Carbon Reduction Strategy & Target Setting

Port of Aberdeen

13/03/2023

Rev	Reason for Issue	Date	Prepared	Checked	Approval	
A1	Issued for Review	06/02/23	AJO	APE	GMD	
B1	Reissued for Review	23/02/23	AJO	APE	GMD	
C1	Issued for Client Review	14/03/23	AJO	APE	APE	

	P0752-REP-004

BISHOP HOUSE, 50 Carden Place, Aberdeen, AB10 1UP

Executive summary

Sealand developed a tailored sustainability programme for Port of Aberdeen. Part of this process involved the development of a clear Carbon Reduction Plan[3]. The steps taken in order for the plan to be established are detailed within this document including the system that was implemented to deem suitability, and other relevant information needed to contextualise the Carbon Reduction Plan[3].

Port of Aberdeen is committed to achieving Net Zero by 2040, to set a clear pathway to achieving this target, Sealand identified suitable initiatives alongside an implementation timeline, this was then reviewed during two workshops with the Port of Aberdeen. Within the workshops the attendees discussed each suggested reduction measure and their suitability for the Port were assessed, ultimately this meant some carbon reduction measures were dismissed and others were kept as they were deemed as favourable.

The proposed reduction measures within the Carbon Reduction Plan[3] could see Port of Aberdeen achieve:

- Net Zero within scope 1 and 2 by 2035, achieving a potential reduction of 82%, leaving residual emissions to be offset.
- A reduction of 57% across scope 3 sources, it is noteworthy to mention that reduction within scope 3 could be accelerated by low carbon technologies coming into fruition in the coming years.

Contents

References

ID	Number	Title
1	P0752-REP-001	Onboarding Document
2	P0752-REP-002	GHG Inventory Report
3	P0752-REP-003	Carbon Reduction Plan

1 Introduction

The following document contains the process the Port of Aberdeen followed in order to develop their Carbon Reduction Plan[3], which ultimately defines their pathway to Net Zero. It should be recognised that their pathway will likely be adjusted year on year due to changes in: investment, resources, suitability and the results of a number of planned feasibility tests.

Part of Sealand's tailored sustainability programme involved a number of workshops held with the Port of Aberdeen to discuss a range of reduction initiatives targeting each emissions source. Within these workshop suitability in terms of finance, timeframe, resources and practicability were discussed. The Carbon Reduction Plan[3] and worksheets provided to Port of Aberdeen should be seen as working documents, which will be revised during annual reviews.

During the carbon reduction mapping process Sealand identified number of recommendations that have fed into their finalised Carbon Reduction Plan[3].

1.1 Workshop Details

1.1.1 Schedule

Port of Aberdeen (PoA) Carbon Management & Reduction Planning workshops took place as follows:

- 14:30 to 16:00 GMT on 31st of Jan. 2023
- 14:30 to 16:00 GMT on 14th Feb. 2023

1.1.2 Location of Meetings

The initial workshop was carried out at Port of Aberdeen South Harbour, Visitors Centre, with some individuals attending on MS Teams, with the second workshop held exclusively on MS Teams.

1.1.3 Meeting Invites

Meeting invites were issued to all attendees on 10.01.2023 by Naveed Qamar.

1.1.4 Attendees

The following personnel attended the sessions.

Name	Company	Role in the session
Naveed Qamar	PoA	Attendee
Jordan Harkins	PoA	Attendee

Name	Company	Role in the session
Jeanine Maindron	PoA	Attendee
Nigel Wright	PoA	Attendee
Marlene Mitchell	PoA	Attendee
Alex Thomson-McIntosh	PoA	Attendee
Trevor Boyes	PoA	Attendee
Mark Guyan	PoA	Attendee
Scott Buchan	PoA	Attendee
Graeme MacDougall	Sealand Projects	Attendee
Ash Penley	Sealand Projects	Facilitator
Alice Jones	Sealand Projects	Attendee
Somya Sharma	Sealand Projects	Scribe

2 Emission Summary

It is important to keep in mind the emission weighting of each source when developing a Carbon Reduction Plan, as ultimately emission sources carrying the most weight should be given precedence. The following table highlights the POA's emissions from most carbon intensive sources; note the table only shows two decimal points, refer to PoA GHG inventory report for full breakdown[2].

During the workshops reduction measures for each emission source were discussed, however, it was clearly identified that Procured Electricity and Client Visiting Vessels should be given priority in terms carbon reduction planning. Client vessel emissions make up the overwhelming majority of PoA annual emissions, however, it is an area which they do not directly control and therefore a collaborative approach must be adopted with all key stakeholders to achieve emission reductions within this area. In contrast the Port's second biggest emissions source is electricity, which is an area in which the Port has direct control over and therefore it is thought that emission savings can be easily achieved.

Table 2-1 Emission intensity comparison

Emission Source	Scope	Percentage of overall emissions	Percentage of emissions within scope 1 & 2	Percentage of emissions within scope 3
Fuel burnt in Port Vessels	Scope 1	0.70%	17.5%	-
Fuel burnt in Port owned equipment and machinery	Scope 1	0.10%	1.9%	
Company vehicles	Scope 1	0.01%	0.9%	
F-gas (aircon)	Scope 1	0.00%	0.7%	
Natural gas	Scope 1	0.70%	18%	
Procured electricity	Scope 2	2.50%	61%	
Client visiting vessels	Scope 3	91.34%		95.1%
Business travel	Scope 3	0.01%		0.0%
Waste	Scope 3	0.00%		0.0%
Water	Scope 3	0.00%		0.0%
Leased assets	Scope 3	4.64%		4.8%
Employee commute	Scope 3	0.06%		0.07%
WFH	Scope 3	0.00%		0.0%

3 Net Zero Pathway

3.1 Net Zero Definition

It is widely accepted that for a business or organisation to meet Net Zero actual emissions must be reduced by around 80-90% from baseline figures, it is then appropriate to offset an residual emissions through a certified offsetting project.

3.2 Target Setting

To establish a pathway to Net Zero the Port of Aberdeen has to define targets for reduction and implementation timeline for scopes 1, 2 and 3. The targets should be set that are achievable and sustainable for the business, recognising there will be short, medium and long-term goals.

During Sealand's review, the potential for Port of Aberdeen to adopt a split target was discussed, this would involve Port of Aberdeen setting one target for scope 1 and 2 and setting a target at a later date for scope 3.

However, during the workshop discussions it was agreed that Port of Aberdeen would stick to one target of reaching Net Zero across all three scopes by 2040. PoA have ambitions of becoming an exemplar green Port and therefore are committed to investing into carbon reduction initiatives to meet an ambitious Net Zero target.

3.3 Net Zero Target

Port of Aberdeen commits to achieving Net Zero by 2040.

4 Carbon Reduction Scenario Mapping

4.1 The Process

During the carbon reduction workshops multiple carbon reduction measures were presented for each emission source. Sealand adopted a Hazard Identification and Risk Assessment (HIRA) system during the workshops and work sheets (see Appendix B), whereby carbon reduction measures were assessed on their cost and ranked in terms of suitability. In addition multiple barriers and enablers to the specific carbon reduction measures were evaluated. The process allowed Sealand and Port of Aberdeen to select the most favourable options, which have now been included the Carbon Reduction Plan[3].

4.2 Cost Ranking

The following thresholds were implemented when assessing the implicated cost of proposed reduction initiatives.

Cost	Range
Low	<£500,000
Medium	£500,000-£2,000,000
High	>£2,000,000

4.3 Suitability Ranking

The following colour coded system was used when assessing the suitability of each reduction measure, largely the identified barriers and enablers decided the final ranking.

Rank	
	Favourable
	Potential for consideration
	To be reviewed in Future
	Not Applicable

4.4 Worksheets

The proposed carbon reduction initiatives worksheets, alongside their final ranking can be seen within Appendix B.

4.5 Output

The outcome of the worksheets can be seen in Port of Aberdeen Carbon Reduction Plan[3]. It is recommended that PoA hold frequent reviews to assess progress and identify any new developments in terms of enablers and barriers in regards to cost, timelines and suitability. It should be recognised that a number of feasibility studies will be needed before the implementation of major reduction initiatives such as Shore Power and Onsite Clean Energy.

4.5.1 Summary Output for each Scope of Emission

The following graphs summarise carbon reduction initiatives that were discussed during the workshops and the timelines.

