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PORT OF WATERFORD - OPS STUDY - REPORT

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OPS FES REPORT

Contents

1	INTRODUCTION	1
1.1	Background	1
1.2	Scope	1
1.3	Benefits Resulting from the use of OPS	1
2	REGULATORY REQUIREMENTS	3
2.1	OPS Regulations	3
2.2	Current Regulations – Summary of OPS Related Requirements	3
2.3	OPS Regulations – Summary of Key Dates	8
2.4	OPS Regulations – Summary of Exemptions	9
3	PORT USAGE	11
4	OPS LOAD ESTIMATE	12
4.1	Overview of Existing Medium Voltage Distribution Network	12
4.2	Berthing Facilities Requiring OPS Provision	12
4.3	OPS Load – Impact on Existing ESB Network.....	12
4.4	ESB Supply	13
5	ELECTRICAL INFRASTRUCTURE	14
5.1	Existing MV Switchgear - Overview	14
5.2	Container Quay – Works Required to Facilitate OPS Provision	14
5.3	Bulk & General Cargo Quay - Works Required to Facilitate OPS Provision	15
6	CIVIL INFRASTRUCTURE	16
6.1	Civil Works Overview	16
6.2	Container Quay	16
6.3	Bulk and General Cargo Quay	16
7	OPS OPEX COST	17
7.1	OPS - Annual Electricity Use	17
7.2	OPS - Annual Electricity Cost	18
7.3	OPS - Annual Operating Costs	19
7.4	OPS - Annual Carbon Offset.....	20
8	COST ESTIMATE	21
9	CONCLUSIONS AND RECOMMENDATIONS	22
9.1	ESB Network Upgrade	22
9.2	Container Terminal.....	22
9.3	Bulk / General Cargo Quay	22
9.4	OPS Equipment	22
10	ACKNOWLEDGEMENTS	23

Appendices

Appendix A OPS Study Load Estimate

Appendix B Electrical Usage Summary

Appendix C OPS Study Cost Estimate

Appendix D Drawing Schedule

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.

This report reviews the key considerations in the provision of OPS at the Port of Waterford (POW).

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.

OPS FES REPORT

- The improvement of air quality within and around the port through reduction in ship-generated pollutants including carbon dioxide (CO₂), nitrogen oxides (NO_x), sulphur oxides (SO_x), particulate matter (PM) or other substances associated with onboard combustion processes.
- Reduction in CO₂ 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.

- Regulation (EU) 2023/1805 of the European Parliament and of the Council of 13 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 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*”.

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 PE-CONS 26 / 23. 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*

OPS FES REPORT

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 transshipment 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*

OPS FES REPORT

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.

OPS FES REPORT

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 5,000 GT) 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: <ol style="list-style-type: none"> (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

OPS FES REPORT

Reference Document	Requirement	Due Date
	<p>(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;</p> <p>(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.</p>	

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 transshipment port listed in the implementing act adopted pursuant to Article 2(2).

OPS FES REPORT

Reference Document	Exemptions / Exceptions
Regulation (EU) 2023/1805 – Article 6 - Clause 5	<p>The requirement for container ships and passenger ships to use OPS shall not apply to ships that:</p> <ul style="list-style-type: none"> (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	<p>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.</p>
2021/0223 (COD) – Article 9 – Cl. 34	<p>For the determination of the number of port calls the following port calls shall not be taken into account:</p>
	<p>(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;</p>
	<p>(b) port calls by ships that use zero-emission technologies, as specified in Annex III of the proposal for a Regulation COM(2021)562;</p>
	<p>(c) unscheduled port calls for reasons of safety or saving life at sea.</p>

Table 2: Summary of Exemptions

OPS FES REPORT

3 PORT USAGE

The following table summarises the annual average number of vessels using POW over the two-year period 2021 to 2022.

Vessel Type	Vessel Size (GT)	Average Number of Visits per Year	Average Time Spent in Port (Hours)
Bulk Carriers			
Bulk Carriers	<50,000	24	129
Bulk Carriers	>50,000	0	0
General Cargo			
General Cargo	<25,000	473	43
General Cargo	>25,000	0	0
Container Vessels			
Container Vessels	<10,000	94	19
Container Vessels	<50,000	0	0
Cruise Ships (Note 1)			
Cruise Ships	<50,000	13	11
Cruise Ships	<100,000	4	18
Cruise Ships	>100,000 (<150,000)	6	16
Total - Annual Average		614 no.	

