



**Port *of* Waterford**

# **Energy Masterplan**

February 2021

## Foreword

This Energy Masterplan provides Port of Waterford with a course of action to proactively address energy consumption and the impact that its operations have on the environment.

It includes a roadmap for efficient, practical, and cost-effective energy infrastructure development.

The overall objective of this plan is to demonstrate the Ports' long-term commitment to decarbonising its operations and to plot a course to achieve that.

### Our Corporate Plan 2020-2024 states: -

*"Climate Change is an enormous threat to the global environment with very significant implications for our economies and day to day lives. Extreme weather events have the ability to impact the economy on a national scale. They also have the potential to directly impact port operations at a local level. The de-carbonisation agenda is a challenge for all and as a State Commercial Company it is incumbent on Port of Waterford to take a proactive role/approach. 'Modal Shift' will assume even greater importance in future as we take steps to ensure that the least impactful modes of transport are utilised. This will create focus around maximising travel by ship and much greater utilisation of rail for freight purposes."*

The specific environmental objectives of the corporate plan and the relevant commercial objectives are reproduced in the appendices. This Energy Masterplan is Port of Waterford's strategy to deal with our direct carbon footprint and should be viewed as part of a larger overall environmental strategy. This plan looks at the activities under the direct control of the Port Company including activities carried out on the container terminal which is owned and managed by us, and activities carried out under contract e.g. dredging and channel maintenance. It does not encapsulate the activities of our port partners and stakeholders, for example the licensed bulk stevedores and the haulage businesses active in and around the Port.

I look forward to working with all of my colleagues on the successful implementation of this plan.

**Frank Ronan.**

**Chief Executive.**

**February 2021.**

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## 1. Executive summary

Port of Waterford is the commercial state company charged with the management, operation and development of Waterford Harbour under the Harbours' Acts. The State is the sole shareholder in the Company and the shareholder is the Minister for Transport.

The level of ambition in the Irish Government's 2019 Climate Action Plan sets out a Climate Action Mandate for Public Bodies. Actionable targets have increased to "a 50% improvement in public sector energy efficiency and an absolute 50% reduction in CO<sub>2</sub> from the sector by 2030, with a view to achieving carbon neutrality by 2050".

These two targets<sup>1</sup> require an integrated framework for both energy efficiency and renewable energy to decarbonise public sector energy consumption. Together, they will set the Public Sector on a pathway to achieving near-zero energy-related greenhouse gas (GHG) emissions by 2050.

This Energy Masterplan sets a high-level course of action towards achieving and possibly going beyond these ambitious targets set by Government.

### ***Implementation of the plan will:***

- Set out a "Decarbonisation Roadmap" for the Port, to take a leadership role when it comes to sustainable energy performance and to continually develop, promote, and implement actions to achieve environmentally effective port operations;
- Provide a more ecologically friendly and a healthier environment for employees and the surrounding community;
- Establish an energy team;
- Monitor and measure energy use and associated emissions;
- Continuous improvement in energy efficiency and CO<sub>2</sub> reduction;
- Deploy alternative and renewable sources of energy where practical;
- Consult with stakeholders on the initiative and progress;
- Regularly review and publish progress towards 2030/2050 targets.

Industry led developments will be considered and supported e.g. on- and off shore power and rail freight. There are also key high-level actions that Port of Waterford will embark on as part of its own decarbonisation plan. To this end, the company's long-term development Masterplan 2044 envisages how the port will develop to accommodate market requirements. This Energy Masterplan factors such growth into our projections for direct consumption and emissions.

The analysis of the energy mix which is attributable to Port of Waterford activities shows that diesel (74%) is the primary energy used, followed by electricity (20%). However, the majority of the diesel usage is an indirect uncontrollable element of port activities as it is associated with contracted channel maintenance activities e.g., dredging.

The electricity usage is within direct port control and is attributed to the container terminal operations, associated with container handling and related operations.

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<sup>1</sup> Indicative targets for public sector bodies:  
- Irish Government 2019 Climate Action Plan - Action no. 145  
- PB Briefing on M&R 2030 System

A selection of decarbonising projects have been identified, however the major challenge for Port of Waterford is to reduce the fossil fuel input and associated emissions in dredging and channel maintenance. The Port company has identified that constructing a river training wall to improve the flow of the River Suir will deliver the most significant reduction in energy consumption and resultant carbon emissions, and will help the company achieve the reduction target by 2030.

In summary, if a standstill approach is taken, decarbonising the electricity grid will deliver lower emissions but this will only impact container operations. Smaller scale projects will deliver savings. However, large scale projects are required to make a meaningful impact on emissions. If all the identified projects are undertaken, Port of Waterford will exceed the target of 50% reduction in emissions by 2030 (72% projected saving), however, this assumes that the river training wall capital investment programme is completed.

## 2. Purpose of this Document

This Energy Master Plan describes Port of Waterford’s energy profile and where the Company is in relation to its energy use and emissions. It considers some of the latest innovations in technologies to assist ports to improve their sustainability and it then provides a road map with actions to meet the targets required.

The Plan reinforces the Port’s commitment to ensuring environmental sustainability is high on its agenda as outlined in the Corporate Plan, including the commitments related to climate change.



Figure 1 Port of Waterford pilots and Harbour Masters with pilotage service Electric Vehicles

### 3. Port of Waterford at a glance

Port of Waterford Company (Port of Waterford) is the commercial state company responsible for the operation and development of Waterford Port. The port is one of five ports of National Significance within the terms of National Ports Policy 2013 and is classified as a comprehensive port on the EU's Ten-T network.

The port accommodates a variety of cargo types:

- Bulk handling is predominately import and focussed on the agri-sector (e.g. fertilisers, animal feedstuffs). Cement products, steel and project cargoes are also handled. Bulk cargo is managed and operated by licenced stevedoring companies who are responsible for the provision of the necessary labour resources, cargo handling equipment and bulk storage (warehousing).
- Container handling is carried out directly by the Port Company (container terminal division) and covers the provision of labour, specialised container handling equipment and various related and ancillary services.

**Vision:** to be the preferred cargo gateway for the South East Region.

**Mission:** to provide infrastructure and services to enable trade and economic development in the Region.

The Port Company's role is to:

- Develop and maintain key port infrastructure;
- Manage and maintain navigational access and pilotage services;
- Plan for future trade and infrastructure requirements (masterplan);
- Promote opportunities to optimise port operations and associated supply chains;
- Manage the safety, security and operations of port facilities in our ownership;
- Engage with Government, business and the community;
- Manage the impact of our operations on the environment.

We engage with others around us to effect positive change in carbon emissions and strive to be an exemplar organisation as part of our overall environmental strategy.



Figure 2 Port of Waterford at a glance



Figure 3 Overview image of Belview Port

## 4. Environmental Policy

Port of Waterford is committed to reducing the impact of its activities on the environment. To this end, Port of Waterford has implemented an environmental management system to the international Environmental Management Standard ISO 14001:2015.

*We continually strive to improve our performance in a sustainable manner, by:*

- *Forward planning to reduce greenhouse gas emissions and to prepare for the effects of climate change;*
- *Implementing a programme of good management practices including adopting an energy efficient design strategy to all future equipment and technology upgrades;*
- *Using Strategic Environmental Assessment (SEA) techniques as part of the Masterplan 2044 process (the Port's long-term infrastructure plan).*

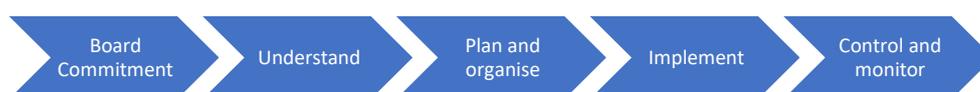
The necessary personnel and financial resources will be allocated to assist Port of Waterford in meeting its environmental objectives and targets, these will be monitored and reviewed as appropriate. In addition, Port of Waterford will continue to raise the level of environmental awareness throughout its workforce and to promote this awareness to all its stakeholders.

### 4.1. Energy Policy

As a first step in developing this Energy Masterplan, the Port has adopted an energy policy (on Page 25 of this document) and will commit the necessary resources to implement the plan.