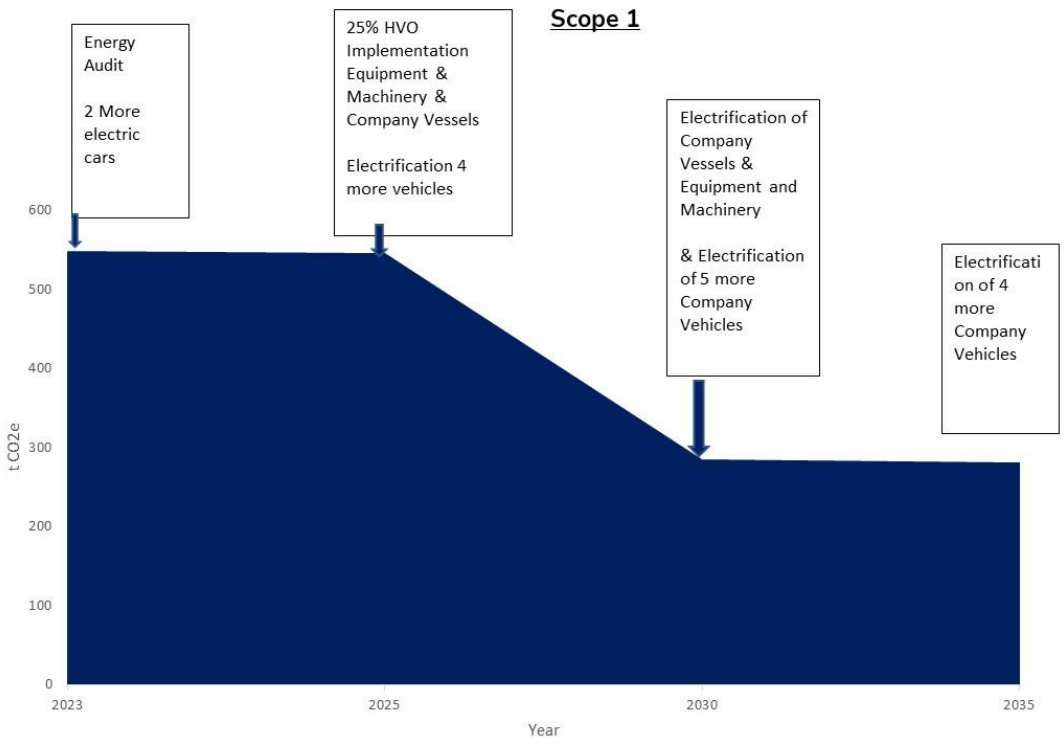


Figure 4-1 Scope 1 Carbon reduction initiatives implementation timeline

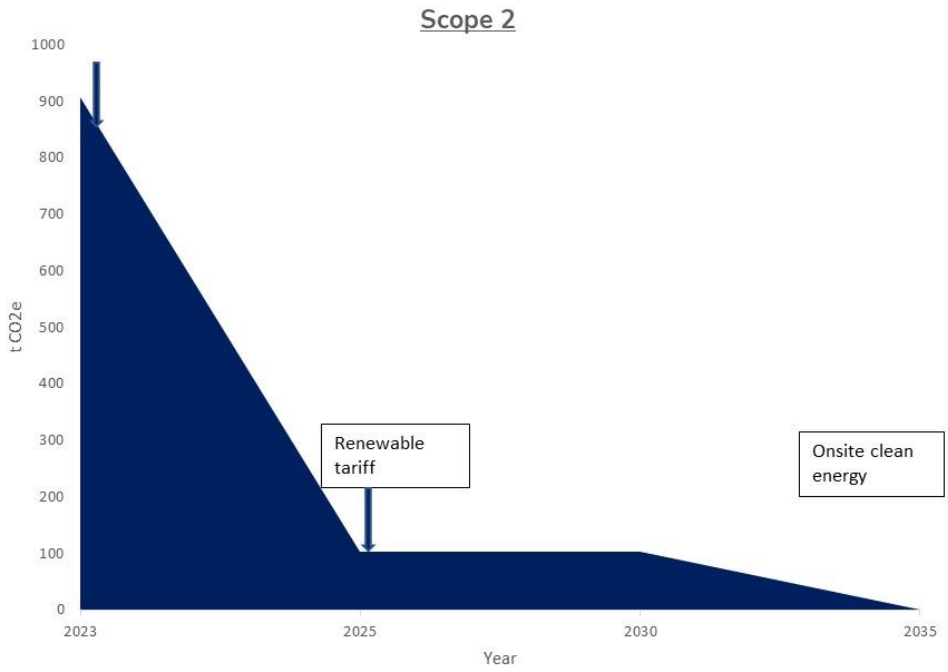


Figure 4-2 Scope 2 Carbon reduction initiatives implementation timeline

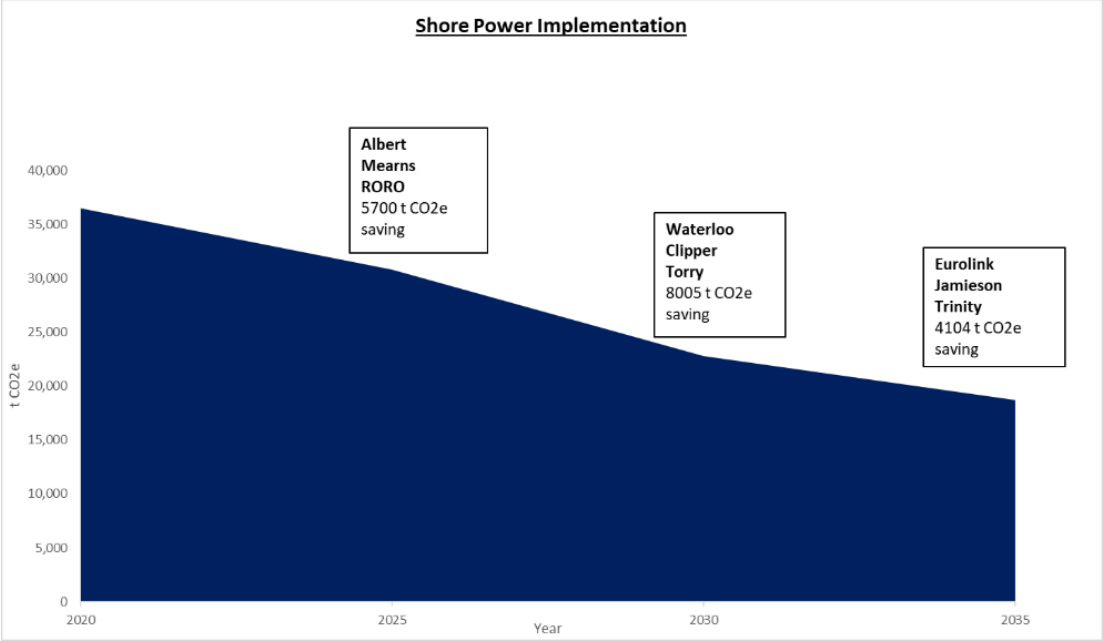


Figure 4-3 Scope 3 Carbon reduction initiatives implementation timeline

5 Offsetting Strategy

To reach Net Zero it is anticipated that PoA will have to offset a small part of residual emissions in 2040 or sooner if their target is brought forward. As noted in 3.1 this is a common part of organisation meeting Net Zero goals.

5.1 Certification

When the necessary time comes for carbon offsetting, projects must be vetted to ensure certified offsetting schemes are being supported. Presently, carbon credits in the UK are scarce, however, by the time PoA will be required to offset it is anticipated that they will be able to support a UK project.

5.2 Scenario costings for offsetting

The following scenarios have been based on PoA following the Carbon Reduction Plan[3] closely, however, it should be recognised that PoA may over achieve on carbon reduction and therefore residual emissions may be smaller, which in turn will decrease cost.

5.2.1 Scope 1 & 2

It is thought that by implementing the noted reduction measures[3] POA could reduce their scope 1 and 2 emissions down 82.9% by 2035, the below table outlines the potential costings of offsetting their emission in 2035. By doing this POA could claim to be Net Zero

for scope 1 and 2 as early as 2035. Given that the UK government under Streamlined Energy and Carbon Reporting(SECR) requirements are only requiring larger businesses to report on and reduce their scope 1 and 2 emission at present, this is a promising and achievable goal for POA.

Table 5-1 Offsetting options for Scope 1 & 2

Scope 1 & 2	
Predicted 2035 Emission Total	281.84 t CO_{2e}
Predicted cost of Offsetting in 2035	£4227.63

5.2.2 Scope 3 (employee commute, waste, business travel, water & WFH) PoA Control

For PoA to offset the scope 3 non-tenant activities for which it has significantly more control over in comparison to their scope 3 tenants activities, the following costs would be involved.

Table 5-2 PoA Scope 3 emissions (employee commute, waste and business travel) offset options

Scope 3 (waste, water employee commute, WFH and business travel)	
Predicted 2040 Emission Total	31.08 t CO_{2e}
Predicted cost of Offsetting in 2035	£478.81

5.2.3 Scope 3 (vessel & tenant activities) Where PoA can Influence

To reach Net Zero across all aspects of scope 3 reducing emissions from tenant activities will be a more challenging task in terms of investment and innovation. It is accepted that the coming years will bring more diverse solutions to target emission abatement and thus it is hoped that further reductions can be achieved with a collaborative approach.