NOTES

- The number of cruise ships using POW in 2022 was 23no (figures are not available for 2023). While Article 9 of 2021/2022 (COD) indicates that ports having fewer than 25no cruise ship visits annually can be exempted from the provision of OPS, the POW Masterplan 2020-2044 Summary notes that "There is an opportunity to increase the number of cruise vessels calling at Waterford". In this regard, it is considered prudent to include for the provision of OPS at one berth by the Bulk & General Cargo quay.

Table 3: Port Usage

4 OPS LOAD ESTIMATE

Note: This section should be read in conjunction with **Appendix A – Port of Waterford – OPS Study – Load Estimate**.

4.1 Overview of Existing Medium Voltage Distribution Network

There is an existing 38kV ESB substation adjacent to the POW site which is used to provide a 10kV supply to an MV switchboard in the POW substation.

The MV switchboard serves the following loads via MV/LV transformers.

- South Distribution Board
- North Distribution Board
- Liebherr Gantry Crane
- Morris Gantry Crane

There are no spare circuit breakers available on the existing MV switchboard.

It is assumed that the existing MV/LV transformers incorporate dual 20kV / 10kV rating on the primary side which would enable them to be retained should the ESB decide to upgrade to a 20KV network.

In the context of OPS, the existing distribution network has a number of deficiencies including the following:

- The MV switchgear is rated at 10kV and is not compatible with a 20kV supply
- The MV switchgear doesn't incorporate any spare circuit breakers
- The anticipated OSP load (7.20MW) will see a ten-fold increase in the current MIC to the site (0.75MW) potentially necessitating significant investment by the ESB

4.2 Berthing Facilities Requiring OPS Provision

Current legislation stipulates that ports used by container vessels and passenger ships of greater than 5,000 GT must have OPS provision in place to serve such vessels from January 2030.

As outlined at Table 3 above, POW have an established container handling business and a growing number of visits from cruise ships.

The river width and depth restricts the size of container vessel and cruise ship using the port to approximately 16,500GT / 25,000DWT and 120,000GT respectively.

The existing quay incorporates the following:

- 450m container quay with 2no berths (B1 & B2)
- 393m bulk and general cargo quay with 2no berths one of which is used to accommodate cruise ships (B3)

Both container vessel berths B1 & B2, and the cruise ship berth B3 at the bulk and general cargo quay, will need to be provided with OPS.

4.3 OPS Load – Impact on Existing ESB Network

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

OPS FES REPORT

Scenario	Description	Existing MIC (MW)	Existing Max Demand (MW)	Diversified OPS Load (MW)	Projected Max Demand (MW)
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EXISTING BERTH CAPACITY - BERTHS B1, B2 & B3

1.00	Typical Berthing Scenario				
1.01	Container Vessels: 1no of 2no berths in use by a vessel of <10,000 GT (0.90MW)	0.75	0.74	0.90	1.64
1.02	RoRo Pax Vessels	NA	NA	NA	NA
1.03	Cruise Ships				
	Sub-Total			0.90	1.64
2.00	Worst Case Berthing Scenario				
2.01	Container Vessels: 2no of 2no berths in use by vessels of <10,000 GT (0.90MW each)	0.75	0.74	1.80	2.54
2.02	RoRo Pax Vessels	NA	NA	NA	NA
2.03	Cruise Ships: 1no vessel (<100,000 GT) berthed at the bulk carrier berth			5.40	5.40
	Sub-Total			7.20	7.94

NOTES

1	The Port of Waterford Masterplan 2020 - 2044 Summary doesn't anticipate any need for additional container vessel capacity until 2035 at the earliest. In this regard, figures for any future container vessel berthing capacity have been excluded.

Table 4: OPS Impact on ESB Supply

4.4 ESB Supply

As outlined in Table 4 above, the EU requirement to provide OPS for use by container vessels, RoRo pax vessels and cruise ships from January 2030, will add a significant electrical load to the POW distribution network (7.20MW).

The existing ESB distribution network operates at 10kV. Typically, 10kV distribution networks are used to serve loads of up to 5MW. In this regard, the ESB will need to decide whether the addition of the anticipated OPS load will necessitate a change from 10kV to 20kV distribution.

We have initiated contact with ESB Networks with a view to getting an opinion as to which of the 10kV / 20kV options is likely to be adopted and an indication of the anticipated cost of the required upgrade works.

Pending feedback from ESB Networks, we propose that an order of magnitude cost allowance of €500,000 be included for the upgrade works necessary to serve the anticipated OPS load.