It is formulated with clear and concise goals which will guide the Port Company to achieving its overall energy and carbon reduction objectives.

The Port has adopted a systematic approach to implementation and the key steps include:



These steps involve the following work:

- Quantify usage and highlight the benefits of proposed actions to overcome any barriers
- Setting energy and emissions reduction targets and goals and regularly reviewing progress against targets;
- Establish an Energy Team and involving all staff whose decisions can have an impact; implement projects and actions and communicate the results.
- Comply with Government requirements for State Bodies and actively seeking to over-achieve;
- Invest in energy infrastructure to deliver on targets;
- Review progress and reassess plan if and as required.

## 4.2. Green Procurement

The company will pursue a Green Procurement strategy by favouring suppliers of products and services with a focus on positive environmental benefits. The concepts of life-cycle analysis (LCA) and life-cycle costing (LCC) are to be factored into buyers and suppliers' considerations, ensuring environmental aspects will be at the forefront of all procurement decisions.

## 4.3. Sustainable port operations

Government mandated obligations as proposed in the Climate Action Plan<sup>2</sup> and Programme for Government<sup>3</sup> provide the main formal motivation for the Company's activities on climate change and carbon reduction. However, it is abundantly clear that all businesses need to embrace the challenge of re-invention toward environmental sustainability.

Other motivations and opportunities include:-

- Cost savings and potentially increased competitiveness can and will arise through lowering of energy costs and avoidance of carbon taxes.
- Maximising the use of renewable energy will be hugely enabled through the move towards 70% renewable electricity in our national grid. Hence a move toward electrification will by definition deliver real progress toward decarbonisation for the activities within our direct control.
- Creating a genuine 'green' operation at Port of Waterford will enhance the business, its reputation and its relationships with the full range of Stakeholders.
- Reducing ship emissions using innovative and sustainable dockside solutions, where possible, is another objective we share with ports across Europe.
- The opportunity to mitigate against climate change and complement carbon reduction initiatives by our partners, stakeholders and customers, e.g. usage of Rail Freight, short sea shipping, reduction in road miles through utilisation of nearest port, conversion of material handlers and shunting/road transport to renewable energy sources.

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<sup>2</sup> Action 145, [Climate Action Plan 2019](#)

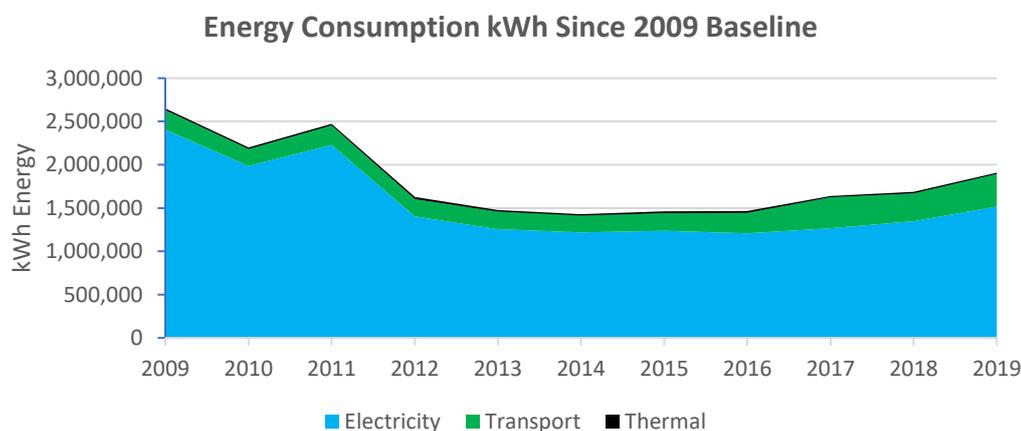
<sup>3</sup> <https://www.gov.ie/en/publication/7e05d-programme-for-government-our-shared-future/>

## 5. Energy use, related emissions and performance to date

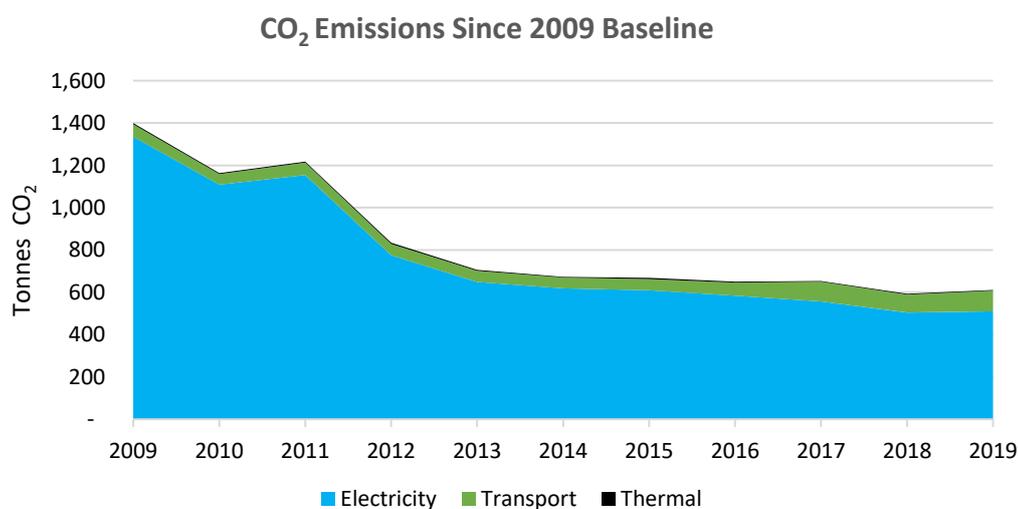
### 5.1. Energy usage since 2009 baseline

Since 2009 (previous baseline year), Port of Waterford has been participating in the Public Sector Energy Programme which is an essential pillar in the National Energy Efficiency Action Plan, and is part of the government's energy efficiency strategy to assist Ireland meets its energy and emissions reduction targets set by the EU.

The Programme offers comprehensive support and engagement to guide public bodies in reaching their energy saving targets. Port of Waterford has actively participated in the SEAI Monitoring and Reporting programme since its inception. With the support of SEAI the Company has undertaken a number of steps to reduce energy and CO<sub>2</sub> emissions. These actions coupled with some reduction in throughput has seen the delivery of moderate improvement in energy performance and a consequential reduction in emissions.



*Figure 4 Energy Consumption since baseline*



*Figure 5 CO<sub>2</sub> Emissions since baseline*

When the Port of Waterford reported on energy use to the SEAI, the Company reported only on port activities which include office energy use, transport use, pilotage energy use and the energy used on the container terminal, yard lighting, reefers (refrigerated containers) and workshop.

The container terminal itself is very electricity intensive in its operations, primarily due to the use of electric cranes for container handling, and related operations such as powered temperature-controlled container storage facilities. Electricity use and its associated emissions accounted for almost 80% of the port's total (excluding contracted channel maintenance activity).