It is recommended that PoA do not offset tenant activities or vessel emissions, however instead commit to work with the Industry to move towards a cleaner future. Supporting new technologies and infrastructure required for alternate fuels and micro-grid renewable energy solutions.

Table 5-3 Offsetting options for Scope 3 (tenant activities)

Scope 3 (client vessels & leased assets)	
Predicted 2040 Emission Total	16,357 t CO_{2e}
Predicted cost of Offsetting in 2040	£245,355

6 Conclusion

Port of Aberdeen have implemented a robust process to devising a clear pathway to meet Net Zero by 2040. The worksheets included in Appendix B, have been provided to PoA and should be seen as a working document, subject to alterations and additions during regular reviews. Shore power will play a big role in achieving carbon reduction from vessel emissions. It is highly recommended that the electricity provided to shore power comes from a renewable energy source. Some options for Renewable energy sources are discussed in detail in Appendix A.

The process identified in this document serve to well explain the steps PoA followed in the creation of their Carbon Reduction Plan[3] and details considerations for future steps such as the implementation of an offsetting strategy later down the line.

6.1 Next steps

The next step in the process involves the Carbon Reduction Plan[3] being signed off by the board of directors. Net Zero steering committee to follow up implementation of carbon reduction actions year on year.

6.2 Recommendations

It is recommended that PoA hold regular meetings to discuss and monitor the progress of the set carbon reduction measures to ensure their implementation timeline is met.

Appendix A Considering Electricity Shore Power

Shore power is currently being considered for tackling emissions as a result of client vessels. PoA has to be cautious about where the electricity to shore power comes from, if it comes from grid (fossil fuels) this will increase Port's Scope 2 emissions and affect their ability to reach Net Zero from Scope 2.

A.1 Considering electricity required for the shore-power

PoA should direct their focus on finding the best renewable energy option to reach their Net zero goal.

We have identified the following five Renewable Energy options which are listed in order of minimum to high cost:

Table A-1

No.	Option	Income stream to PoA	Initial investment
1	RE tariff from the grid- purchased electricity	None	Minimum
2	Power purchase agreement- independent from a RE developer, such as a solar/wind/wave/tidal	None	Minimum
3	On-site RE generation (Solar/Wind/wave/tidal) - Work with a Developer; A developer comes with necessary funding and technology to develop an on-site RE generations, owns and sells the electricity to PoA tenants. A new income stream for the port from the space rented for the RE equipment.	Rental income	Low
4	On-site RE generation -with an SPV; An SPV is set up, SPV sells the electricity to tenants, a new income stream for the Port as per their SPV shareholding	Electricity sales as per shareholding	Low-Medium
5	On-site RE generation; Port owned; Port invests and builds an on-site RE system. They own and sell the electricity to their tenants, a new income stream, 100% electricity sales – the OPEX)	100% of electricity sales minus the OPEX	High

A port owned RE generation (option 5) would be the best option in the long term, however it would have a high initial investment (circa £5m). However, if the right type of technology can be found, with 3-5 years of ROI, this would be the best commercial option as there would be a steady revenue stream from the electricity sales for the port for the lifetime of the RE system, which is usually about 25 years. In addition, this would be the best option for carbon reduction, as the on-site RE generation would have 0 carbon emission. One should also consider the carbon emissions during the construction & LCA of the RE system during the decision-making process.

A.2 Possible Renewable Energy options for PoA

PoA has limited space for solar, plus during the winter months, solar power would be very weak. Onshore wind would not be an easy option due to consenting issues, PoA is at a city centre location. What is left is wave and tidal; PoA has excellent tidal range, and some wave resource. Below is a list of Wave and Tidal companies that we know of based in Scotland:

Table A-2 List of Wave and Tidal Technologies

Technology	TRL	Name of Company	Based in
Tidal	9	Nova Innovations	Edinburgh
Tidal	8	QED Naval Ltd	Edinburgh
Wave	7	Mocean Energy	Edinburgh
Wave	5	ZOEX	Aberdeen
Wave	7	AWS Ocean Energy	Inverness

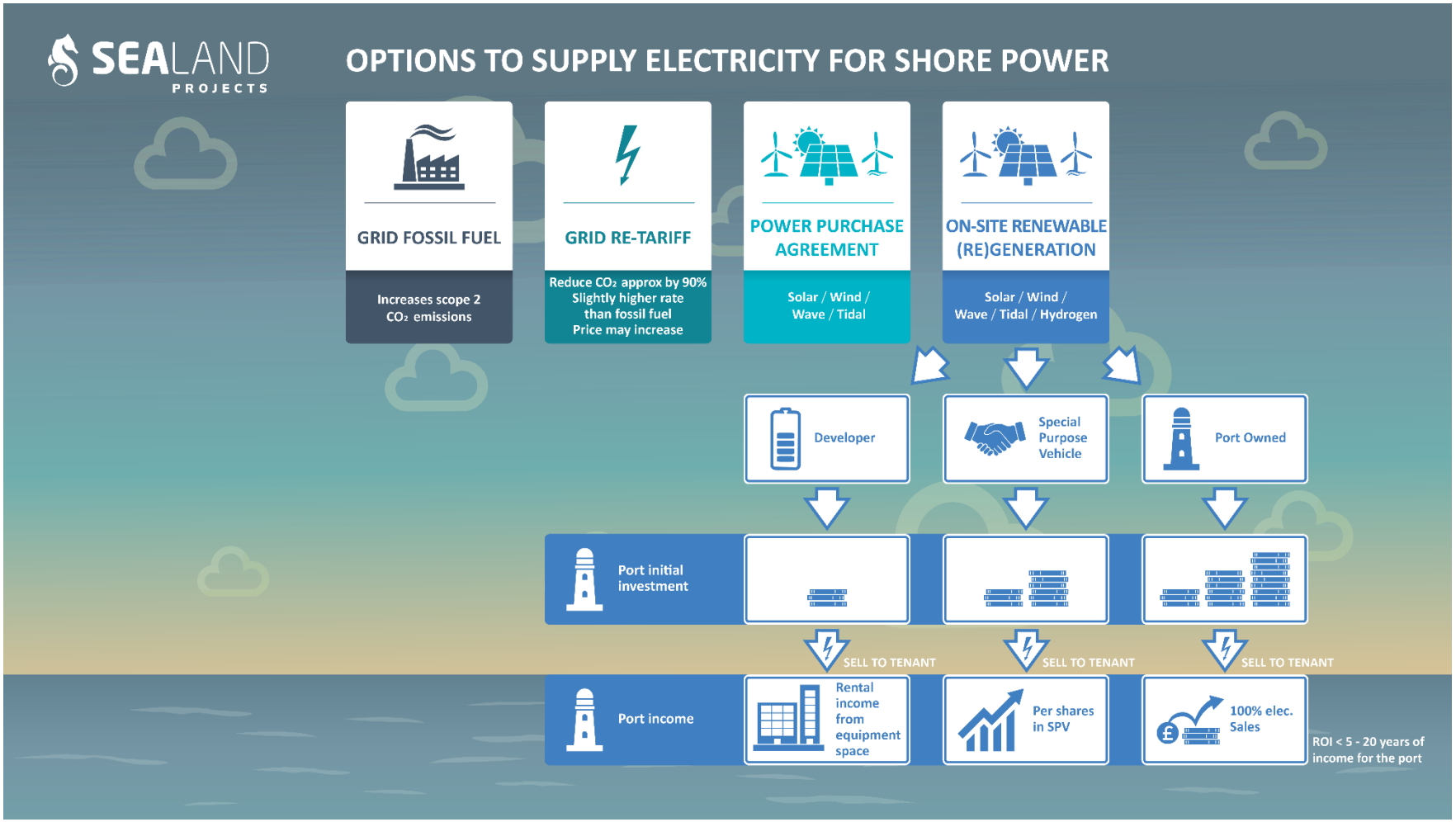
Energy generated from any of these sources can be directed to an electrolysis unit for on-site hydrogen generation. H_2 can be offered to tenants vessels, or can feed H_2 fuel cells, which would provide necessary energy for the shore-power. Even though H_2 generation would add to the cost of initial investment as more equipment is needed, this may reduce the cost needed from the RE device. Some Hydrogen developer companies in Scotland are:

Table A-3 List of Hydrogen system development companies

Technology	TRL	Name of Company	Based in
Hydrogen	9	Logan Energy	Edinburgh
Hydrogen	9	Aberdeen International Associates	Aberdeen

It is recommended that PoA carry out a feasibility study evaluating RE resources available on PoA site, then match these with the best technology showing a cost-benefit analysis and LCOE. The recently won clean maritime call may investigate these.