Regardless of whether the voltage of the upgraded ESB Networks supply will be 10kV or 20kV, substantial investment will be required by both ESB Networks and POW in respect of civil works (trenching, cable ducting, POW MV switchroom bases etc.) and electrical works (MV cable, MV switchgear, MV / LV transformers etc.).

5 ELECTRICAL INFRASTRUCTURE

5.1 Existing MV Switchgear - Overview

Note: This section should be read in conjunction with MV schematic IE000678-RPS-03-XX-DR-E-ED0001.

The existing ESB Network supply to POW is a 10kV MV supply with an MIC (maximum import capacity) of 0.75MW.

In a worst-case scenario, the anticipated load increase associated with the provision of OPS power (2no container vessels - 1.80MW / 1no cruise ship - 5.40MW) will necessitate an ESB supply at an MIC of the order of 8.00MW with associated requirements for:

- Containerised POW switchrooms and associated switchgear
- Containerised OPS equipment switchrooms and associated switchgear
- MV cabling and associated cable trenching and cable draw chambers etc.

It is envisaged that dedicated switchrooms will be required to serve the OPS infrastructure for the following berths:

- Container quay – Existing berths B1 & B2
- Bulk and general cargo quay – Existing cruise ship berth B3

5.2 Container Quay – Works Required to Facilitate OPS Provision

Note: This section should be read in conjunction with MV schematic IE000678-RPS-03-XX-DR-E-ED0002.

The following is a summary of the electrical works necessary to accommodate the provision of OPS at the existing container vessel berths B1 & B2.

a. Switchgear:

- Primary switchboard MVSb.1: 20kV rated, five cubicle switchboard with 5no circuit breakers serving the incoming ESB supply (1no), supply and return legs of an MV ring main network (2no) and 2no spare.
- Ring Main Unit RMU1: 20kV rated eight cubicle RMU incorporating 2no switches and 6no circuit breakers serving the following –
 - Switches 1 & 2: Incoming and outgoing connections to a new MV ring main network
 - Circuit breaker no.1: “South Distribution Board” MV/LV transformer T1
 - Circuit breaker no.2: “North Distribution Board” MV/LV transformer T2
 - Circuit breaker no.3: “Liebherr Gantry Crane” MV/LV transformer T3
 - Circuit breaker no. 4: “Morris Gantry Crane” MV/LV transformer T4
 - Circuit breaker no. 5: Berths B1 & B2 OPS equipment
 - Circuit breaker no. 6: Spare
- Berth 1 & 2 OPS switchgear
- Berth 1 & 2 OPS outlets

b. Cable:

- 24kV rated cable serving MVSb1
- 24kV rated cable serving RMU1
- 24kV rated cable serving transformers T1 to T4
- 24kV rated cable serving Berth B1 & B2 OPS switchgear
- 24kV rated cable serving Berth B1 & B2 OPS outlets

5.3 Bulk & General Cargo Quay - Works Required to Facilitate OPS Provision

Note: This section should be read in conjunction with MV schematic IE000678-RPS-03-XX-DR-E-ED0002.

The following is a summary of the electrical works necessary to accommodate the provision of OPS at the cruise ship berth by the existing bulk and general cargo quay.

a. Switchgear:

- Ring Main Unit RMU2: 20kV rated six cubicle RMU incorporating 2no switches and 4no circuit breakers serving the following –
 - Switches 1 & 2: Incoming and outgoing connections to a new MV ring main network
 - Circuit breaker no.1: MV/LV transformer T5 to local LV main distribution board (MDB1)
 - Circuit breaker no.2: Berth B3 OPS equipment
 - Circuit breakers no. 3 & no.4: Spare
- MV/LV transformer T5
- LV main distribution board MDB1 (serving switchrooms, site lighting etc.)
- Berth B3 OPS switchgear
- Berth B3 OPS outlets

b. Cable:

- 24kV rated cable serving transformer RMU2
- 24kV rated cable serving transformer T5
- 24kV rated cable serving Berth B3 OPS switchgear
- 24kV rated cable serving Berth B3 OPS outlets
- LV cable serving MDB1

6 CIVIL INFRASTRUCTURE

Note: This section should be read in conjunction with the indicative cable management layout IE000678-RPS-03-XX-DR-E-EK0002.

6.1 Civil Works Overview

The OPS installation required to serve the existing container vessel berths (B1 & B2) and cruise ship berth (B3) will necessitate the provision of containerised POW switchrooms, containerised OPS equipment switchrooms and associated cable duct trenching and cable draw chambers etc.