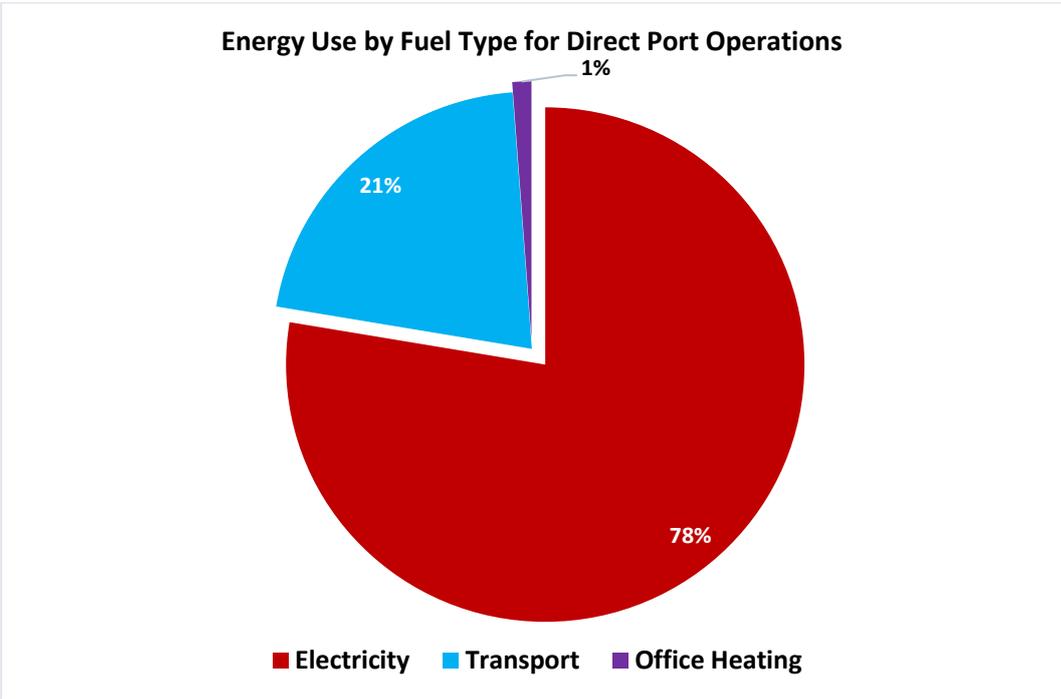


Figure 6 Energy use - Port controlled operations and activities

In this scenario it would make sense for the Port to consider increasing the penetration of renewable electricity into the supply mix. This, coupled with the Government plans to decarbonise the grid to 70% (from 40% currently) by 2030 would see the Port benefit significantly in terms of reduced emissions. It would have meant the new 50% absolute reduction target for CO<sub>2</sub> and possibly zero carbon emissions were within reach of the Port if supported by investment in some renewable electricity generation within the port area.

When one considers the fact that company's direct energy usage is necessitated in the main by container handling activity (as opposed to other throughputs where the energy use is external to Port of Waterford), in future Port of Waterford will report on container throughput metrics as the 'driver' to represent an activity-based understanding of directly controlled operational energy use.

## 5.2. Operational performance and energy use

In the last baseline year of 2009, Port of Waterford handled significantly more containers than at present, this is mainly due to changes in the market resulting in the Port's container volumes decreasing significantly. As electricity is the main source of energy, and its usage is primarily geared towards container volumes, container throughput is the appropriate activity base.

Bulk cargo volumes are primarily handled by the Port Company's stevedoring partners, who are private entities. The Port Company will work with them to effect positive changes in the wider Port environmental footprint.

Given the change in volumes for cargo activities since the baseline of 2009, it would be more appropriate to report energy usage against cargo volumes for the past five years which are shown in **Table 1** and **Figure 7** as follows:

Table 1: Port Activity 2015 to 2019

Activity Metric Values		2015	2016	2017	2018	2019
Bulk cargo	(Tonnes)	1,228,834	1,046,029	1,328,904	1,701,579	1,535,714
Number of containers	(TEU)	40,224	43,240	42,408	43,620	49,657

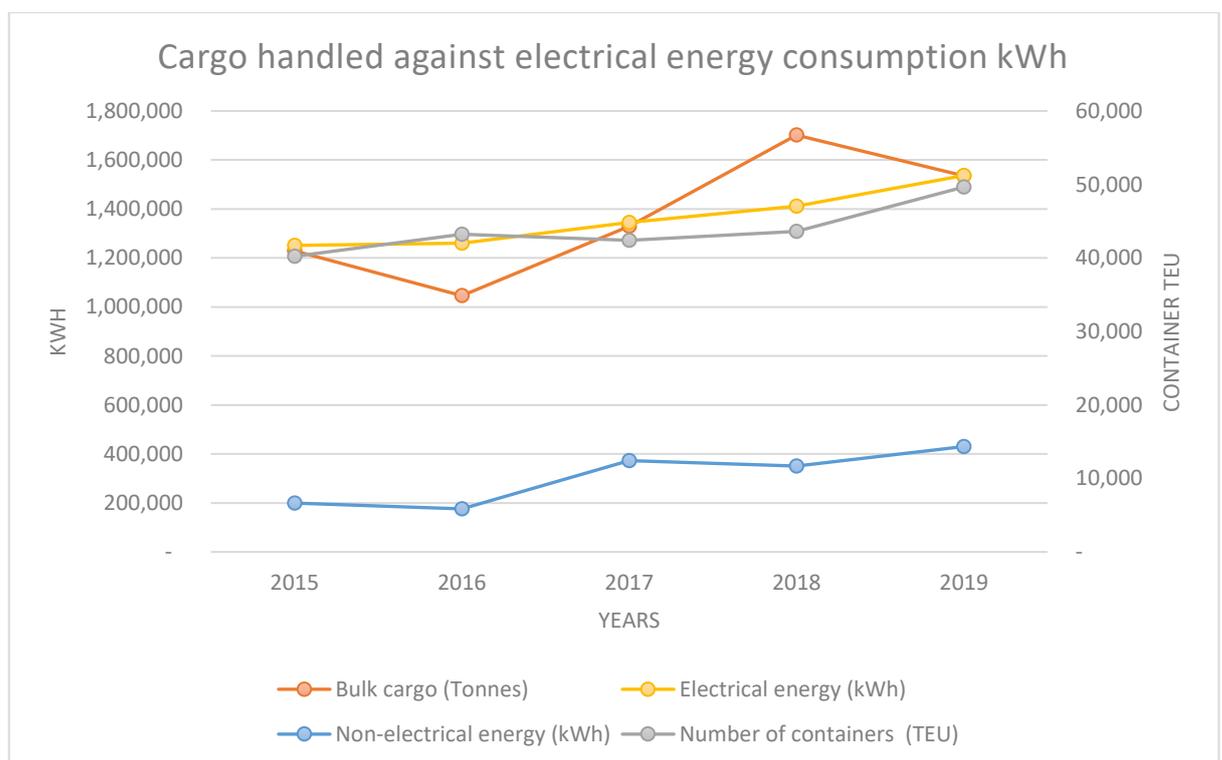


Figure 7: Cargo handled relative to energy consumption kWh

This graph demonstrates electricity usage is correlated to the volume of containers handled.

### 5.3. Energy use and emissions going forward

Electricity is the main source of energy directly consumed by Port of Waterford. Container terminal operations account for the majority of electricity usage, (almost 80%). However, this does not take account of other areas such as 3<sup>rd</sup> party bulk cargo stevedoring operations, dredging and other service operators. The 2030 Government target will require us to include all core and direct services energy use, hence we have now decided to include direct services supplied under contract to the Port in this energy plan.

The following table provides a summary of energy use by fuel type for each area of operation under the Port's control. The table includes the energy use and emissions attributable to the Port's operations and for the first time, it now includes energy use and associated emissions generated by directly contracted services such as our dredging activities. These activities account for over 74% of the Port's overall energy use and 69% of its overall emissions.

***Taking these contracted services into account, the port consumes almost 7 million kWh of energy and emits almost 2,000 tonnes of CO<sub>2</sub> in its operations.***

The company's energy profile and reporting requirements will continue to follow SEAI Monitoring and Reporting guidelines and will include this additional data related to contracted port services as in **Table 2** below.

