of using the electricity at sufficient level, should have a dissuasive effect as regards the use of more polluting energy sources and should be expressed in a fixed amount in EUR, multiplied by the established total electrical power demand of the ship at berth and by the total number of hours, rounded up to the nearest whole hour, spent at berth in non-compliance with OPS requirements.*

Chapter 1 - General Provisions - Article 1 - Subject Matter and Objective

This Regulation lays down uniform rules imposing:

(a) *a limit on the greenhouse gas (GHG) intensity of energy used on board by a ship arriving at, staying within or departing from ports under the jurisdiction of a Member State; and*

(b) *an obligation to use on-shore power supply (OPS) or zero-emission technology in ports under the jurisdiction of a Member State.*

Its objective in doing so is to increase consistent use of renewable and low-carbon fuels and substitute sources of energy in maritime transport across the Union, in line with the objective of reaching Union-wide climate neutrality at the latest by 2050, while ensuring the smooth operation of maritime transport, creating regulatory certainty for the uptake of renewable and low-carbon fuels and sustainable technologies and avoiding distortions in the internal market.

Chapter 1 - General Provisions - Article 3 – Definitions

For the purposes of this Regulation, the following definitions apply:

(10) *'port of call' means a port where ships stop to load or unload cargo or to embark or disembark passengers with the exclusion of stops for the sole purposes of refuelling, obtaining supplies, relieving the crew, going into dry-dock or making repairs to the ship, its equipment or both; stops in port because the ship is in need of assistance or in distress; ship-to-ship transfers carried out outside ports; stops for the sole purpose of taking shelter from adverse weather or rendered necessary by search and rescue activities; and stops of containerships in a neighbouring container transhipment port listed in the implementing act adopted pursuant to Article 2(2);*

Chapter II – Requirements for Energy Used on Board by Ships - Article 6 – Additional Zero-Emission Requirements for Energy Used at Berth

1. *From 1 January 2030, a ship moored at the quayside in a port of call which is covered by Article 9 of Regulation (EU) 2023/1805 and which is under the jurisdiction of a Member State shall connect to OPS and use it for all its electrical power demand at berth.*

2. *From 1 January 2035, a ship moored at the quayside in a port of call which is not covered by Article 9 of Regulation (EU) 2023/1805, which is under the jurisdiction of a Member State and where the quay is equipped with available OPS, shall connect to that OPS and use it for all its electrical power demand at berth.*

3. *From 1 January 2030 and until 31 December 2034, and after consulting relevant stakeholders, including, where appropriate, the managing body of the port, a Member State may decide that a ship moored at the quayside in a port of call under its jurisdiction which is not covered by Article 9 of Regulation (EU) 2023/1805, or in certain parts of such port, shall connect to OPS and use it for all its electrical power demand at berth. The Member State shall notify its decision imposing such requirement to the Commission a year prior to the application thereof. Such decision must apply from the beginning of a reporting period. The Commission shall publish the information in the*

Official Journal of the European Union and make publicly available an updated list of the ports concerned. Such list shall be easily accessible.

4. *Paragraphs 1, 2 and 3 shall apply to:*

   (a) *containerships.*

   (b) *passenger ships.*

5. *Paragraphs 1, 2 and 3 shall not apply to ships that:*

   (a) *are moored at the quayside for less than two hours, calculated on the basis of time of arrival and time of departure monitored and recorded in accordance with Article 15;*

   (b) *use zero-emission technologies which comply with the general requirements for such technologies provided for in Annex III and are listed and specified in the delegated and implementing acts adopted in accordance with paragraphs 6 and 7 of this Article, for all their electrical power demand at berth, while moored at the quayside;*

   (c) *due to unforeseen circumstances beyond the control of the ship, have to make an unscheduled port call, which is not made on a systematic basis, for reasons of safety or saving life at sea, other than those already excluded under Article 3, point (10);*

   (d) *are unable to connect to OPS due to the unavailability of OPS connection points in a port;*

   (e) *are unable to connect to OPS because exceptionally the electrical grid stability is at risk, due to insufficient available shore-power to satisfy the ship's required electrical power demand at berth;*

   (f) *are unable to connect to OPS because the shore installation at the port is not compatible with the onboard on-shore power equipment, provided that the installation for shore-connection on board the ship is certified in accordance with the technical specifications set out in Annex II to Regulation (EU) 2023/1805 for the shore-connection systems of seagoing ships;*

   (g) *for a limited period of time, require the use of onboard energy generation, under emergency situations representing immediate risk to life, the ship or the environment or for other reasons of force majeure;*

   (h) *while remaining connected to OPS, for a period of time limited to what is strictly necessary, require the use of onboard energy generation for maintenance tests or for functional tests carried out at the request of an officer of a competent authority or the representative of a recognised organisation undertaking a survey or inspection.*

Chapter VI – Delegated and Implementing Powers and Final Provisions – Article 30 – Reports and Review

2. *By 31 December 2027, and every five years thereafter at the latest, the Commission shall report to the European Parliament and the Council the results of an evaluation as regards the functioning of this Regulation, including possible impacts of market distortions or port evasion; as regards the evolution of the zero-emission technologies in maritime transport and their market, as well as the evolution of the technologies and market for renewable and low-carbon fuels and for OPS, including at anchorage; as regards the use of revenue generated by the FuelEU penalties; and as regards the impact of this Regulation on the competitiveness of the maritime sector in the Union.*

c. 2021/0223 (COD): Proposal for a Regulation of the European Parliament and of the Council on the Deployment of Alternative Fuels Infrastructure, and repealing Directive 2014/94/EU of the European Parliament and of the Council

1.2 For waterborne transport, this initiative delivers on the clear requirement of the European Green Deal to oblige docked ships to use shore-side electricity. It is fully complementary to Fuel EU maritime initiative by ensuring that sufficient shore-side electricity supply is installed in ports to provide electricity while passenger ships (including ro-ro passenger ships, high speed passenger craft and cruise ships) and container vessels are at berth and accommodating the demand for decarbonised gases (i.e. bio-LNG and synthetic gaseous fuels (e-gas). For the case of passenger ships, the different ship categories vary in their power demand characteristics while at berth, which leads to different investment needs at port. This needs to be combined with the different

operational characteristics of ports, including layouts and terminals. For this reason, a further distinction is made on passenger ships compared to the FuelEU maritime initiative in identifying two categories, that of ro-ro passenger ships and high-speed passenger vessels, and that of other passenger ships, notably cruise ships. Together with the FuelEU maritime initiative it therefore contributes to overcoming the current "chicken-and-egg" issue, which has meant that the very low demand for ship operators to connect to the electric grid while at berth has made it less attractive for ports to invest in shore-side electricity. Limited introduction of On-shore power supply OPS in ports risks disturbing the level playing between ports, in particular for early investors, as not OPS equipped vessels could shift their traffic. It is therefore important that minimum requirements be set for maritime ports across the whole TEN-T network.