These suggestions need specialised studies, if requested, Sealand Projects could support these.


SEALAND PROJECTS
OPTIONS TO SUPPLY ELECTRICITY FOR SHORE POWER
GRID FOSSIL FUEL
Increases scope 2 CO_2 emissions
GRID RE-TARIFF
Reduce CO_2 approx by 90%
Slightly higher rate than fossil fuel
Price may increase
POWER PURCHASE AGREEMENT
Solar / Wind / Wave / Tidal
ON-SITE RENEWABLE (RE)GENERATION
Solar / Wind / Wave / Tidal / Hydrogen
Developer
Special Purpose Vehicle
Port Owned
Port initial investment
SELL TO TENANT
SELL TO TENANT
SELL TO TENANT
Port income
Rental income from equipment space
Per shares in SPV
100% elec. Sales
ROI < 5 - 20 years of income for the port

Appendix B Worksheets

PORT OF ABERDEEN

Port of Aberdeen Carbon Reduction Plan, based on 2020 GHG Inventory Report

	GHG Source	Process	kg CO_2e	%kg CO_2	%kg CO_2	2023 kg CO_2e	2023 Plan	2025 kg CO_2e	2025 Plan	2030 kg CO_2e	2030 Plan	2035 kg CO_2e	2035 Plan	2040 kgCO2e	2040 Plan	Notes
	Scope 1 & 2: Direct emissions from fuel use & Indirect emissions from purchased energy															
1.1	Marine fuel	Pilot boats	273,915	0.7%	17.5%	232,828	25% implementation of HVO	232,828	25% implementation of HVO	-	100% electrification of company vessels.		100% electrification of company vessels.	-	100% electrification of company vessels.	Figures for 2030,2035 and 2040 are based on electricity being supplied by clean onsite energy.
1.1	Diesel	Equipment & machinery	29,918	0.1%	1.9%	25428.80	Test HVO within 25% of equipment & machinery.	25,429	25% implementation of HVO	-	All electric equipment and machinery.		All electric equipment and machinery.	-	All electric equipment and machinery.	Figures for 2030,2035 and 2040 are based on electricity being supplied by clean onsite energy.
1.2	Diesel blend	Company Vehicles	14,079	0.0%	0.9%	12319.13	Electrification of 2 vehicles 12.5% reduction	10,559	Electrification of more 4 vehicles 25% reduction	7,039	Electrification of 5 more vehicles 50% reduction	3,520	Electrification of 4 more vehicles 75% reduction	-	Electrification of 5 more vehicles 100% electric fleet	These calculations assume that the electric vehicles are battery and are charged by 100% by renewable energy.
	Gas	Heat	281,265	0.7%	18.0%	267201.75	Implement measures of current energy audits to achieve approximately 5% reduction.	267,202		267,202	Heat pump installation	267,202		267,202		
1.4	F Gas Fugitives R410A	Refrigeration & A/C	11,066	0.0%	0.7%	10512.70	Annual maintenance checks to prevent leaks.	10,513	Maintain 5%	10,513	Maintain 5%	10,513	Maintain 5%	10,513	Maintain 5%	
2.1	Indirect emissions from imported electricity	Power	955,476	2.4%	61.0%	907,702.20	Implement measures of current energy audits to achieve approximately 5% reduction.	102,457	Renewable electricity tariff produced.	102,457			Create a direct line with a renewable supplier or implement onsite electricity prodition.	-	Renewable electricity sourced.	
	Total Scope 1 & 2		1,565,717.00		100%	1,455,092.13		640,987.38		387,211.23		281,234.15		277,714.45		
	Scope 3: Indirect emissions															
3.1	Emissions from Employee commuting	Travel	24,900	0.06%	0.06%	23655.00	Cycle to work scheme More electric car charging points Explore car sharing app Explore salary sacfice for electric cars 5%	21,788	12.5% reduction Continue the implementation of 2023 schemes	18,675.00	25% reduction	18,675	25% reduction	18,675	25% reduction	
3.2	Client vessels	Travel	36,525.740	91.34%	95.1%	30,825.740	Shore power implemented: Albert Mearns RORO	30825740	Shore power implemented: Albert Mearns RORO	22820740	Shore power implemented: Torry Waterloo Clipper	18716740	Shore power implemented: Eurolink Jamieson Trinity	18716740	All berths providing shore power	Remaining emissions are a result of vessels transit in and out of port.
3.3	Emissions from Business travels	Travel	5,643	0.01%	0.0%	4937.63	Carbon budget 12.5% reduction	4,232.25	25% reduction	2,821.50	50%	1,410.75	75%	1410.75	75%	
3.4	Emissions from the disposal of solid waste by organisation	Waste	1,606	0.00%	0.0%	1,605		1,204	39%	803	50% reduction	802.5	50%	802.5	50%	
3.5	Emissions from the water supply to the organisation	Water	5,457	0.01%	0.0%	5184.15	Water audit to detect leaks 5% reduction	4,092.75	Water audit to detect leaks 5% reduction	4092.75	12.5% reduction Water saving technology to be explored	4,093	13%	4,093	13%	
3.6	Emissions from use of leased assets	Tenat electricity and heat	1,855,239.51	4.64%	4.8%	1855239.513	EPC energy audits of leased out facilities 5%	1762427.538	EPC energy audits of leased out facilities 5%	1391429.63	clean energy for some clients ; 25%	927619.7587	Clean energy onsite 50%	927619.7567		
3.7	Work from home	Heat & Power	6,100	0.02%	0.0%	6,100		6,100		6,100		6100		6,100		
	Total Scope 3		38,424,085		96.1%											
	Total Scope 1,2 & 3		39,990,402		100.0%	34178453.41		##########		24631872.61		19956074.91		19953165.21		

2020	kg CO_2e
Scope 1: Direct emissions from fuel activities	610,241.00
Scope 2: Imported energy	955,476.00
Scope 3: Indirect emisions including client vessels	38,424,684.51
Total Scope 1,2 &3	39,990,401.51

Scope 1: Carbon Reduction Initiatives

Scope	Hot Spot Source	Scope 1 Emissions 2020 kg CO2e	Scope 1 Emissions 2020 % O/A	Reduction Initiative	% Target Reduction 2025 Short	2030 Med	2035 Long	2040 Stretch	Enablers	Barriers	Cost	Rank	Notes
Scope 1	Company Vessels	273,915	45%	Conversion of Pilot Boats to use Hydrotreated Vegetable Oil (HVO) fuel	25%				PoA currently has 2 pilot boats & 1 workboat. HVO as a fuel technology available and field proven in marine application Extended trial program ongoing on 3rd Party Port Confirm if current asset inventory suitability for conversion to use HVO Renewable diesels lower greenhouse gas emissions by 80-90%	Phased approach to bring on all vessels will impact timeline Establishing fuel source to meet demands. Circular economy - extended delivery routes for fuel supply Installation of storage facilities for the HVO Fuel cost 10-15% more expensive than diesel Long term HVO may be serve aviation industry rather than marine. High volume of demand can stress the agriculture sector/land use Monitor feedstock source - ensure not Palm Oil	Low		Observations 1. Adoption of HVO will be subject to review with compatibility with OEM of engine 2. Minimum infrastructure upgrade to adopt HVO. 3. Promote early emissions reductions in existing fleet 4. Sourcing of HVO fuel stock supply may be challenging due to high competition from other sectors Recommendations 1. POA plan to change out the Pilot boats and work boat by 2030 - most likely that HVO is not a long term as Hybrid / Electric replacement vessel will be under consideration. 2. Potential for a short term carbon abatement initiative and consideration should be given to assessment / potential trial. Meetings are ongoing related to a trial of at least one boat 2023.
Scope 1	Company Vessels	273,915	45%	Replace existing Pilot Boats with Hybrid Diesel / Electric Powered Vessels	50%	90%			Technology available and field proven in marine application Endurance and range of batteries will suit the pilot runs. Phased replacement of existing fleet when they reach end of service. Accelerate replacement of existing fleet. Electrical supplier to source from renewables only Consider HVO as alternative fuel source to diesel	Timeline for implementation restricted by replacement program CAPEX investment of hybrid electric powered pilot vessels will be significant CAPEX investment for infrastructure to provide dedicated power charging stations for the 2-No pilot boats and 1 work boat			Observations 1. POA plan to change out the Pilot boats and work boat by 2030 2. Infrastructure upgrade to provide quayside power charging points 3. Promote early emissions reductions in existing fleet Recommendations 1. Hybrid replacement vessel for existing fleets, as the come to end of service, represents a favourable option 2. Ensure electricity drawn to charge new vessels is from renewables source