Table 2: Total Energy Use across activities controlled by Port of Waterford for 2019

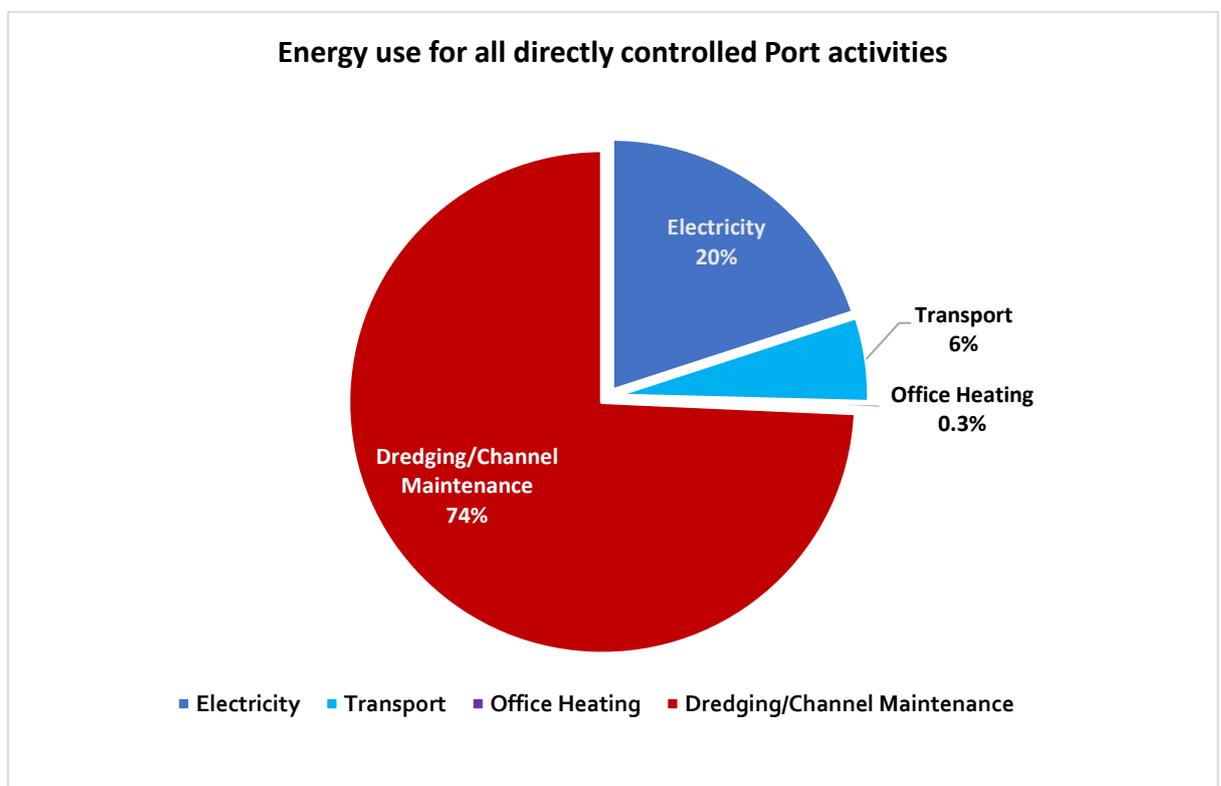
Port Related Activities 2019 – Operations and Administration (direct)		
Fuel Type	kWh	kg CO <sub>2</sub> Emissions
Electricity - container terminal	1,215,336	410,784
Electricity - bulk quay lighting	90,930	30,734
Electricity – operations offices/services	58,148	19,654
Renewable Electricity	-7,510	0
Other Areas*	101,954	34,460
LPG - Office Heating	20,987	3,376
Diesel - Road Transport	77,534	18,802
Marked Diesel – Non-road machinery	189,270	50,781
Marine Gas Oil	107,390	28,816
Biofuels	7,340	0
<b>Sub-total – Direct</b>	<b>1,861,379</b>	<b>597,407</b>
Port and Operations Related Service Activities (indirect & contracted services)		
Electricity for offsite charging	2,015	681
Channel Maintenance - Ploughing/Bed levelling	1,078,840	284,672
Channel Maintenance -Dredging	3,924,000	1,035,421
<b>Sub-total – Indirect activities</b>	<b>5,004,855</b>	<b>1,320,774</b>
<b>Totals – Direct + indirect activities</b>	<b>6,866,234</b>	<b>1,918,181</b>

\*Other areas include: Head office, Car Parks, Pilot station, Passage East & Duncannon lighthouses

## 5.4. Energy use and by end-use including contracted services

The inclusion of energy use and associated emissions generated by externally sourced services (mainly dredging/channel maintenance activities) under the new reporting obligations provides a far clearer picture of the Port Company's energy mix and has changed the reported emissions substantially.

Electricity is now no longer the main energy used. Emissions resulting from the fuel used to power the channel maintenance activities are now driving business energy use. These activities account for over 70% of the Port's overall energy use and associated emissions under this new reporting regime, as shown in **Figure 8** below:



*Figure 8: Energy use for Port company activities*

The associated oil consumption for dredging now presents the Ports most significant challenge in terms of the Port's aims and to meet or possibly exceed the 2030 CO<sub>2</sub> emissions reduction target.

The Port's infrastructure Masterplan has identified some interventions which will reduce this impact, but at considerable cost and with significant consenting work to be done. The Port Company will also need to make considerable investments in order to switch container handling equipment to diesel/hydrogen/electric hybrid or even to full electric to improve the overall sustainability of operations.



*Figure 9 Boskalis dredger, Shoalway*

## 6. Key Highlights – actions and achievements to date

This is summary of achievements and actions to date:

2016	Energy Audit
2017	Light Emitting Diode (LED) lighting retrofit, Marine Point office building (common areas)
2017	Introduction of renewable energy Solar PV on Marine Point office building to meet up to 10% of the building's electricity use
2017	Obtained EcoMerit environmental certification
2019	Participant in SEAI's Partnership Programme
2019	LED upgrades in container terminal crane and yard lighting and commercial carparks on Waterford City South Quays. Increase our use of renewable energy with additional solar PV to offset office electricity consumption
2019	Electric Vehicles (EVs) to replace own use cars for pilotage operations
2019	Achieved ISO 14001 Environment certification
2020	Employee engagement ongoing
2020	Participant in the Harbour and Marine SEAI Energy Bureau
2020	Energy monitoring of Significant Energy Users (SEUs)
2020	Joined ECO Ports, an initiative of the European Sea Ports Organisation (ESPO)
2020	Corporate Plan with a specific focus on environmental initiatives
2021	Formalise energy management strategy i.e. this Energy Master Plan



*Figure 10 Installation of LED floodlighting*

## 7. A look at port energy innovations

Port of Waterford is conscious that other ports of larger scale have made changes and are planning new initiatives to reduce emissions. While some of the initiatives might be beyond our immediate capability, they are worth highlighting:

**Reducing emissions of docked vessels** - Cold ironing, or shore connection, shore-to-ship power or alternative maritime power, is the process of providing shoreside electrical power to a ship at berth while its main and auxiliary engines are turned off. Emissions from heavy fuel combustion will be avoided.

*This will require considerable investment in infrastructure as electricity supply networks in the port will have to be enhanced and strengthened. On the other hand, as ship engine technology improves and their emissions reduce then the net emissions benefit of this approach will be reduced.*

**Increase penetration of renewable energy – solar PV and wind** - In terms of ease of installation and maintenance, PV is the most convenient way to generate renewable electricity. A large solar panel park was opened on the roof of the RDM Scheepsbouwloods in the Port of Rotterdam and panels have also been installed on cold storage facilities. A wind park in the Antwerp port area, for example, consists of 19 wind turbines, producing three megawatts each – enough to furnish the electricity needs of almost 40,000 households.

*Port of Waterford has undertaken an analysis of solar PV in Belview and has commissioned a study to further investigate the potential from wind technology. The limited space available might be a barrier as well as turbine noise and aesthetic impact. However, wind power can be cost-effective and it does not emit any emissions to produce energy.*

*Potential options that could be explored:*

- *Solar PV on storage and car parking areas*
- *Build a wind turbine/s in local Belview area*
- *Strategic alliance with a wind-farm development as part of an energy performance contract*

*These matters will be kept under review during the course of the plan.*

**More efficient pilot boats** - Optimising the design to deliver an inclusive system which includes engines, running gear, and vessel displacement and trim, delivering fuel consumption savings of about 30 per cent.

The next generation of pilot boats are likely to be hybrid versions with diesel electric or even hydrogen or full electric powered. These boats are not commercially available and are mainly being developed with the support of research grants.

*Port of Waterford recently commissioned a new pilot boat which will be 10% more efficient than their previous one.*

**Zero emissions pilot boats - Hydrogen fuel cell (FC)** - A demonstration project for the commercialisation of high-power hydrogen fuel cell (FC) vessels to enable zero-emission operations will be carried out by a group of Japanese companies. By using FCs as a power source, it will be possible to eliminate greenhouse gas (GHG) emissions during navigation.