5.2 Articles 9 and 10 set out provisions for Member States to ensure installation of a minimum shore-side electricity supply for certain seagoing ships in maritime ports and for inland waterway vessels. The articles also define further the criteria for exempting certain ports and set requirements to ensure a minimum shore-side electricity supply.

(32) Shore-side electricity facilities can serve maritime and inland waterway transport as clean power supply and contribute to reducing the environmental impact of seagoing ships and inland waterway vessels. Under the FuelEU maritime initiative, ship operators of container and passenger ships need to comply with provisions to reduce emissions at berth. Mandatory deployment targets should ensure that the sector finds sufficient shore-side electricity supply in TEN-T core and comprehensive maritime ports to comply with those requirements. The application of these targets to all TEN-T maritime ports should ensure the level playing field between ports.

(33) Container ships and passenger ships, being the ship categories, which are producing the highest amount of emissions per ship at berth, should as a priority be provided with shore-side electricity supply. In order to take into account power demand characteristics while at berth of different passenger ships, as well as port operational characteristics, it is necessary to distinguish between the passenger ship requirements for ro-ro passenger ships and high-speed passenger vessels, and those for other passenger ships.

(34) These targets should take into account the types of vessels served and their respective traffic volumes. ***Maritime ports with low traffic volumes of certain ship categories, should be exempted from the mandatory requirements for the corresponding ship categories based on a minimum level of traffic volume, so as to avoid underused capacity being installed. Similarly, the mandatory targets should not aim to target maximum demand, but a sufficiently high volume, in order to avoid underused capacity and to take account of port operational characteristics.*** *Maritime transport is an important link for the cohesion and economic development of islands in the Union. Energy production capacity in these islands may not always be sufficient to account for the power demand required to support the provision of shore-side electricity supply. In such a case, islands should be exempted from this requirement unless and until such an electrical connection with the mainland has been completed or there is a sufficient locally generated capacity from clean energy sources.*

Article 9 – Targets for Shore-Side Electricity Supply in Maritime Ports

1. Member States shall ensure that a minimum shore-side electricity supply for seagoing container and passenger ships is provided in maritime ports. To that end, Member States shall take the necessary measures to ensure that by 1 January 2030:

(a) TEN-T core and TEN-T comprehensive maritime ports whose average annual number of port calls over the last three years by seagoing container ships above 5000 gross tonnes, in the previous three years, is above 50 have sufficient shore-side power output to meet at least 90% of that demand;

(b) TEN-T core and TEN-T comprehensive maritime ports whose average annual number of port calls over the last three years by seagoing ro-ro passenger ships and high-speed passenger craft above 5000 gross tonnes, in the previous three years, is above 40 have sufficient shore-side power output to satisfy at least 90% of that demand;

(c) TEN-T core and TEN-T comprehensive maritime ports whose average annual number of port calls over the last three years by passenger ships other than ro-ro passenger ships and high-speed passenger craft above 5000 gross tonnes, in the previous three years, is above 25 have sufficient shore-side power output to meet at least 90% of that demand.

2. *For the determination of the number of port calls the following port calls shall not be taken into account:*

   (a) port calls that are at berth for less than two hours, calculated on the basis of hour of departure and arrival monitored in accordance with Article 14 of the proposal for a Regulation COM(2021)562;

   (b) port calls by ships that use zero-emission technologies, as specified in Annex III of the proposal for a Regulation COM(2021)562;

   (c) unscheduled port calls for reasons of safety or saving life at sea.

3. *Where the maritime port of the TEN-T core network and the TEN-T comprehensive network is located on an island which is not connected directly to the electricity grid, paragraph 1 shall not apply, until such a connection has been completed or there is a sufficient locally generated capacity from clean energy sources.*

2.3 OPS Regulations – Summary of Key Dates

The following is a summary of the key dates to be met to comply with current OPS directives and regulations.

Reference Document	Requirement	Due Date
FuelEU Maritime Initiative	Passenger ships and container ships **(over 5,000GT)** to use OPS for all electricity needs while moored at the quayside in major EU ports as of 2030.	2030
Regulation (EU) 2023/1805 – Clause 43	The requirement for ships to connect to OPS should not apply to ships when calling at ports that are not covered by the OPS requirement set out in that Regulation, unless the port has OPS installed and available at the visited quayside, in which case the ship should be required to connect to OPS from 1 January 2035.	Jan. 1st 2035
Regulation (EU) 2023/1805 – Article 6	From 1 January 2030, a container ship or passenger ship moored at the quayside in a port of call which is covered by Article 9 of Regulation (EU) 2023/1805 and which is under the jurisdiction of a Member State shall connect to OPS and use it for all its electrical power demand at berth.	Jan. 1st 2030
Regulation (EU) 2023/1805 – Article 6	From 1 January 2035, a container ship or passenger ship moored at the quayside in a port of call which is not covered by Article 9 of Regulation (EU) 2023/1805, which is under the jurisdiction of a Member State and where the quay is equipped with available OPS, shall connect to that OPS and use it for all its electrical power demand at berth.	Jan. 1st 2035
Regulation (EU) 2023/1805 – Article 6	From 1 January 2030 and until 31 December 2034, and after consulting relevant stakeholders, including, where appropriate, the managing body of the port, a Member State may decide that a container ship or passenger ship moored at the quayside in a port of call under its jurisdiction which is not covered by Article 9 of Regulation (EU) 2023/1805, or in certain parts of such port, shall connect to OPS and use it for all its electrical power demand at berth.	Jan. 1st 2030
2021/0223 (COD) – Article 9	Member States shall ensure that a minimum shore-side electricity supply for seagoing container and passenger ships is provided in maritime ports. To that end, Member States shall take the necessary measures to ensure that by 1 January 2030: (a) TEN-T core and TEN-T comprehensive maritime ports whose average annual number of port calls over the last three years by seagoing container ships above 5000 gross tonnes, in the previous three years, is above 50 have sufficient shore-side power output to meet at least 90% of that demand;	Jan. 1st 2030

Reference Document	Requirement	Due Date
	(b) TEN-T core and TEN-T comprehensive maritime ports whose average annual number of port calls over the last three years by seagoing ro-ro passenger ships and high-speed passenger craft above 5000 gross tonnes, in the previous three years, is above 40 have sufficient shore-side power output to satisfy at least 90% of that demand; (c) TEN-T core and TEN-T comprehensive maritime ports whose average annual number of port calls over the last three years by passenger ships other than ro-ro passenger ships and high-speed passenger craft above 5000 gross tonnes, in the previous three years, is above 25 have sufficient shore-side power output to meet at least 90% of that demand.	

Table 1: Summary of Key Dates

2.4 OPS Regulations – Summary of Exemptions

The following is a summary of the exemptions applicable to current OPS directives and regulations.