Scope 1: Carbon Reduction Initiatives

Scope	Hot Spot Source	Scope 1 Emissions 2020 kg CO2e	Scope 1 Emissions 2020 % O/A	Reduction Initiative	% Target Reduction 2025 Short	% Target Reduction 2030 Med	% Target Reduction 2035 Long	% Target Reduction 2040 Stretch	Enablers	Barriers	Cost	Rank	Notes
Scope 1	Company Vessels	273,915	45%	Replace existing Pilot Boats with Fully Electric Powered Vessels			100%		Technology available and field proven in marine application Endurance and range of batteries will suit the pilot runs. Phased replacement of existing fleet when they reach end of service. Accelerate replacement of existing fleet. Source Electricity from renewables source	No option to retrofit existing fleet Timeline for implementation restricted by replacement program CAPEX investment of electric powered pilot vessels will be significant CAPEX investment for infrastructure to provide dedicated power charging stations for the 2 pilot boats & a workboat			<u>Observations</u> 1. POA plan to change out the Pilot boats and work boat by 2030 2. Infrastructure upgrade to provide quayside power charging points 3. Promote early emissions reductions in existing fleet <u>Recommendations</u> 1.Fully electric replacement vessel for existing fleet, as the come to end of service, represents a favourable option 2. Ensure electricity drawn to charge new vessels is from renewables source
Scope 1	Company Vessels	273,915	45%	Hydrogen		50%	90%		Technology available and evidence of field trials in marine environment but more testing needed on the safety aspects of handling, storage and bunkering hydrogen Potential to partner with shipyard to field trial Phased replacement of existing fleet when they reach end of service. Infrastructure in Aberdeen to service Hydrogen Fleet of Buses. Can this be adapted to support fuel stock requirements	Timeline for implementation restricted by replacement program CAPEX investment of hydrogen powered pilot vessels will be significant CAPEX investment for infrastructure to provide transport , storage and fuelling stations for the 4-No pilot boats Cost of hydrogen Sourcing Hydrogen fuel stock to meet demand			<u>Observations</u> 1. POA plan to change out the Pilot boats and work boat by 2030 2. The availability commercially viable Hydrogen vessel may not be available until window 2030 to 2035. 3. Significant investment required in infrastructure for storage, handling and fuelling 4. Hydrogen can be generated at site from seawater, thus reducing fuelling costs <u>Recommendations</u> 1. Offers a future opportunity for consideration but Electric / Hybrid options offer a more favourable opportunity 2. Consider on-site renewable energy providing power to on-site electrolysis unit for H2 generation. This option would make PoA independent of cost fluctuations.

Scope 1: Carbon Reduction Initiatives

Scope	Hot Spot Source	Scope 1 Emissions 2020		Reduction Initiative	% Target Reduction				Enablers	Barriers	Cost	Rank	Notes
					2025	2030	2035	2040					
		kg CO2e	% O/A		Short	Med	Long	Stretch					
Scope 1	Equipment and Machinery	29,916	5%	HVO fuel	25%				Technology available and field proven in equipment and machinery applications Review Asset Inventory with OEM to confirm compatibility for HVO Phase out asset inventory not suitability for conversion to use HVO Renewable diesels lower greenhouse gas emissions by 80-90%	Phased approach to bring on all equipment & machinery will impact timeline Availability of HVO in Aberdeen is the biggest barrier, supply is limited. If the supply comes from England that adds to Transport emissions. Establishing fuel source to meet demands. Installation of storage facilities for the HVO Fuel cost 10-15% more expensive than diesel Monitor feedstock source - ensure not Palm Oil. Potential performance impact on plant and machinery capabilities - cranes / fork lifts	Low		<u>Observations</u> 1. Adoption of HVO will be subject to review with compatibility with OEM of equipment & machinery 2. Minimum infrastructure upgrade to adopt HVO. 3. Promote early emissions reductions in existing inventory 4. Sourcing of HVO fuel stock supply may be challenging due to high competition from other sectors 5. Based on current technology not all plant and equipment can be replaced for like-for-like alternative powered by HVO / electric <u>Recommendations</u> 1. POA to review Plant & Equipment Inventory as it approaches end of service life and identify replacements that are HVO / Electric powered as alternatives. 2. Monitor technology and advancement in equipment design and specifications for HVO / Electric alternatives in preparations for phased replacement
Scope 1	Equipment and Machinery	29,916	5%	Electrification		100%	100%	100%	Technology available and field proven in some equipment and machinery applications Review Asset Inventory and assess availability of electric alternative Phase diesel powered assets with electrically power alternatives Electrical supplier to source from renewables only	Phased approach to bring on all equipment & machinery will impact timeline Higher Cost of electricity Availability of fully electric Equipment and Machinery. Potential performance impact on plant and machinery capabilities - cranes / fork lift	Low		<u>Observations</u> 1. Promote early emissions reductions in existing inventory 2. Based on current technology not all plant and equipment can be replaced for like-for-like alternative powered by HVO / electric <u>Recommendations</u> 1.POA to review Plant & Equipment Inventory as it approaches end of service life and identify replacements that are HVO / Electric powered as alternatives. 2. Monitor technology and advancement in equipment design and specifications for HVO / Electric alternatives in preparations for phased replacement

Scope 1: Carbon Reduction Initiatives

Scope	Hot Spot Source	Scope 1 Emissions 2020		Reduction Initiative	% Target Reduction				Enablers	Barriers	Cost	Rank	Notes
		kg CO2e	% O/A		2025 Short	2030 Med	2035 Long	2040 Stretch					
Scope 1	Company Fleet	14,079	2%	Electrification of Cars & Vans	25%	50%	75%	100%	Technology available and ready for deployment Electric car charging points available in Port facilities Two vehicles within fleet are electric. Phased replacement of existing fleet when they reach end of service/lease. Accelerate replacement of existing fleet. Electrical supplier to source from renewables only	Infrastructure investment to increase number of car charging points. High cost for investment in electric cars	Low		<u>Observations</u> 1. PoA has a total of 19 vehicles, 2 out of 19 are currently electric. 2. 4-No replacement vans are currently schedule to be electric 2023. 3. Investment required to increase the number of car charging points for company vehicles and visitors 4. Condition and Age of the vehicle dictattes that- A couple a year would be . A schedule should be set change out of existing vehicle to be replaced. <u>Recommendations</u> 1. As the company vehicles come to end of lease / service life replace with electric vehicles. 2. For long range vans, Hydrogen can be an alternate solution too

Scope 1: Carbon Reduction Initiatives

Scope	Hot Spot Source	Scope 1 Emissions 2020		Reduction Initiative	% Target Reduction				Enablers	Barriers	Cost	Rank	Notes
					2025	2030	2035	2040					
		kg CO2e	% O/A		Short	Med	Long	Stretch					
Scope 1	F-gas	11,066	2%	Adopt planned maintenance program of units for leak detection and prevention. End of service life replacement program	5%	5%	5%	5%	Review asset Inventory of Fluorinated (F)-gas sources. Develop a planned maintenance program for each assets / building. Replacement program for end of service life for equipment, procuring more energy efficient units that use Natural refrigerants (CO2). In room air conditioning systems, hydrocarbons are safely used as alternative refrigerants in several countries such as India and China, but they are not yet common in the EU. In chillers, hydrocarbons and ammonia are safe and energy-efficient alternatives to HFCs, Heat pumps are also used with hydrocarbons, additionally CO2 is available on the market.	Limited data on historical OEM equipment. Equipment spares / parts limited Expensive to replace redundant equipment with Natural refrigerants (CO2). Regulatory authorities in UK / EU have restrictions on use of Natural Refrigerants	Low		Observation: 1. PoA have preventative maintenance program in place 2.Hydrofluorocarbons (HFCs) are used in various applications, such as refrigerants in refrigeration, air-conditioning and heat pump equipment. Recommendations: 1. Regular maintenance to prevent any leaks. 2. Measure leaks (to understand the volume and for more accurate calculations 3. Offsetting is an option considering the small amount
Scope 1	Gas	281265	46%	Heat pump installation	5%	65%	65%	65%	Good applicability, as noted in Buro Happold report. High emission reduction. Grant may be available. Buildings coming up for re-lease.	Installation costs	Med		Observation 1. Feasibility study required. Buro Happold report suggested that PoA were a good candidate for Heat Pumps. Percentage decrease reflects heat pump installation in 2030. 2. Installation of Heat pumps may not viable in North Harbour Facilities due to listed building status. This requires to be reviewed and assessed. Potential opportunities in South harbour location Recommendation: 1. Carry out better insulation 2. Look into other technological solutions to reduce gas use, such as Hydromx- a nano technology to circulate water/glycol system in the heating systems. Claimed to reduce heating costs up to 30% 3. Offset gas, rather than investing in heat pumps. Offset cost currently estimated as: £4-5k
Scope 1	Gas	281,265	46%	Energy audit	5%	5%	5%	5%	Review Facilities inventory and perform an energy audit of the respective facilities to identify waste reduction, energy savings and improvement plans. Adopt a Phased approach - focusing initially on highest energy utilisation facilities	Aging inventory requiring high CAPEX investment to improve energy efficiency Cost of energy audit across facilities inventory	Low		Recommendation: 1. Engagement with an energy assessor needed. Observation: 2. Improvement recommendation provided by the audit may yield greater reductions than 5%. Regular scheduled energy audits.
	Sum	610,241											