6.2 Container Quay

The following civil works are anticipated in respect of the provision of OPS units for the existing berths B1 & B2 at the container terminal quay:

- Base for containerised / modular POW MV/LV switchroom SR.1
- Base for containerised / modular OPS equipment switchroom OS.1 (to accommodate the OPS switchgear, transformers, frequency converters etc.)
- Flush formed pockets at the quay edge (to accommodate OPS JB's).
- Cable ducting to provide an interface between the existing ESB substation and the proposed POW MV/LV switchroom SR.1.
- Cable ducting and associated cable draw chambers to provide an interface between the proposed POW MV/LV switchroom SR.1 and the proposed OPS equipment switchroom OS.1.
- Cable ducting and associated cable draw chambers to provide an interface between the proposed OPS equipment switchroom OS.1 and the flush formed OPS JB pockets in the existing quay.

6.3 Bulk and General Cargo Quay

The following civil works are anticipated in respect of the provision of OPS units for cruise ship berth B3 at the existing bulk and general cargo quay.

- Base for containerised / modular POW MV/LV switchroom SR.2.
- Base for containerised / modular OPS Equipment Switchroom OS.2.
- Flush formed pockets at the quay edge (to accommodate OPS JB's).
- Cable ducting and associated cable draw chambers to provide an interface between the proposed POW switchrooms SR.1 and SR.2.
- Cable ducting and associated cable draw chambers to provide an interface between the proposed POW MV/LV switchroom SR.2 and the proposed OPS equipment switchroom OS.2.
- Cable ducting and associated cable draw chambers to provide an interface between the proposed OPS equipment switchroom OS.2. and the flush formed OPS JB pockets in the existing quay.

7 OPS OPEX COST

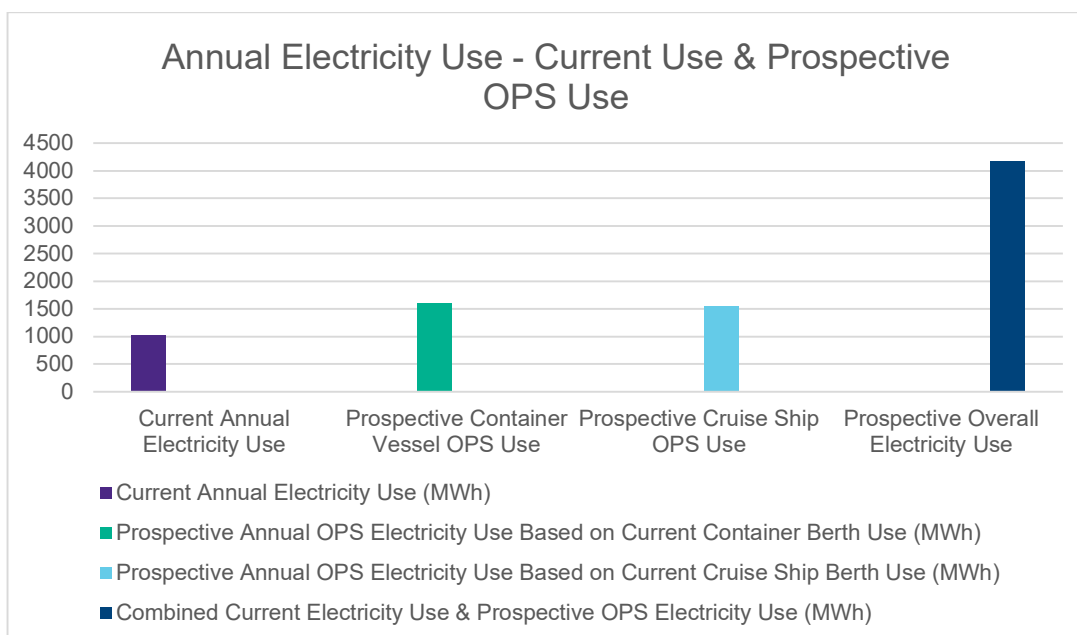
7.1 OPS - Annual Electricity Use

The chart included below shows the current annual electricity use, prospective annual OPS electricity use by container vessels and cruise ships, and a combination of the three for the existing POW quay. All values are in megawatt hours.

While the bulk, general cargo and cruise ship quay is a multi-modal facility capable of accommodating several vessel types, the OPS electricity use values used in the chart relate specifically to cruise ships.

The current annual electricity use relates to the 12-month period extending from June 2023 to May 2024 and the prospective OPS electricity use is based on current average annual berth use.