Reference Document	Exemptions / Exceptions
Regulation (EU) 2023/1805 – Clause 39	When the use of an alternative technology is demonstrated to be equivalent to the use of OPS, a ship should be exempted from the obligation to use OPS.
Regulation (EU) 2023/1805 – Clause 40	The obligation to use OPS should be, in principle, limited to ships moored at the quayside.
Regulation (EU) 2023/1805 – Clause 41	Exceptions from the obligation to use OPS should also be provided for a number of objective reasons, subject to verification by the competent authority of the Member State of the port of call or any duly authorised entity, after consulting relevant entities where appropriate. Such exceptions should be limited to unscheduled port calls, which are not made on a systematic basis, for reasons of safety or saving life at sea, to short stays of ships moored at the quayside of less than two hours as this is the minimum time required for connection, to cases of unavailability or incompatibility of OPS, to the use of onboard energy generation under emergency situations and to maintenance and functional tests.
Regulation (EU) 2023/1805 – Clause 47	From 2035, the number of exceptions granted under this Regulation from the obligation to connect to OPS, which apply to certain cases where the ship is unable to connect to OPS, should be limited per ship during a reporting period. To ensure fair treatment of ships and to reflect the differences in their operating profiles, the number of exceptions should reflect the frequency of their port calls but should never amount to more than ten port calls per reporting period.
Regulation (EU) 2023/1805 – Article 3 - Clause 10	‘Port of call’ means a port where ships stop to load or unload cargo or to embark or disembark passengers with the **exclusion** of stops for the sole purposes of refuelling, obtaining supplies, relieving the crew, going into dry-dock or making repairs to the ship, its equipment or both; stops in port because the ship is in need of assistance or in distress; ship-to-ship transfers carried out outside ports; stops for the sole purpose of taking shelter from adverse weather or rendered necessary by search and rescue activities; and stops of containerships in a neighbouring container transhipment port listed in the implementing act adopted pursuant to Article 2(2).

Reference Document	Exemptions / Exceptions
Regulation (EU) 2023/1805 – Article 6 - Clause 5	The requirement for container ships and passenger ships to use OPS shall not apply to ships that: (a) are moored at the quayside for less than two hours, calculated on the basis of time of arrival and time of departure monitored and recorded in accordance with Article 15; (b) use zero-emission technologies which comply with the general requirements for such technologies provided for in Annex III and are listed and specified in the delegated and implementing acts adopted in accordance with paragraphs 6 and 7 of this Article, for all their electrical power demand at berth, while moored at the quayside; (c) due to unforeseen circumstances beyond the control of the ship, have to make an unscheduled port call, which is not made on a systematic basis, for reasons of safety or saving life at sea, other than those already excluded under Article 3, point (10); (d) are unable to connect to OPS due to the unavailability of OPS connection points in a port; (e) are unable to connect to OPS because exceptionally the electrical grid stability is at risk, due to insufficient available shore-power to satisfy the ship's required electrical power demand at berth; (f) are unable to connect to OPS because the shore installation at the port is not compatible with the onboard on-shore power equipment, provided that the installation for shore-connection on board the ship is certified in accordance with the technical specifications set out in Annex II to Regulation (EU) 2023/1805 for the shore-connection systems of seagoing ships; (g) for a limited period of time, require the use of onboard energy generation, under emergency situations representing immediate risk to life, the ship or the environment or for other reasons of force majeure; (h) while remaining connected to OPS, for a period of time limited to what is strictly necessary, require the use of onboard energy generation for maintenance tests or for functional tests carried out at the request of an officer of a competent authority or the representative of a recognised organisation undertaking a survey or inspection.
2021/0223 (COD) – Clause 34	Maritime ports with low traffic volumes of certain ship categories, should be exempted from the mandatory requirements for the corresponding ship categories based on a minimum level of traffic volume, so as to avoid underused capacity being installed. Similarly, the mandatory targets should not aim to target maximum demand, but a sufficiently high volume, in order to avoid underused capacity and to take account of port operational characteristics.
2021/0223 (COD) – Article 9 – Cl. 34	For the determination of the number of port calls the following port calls shall not be taken into account:
	(a) port calls that are at berth for less than two hours, calculated on the basis of hour of departure and arrival monitored in accordance with Article 14 of the proposal for a Regulation COM(2021)562;
	(b) port calls by ships that use zero-emission technologies, as specified in Annex III of the proposal for a Regulation COM(2021)562;
	(c) unscheduled port calls for reasons of safety or saving life at sea.

Table 2: Summary of Exemptions

3 PORT USAGE

The following table summarises the annual average number of vessels using the various Port of Cork ports over the four-year period 2019 to 2023.

Vessel Type	Vessel Size (GT)	Average Number of Visits per Year	Average Time Spent in Port (Hours)
Container Terminal	**(Note 1)**		
Container Vessels (Note 2)	<10,000	96	18
Container Vessels	<50,000	155	18
Container Vessels	>50,000	0	0
Ferry Terminal	**(Note 1)**		
Ro-Pax Vessel	<20,000	0	0
Ro-Pax Vessel	>20,000	59	6
Deepwater Berth	**(Note 1)**		
Bulk Carriers	<50,000	21	77
Bulk Carriers	>50,000	0	0
General Cargo	<25,000	124	38
General Cargo	>25,000	15	68
Ro-Pax Vessels	>20,000	1	63
Cruise Ships	<100,000	4	10
Cruise Ships	>100,000	1	10
Car Carriers	<20,000	1	24
Car Carriers	>20,000	29	15
Car Carriers	>50,000	1	11
Deepwater Berth – ADM Jetty			
Liquid Bulk	<5,000	5	27
Liquid Bulk	<10,000	1	49
Liquid Bulk	>10,000	4	45
Cobh (Note 3)			
Cruise Ships	<100,000	55	
Cruise Ships	>100,000	24	
City Quays (Note 3)			
Cruise Ships	<100,000	1	
Cruise Ships	>100,000	0	

Vessel Type	Vessel Size (GT)	Average Number of Visits per Year	Average Time Spent in Port (Hours)
Bantry (Note 3)			
Cruise Ships	<100,000	9	
Cruise Ships	>100,000	2	

NOTES

1. All of the container vessels, Ro-Pax vessels and cruise ships which berthed in POC Ringaskiddy in the four-year period 2019 to 2023 were >5,000GT with the exception of 4no container vessels which visited the port in 2023. This would suggest that of the total number of such vessels using the port annually (316no.), in excess of 98% are >5,000GT and therefore falling within the requirement to use OPS as of Jan. 1st 2030.
2. Approximately 40% (168no) of the overall number of container vessels using the Port of Cork ports berth in Tivoli. These are all of <10,000GT. The balance of this vessel size (96no) use the Ringaskiddy terminal.
3. The number of cruise ships using Cobh, City Quays and Bantry are included to facilitate a comparison between the overall number of cruise ships using the Port of Cork ports and the number using the Deepwater Berth.

   The number of cruise ships currently using the Deepwater Berth represents 5% of the overall number of cruise ships using Port of Cork ports.