Cost	Range
Low	<£500,000

Scope 2: Carbon Reduction Initiatives

Scope	Hot Spot Source	Scope 2 Emissions 2020		Reduction Initiative	% Target Reduction				Enablers	Barriers	Cost	Rank	Notes
					2025	2030	2035	2040					
		kg CO2e	% O/A		Short	Med	Long	Stretch					
Scope 2	Electricity	955,476	100%	Energy audit	5%				Review Facilities inventory and perform an energy audit of the respective facilities to identify waste reduction, energy savings and improvement plans. Adopt a Phased approach - focusing initially on highest energy utilisation facilities	Aging inventory requiring high CAPEX investment to improve energy efficiency Cost of energy audit across facilities inventory	Low		Observation: 1 .Implementation of recommendation may yield greater reductions, for example use of light sensors etc. Recommendations 1. Engagement with an energy assessor consultant to perform audit
Scope 2	Electricity	955,476	100%	Renewable tariff		90%			Electrical supplier to provide from renewables source only. Review at next contract renewal with energy supplier. Consider a phased approach to transition to smooth cost curve	Renewables sourced electricity costs significantly more - circa 15% more expensive. Electricity provider may not be able to offer fully renewables solution	Low		Observations 1. Renewable tariff must come from a supplier who confirms the Port can claim ZERO emissions for their electricity, 2. It must be noted that PoA will still have to report Location-based emission total (UK Grid Mix) alongside side their new Market-based figure, this is in case of a third-party audit, for example SECR requires this. 3. The higher cost of electricity form renewables sources may promote the opportunity to split metering across the Port or adopt Phased approach

Scope 2: Carbon Reduction Initiatives

Scope	Hot Spot Source	Scope 2 Emissions 2020		Reduction Initiative	% Target Reduction				Enablers	Barriers	Cost	Rank	Notes
					2025	2030	2035	2040					
		kg CO2e	% O/A		Short	Med	Long	Stretch					
Scope 2	Electricity	955,476	100%	Onsite energy production through solar panels on infrastructure / site boundaries			50%		Technology available and field proven for retrofit on buildings and land. Performance and efficiency of Solar Panels improving. Review building inventory to confirm suitable host candidates. Explore partnership with adjacent facilities and land owners to increase potential solar panel footprint - especially at South Harbour	Limited availability of suitable host facilities withing POA infrastructure. High cost of retrofit to exiting buildings v's return Planning and consents for local solar farm may be prohibitive.	Medium		Observations 1. Significant amount of investment required, however, if implemented PoA tenants could also use this energy, which in turn would reduce the emission total for Scope 3, Leased Assets. 2. Other harbours in the Northeast tried solar panels, and the ROI is found to be around 10+ years. This is due to the fact that 6 months of the year, there is not much light at this geographical location. 3 .No benefits adopted for the Short to medium term reduction. Recommendation: 1. A technology review and feasibility assessment is review again in 2025 to identify if any emerging opportunities

Scope 2: Carbon Reduction Initiatives

Scope	Hot Spot Source	Scope 2 Emissions 2020		Reduction Initiative	% Target Reduction				Enablers	Barriers	Cost	Rank	Notes
					2025	2030	2035	2040					
		kg CO2e	% O/A		Short	Med	Long	Stretch					
Scope 2	Electricity	955,476	100%	Onsite energy production through wave energy	-		90%		Consideration should be given to support emerging technologies and provide potential field trial opportunities with POA boundaries. Look for potential funding opportunities to promote technology as it develops through pre-commercial phase	Technology has not matured to commercialisation scale and whilst field trials are ongoing it is not anticipated this will represent an opportunity to POA in the short to medium term to generate onsite electricity. High investment cost for deployment of prototypes	Medium		Observation 1. No benefit has been drawn for reduction in short / medium. 2. Monitor technology advancement and commercialisation of WEC. Recommedation: 1. Recommend that a technology review and feasibility assessment is review again in 2025 to identify if any emerging opportunities 2. In the future, electricity to the harbour office could be provided from an on-site renewable energy generation. On-site RE could be commercially viable to provide power to shore-power. A cable could be pulled to the harbour building, and give energy independency to PoA. 3. Nearshore wave resource should be obtained and a feasibility study can be conducted to suit the wave profile at the harbour
Scope 2	Electricity	955,476	100%	Onsite energy production through tidal flow	-		90%		Consideration should be given to support emerging technologies and provide potential field trial opportunities with POA boundaries. Look for potential funding opportunities to promote technology as it develops through pre-commercial phase	Technology has not matured to commercialisation scale and whilst field trials are ongoing it is not anticipated this will represent an opportunity to POA in the short to medium term to generate onsite electricity. High investment cost for deployment of prototypes	Medium		Observation 1 .No benefit has been drawn for reduction in short / medium. 2. Monitor technology advancement and commercialisation of WEC. 3. Recommend that a technology review and feasibility assessment is review again in 2025 to identify if any emerging opportunities Recommendations 1. In the future, electricity to the harbour office could be provided from an on-site renewable energy generation. On-site RE could be commercially viable to provide power to shore-power. A cable could be pulled to the harbour building, and give energy independency to PoA. 2. Tidal resource should be obtained and a feasibility study can be conducted to suit the tidal profile at the harbour

Scope 2: Carbon Reduction Initiatives

Scope	Hot Spot Source	Scope 2 Emissions 2020		Reduction Initiative	% Target Reduction 2025	2030	2035	2040	Enablers	Barriers	Cost	Rank	Notes
		kg CO2e	% O/A		Short	Med	Long	Stretch					
Scope 2	Electricity	955,476	100%	Onsite energy production through Wind via onshore WTG within PoA Facilities	-				Technology available and field proven for deployment adjacent to harsh marine environment. Consideration to VA (Vertical Access) WTG as 0.5 to 1MW units become available VA WTG offer deployment on breakwaters / adjacent land in close cluster configuration,	High investment cost for the WTG , installation, power cable and infrastructure. EIA, Planning and consents for local WF may be time consuming and prohibitive .	Medium		Observation 1 .No benefit has been drawn for reduction in short / medium. 2 .Monitor technology advancement and commercialisation of Vertical axis WTG. 3. Timeline for EIA, planning and consents will be significant (circa 5-7 years) . 4. Potentially not well received by local community 5. Recommend that a technology review and feasibility assessment is review again in 2025 to identify if any emerging opportunities

Scope 2: Carbon Reduction Initiatives

Scope	Hot Spot Source	Scope 2 Emissions 2020		Reduction Initiative	% Target Reduction				Enablers	Barriers	Cost	Rank	Notes
					2025	2030	2035	2040					
		kg CO2e	% O/A		Short	Med	Long	Stretch					
Scope 2	Electricity	955,476	100%	Onsite energy production via FLPB (Floating LPG power barge	-		60%		Technology available and field proven for FLPB to provide 20MW off-grid power solution to remote areas either alongside / spread moored. Lease options available to spread CAPEX costs Lead time for unit is circa 18 to 24 months. Potential to sell excess power to grid. Offers a temporary solution which can be re-deployed	Significant cost for Lease, transport and installations. Infrastructure investment on quayside for substation and cabling Planning consent required for temporary anchoring / bring alongside for extended period. LPG is still hydrocarbon derivative - need to asses life cycle emission reductions	Medium		<u>Observation</u> 1. LPG does not offer an emission free solution and unlikely that planning consents would achieved for moored assets in Bay.
Scope 2	Electricity	955,476	100%	Local Power and Purchase Agreement with Offshore Wind Farm	-		100%	100%	Well-placed for access to offshore wind farms. Existing relationship with the OWF developers to explore opportunity for PPA / late life farm in. Confirm when current CFD expires as OFTO / OWFD will be looking for potential market opportunities	Regulatory body (OFGEM Grid) may restrict local PPA. Late Life farm in may be expensive and incur deco mm liabilities	Medium		<u>Observations</u> 1. Significant amount of investment required, however, if implemented PoA tenants could also use this energy, which in turn would reduce the emission total for Scope 3, Leased Assets. 2. PoA is situated in close proximity to two Offshore wind (OWF) projects and is providing Operations and maintenance for them. 3. A PPA from offshore wind is an excellent option for providing green energy. <u>Recommendation:</u> 1. Discussions should be held with nearby OWFs