Please refer to Appendix B for a detailed breakdown of electricity use in the existing Port of Waterford.



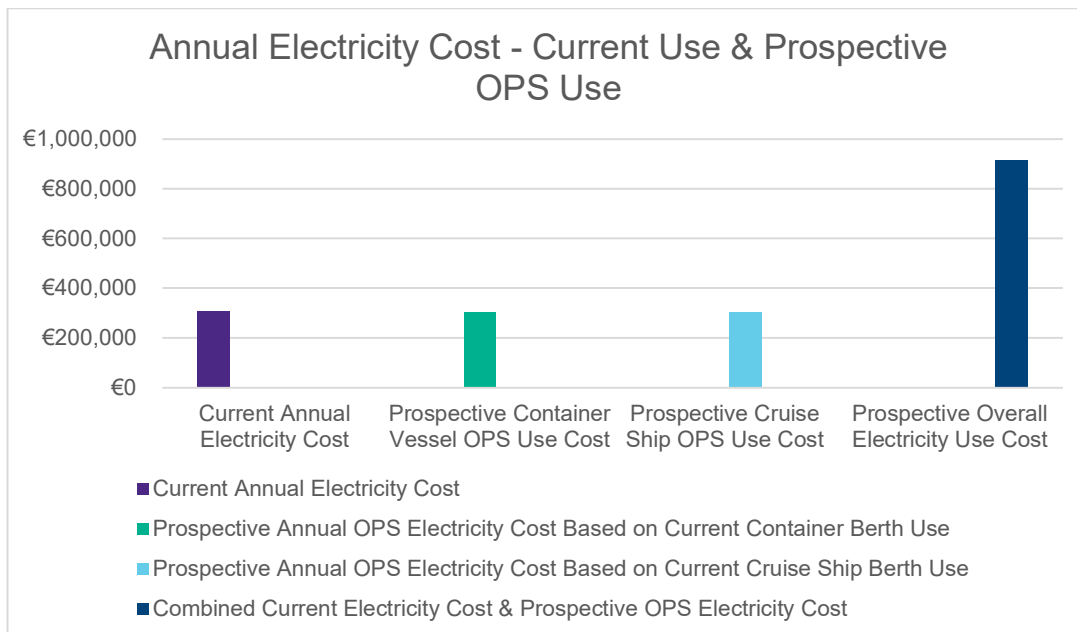
7.2 OPS - Annual Electricity Cost

The chart included below shows the current annual electricity cost, prospective annual OPS electricity cost for container vessels and cruise ships, and a combination of the three for the existing POW quay.

While the bulk, general cargo and cruise ship quay is a multi-modal facility capable of accommodating several vessel types, the OPS electricity cost figures used in the chart relate specifically to cruise ships.

The current annual electricity cost relates to the 12-month period extending from June 2023 to May 2024 and the prospective OPS electricity cost is based on current average annual berth use.

Please refer to Appendix B for a detailed breakdown of electricity costs in the existing Port of Waterford.



OPS FES REPORT

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
1.00	Container Berths B1 & B2 / Cruise Ship Berth B3		(Note 1)	
1.01	OPS equipment electricity usage costs (Refer to Appendix B)	€607,998.00	20%	€729,598.00
1.02	OPS equipment depreciation allowance based on a 20-year lifespan (@5% of €10,415,000 installed cost)	€520,750.00	20%	€624,900.00
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 at €60/hr for each of 117no vessels berthing per year)	€28,080.00	20%	€33,696.00
1.05	OPS equipment disconnection costs (Based on two electricians for two hours at €60/hr for each of 117no vessels berthing per year)	€28,080.00	20%	€33,696.00
	Total (Excl. VAT)	€1,194,908.00		€1,433,890.00