Table 3: Port Usage

4 OPS LOAD ESTIMATE

Note: *This section should be read in conjunction with* ***Appendix A*** *– POC Ringaskiddy – OPS Study – Load Schedule.*

4.1 OPS Load – Impact on Existing ESB Supplies

The Deepwater Berth (DWB) is currently served via a 10kV ESB sub-station located in the vicinity of the entrance to the DWB site. The contracted level of supply (MIC – maximum import capacity) from the ESB is 0.40MVA and the current maximum demand on the supply is 0.20MVA (based on ESB bills for the year June 2022 to May 2023).

The Ferry / Container Terminal is currently served via a 20kV ESB sub-station located adjacent to the Ferry Terminal Building. The contracted level of supply (MIC – maximum import capacity) from the ESB is 2.50MVA and the current maximum demand on the supply is 1.24MVA (based on ESB bills for the year May 2022 to May 2023).

The DWB is a multi-modal berth accommodating several vessel types including bulk carriers, general cargo vessels, Ro-Pax vessels, offshore supply vessels, pure car carriers and cruise vessels.

Several berthing scenarios for the DWB were shared by POC. These scenarios were reviewed and three were selected to establish the impact of OPS load for a typical berthing scenario, a worst-case berthing scenario (excluding cruise vessels) and a worst-case berthing scenario (including cruise vessels).

The Ferry / Container Terminal is dedicated to Ro-Pax vessels (FT) and container vessels (CT). The single mode use of these terminals limits the number of applicable berthing scenarios. For the purposes of the OPS study load schedule, a typical and worst-case berthing scenario was selected.

The findings of the OPS Study load schedule included at Appendix A are summarised in the following table.

Scenario	Description	Existing MIC (MW)	Existing Max Demand (MW)	Diversified OPS Load (MW)	Projected Max Demand (MW)
DEEPWATER BERTH					
1	Current Berthing Capacity - Typical Berthing Scenario	0.40	0.20	0.00	0.20
2	Current Berthing Capacity - Worst Case Scenario (Excluding Cruise Ship)	0.40	0.20	0.00	0.20
3	Current Berthing Capacity - Worst Case Scenario (Including Cruise Ship)	0.40	0.20	9.00	9.20
4	Future Berthing Capacity (2030) – Typical Berthing Scenario	0.40	0.20	0.00	0.20
5	Future Berthing Capacity (2030) - Worst Case Scenario (Excluding Cruise Ship)	0.40	0.20	0.00	0.20
6	Future Berthing Capacity (2030) - Worst Case Scenario (Including Cruise Ship)	0.40	0.20	9.00	9.20
FERRY / CONTAINER TERMINAL					
1	Current Berthing Capacity – Typical Berthing Scenario	2.50	1.24	3.25	4.49
2	Future Berthing Capacity (2030) – Typical Berthing Scenario	2.50	1.24	5.25	6.49

Table 4: OPS Impact on ESB Supply

4.2 ESB Supply – Deepwater Berth

While currently, the use by cruise ships of the DWB is <10% of the overall number of such vessels visiting the Port of Cork ports, POC would like to make OPS provision for cruise ships at one of the DWB berths, (subject to its being financially feasible) in the interests of retaining current business levels and having the ability to expand on same in the coming years.

The MIC required from the ESB to serve berthing scenarios including a cruise ship would be of the order of 10MW (per Table 4). This represents a very significant increase on the current MIC of 0.40MW.

As noted at item 4.1 above, the current ESB supply to the DWB is a 10kV supply. The transition to a supply with the capacity to serve a 10MW load is likely to require a significant upgrade to ESB Networks infrastructure.

RPS have engaged with ESB Networks regarding the OPS project and its impact on existing ESB infrastructure. A meeting is planned with senior ESB Networks personnel to discuss this in more detail, but it has not been possible to have this meeting prior to the issue of this report.

In advance of any detailed discussion or feedback from ESB Networks, we would suggest that an order of magnitude cost allowance of €600,000 be included for ESB upgrade works.

4.3 ESB Supply – Ferry Terminal / Container Terminal

The current MIC to the Ferry / Container Terminal is 2.50MW. This level of MIC would need to increase to 4.50MW based on current berthing capacity and to 6.50MW based on future berthing capacity (2030).

The ESB have been provided with a copy of the OPS Study Load Estimate (Appendix A) with a request to provide a high-level indication of the upgrade works required to the ESB network together with an indicative cost for same.

The use of OPS was anticipated in the design of the electrical infrastructure provided by both ESB Networks and POC in conjunction with the recent redevelopment of the Container Terminal. In this regard, the capital contribution likely to be associated with an increase in MIC from 2.50MW to 6.50MW would be expected to be of the order of €200,000 to €300,000.

5 ELECTRICAL INFRASTRUCTURE

5.1 Deepwater Berth – Existing MV Switchgear

Note: *This section should be read in conjunction with MV schematic IE000678-RPS-00-XX-DR-E-ED0003.*

The existing MV (medium voltage) distribution network is based on a radial distribution philosophy. This type of network limits the potential for adding additional switchgear capacity and has the inherent disadvantage that a cable fault anywhere on the distribution network will mean that service beyond the fault point is lost and will remain so until the fault is located and rectified.

The existing MV (medium voltage) switchgear installation incorporates the following MV switchgear panels.

a. SUB1:

The SUB1 substation is located adjacent to the ESB substation in close proximity to the main entrance to the DWB.

The SUB1 switchgear comprises a four cubicle 10kV rated panel with 4no circuit breakers serving the ESB incoming supply, transformer T1, Crane 1 & SUB2A.

The following issues are noted in respect of OPS provision:

- The switchgear doesn't incorporate any spare circuit breakers to facilitate the introduction of a ring-main type distribution network.
- The switchgear is old and is likely to have exceeded its design life.
- The switchgear is rated at 10kV and wouldn't support a change to 20kV supply if proposed by ESB Networks.
- The sub-station within which the switchgear is located is not large or high enough to accommodate modern primary switchgear.

b. SUB2A:

The SUB2 substation is referred to as the middle-docks substation as it is located approximately mid-way along the existing DWB quay. The substation houses both the SUB2A and SUB2B switchboards.

The SUB2A switchgear comprises a four cubicle 17.50kV rated panel with 2no switches and 2no circuit breakers. The switches are used to take supply from SUB1 and provide supply to SUB2B. One of the circuit breakers is reserved as a spare for Crane 2 and the second is used to serve Transformer T2.

The following issues are noted in respect of OPS provision:

- The switchgear doesn't incorporate any spare circuit breakers.
- The switchgear is old and is likely to have exceeded its design life.
- The switchgear is rated at 17.50kV and wouldn't support a change to 20kV supply if proposed by ESB Networks.
- Based on the switchgear rating, the cable interconnecting SUB1 and SUB2A is unlikely to have a 20kV rating

c. SUB2B:

The SUB2B switchgear comprises a four cubicle 24.00kV rated panel with 2no switches and 2no circuit breakers. The panel is located adjacent to SUB2A. The switches are used to take supply from SUB2A and provide supply to SUB3. One of the circuit breakers is used to serve Crane 2 and the second is retained as a spare for Crane 1.