**Container Handlers** - The container terminal at Port of Salerno have been using six reach stackers since 2018 which use 40% less fuel compared to similar equipment. This reduced fuel consumption means less emissions and better air quality. Diesel-electric driveline, an electrified hydraulic lifting system and a super capacitor based regenerative system that stores energy for traction and lifting. Full electric options now available up to 35t lifting capacity.

**Forklifts** - heavy-duty lifting applications have long relied on internal combustion engines (ICE), green initiatives have made an electric option increasingly attractive using lithium-ion power. The fully sealed battery has no maintenance requirements, offering faster charging and a longer overall battery cycle life than typical lead acid batteries. The battery can fully charge in less than 90 minutes.

*Port of Waterford is currently investigating the option to introduce a small electric forklift to their operations to replace diesel.*



*Figure 11 Port technician at work*

## 8. Decarbonisation Actions Overview

The follow are the key high-level actions that Port of Waterford will embark on as part of its own decarbonisation plan, showing how it will contribute to industry and national objectives as set out in the Climate Action Plan and more recently, the Programme for Government.



Figure 12 Container train departing Belview

### Action 1 - Active Participant/Influencing role

Promote short sea shipping and rail freight

- Using the 'closest port' and the reinstatement of rail freight will reduce road miles and take trucks off the road, which have clear de-carbonising benefits;
- Port of Waterford expects rail freight activity to recommence in Belview in 2021 and to develop from there;
- Seeking to expand lo-lo services to support regional logistics/supply chain.

### Action 2 - Active Participant/Influencing role

Support on-shore and off-shore wind farm development

- De-carbonising electricity generation is a key objective of the Climate Action Plan.
- A number of on-shore wind power development projects will utilise the Port in 2021 and later years.
- Support off-shore wind farm developments thought provision of services to a range of support vessels.

### **Action 3 – Strategic project**

#### Training Wall at Cheekpoint Lower Bar

- Port of Waterford’s Masterplan to 2044 envisages the construction of a river training wall to significantly reduce the requirement for mechanised dredging and channel maintenance at Cheekpoint Lower Bar.
- This project will have a very significant impact in terms of removal of over 75% of the carbon footprint of these activities;
- Consent processes will commence during 2021 involving 2 years of environmental studies.

### **Action 4 – industry and community-based role**

#### Operational efficiency and investment in improved equipment

- The majority of direct stevedoring operations carried out by Port of Waterford on container handling are fuelled by electricity. Decarbonisation of the electricity supply will by definition decarbonise the container handling operation.
- However, subsidiary handling is affected using diesel powered machinery. Alternative equipment and operational efficiencies will enable further progress.

### **Action 5 – industry and community-based**

#### 3<sup>rd</sup> party port operators

Port of Waterford is just one actor in the overall port community in Belview. Steps will be taken to include the licensed bulk stevedoring operations in the decarbonising process, e.g. bulk handling equipment/cranes, material handlers (loaders), shunting (local trucking). Transitioning material handlers and shunters to renewable fuels will probably be a servant of green hydrogen developments.

### **Action 6 – industry and community-based**

#### Shore-power

Cold ironing (provision of quay side electrical connection) for ships in port will follow market development. It remains to be seen how Port of Waterford can meet market requirements in a way that is appropriate for a small rural port. Outside of that ‘in-port’ support – shipping will move the decarbonisation agenda on a global basis.

### **Action 7 – Short-term projects**

#### Decarbonise routine activity

Very useful steps have been taken in recent years to decarbonise routine Port controlled activities, e.g. electric pool cars for pilotage service, solar heating for building common areas, LED lighting installation on quays/cranes. This will continue.

To add more detail to the decarbonising activities, a series of initiatives are set out in Section 9 below.

## 9. Future initiatives for Port of Waterford– the “Decarbonisation Roadmap”

2021	Port of Waterford <b>Masterplan 2020 – 2044</b>
	Begin the planning and environmental consenting process for the construction of a river training wall to encourage current flows to remove silt from key areas that require very regular dredging and ploughing to maintain a safe navigation channel. Such a training wall, as envisaged in our <b>Masterplan 2020 – 2044</b> (See excerpt in Appendix A) would minimise the requirement for dredging and its associated emissions at this location.
2021	Adoption/approval of this Energy Masterplan.
2021	Implementation and delivery plan, detailed level - scoped and prepared: <ul style="list-style-type: none"><li>• Project Pipeline finalised.</li><li>• Gap to Target projection to 2030 completed.</li><li>• Quantification of Capital &amp; Operating Budget to realise projects and targeted savings.</li></ul>
2021	Energy Information System developed and implemented to include key environmental factors. Migrate to full electronic based information system.
2021	Structured consideration of any community implications.
2021	All terminal lights to be 100% LED, with adaptive <sup>4</sup> controls on lighting
2021	Investigate EVs to replace all other port vehicles including the maintenance service vehicles.
2021	New more efficient pilot boat will be introduced with shore side power to allow warm engine standby for optimal performance.
2021	Container stacking system revised and refined to deliver more efficient container movements
2021	Change any diesel-powered smaller forklifts to electric
2022	Investigate the use of Biofuel or Electric Reach-stackers and handlers for port activities
2022	Pursue SEAI Energy MAP training with a view to achieving ISO50001:2018 Energy Management certification
2023	Building retrofit work for Marine Point office building to achieve B2 rating or higher. Possible options are: Heating of common areas to be changed from LPG to highly efficient renewable heat pump system
2023	Carbon displacement initiatives implemented such as increased PV coverage to power the terminal lighting and refrigerated container bays.

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<sup>4</sup> An adaptive lighting system automatically adjusts its light output and operation to provide targeted light levels based on environmental conditions, user schedules, or other application-specific criteria.

**Table 3** below sets out the decarbonising projects with estimations of savings and costs, categorised by potential savings and state of readiness according to the following classification:

1= relatively easy to implement, low cost and/or short time frame  
3 = moderate to difficult; medium term project, investigate further  
5= difficult to implement, long-term timeframe, high cost and/or dependent on other factors such as planning consent or 3<sup>rd</sup> parties



*Figure 13 Wind turbine blades discharged onto port quays*

Table 3: Decarbonising Projects

POTENTIAL DECARBONISING PROJECTS	Unit	Annual Savings (Units)	Conversion Rates; Units to kWh (source: SEAI *)	kWh Savings -calculated **	Conversion Rates; kWh to kg of CO <sub>2</sub> (source: SEAI *)	kgs CO <sub>2</sub> saving per annum	Budgeted Cost €	Readiness	Reference
<b>INFRASTRUCTURE</b>									
River training wall (to reduce dredging requirement[1])	Marine Diesel (l)	303,000	9.83	2,978,490	0.264	786,321	€6,500,000	5	Masterplan
Wind 100kW Turbine	Electricity kWh	230,000	1.00	230,000	0.325	74,750	€200,000	3	3rd party wind prefeasibility study
Solar PV (Own consumption) terminal – 200kW	Electricity kWh	130,000	1.00	130,000	0.325	42,185	€125,000	3	Solar PV analysis report
Solar PV Large Scale (with 3 <sup>rd</sup> parties)	Electricity kWh	335,000	1.00	335,000	0.325	108,708	€450,000	5	Solar PV analysis report
<b>OPERATIONAL EFFICIENCY</b>									
Forklift and Reachstacker Hybrid/Electric [2] (80% saving)	Road Diesel (l)	15,200	9.83	149,416	0.264	39,446	€375,000	3	Market budget quotation
New pilot boat (expect to be 10% more efficient)	Marine Diesel (l)	964	9.83	9,476	0.264	2,502	€1,000,000	5	Market procurement
Replace Diesel vehicles with EV (one or two vehicles)	Road Diesel (l)	1,050	9.83	10,322	0.264	2,725	€50,000	1	Market budget quotations
Dredger - potentially more efficient engines [3]	Marine Diesel (l)	40,000	9.83	393,200	0.264	103,805	-	1	Dredging engineer advice
Container Storage Optimisation[4] (10% saving)	Electricity kWh	100,000	1.00	100,000	0.325	32,500	€50,000	1	Estimated based on electrical analysis
<b>FACILITIES</b>									
Terminal Lighting and controls (50% more efficient)	Electricity kWh	152,000	1.00	152,000	0.325	49,400	€35,000	1	Past experience and best practice
Energy Mgmt system (Office buildings: electrical and thermal) (25%)	Electricity kWh	25,000	1.00	25,000	0.325	8,125	€12,000	1	Best practice estimates
Heat Pump for Office building heating[5]	LPG (kWh)	21,000	1.00	21,000	0.229	4,809	€40,000	3	Estimates
Staff Energy Awareness programme (office users) (10% saving)	Electricity kWh	4,000	1.00	4,000	0.325	1,300	€5,000	1	Estimates
		<b>1,357,214</b>		<b>4,537,904</b>		<b>1,256,575</b>	<b>€8,842,000</b>		