Cost	Range
Low	<£500,000
Medium	£500,000-£2,000,000
High	>£2,000,000

Scope 1
Scope 2
Scope 3

Scope 3: Non-Tenant Carbon Reduction Initiatives

Scope	Hot Spot Source	Scope 3 NT Emissions 2020		Reduction Initiative	% Target Reduction				Enablers	Barriers	Cost	Rank	Notes
		kg CO2e	% O/A		2025 Short	2030 Med	2035 Long	2040 Stretch					
Scope 3	Business Travel	5,643	13%	Carbon Budget	20%	30%	75%	75%	Development of carbon budgets for leadership team / departments Development of incentive scheme to promote engagement Develop partnership with airlines / hotel groups offering lowest carbon emissions. Adopt monthly monitoring and tracking, with quarterly reporting Develop in-house software for tracking. Promote use of train Draw on pull of electric cars In time low carbon air travel may be possible for domestic / regional flights.	Requires in-house man hours to coordinate Risk to business continuity Challenge to reduce air miles carbon footprint until technology offer low carbon fuel alternatives	Low		Recommendations 1. Start a carbon budget scheme - aim to reduce travel whilst maintain business continuity. 2. Promote use of remote / virtual working 3. Develop in-house software for tracking.
Scope 3	Employee Commute	24,900	57%	Behavioural schemes including salary sacrifices: - Cycle to Work Scheme + facilities to change - Electric car salary sacrifice - Increase car charging point - Employee awareness training - Promote train / bus transport - Flexible working	25%	35%	50%	75%	Development of incentive scheme to promote engagement Invest in infrastructure / facilities for cycle to work. Invest in infrastructure for car charging points Offer cost incentives for electric charging For long distance commuters promote use of alternative transport options - train / bus Flexible working	Requires in-house man hours to coordinate. Local climate does not encourage all year round cycling. Public transport may not provide favourable routing options.	Low		Observations 1. Hard area to influence directly, however it is thought by promotion of such measures reduction could be made within the emission source. 2. Must be noted as the UK moves towards electric cars, overtime emissions will decrease within this area.
Scope 3	WFH	6,100	14%	Training & Behavioural schemes to promote Energy consumption reduction measures Reduce Waste	0	0	0	0	Training & Behavioural schemes to promote Energy consumption reduction measures Reduce Waste Encourage to go to supplier for renewables Energy audit of home	Challenge to influence home environment	Low		Observations 1.Currently there is very little can be done to reduce in this area, the Emission Factor for WFH will lower as UK grid mix decreases.
Scope 3	Waste	1,605	4%	Reduction in waste through: Reduction, re-use and recycle.	25%	50%	50%	50%	Development of targets and incentive scheme to reduce waste to landfill across business activities. Development of targets and incentive scheme to increase recycling Restrict the use of single use plastic across the business	Requires in-house man hours to co-ordinate	Low		Recommendations 1.Assignment of Environmental officer to be tasked with an overall waste reduce and behavioural training. 2. Quarterly targets for waste reduction to established.
Scope 3	Water	5,457	12%	Water saving technologies Use a water-saving device in your toilet cistern. Depending on the size of your cistern, you could save between one and three litres each time you flush the toilet. Consider fitting a water butt to collect rainwater off your roof. Water butts usually store about 200 litres of water. Check your property regularly for leaks on your internal plumbing. Install motion sensors on sink taps.	5.00%	12.50%	12.50%	12.50%	Review asset inventory and monitor water consumption hot spots. Develop a maintenance programme for the water storage and supply across the facilities Don't run appliances on half loads Engage and inform employees Switch water suppliers for new business water rates at contract renewal Install water-saving measures		Low		Observations 1. Rain water re-use could also be explored.
Scope 3	Water	5,457	12%	Leak detection audit	5%	5%	5%	5%	Low cost		Low		Recommendations 1.Leak proofing implementation and water saving measures to be identified within full water audit.

45,769

Low	<£100,000
Medium	£100,000-£2,000,000
High	>£2,000,000

Rank	
	High - 90% Reduction by 2030
	Medium - 90% reduction by 2035
	Low - 90% reduction by 2040
	Mark - reduction targets not met

Scope 1
Scope 2
Scope 3

Cost	
	Proceed
	Potential De-prioritisation
	To be reserved at Index
	Not Applicable

Scope 3: Tenant Carbon Reduction Initiatives

Scope	Hot Spot Source	Scope 3 T Emissions 2020		Reduction Initiative	% Target Reduction				Enablers	Barriers	Cost	Rank	Notes
		kg CO2e	% O/A		2025 Short	2030 Med	2035 Long	2040 Stretch					
Scope 3	Leased Assets	1,855,240	100%	Influence tenants to use clean energy		25%	25%	25%	Electrical supplier to provide from renewables source only. Review at next contract renewal with energy supplier. Consider a phased approach to transition to smooth cost curve. Engage with Tenants to promote benefits of carbon emissions reductions Promote reporting and monitoring of energy consumption reporting and monitoring. Some tenants like Petersen is already announced they are not zero. Best practice can be taken from them and others can be encouraged.	Renewables sourced electricity costs significantly more - circa 15% more expensive. Electricity provider may not be able to offer fully renewables solution. Resistance from tenants.			Recommendation: 1. Provide template and briefs on required data. 2. Allow extended period for Tenants to report. 3.Thames Green scheme PLA: 5 different bandings on air quality, carbon, energy, water quality, litter and waste. A good way to incentivise tenants. https://greenscheme.pla.co.uk/ 3. A meeting could be held to discuss the appetite for a collaborative approach to have a better deal for RE tariff or on-site RE development.
Scope 3	Leased Assets	1,855,240	100%	Energy audits of leased buildings	5%	5%	5%	5%	Review Facilities inventory and perform an energy audit of the respective facilities to identify waste reduction, energy savings and improvement plans. Adopt a Phased approach - focusing initially on highest energy utilisation facilities	Aging inventory requiring high CAPEX investment to improve energy efficiency. Cost of energy audit across facilities inventory. Access to buildings.	Low		Observation: 1. Engagement with energy assessor required, dependant on measures identified reduction measures could be greater than 5%.
Scope 3	Leased Assets	1,855,240	100%	Onsite clean energy production (Solar / Wave / Tidal / Wind)	N/A	N/A	2%	2%	Opportunities to install Solar Panels on tenant facilities If WTG installed, potential excess power could be offered to tenant facilities	High cost. Contractual agreements that tenants would use such power.	Medium		Observation: 1. No benefit has been drawn for reduction in short / medium. 2. Monitor technology advancement and commercialisation . Recommendation: 1.Recommend that a technology review and feasibility assessment is review again in 2025 to identify if any emerging opportunities
Scope 3	Leased Assets	1,855,240	100%	Heat pump installation by PoA	5%	65%	65%	65%	Good applicability, as noted in Buro Happold report. High emission reduction. Grant may be available. Opportunity to offer to Tennant facilities	Installation costs	Low		Observation: 1.Installation of Heat pumps may not viable in North Harbour Facilities due to listed building status. This requires to be reviewed and assessed. May be suitable for some tenant facilities, which are not listed buildings. 2. Potential opportunities in South harbour location. 3.Feasibility study required. Buro Happold report suggested that PoA were a good candidate for Heat Pumps. Percentage decrease reflects heat pump installation in 2030.
Scope 3	Leased Assets	1,855,240	100%	Local Power and Purchase Agreement with Offshore Wind Farm	-		100%	100%	Well-placed for access to offshore wind farms. Existing relationship with the OWF developers to explore opportunity for PPA / Lots Life farm in. Confirm when current CFD expires as OFTO / OWFD will be looking for potential market opportunities	Regulatory body (OFGEM Grid) may restrict local PPA. Lots Life farm in may be expensive and incur decomm liabilities	Medium		Observation: 1. Significant amount of investment required, however, if implimented PoA tenants could also use this energy, which in turn would reduce the emission total for Scope 3, Leased Assets. 2. PoA is situated in close proximity to two Offshore wind (OWF) projects and is providing Operations and maintenance for them. 3. A PPA from offshore wind could be the best option for providing green energy.

#REF!

Cost	Range
Low	<£500,000
Medium	£500,000-£2,000,000
High	>£2,000,000

Ranks	
	High - 90% Reduction by 2030
	Medium - 90% reduction by 2035
	Low - 90% reduction by 2040
	Alert - reduction targets not met.