The following issues are noted in respect of OPS provision:

- The switchgear doesn't incorporate any spare circuit breakers.
- The switchgear is not extendable.
- The sub-station within which the switchgear (SUB2A & SUB2B) is located would require significant civil works (provision of floor trenches) to facilitate the addition of a new panel with capacity to serve OPS units.

d. SUB3:

The SUB3 substation is located adjacent to the existing DWB container facility at the NW end of the DWB quay.

The SUB3 switchgear comprises a four cubicle 24.00kV rated panel with 2no switches and 2no circuit breakers. One of the switches is used to take supply from SUB2B and the second is a spare. One of the circuit breakers is used to serve RT-251Crane and the second is used to serve Transformer T3.

The following issues are noted in respect of OPS provision:

- The switchgear does include a spare switch which would facilitate the creation of a ring-main type distribution network.
- The switchgear doesn't incorporate any spare circuit breakers.
- The switchgear is not extendable.

5.2 Deepwater Berth – Works Required to Facilitate OPS Provision

Note: *This section should be read in conjunction with MV schematic IE000678-RPS-00-XX-DR-E-ED0004.*

Following a review of the existing MV network (Section 5.1), the following is a summary of the electrical works that would need to be implemented to accommodate the provision of OPS units.

a. SUB1:

- Replace the existing 10kV rated panel with a new 20kV rated primary switchboard.
- Replace the existing T1 transformer.
- Replace the existing Crane 1 transformer.
- Replace the existing MV cable serving SUB2A with a new 20kV rated cable.
- Replace the existing MV cable to the T1 transformer.
- Replace the existing MV cable to Crane 1.

b. SUB2A:

- Replace the existing 17.50kV rated panel with a new 20kV rated secondary switchboard.
- Replace the existing transformer T2
- Replace the existing MV cable serving SUB2B with a new 20kV rated cable.

c. SUB2C:

- Provide a new 20kV secondary switchboard (SUB2C) within the SUB2 substation. This switchboard to incorporate circuit breakers to serve 3no OPS units.
- Modify the existing 20kV cable between SUB2B and SUB3 to accommodate the proposed SUB2C.
- Provide a containerised OPS equipment switchroom to accommodate the OPS switchgear, transformers, frequency converters etc., required to serve OPS outlets at the cruise ship berth (DWB-DB1).
- Provide MV cable from SUB2C to the OPS equipment switchroom
- Provide MV cable from the OPS equipment switchroom to the OPS outlets

d. SUB3:

- Provide a new 20kV secondary switchboard (SUB3B) within the SUB3 substation. This switchboard to incorporate circuit breakers to serve 3no OPS units.
- Provide a new 20kV rated cable between the existing SUB3 and the proposed SUB3A
- Provide a new 20kV rated cable between the proposed SUB3A and the proposed new primary switchgear at SUB1, to complete a ring-main network.

5.3 Ferry Terminal / Container Terminal - Existing MV Switchgear

Note: *This section should be read in conjunction with MV schematic IE000678-RPS-00-XX-DR-E-ED0001.*

The existing MV distribution network serving the Ferry / Container terminal is a ring-main type network rated at 20kV and commissioned in 2021.

The network incorporates the following MV switchgear panels.

a. MVSB1:

The MVSB1 substation is located adjacent to the ESB sub-station in close proximity to the Ferry Terminal building.

The MVSB1 switchgear comprises a five cubicle 20kV rated primary switchgear panel with 5no circuit breakers serving the ESB incoming supply, transformer T1, outbound leg of MV ring-main, inbound leg of MV ring-main and one spare.

The following issues are noted in respect of OPS provision:

- The panel has sufficient capacity to serve the anticipated OPS load without modification.

b. RMU1:

The RMU1 substation is located adjacent to the Reefer section within the container compound.

The RMU1 switchgear comprises a six cubicle 20kV rated secondary switchgear panel with 2no switches and 4no circuit breakers. The switches serve the incoming and outgoing legs of the ring-main network. One of the circuit breakers serves Transformer T2, there are 2no spare circuit breakers retained for future RTG use and 1no spare.

The following issues are noted in respect of OPS provision:

- It is unlikely that the RMU1 switchgear would be used to serve OPS units as the RMU2 substation is positioned closer to the container terminal quay.

c. RMU2:

The RMU2 substation is located in close proximity to the container terminal quay.

The RMU2 switchgear comprises a six cubicle 20kV rated secondary switchgear panel with 2no switches and 4no circuit breakers. The switches serve the incoming and outgoing legs of the ring-main network. Two of the circuit breakers are dedicated to Ship to Shore Cranes 1 & 2 and the remaining two are retained for future OPS use.

The following issues are noted in respect of OPS provision:

- RMU2 has the circuit breakers necessary to serve 2no OPS units which is considered sufficient for the existing container terminal berth.

d. RMU3:

The RMU3 substation is located outside the south-eastern boundary of the container terminal.

The RMU3 switchgear comprises a four cubicle 20kV rated secondary switchgear panel with 2no switches and 2no circuit breakers. The switches serve the incoming and outgoing legs of the ring-main network. One of the circuit breakers serves Transformer T3 whiel the second is a spare circuit breaker.

The following issues are noted in respect of OPS provision:

- It is unlikely that the RMU3 switchgear would be used to serve OPS units as the substation is outside the container terminal boundary and remote from the container terminal quay.

5.4 Ferry Terminal / Container Terminal – Works Required to Facilitate OPS Provision

Note: *This section should be read in conjunction with MV schematic IE000678-RPS-00-XX-DR-E-ED0002.*

Following a review of the existing MV network (Section 5.3), the following is a summary of the electrical works that would need to be implemented to accommodate the provision of OPS units.

a. MVSB1:

- The panel has sufficient capacity to serve the anticipated OPS load without modification.

b. RMU1:

It is unlikely that RMU1 would be used to serve OPS units.

c. RMU2:

The RMU2 switchgear has sufficient capacity to serve 2no OPS units without modification.

- Provide 2no containerised OPS equipment switchrooms to accommodate the OPS switchgear, transformers, frequency converters etc., associated with the proposed OPS outlets at each of the 2no existing berths.
- Provide MV cable from RMU2 to the OPS equipment switchrooms
- Provide MV cable from the OPS equipment switchrooms to the OPS outlets

d. RMU3:

RMU3 is located remote from the container terminal quay and is not required to serve any OPS units.

e. RMU4 (Proposed):

It is anticipated that the existing container terminal quay will be extended north-eastward to include a third berth by 2030.

Cable ducts and cable draw chambers are in place to facilitate the installation of a new containerised substation (RMU4) to serve the extended quay area.