\* <https://www.seai.ie/data-and-insights/seai-statistics/conversion-factors/>

[1] New River Training Wall planned to mitigate dredging of Cheekpoint lower bar, which would account for approx. 60% of related CO2 dredging emissions and 90% of ploughing/bed levelling emissions.

[2] Hybrid reachtruck 30% more efficient <https://www.greenport.com/news101/Products-and-Services/konecranes-hybrid-reach-stacker>

[3] Advice from dredging contractor regarding engine efficiency work to date

[4] Container operations account for approx. 82% electricity consumption. Container storage optimisation assumes 10% increased efficiency from reduced number moves due to better storage planning e.g. for 2019 saw electrical consumption of 1,215,336 kWh for container terminal, with estimated usage of 1,090,000 kWh for two gantry cranes, based on usage analysis from Eninserv Consultant

[5] Marginal difference from emissions for LPG vs electric heat pump, but as we decarbonise our operations, the CO2 avoided will increase however ROI is not attractive

\*\* Note: Projects proposed would materialise at different points in 10 year time frame

NOTE: The overall approach taken regarding assumptions made was based on 2019 consumption data, budget quotations where available and industry best practice.

## SUMMARY

Taking into account the energy use from operations and administration of the port for the last year, we can show how we could reduce emissions by pursuing some or all of the above decarbonising projects, projected to the target year of 2030.

Table 4: Decarbonising projects summary

	2019	2030	2030	Saving wrt 2019	Target 2030	2030 exclude Training Wall	Saving wrt 2019
	Baseline	No decarbonising projects	With all decarbonising projects				
Consumption (kWh)	6,866,234	7,817,120	2,150,412	69%	50%	5,475,768	20%
Carbon Emissions (kg Co2)	1,918,788	2,198,108	535,878	72%	50%	1,413,772	26%

**Note:**

- Allow for growth in operating activity of 5%
- Projects proposed would materialise at different points in the 10 year time frame

## Conclusion

The projected net effect of pursuing all these decarbonising projects is projected to deliver:

- over 4.5 million kWh of reduced energy consumption which is 1,257 tonnes of annual savings in CO<sub>2</sub> emissions
- an estimated saving of 69% on energy consumption and
- absolute reduction in carbon emissions projected at 72%,

thereby achieving the 2030 target of 50% savings.

The projected net effect of pursuing all these projects excluding the River Training wall infrastructural project, which is designed to reduce port dredging and channel maintenance,

- energy consumption would reduce by 20%
- emissions would decrease by only 26% from 2019 baseline

and Port of Waterford would miss the 2030 target.

## 10. Next steps

- Finalise/adopt the plan, quantify budget costs and begin implementation programme, subject to Board approval, as appropriate.
- Formally launch and display the Port's energy sustainability policy in all the Port's offices and locations frequented by the staff and public.
- As a member of EcoPorts, we intend to obtain Port Environmental Review System (PERS) certification.
- Investigate funding opportunities for river training wall and other large-scale environmental projects.
- Continue to investigate opportunities to de-carbonise operations.

## 11. References and useful sources of information

- SEAI Public Sector Programme - <https://www.seai.ie/business-and-public-sector/public-sector/public-sector-energy-programme/>
- *Port of Waterford Masterplan 2020-2044*
- Port of Waterford Corporate Plan - <http://www.portofwaterford.com/corporate-documents>
- Solar PV Analysis Report, Powertherm 22/05/2020
- Climate Action Plan – <https://www.dccae.gov.ie/en-ie/climate-action/publications/Pages/Climate-Action-Plan.aspx>
- GreenPort - <https://www.greenport.com/>
- ECO Ports Network - <https://www.ecoport.com/>
- Green Efforts – Green and effective operations at Terminals and Ports (an EU Initiative) <https://cordis.europa.eu/project/id/285687/reporting>



## Energy Policy

*Port of Waterford will promote sustainability of its operations through implementation of its Energy Masterplan and implement energy efficiency and renewable energy measures to support reductions in CO<sub>2</sub> emissions within its facilities and operations.*

**The Port is committed to:**

1. Establishing an Energy Team and involving all staff whose decisions can have an impact.
2. Setting energy and emissions reduction targets and goals and regularly reviewing progress against targets.
3. Complying with Government requirements for State Bodies and actively seeking to over-achieve.
4. Investing in energy infrastructure to deliver on targets.
5. Putting in place an Energy Information System (EIS) to track, measure and report on performance.
6. Engaging with the local businesses, communities and stakeholders who are impacted by the port's facilities on energy and environmental matters.
7. Regularly report on energy performance to the SEAI (Government) and Board as required.
8. Encouraging our customers, suppliers and other stakeholders to develop their own energy policies.
9. Being an active member of the ECO Ports network.

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Frank Ronan,  
Chief Executive

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Date

This policy will be reviewed on a regular basis to evaluate continued relevance and to monitor compliance.

# Port of Waterford



## Masterplan 2020 – 2044 Summary



Brings you closer

River Training Wall (marked in black) would help increase the flow of water and reduce the build-up of silt, which needs to be removed under licence

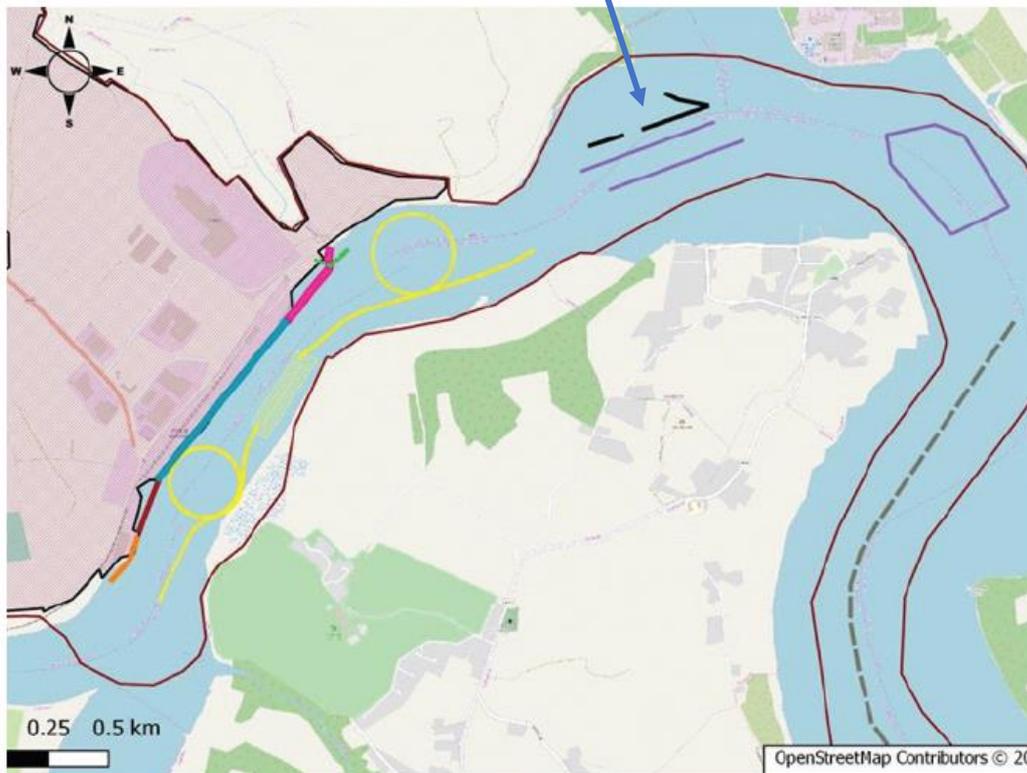


Figure 9 Details of proposed Masterplan Projects at Belview

## 10.1 Options to minimise maintenance dredging and improve marine access

### Option 1.1 - Cheekpoint Lower Bar River Training Wall

This will help to minimise future maintenance dredging requirements by controlling and reducing sedimentation. The project envisages the construction of two lengths of sheet piled training wall, one a vee shaped wall approximately 495m long and the other a straight wall 130m long. The proposed layout of the sheet piled training walls is shown in Figure 10 below and a photomontage of the proposed sheet piled walls at low and high tide is shown in Figure 11 A and B.