Scope 1
Scope 2
Scope 3

Rank	
	Favourable
	Potential for consideration
	To be actioned in Future
	Not Applicable

Scope 3: Marine Traffic Carbon Reduction Initiatives

Scope	Hot Spot Source	Scope 3 T Emissions 2020		Reduction Initiative	% Target Reduction				Enablers	Barriers	Cost	Rank	Notes
		kg CO2e	% O/A		2025 Short	2030 Med	2035 Long	2040 Stretch					
Scope 3	Client Vessels	36,525,740	95%	Speed restrictions	5%	5%	5%	5%	Set and monitor speed in controlled zones Monitor speed in port restricted zone -fairway buoy to harbour entrance	Communication to visitors	Low		Observation: 1. Even a 10% reduction in their speed can have them 30% reduction in CO2 emissions. Current speed: 5 nautical miles
Scope 3	Client Vessels	36,525,740	95%	Record actual fuel consumption and vessel carbon emissions rating in POA boundaries	10%	10%	10%	10%	Monitor and record the fuel consumed within the PoA boundary for transits and alongside. Provide a standard template and automated interface to allow this to be recorded per visit and logged		Low		Observation: 1.The marine traffic emissions are determined using the AIS tracker and IMO reference number to determine vessel size and engine specification . This is a conservative approach and field data would allow the model to be optimised to reflect reported data.
Scope 3	Client Vessels	36,525,740	95%	Carbon Capture and Utilisation	10%	20%	50%	70%	New technologies being developed for on-site carbon capture.	early days	Meidum		Observation: 1.A couple of meetings held with a company in Aberdeen, who offers a solution. Could be a good long-term solution 2. An advantage this offers compared to shore power is that it will not need RE. The technology will capture the emissions at site. It would also offer a new revenue stream from utilisation.
Scope 3	Cleint Vessels	36,525,740	95%	Shore power: Albert Mearns RORO			57%		ROpax ferries will have available to retrofit vessels with power from shore capabilities whilst berthed along side by 2023. Feasibility assessment to be performed on the Ferry's to confirm in power from shore hook-up is feasible, cost & timeline for implementation. Infrastructure investment require to provide power from shore at the dedicated quayside Government Chartered vessel that will require to meet the Scottish Government Net Zero Targets. Confirm power is sourced form renewables facility. Review when ferry's are due to be replaced and replace with vessel's capability of running on electric in PoA boundaries	Budget and time constraints to upgrade the ferry to receive power from shore. Infrastructure investment to provide power from shore to quayside. Stakeholder engagement with vessel owner /Scottish Government Transit form quayside to fairway buoy will still be carbon emission source			Observations: 1. POA providing power to Client vessel's will result on impact on Scope 2 emissions 2. Until Ferry is swapped out emissions will be remaining for transit time. 2. PoA is at tender stage right now. Shore power will be installed and available in the next 12 months. The RoPax island ferries (excluding cargo) will be the first to serve. 3. Albert and Merns are initial berths for consideration. For ferries it would be RORO berth. Recommendation: A feasibity study with cost benefit analysis should be carried out to obtain RE for the shore-power. The alternatives are: i) RE tariff- from the grid ii) PPA agreement from a nearby offshore wind farm iii) On-site RE development from solar/wave/tidal.
Scope 3	Cleint Vessels	36,525,740	95%	Shore power: Torry Waterloo Clipper			57%		PSV/ MPSV (Torry) service high profile Energy Companies that will be looking to implement carbon emissions reductions across PSV fleet Engagement with vessel owners to promote power from shore from regular visitors. Vessel Owners will look to introduce more modern vessels to replace existing assets - these will be likely fitted ready to be powered from shore. Review how many of existing regular visitors are fit for power from shore Investment in infrastructure to provide power from shore	Phased timeline for replacement of vessel High cost and timeline for infrastructure to offer power from shore Relies on client's vessels being ready to take shore power			Observations: 1. POA providing power to Client vessel's will result on impact on Scope 2 emission. 2.PSV activity may reduce as the O&G activity drops as mature basin steps through energy transition period Recommendations: 1. Require to ensure the electricity is procured from renewables source.

Scope 3: Marine Traffic Carbon Reduction Initiatives

Scope	Hot Spot Source	Scope 3 T Emissions 2020		Reduction Initiative	% Target Reduction				Enablers	Barriers	Cost	Rank	Notes
					2025	2030	2035	2040					
		kg CO2e	% O/A		Short	Med	Long	Stretch					
Scope 3	Cleint Vessels	36,525,740	95%	Shore power: Eurolink Trinity Jamieson					DSV (Eurolink) service high profile Energy Companies that will be looking to implement carbon emissions reductions across DSV fleet Engagement with vessel owners to promote power from shore from regular visitors. Vessel Owners will look to introduce more modern vessels to replace existing assets - these will be likely fitted ready to be powered from shore. Review how many of existing regular visitors are fit for power from shore Investment in infrastructure to provide power from shore	Phased timeline for replacement of vessel High cost and timeline for infrastructure to offer power from shore Relies on client's vessels being ready to take shore power			<u>Observations:</u> 1. POA providing power to Client vessel's will result on impact on Scope 2 emission. <u>Recommendations:</u> 1. Require to ensure the electricity is procured from renewables source.

Scope 3: Marine Traffic Carbon Reduction Initiatives

Scope	Hot Spot Source	Scope 3 T Emissions 2020 kg CO2e	Scope 3 T Emissions 2020 % O/A	Reduction Initiative	% Target Reduction 2025 Short	% Target Reduction 2030 Med	% Target Reduction 2035 Long	% Target Reduction 2040 Stretch	Enablers	Barriers	Cost	Rank	Notes
Scope 3	CTV work boat	4,017,831	11%	Hybrid Vessel Shore power	50%	100%	100%	100%	Technology available and field proven in marine application Endurance and range of batteries will suit the CTV to OWF in ABZ and Kincardine Phased replacement of existing fleet when they reach end of service. Accelerate replacement of existing fleet Electrical supplier to source from renewables only Consider HVO as alternative fuel source to diesel	Timeline for implementation restricted by replacement program CAPEX investment of hybrid electric powered CTV vessels will be significant CAPEX investment for infrastructure to provide dedicated power charging stations for the CTV fleet			Observations 1. Infrastructure upgrade to provide quayside power charging points 2. Promote early emissions reductions in existing fleet Recommendations 1. Hybrid replacement vessel for existing fleets, as the come to end of service, represents a favourable option 2.Ensure electricity drawn to charge new vessels is from renewables source 3. One of the CTV workboats (Vattenfal) is looking to retrofit to electrify their boat and carry out trials.
Scope 3	Harbour Tug	58,441	0%	HVO Shore power	50%	100%	100%	100%	Technology available and field proven in marine application Endurance and range of batteries will suit the CTV to OWF in ABZ and Kincardine Phased replacement of existing fleet when they reach end of service. Accelerate replacement of existing fleet Electrical supplier to source from renewables only Consider HVO as alternative fuel source to diesel	Timeline for implementation restricted by replacement program CAPEX investment of hybrid electric powered CTV vessels will be significant CAPEX investment for infrastructure to provide dedicated power charging stations for the CTV fleet			Observations 1. Infrastructure upgrade to provide quayside power charging points 2.Promote early emissions reductions in existing fleet Recommendations 1.Hybrid replacement vessel for existing fleets, as the come to end of service, represents a favourable option 2. Ensure electricity drawn to charge new vessels is from renewables source
Scope 3	CTV	2,556,802	7%	HVO Shore power	50%	100%	100%	100%	Technology available and field proven in marine application Endurance and range of batteries will suit the CTV to OWF in ABZ and Kincardine Phased replacement of existing fleet when they reach end of service. Accelerate replacement of existing fleet Electrical supplier to source from renewables only Consider HVO as alternative fuel source to diesel	Timeline for implementation restricted by replacement program CAPEX investment of hybrid electric powered CTV vessels will be significant CAPEX investment for infrastructure to provide dedicated power charging stations for the CTV fleet			Observations 1. Infrastructure upgrade to provide quayside power charging points 2. Promote early emissions reductions in existing fleet 3. To date, PoA have not heard any CTV moving to alternate fuels Recommendations 1. Hybrid replacement vessel for existing fleets, as the come to end of service, represents a favourable option 2. Ensure electricity drawn to charge new vessels is from renewables source

#REF!

Total Marine Traffic Emissions 3652574.00

Cost	Range
Low	<£500,000
Medium	£500,000-£2,000,000
High	>£2,000,000

Top 4 Vessels	Total No.	Percentage
Platform Supply Vessel	1887	29.65%
Multi-Purpose Supply Vessel	1105	17.36%
Divers Workboat	678	10.65%
Standby/Safety Vessel	623	9.79%

Impact	
	High - 90% Reduction by 2030
	Medium - 90% reduction by 2035
	Low - 90% reduction by 2040
	Alert - reduction targets not met