- Provide a containerised substation (RMU4) to provide power to the extended quay.
- Provide a containerised OPS equipment switchroom to accommodate the OPS switchgear, transformers, frequency converters etc., associated with the proposed OPS outlets.
- Provide MV cable from RMU2 to RMU4
- Provide MV cable from RMU4 to RMU5
- Provide MV cable from RMU4 to the OPS equipment switchroom
- Provide MV cable from the OPS equipment switchroom to the OPS outlets

f. RMU5 (Proposed):

- Provide a containerised substation (RMU5) to provide power to the Ferry Terminal OPS Unit.

  The RMU5 switchgear will comprise a four cubicle 20kV rated secondary switchgear panel with 2no switches and 2no circuit breakers. The switches will be used to interface with the incoming and outgoing legs of the ring-main network. One of the circuit breakers will be used to serve the proposed OPS unit while the second breaker will be retained as a spare for future use.
- Provide a containerised OPS equipment switchroom to accommodate the OPS switchgear, transformers, frequency converters etc., associated with the proposed OPS outlets.
- Provide MV cable from RMU5 to MVSB.1
- Provide MV cable from RMU5 to the OPS equipment switchroom
- Provide MV cable from the OPS equipment switchroom to the OPS outlets

The containerised substation and switchroom will be located in close proximity to the existing Ferry / Container Terminal main sub-station (MVSB.1) / ESB substation building.

6 CIVIL INFRASTRUCTURE

Note: *This section should be read in conjunction with the indicative cable management layout IE000678-RPS-00-XX-DR-E-EK0002.*

6.1 Deepwater Berth

The main cable routes within the DWB consist of cable ducting interlinking the 3no sub-station buildings (SUB1, SUB2 & SUB3). In addition to this ducting, there is an existing service trench running the full length of the existing quay.

The following civil works are anticipated in respect of the provision of OPS units at each berth:

a. Deepwater Berth
   - New ESB substation with adjoining DWB MV switchroom.
   - Concrete base for OPS equipment switchrooms.
   - Extension of cable trench within the SUB2 switchroom.
   - Cable ducting and associated cable draw chambers to provide an interface between the OPS equipment switchroom and the service trench in the existing quay.
   - Extension of the existing service trench into the extended quay.
   - Cable ducting from the service trench to flush formed pockets at the quay edge (to accommodate OPS JB's).

b. Liquid Bulk Berth (ADM Jetty)
   - Cable ducting and associated cable draw chambers to provide an interface between the service trench in the extended quay and the liquid bulk berth.
   - Concrete base for OPS equipment switchroom.
   - Flush formed pockets at the quay edge (to accommodate OPS JB's).

6.2 Ferry Terminal / Container Terminal

There is a comprehensive cable management system in place with the redeveloped Ferry / Container Terminal. The existing infrastructure includes the cable ducting and flush formed pockets required to provide OPS power at each of the existing container vessel berths.

The following civil works are anticipated in respect of the provision of OPS units at each berth:

a. Ferry Terminal
   - Concrete base for containerised RMU5 substation.
   - Concrete base for containerised OPS equipment switchroom.
   - Extension to Ferry Terminal jetty to provide a base for the proposed OPS unit.
   - Cable ducting and associated cable draw chambers to provide an interface between the MVSB.1 substation, RMU5 substation, OPS equipment switchroom and the OPS unit on the extended Ferry Terminal jetty.

b. Container Terminal
   - Concrete base for containerised RMU4 substation.
   - Concrete base for containerised OPS equipment switchrooms.
   - Cable ducting and associated cable draw chambers to provide an interface between the RMU2 and RMU4 substations, OPS equipment switchrooms and the extended Container Terminal quay.
   - Cable ducting from the main duct run to flush formed pockets at the quay edge (to accommodate OPS JB's).

7 OPS OPEX COST

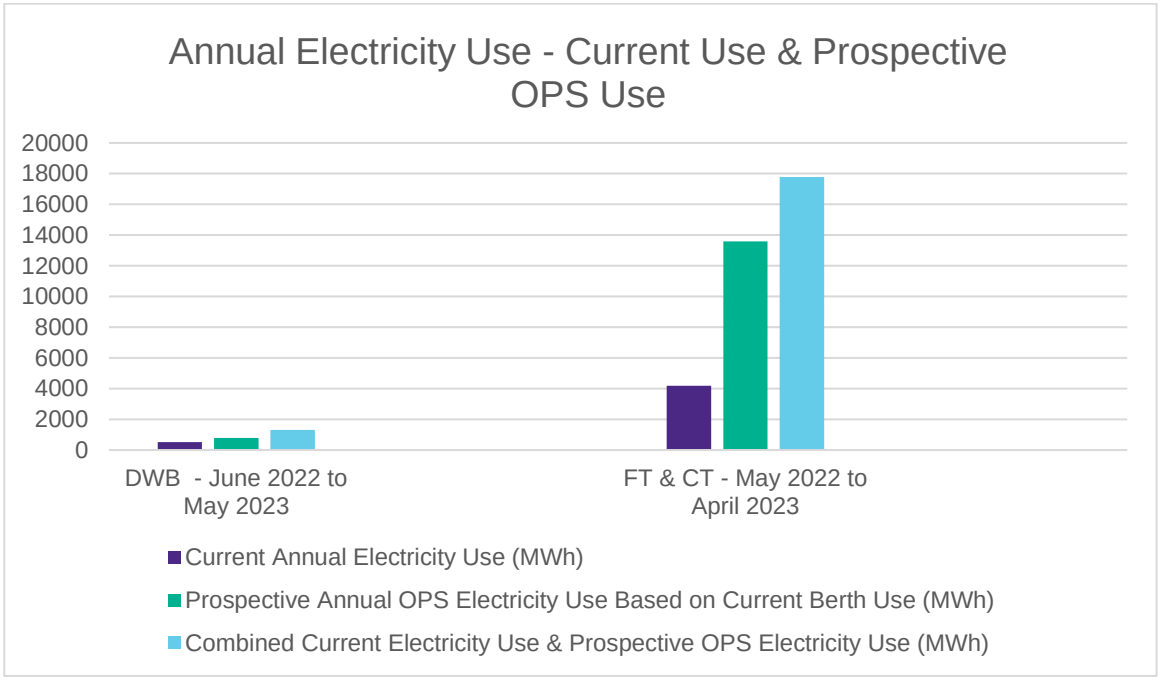
7.1 OPS - Annual Electricity Use

The chart included below shows the current annual electricity use, prospective annual OPS electricity use and a combination of the two for the Deep Water Berth (DWB) and the Ferry & Container Terminal (FT & CT). All values are in megawatt hours.

While the DWB is a multi-modal facility capable of accommodating several vessel types, the OPS electricity use values used in the chart relate specifically to those vessels which will be obliged to use OPS from Jan. 1st 2030 (RoRo Pax vessels and cruise ships as container vessels are accommodated at the container terminal).

The current annual electricity use is based on the period indicated in the chart and the prospective OPS electricity use is based on current annual average berth use.

Please refer to Appendix D for a detailed breakdown of electricity use in the DWB and the FT & CT.