## ***Extract from Port of Waterford Corporate plan 2020 to 2024***

### **6. Objectives**

Our objectives (and their associated action plans) have been identified and grouped under five primary headings:

- 6.1 Environmental
- 6.2 Commercial development
- 6.3 Infrastructure
- 6.4 People
- 6.5 Systems

#### **6.1 Environmental**

##### a) Climate Change

We are committed to minimising our environmental impact through reducing our direct carbon footprint. Perhaps more significantly in terms of impacts we are committed to taking carbon out of the supply chain by promoting utilisation of the most environmentally effective transport modes. We will also seek to provide appropriate renewable energy sources to support transport/freight if and as this is required within the port.

It is a commercial objective to support the provision of Ireland's offshore renewables industry.

##### b) Port/Wharf Environmental Impacts and Sustainability

We are committed to implementing appropriate management systems around port related impacts, including air quality (dust), waste water treatment, noise and cargo residues. These management systems will also contribute to supporting aquatic and terrestrial biodiversity.

##### c) Shipping Environmental Impacts

The Port's management of depths and dredging in the Waterford Harbour navigation is licensed through the EPA. We will continue to meet the terms of our formal licences and will seek to expand our knowledge around the impact of our activities on the ecology and water quality of the estuary, as well as potential impacts on local communities, fisheries, aquaculture and the estuary as an amenity.

Shipping is undergoing huge transformation to meet challenging global goals to decarbonise. We will take the necessary steps within our Port to support this transformation.

#### d) Certification and accreditation

The port has achieved certification to ISO 14001:2015. Maintenance and development under the standard will be undertaken and other appropriate certifications will be reviewed.

Our engagement with Eco Merit supports our key focus to make our organisation more sustainable.

#### e) Culture

Our goal is to increase the awareness and engagement of our employees and stakeholders, with a positive environmental culture.

To support that goal, we actively facilitate our Port Users Environmental, Health & Safety (EHS) forum, to promote and work collaboratively on safe working systems, sound environmental practices and proactive communication on all safety & environmental matters, throughout the port.

### **6.2 Commercial Development**

#### a) Container Traffic (lo-lo) & Rail Freight

The Port will continue to seek to expand the lo-lo offering from Waterford. The decarbonisation agenda, possible benefits of avoiding the UK land-bridge to Europe and pressure around capacity in Dublin all represent sound bases for opportunity.

Re-activation of the rail freight connection to Ireland's Northwest and West is an ongoing priority. This facility can support growth in container handling through the Port and provide an economic and environmentally sound option for exporters and importers outside of our immediate region.

#### c) Onshore and Offshore Renewables

The movement towards renewable power generation is core to Ireland's decarbonisation agenda. It is clear that both On- and Offshore Renewable Wind Energy has a central role to play here. Port of Waterford is well placed to facilitate and support this industry and will actively seek opportunities to contribute.

# APPENDIX II Energy and CO<sub>2</sub> Reduction Projections of Decarbonising Projects

Table 5: Impact Projections of Decarbonising Projects On Consumption And Carbon Emissions

PORT OF WATERFORD ENERGY MASTERPLAN

PROJECTIONS OF DECARBONISING PROJECTS SHOWING EFFECT ON CONSUMPTION AND CARBON EMISSIONS

			CONSUMPTION (kWh)								2030 Target	
Fuel Type	kWh (2019) *	Growth PA	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Electricity - container terminal	1,215,336	5.00%	1,276,103	1,339,908	1,406,903	1,477,249	1,551,111	1,628,666	1,710,100	1,795,605	1,885,385	1,979,654
Electricity - Bulk quay lighting	90,930	0%	90,930	90,930	90,930	90,930	90,930	90,930	90,930	90,930	90,930	90,930
Electricity - Offices	58,148	0%	58,148	58,148	58,148	58,148	58,148	58,148	58,148	58,148	58,148	58,148
Renewable Electricity	-7,510	0%	(7,510)	(7,510)	(7,510)	(7,510)	(7,510)	(7,510)	(7,510)	(7,510)	(7,510)	(7,510)
LPG - Office Heating	20,987	0%	20,987	20,987	20,987	20,987	20,987	20,987	20,987	20,987	20,987	20,987
Diesel - Road Transport	77,534	0%	77,534	77,534	77,534	77,534	77,534	77,534	77,534	77,534	77,534	77,534
Marked Diesel – Non-road machinery	189,270	5%	198,734	208,670	219,104	230,059	241,562	253,640	266,322	279,638	293,620	308,301
Marine Gas Oil	107,390	5%	112,760	118,397	124,317	130,533	137,060	143,913	151,109	158,664	166,597	174,927
Biofuels	7,340	0%	7,340	7,340	7,340	7,340	7,340	7,340	7,340	7,340	7,340	7,340
Other Areas*	101,954	0%	101,954	101,954	101,954	101,954	101,954	101,954	101,954	101,954	101,954	101,954
Electricity for offsite charging	2,015	0%	2,015	2,015	2,015	2,015	2,015	2,015	2,015	2,015	2,015	2,015
Diesel for Ploughing/Bed levelling	1,078,840	0%	1,078,840	1,078,840	1,078,840	1,078,840	1,078,840	1,078,840	1,078,840	1,078,840	1,078,840	1,078,840
Dredging	3,924,000	0%	3,924,000	3,924,000	3,924,000	3,924,000	3,924,000	3,924,000	3,924,000	3,924,000	3,924,000	3,924,000
<b>Totals</b>	<b>6,866,234</b>		<b>6,941,834</b>	<b>7,021,214</b>	<b>7,104,562</b>	<b>7,192,079</b>	<b>7,283,971</b>	<b>7,380,457</b>	<b>7,481,768</b>	<b>7,588,145</b>	<b>7,699,840</b>	<b>7,817,120</b>
<b>Before Impacts</b>	( 000)											
Electricity	1,461		1,522	1,585	1,652	1,723	1,797	1,874	1,956	2,041	2,131	2,225
LPG	21		21	21	21	21	21	21	21	21	21	21
Diesel	5,384		5,399	5,415	5,431	5,448	5,466	5,485	5,505	5,526	5,548	5,571
	<b>6,866</b>		<b>6,942</b>	<b>7,021</b>	<b>7,105</b>	<b>7,192</b>	<b>7,284</b>	<b>7,380</b>	<b>7,482</b>	<b>7,588</b>	<b>7,700</b>	<b>7,817</b>
<b>Energy Efficiency Measures</b>			CONSUMPTION (000's)								( 000)	
Electricity Grid %age renewable	Renewable energy		2	57	117	183	253	330	413	502	599	703
Wind turbine	Renewable energy		230	230	230	230	230	230	230	230	230	230
Solar PV	Renewable energy			130	130	130	130	130	130	130	130	130
Solar PV (with 3rd parties)	Renewable energy		0	0	0	465	465	465	465	465	465	465
Dredger Amazone - improved engines	Energy efficiency		392	392	392	392	392	157	157	157	157	157
New Pilot Boat - improved engines	Energy efficiency		11	12	12	13	14	14	15	16	17	17
Training Wall - ploughing displacement	Energy efficiency							971	971	971	971	971
Training Wall - dredging displacement	Energy efficiency							2,354	2,354	2,354	2,354	2,354
Road Transport	Hybrid/Electric		39	39	39	39	39	39	39	39	39	39
Non-road machinery	Hybrid/Electric			63	66	69	145	152	213	224	235	247
Terminal Lighting and controls ( c. 60% more efficient)	Energy efficiency		152	152	152	152	152	152	152	152	152	152
Heating/building retrofit - LPG to Heat pump	Renewable energy				14	14	14	14	14	14	14	14
Container Storage Optimisation (10% saving)	Energy efficiency		105	110	115	121	127	134	140	147	155	162
Energy mgmt controls and awareness	Energy efficiency		25	25	25	25	25	25	25	25	25	25
<b>Impacts of EE projects - Summary of results</b>			(000's)									
Electricity			513	704	784	1,320	1,397	1,479	1,569	1,665	1,769	1,867
LPG					14	14	14	14	14	14	14	14
Diesel			442	506	509	513	590	3,688	3,749	3,761	3,773	3,785
			<b>956</b>	<b>1,210</b>	<b>1,307</b>	<b>1,847</b>	<b>2,000</b>	<b>5,181</b>	<b>5,332</b>	<b>5,440</b>	<b>5,556</b>	<b>5,667</b>
<b>After Impacts</b>			CONSUMPTION									
Electricity			1,008	881	869	403	400	395	387	376	362	358
LPG			21	21	7	7	7	7	7	7	7	7
Diesel			4,957	4,909	4,922	4,935	4,877	1,798	1,756	1,765	1,775	1,786
			<b>5,986</b>	<b>5,812</b>	<b>5,798</b>	<b>5,345</b>	<b>5,284</b>	<b>2,199</b>	<b>2,150</b>	<b>2,148</b>	<b>2,144</b>	<b>2,150</b>
<b>As a percentage of 2019 position</b>			87%	85%	84%	78%	77%	32%	31%	31%	31%	31%
Reduction , including Training Wall			13%	15%	16%	22%	23%	68%	69%	69%	69%	69%
Reduction compared to 2019, <u>excluding</u> Training Wall			87%	85%	84%	78%	77%	80%	80%	80%	80%	20%