NOTES

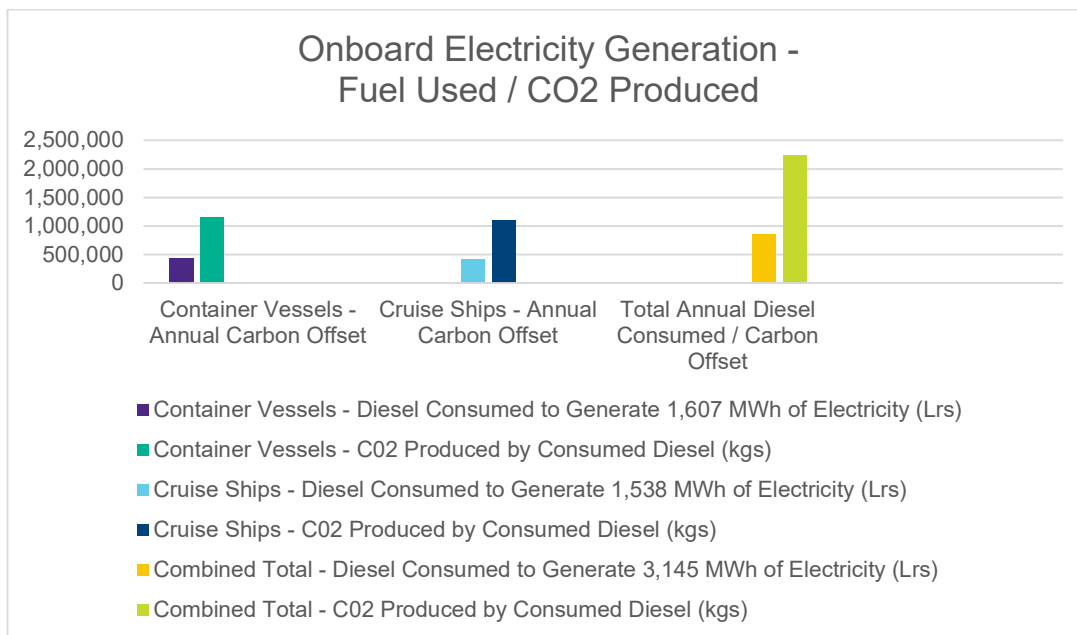
1	Contingency included to cover unforeseen items, price escalation etc.

Table 5: OPS – Annual Operating Costs

7.4 OPS - Annual Carbon Offset

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 CO₂, equating to 713kg of CO₂/MWh of electricity.

The chart included below shows both the amount of fuel consumed and the associated CO₂ released by vessel generators while at berth in Port of Waterford over an average year.



9 CONCLUSIONS AND RECOMMENDATIONS

9.1 ESB Network Upgrade

The provision of OPS power at the existing container terminal quay and bulk / general cargo quay will see the MIC required from the ESB increase from the current level of 0.75MW to a projected level of 8.00MW. The latter value excludes the power requirement associated with loads such as the charging of any future electric rubber tyred gantry cranes, straddle carriers, port vehicles etc.

This level of MIC increase will necessitate significant upgrade of the existing MV network with associated substantial cost.

It is recommended that POW engage early with the ESB to establish the extent of the upgrade work that needs to be done on the local network, the timelines for same and the associated cost.

9.2 Container Terminal

MV supplies will be required to serve the proposed OPS equipment at berths B1 and B2. This will necessitate significant capital investment by POW in relation to the following works:

a. Civil Works:

- Base and steel supports for containerised POW MV / LV switchroom
- Base and steel supports for containerised OPS equipment switchroom
- Trenching, cable ducting & cable draw chambers
- Flush formed pockets for OPS outlets

b. Electrical Works:

- ESB capital contribution
- MV switchgear – existing replaced
- MV cabling
- Switchroom M&E services

It is recommended that POW progress the necessary works to design and construction stage to ensure that works can be in place and operational for the January 2030 deadline.

9.3 Bulk / General Cargo Quay

Given its location some distance east of the container terminal, it is anticipated that power to the OPS equipment at the cruise ship berth B3 will be served from the upgraded MV infrastructure proposed for the container terminal via a dedicated containerised MV / LV switchroom located at the periphery of the bulk / general cargo area.

9.4 OPS Equipment

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 the proposed OPS installations in the lead up to 2030.

10 ACKNOWLEDGEMENTS

RPS would like to thank the following POW personnel for their assistance in the preparation of this OPS FES Report.

- Noel Collins
- Niall Barry

Appendix A

OPS Study Load Estimate

Appendix B

Electrical Usage Summary

Appendix C

OPS Study Cost Estimate

Appendix D

Drawing Schedule

The following drawings are appended to this report:

Drawing No	Description	Status / Rev.
IE000678-RPS-03-XX-DR-E-ED0001	Port of Waterford - Existing MV Schematic	A1 / P01
IE000678-RPS-03-XX-DR-E-ED0002	Port of Waterford - Proposed MV Schematic	A1 / P01
IE000678-RPS-03-XX-DR-E-EK0001	Port of Waterford - Indicative OPS Layout	A1 / P01
IE000678-RPS-03-XX-DR-E-EK0002	Port of Waterford - Indicative Cable Management Layout	A1 / P01