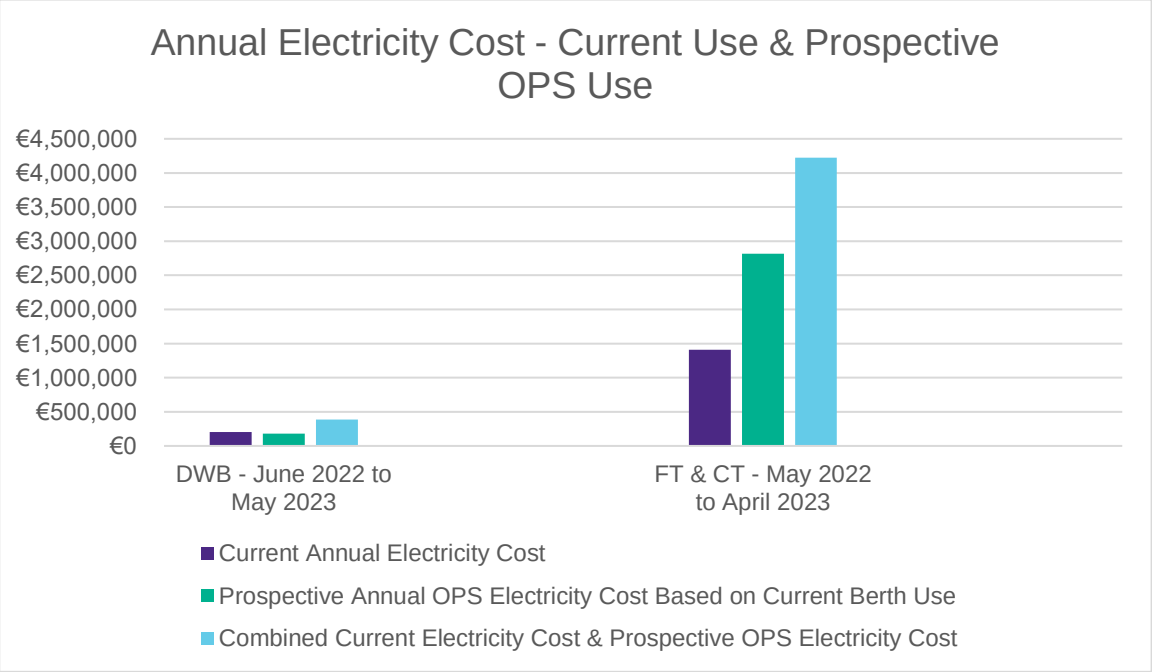
7.2 OPS - Annual Electricity Cost

The chart included below shows the current annual electricity cost, prospective annual OPS electricity cost and a combination of the two for the Deep Water Berth (DWB) and the Ferry & Container Terminal (FT & CT).

While the DWB is a multi-modal facility capable of accommodating several vessel types, the OPS electricity cost figures used in the chart relate specifically to those vessels which will be obliged to use OPS from Jan. 1st 2030 (RoRo Pax vessels and cruise ships as container vessels are accommodated at the container terminal).

The current annual electricity cost is based on the period indicated in the chart and the prospective OPS electricity cost is based on current annual average berth use.

Please refer to Appendix D for a detailed breakdown of electricity costs in the DWB and the FT & CT.



7.3 OPS - Annual Operating Costs

An indicative breakdown of the annual operating costs associated with OPS provision and use is included in Table 5 below.

Item	Description of Works	Nett Amount	Contingency	Total Amount
			(Note 1)	
1.00	**Ferry / Container Terminal**			
1.01	OPS equipment electricity usage costs (Refer to Appendix D)	€2,815,110.00	20%	€3,378,132.00
1.02	OPS equipment depreciation allowance (@5% of purchase cost)	€531,000.00	20%	€637,200.00
1.03	OPS equipment maintenance cost (Maintenance contract based on quarterly visits)	€10,000.00	20%	€12,000.00
1.04	OPS equipment connection costs (Based on two electricians for two hours for each of 478no vessels berthing per year)	€95,600.00	20%	€114,720.00
1.05	OPS equipment disconnection costs (Based on two electricians for two hours for each of 478no vessels berthing per year)	€95,600.00	20%	€114,720.00
	Sub Total	**€3,547,310.00**		**€4,256,772.00**
2.00	**Deepwater Berth**			
2.01	OPS equipment electricity usage costs (Refer to Appendix D)	€180,340.00	20%	€216,408.00
2.02	OPS equipment depreciation allowance (@5% of purchase cost)	€290,250.00	20%	€348.300.00
2.03	OPS equipment maintenance cost (Maintenance contract based on quarterly visits)	€10,000.00	20%	€12,000.00
2.04	OPS equipment connection costs (Based on two electricians for two hours for each of 6no vessels berthing per year)	€1,200.00	20%	€1,440.00
2.05	OPS equipment disconnection costs (Based on two electricians for two hours for each of 6no vessels berthing per year)	€1,200.00	20%	€1,440.00
	Sub Total	**€482,990.00**		**€579,588.00**
	Total (Excl. VAT)	**€4,030,300.00**		**€4,836,360.00**

NOTES

1	Contingency included to cover unforeseen items, price escalation etc.
2.	The vessel numbers using the ferry / container terminal (478no) assume that the container vessels currently berthing at Tivoli (168no) will transfer to Ringaskiddy over the coming years.