2030 Target

Fuel Type	CO <sub>2</sub> EMISSIONS												
	(2019)	kg CO <sub>2</sub> per kWh											2030
	kg CO <sub>2</sub>		2021	2022	2023	2024	2025	2026	2027	2028	2029	kg CO <sub>2</sub>	
Electricity - container terminal	394,377	0.325	414,095	434,800	456,540	479,367	503,335	528,502	554,927	582,674	611,807	642,398	
Electricity - Bulk quay lighting	29,507	0.325	29,507	29,507	29,507	29,507	29,507	29,507	29,507	29,507	29,507	29,507	
Electricity - Offices	18,869	0.325	18,869	18,869	18,869	18,869	18,869	18,869	18,869	18,869	18,869	18,869	
Renewable Electricity	0	0.000	0	0	0	0	0	0	0	0	0	0	
LPG - Office Heating	4,806	0.229	4,806	4,806	4,806	4,806	4,806	4,806	4,806	4,806	4,806	4,806	
Diesel - Road Transport	20,469	0.264	20,469	20,469	20,469	20,469	20,469	20,469	20,469	20,469	20,469	20,469	
Marked Diesel - Non-road machinery	49,967	0.264	52,466	55,089	57,843	60,736	63,772	66,961	70,309	73,824	77,516	81,391	
Marine Gas Oil	28,351	0.264	29,769	31,257	32,820	34,461	36,184	37,993	39,893	41,887	43,982	46,181	
Biofuels	0	0.000	0	0	0	0	0	0	0	0	0	0	
Other Areas*	33,084	0.325	33,084	33,084	33,084	33,084	33,084	33,084	33,084	33,084	33,084	33,084	
Electricity for offsite charging	654	0.325	654	654	654	654	654	654	654	654	654	654	
Diesel for Ploughing/Bed levelling	284,814	0.264	284,814	284,814	284,814	284,814	284,814	284,814	284,814	284,814	284,814	284,814	
Dredging	1,035,936	0.264	1,035,936	1,035,936	1,035,936	1,035,936	1,035,936	1,035,936	1,035,936	1,035,936	1,035,936	1,035,936	
<b>Totals</b>	<b>1,900,833</b>		<b>1,924,468</b>	<b>1,949,284</b>	<b>1,975,342</b>	<b>2,002,702</b>	<b>2,031,430</b>	<b>2,061,595</b>	<b>2,093,268</b>	<b>2,126,524</b>	<b>2,161,443</b>	<b>2,198,108</b>	
			0	0	0	0	0	0	0	0	0	(000)	
	476		496	517	539	561	585	611	637	665	694	725	
	5		5	5	5	5	5	5	5	5	5	5	
	1,420		1,423	1,428	1,432	1,436	1,441	1,446	1,451	1,457	1,463	1,469	
	<b>1,901</b>		<b>1,924</b>	<b>1,949</b>	<b>1,975</b>	<b>2,003</b>	<b>2,031</b>	<b>2,062</b>	<b>2,093</b>	<b>2,127</b>	<b>2,161</b>	<b>2,198</b>	

Energy Efficiency Measures	CO <sub>2</sub> EMISSIONS										(000)
	2021	2022	2023	2024	2025	2026	2027	2028	2029		
Electricity Grid %age renewable	0	19	38	59	82	107	134	163	194	228	
Wind turbine	75	75	75	75	75	75	75	75	75	75	
Solar PV	0	42	42	42	42	42	42	42	42	42	
Solar PV (with 3rd parties)	0	0	0	151	151	151	151	151	151	151	
Dredger Amazone - improved engines	104	104	104	104	104	41	41	41	41	41	
New Pilot Boat - improved engines	3	3	3	3	4	4	4	4	4	5	
Training Wall - ploughing displacement	0	0	0	0	0	256	256	256	256	256	
Training Wall - dredging displacement	0	0	0	0	0	622	622	622	622	622	
Road Transport	13	13	13	13	13	13	13	13	13	13	
Non-road machinery	0	20	21	22	47	49	69	73	76	80	
Energy efficient lighting and controls	49	49	49	49	49	49	49	49	49	49	
Heating/building retrofit - LPG to Heat pump	0	0	3	3	3	3	3	3	3	3	
Container storage optimisation	34	36	37	39	41	43	46	48	50	53	
Energy mgmt controls and awareness	8	8	8	8	8	8	8	8	8	8	

Impacts of EE projects - Summary of results

Electricity	167	228	253	427	452	479	508	539	573	606
LPG	0	0	3	3	3	3	3	3	3	3
Diesel	119	140	141	142	167	985	1,005	1,009	1,013	1,017
	<b>286</b>	<b>368</b>	<b>397</b>	<b>572</b>	<b>622</b>	<b>1,467</b>	<b>1,516</b>	<b>1,551</b>	<b>1,588</b>	<b>1,626</b>

After Impacts	CO <sub>2</sub> EMISSIONS										
	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	
Electricity	310	268	264	112	110	107	103	98	92	88	
LPG	5	5	2	2	2	2	2	2	2	2	
Diesel	1,300	1,284	1,287	1,290	1,270	456	441	443	444	446	
	<b>1,615</b>	<b>1,556</b>	<b>1,553</b>	<b>1,403</b>	<b>1,381</b>	<b>565</b>	<b>546</b>	<b>543</b>	<b>538</b>	<b>536</b>	

As a percentage of 2019 position	ared to 2019	85%	82%	82%	74%	73%	30%	29%	29%	28%	28%	Target
Reduction , including Training Wall	aining Wall)	15%	18%	18%	26%	27%	70%	71%	71%	72%	72%	50%
Reduction compared to 2019, <u>excluding</u> Training Wall												26%