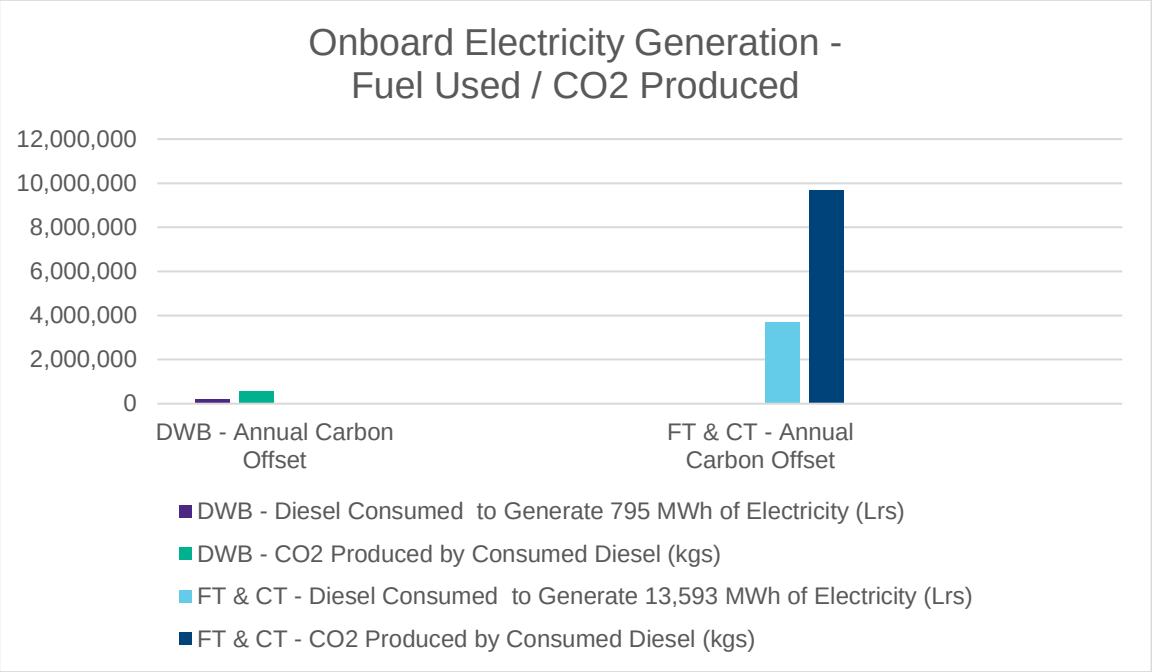
Table 5: OPS – Annual Operating Costs

7.4 OPS - Annual Carbon Offset

Energia are the current electricity provider to both the Deepwater Berth and the Ferry / Container Terminal and note in their electricity bills that all electricity supplied to POC is from renewable energy sources.

The amount of diesel fuel used to produce one megawatt of electricity is of the order of 270L/hr with each litre producing 2.64kgs of CO_2, equating to 713kg of CO_2/MWh of electricity.

The chart included below shows both the amount of fuel consumed and the associated CO_2 released by vessel generators while at berth in the DWB and the FT / CT over an average year.



8 COST ESTIMATE

Note: *This section should be read in conjunction with Appendix B – POC Ringaskiddy – OPS Study – Cost Estimate.*

Item	Description of Works	Nett Amount	Contingency	Total Amount
			(Note 4)	
1.00	**Ferry / Container Terminal**			
1.01	Civil Works	€823,975.00	20%	€988,770.00
1.02	Electrical Works	€1,119,000.00	20%	€1,342,800.00
1.03	OPS Equipment (Note 1)	€10,620,000.00	20%	€12,744,000.00
1.04	ESB Networks (Note 2)	€300,000.00	20%	€360,000.00
	Sub Total	**€12,862,975.00**		**€15,435,570.00**
2.00	**Deepwater Berth**			
2.01	Civil Works (Note 3)	€1,536,975.00	20%	€1,844,370.00
2.02	Electrical Works	€1,316,835.00	20%	€1,580,202.00
2.03	OPS Equipment (Note 1)	€5,805,000.00	20%	€6,966,000.00
2.04	ESB Networks (Note 2)	€600,000.00	20%	€720,000.00
	Sub Total	**€9,258,810.00**		**€11,110,572.00**
	Total (Excl. VAT)	**€22,121,785.00**		**€26,546,142.00**

NOTES

1	Indicative cost estimates for OPS substation equipment were provided by OPS system specialists PowerCon of Denmark.
2	Order of magnitude cost.
3	The indicated amount (€1,536,975.00) includes for the civil works necessary to facilitate the provision of OPS at 1no deepwater berth (€543,950) and the future provision of OPS (€993,025) at remaining deepwater berths.
4	Contingency included to cover unforeseen items, price escalation etc.

Table 6: Cost Estimate Summary

9 CONCLUSIONS AND RECOMMENDATIONS

9.1 Ferry Terminal

OPS equipment vendors have advised that with all major European ports facing the same 2030 deadline for the provision of OPS power, the lead time on OPS equipment is currently running at twelve to eighteen months depending on the complexity of the system proposed.

In the context of extended OPS equipment deliveries, it is recommended that a programme be prepared to detail the works that need to be put in place to achieve completion of an OPS installation at the Ferry Terminal by 2025.

9.2 Container Terminal

POC have advised that they plan to have the extended Container Terminal berth in place by 2030 which will increase the berthing capacity of the facility from two container vessels to three.

The redeveloped Container Terminal is well placed to accommodate the introduction of OPS at each of the three berth positions as the introduction of OPS was anticipated in the design of the MV switchgear, MV cable and cable management systems installed within the scope of the redevelopment works.

9.3 Deepwater Berth

POC have advised that they would like to maintain and grow their current cruise vessel business and, in this regard, would see a necessity to have cruise vessel OPS provision in place at one of the deepwater berths by the 2030 deadline.

As noted in preceding sections of this report, the introduction of OPS will have significant implications for the medium voltage network currently serving the facility. The main impacts are summarised as follows:

- Anticipated increase in ESB Networks voltage from 10kV to 20kV
- Upgrade works on the ESB Networks infrastructure
- Replacement of existing MV switchgear and cables rated at <20kV
- Installation of the additional MV switchgear and cables necessary to serve both the cruise vessel OPS requirement and the OPS provision likely to be required at the other deepwater berths in the years beyond 2030.
- Significant civil works necessary to accommodate the above electrical works.

The items scheduled above represent a substantial body of work with associated substantial cost and would necessitate a two-to-three-year programme to implement.

9.4 OPS Equipment

Once installed, the provision of OPS power will entail substantial operating cost (refer to Table 5) and associated challenges including the following:

- How will vessels using OPS power be billed for its use ?
- Based on current port usage, the connection and disconnection of OPS will require an input of the order of 4,000 manhours by suitably qualified electricians with MV training. This level of input represents two operatives averaging 2,000 hours per year.

9.5 Deferred Works

It is noted that the overall cost estimate (€26,776,785.00) detailed in Table 6 above, includes €1,536,975.00 for the civil works necessary to facilitate the provision of OPS at 1no deepwater berth (€543,950) for cruise ship use, and the future provision of OPS (€993,025) at remaining deepwater berths. The latter amount could be deferred and implemented at a later date with a consequent reduction in the overall cost estimate to €25,783,760.

10 ACKNOWLEDGEMENTS

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   - Paul Brewster
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   - Edel O'Connor

b. Port of Cork
   - Shane Hurley
   - Dave Lewis
   - Toddy Cuthbert

Appendix A
OPS Study Load Estimate

Appendix B
OPS Study Cost Estimate

Appendix C
Drawing Schedule

The following drawings are appended to this report:

Drawing No	Description	Status / Rev.
IE000678-RPS-00-XX-DR-E-ED0001	Ferry & Container Terminal – Existing MV Schematic	A1 / P01
IE000678-RPS-00-XX-DR-E-ED0002	Ferry & Container Terminal – Proposed MV Schematic	A1 / P01
IE000678-RPS-00-XX-DR-E-ED0003	Deepwater Berth – Existing MV Schematic	A1 / P01
IE000678-RPS-00-XX-DR-E-ED0004	Deepwater Berth – Proposed MV Schematic	A1 / P01
IE000678-RPS-00-XX-DR-E-EK0001	Onshore Power Supply Unit – Indicative Layout	A1 / P01
IE000678-RPS-00-XX-DR-E-EK0002	Onshore Power Supply Unit – Indicative Cable Management Layout	A1 / P01

Appendix D
Electrical Usage Summary - Current Use & Prospective OPS Use