Ports Energy and Carbon Savings

Deliverables 1.2.1 and D1.2.2

Pilot testing of carbon footprint and energy audit methodology and validated audit methodology

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Table of contents

Table of figures

Table of Tables

1. Introduction

Ports represent a range of processes and actors including shipping, logistics, warehousing, heavy industry and passenger transport among others. These activities require energy consumption and therefore impact on the level of greenhouse gas (GHG) emissions. To encourage and enable management of the energy consumption and associated reduction of GHG emissions in ports and understanding of the amount of energy used and emissions is required. This project developed the methods necessary for the auditing of energy and carbon footprint associated with port activities, detailed in report D1.1.4.

This report describes a pilot test (D1.2.1) and validation (D1.2.3) of the methodology developed in D1.1.4, for the PECS partner, Portsmouth International Port, UK.

The completion of the method relies on the availability of complete and reliable data. The pilot study would indicate that many ports do not currently have the procedures and/or capacity to collect, collate, and manage the data required for a complete footprint. Whilst it is possible to provide some derived estimates on the basis of regional or national datasets, accuracy and reliability can be greatly improved where specific port level data is available. Despite these challenges, the methods presented in D1.1.4 provides an opportunity to develop reliable and complete energy and carbon footprints for ports and harbours.

2. Pilot test and validation

2.1.Portsmouth International Port

Portsmouth International Port, owned and operated by Portsmouth City Council, represents one of the six PECS project pilot partners. Portsmouth International Port is located in the City of Portsmouth, Hampshire, on the south coast of the UK (*Figure 1*). Portsmouth is the only island city in the United Kingdom, and is the only city whose population density exceeds that of London. Portsmouth is located 70 miles (110 km) south-west of London.

Portsmouth International Port is the second busiest in the United Kingdom, after Dover, handling around three million ferry and cruise passengers a year. In addition, the Port comprises of multiple activities including various industries and processes. One example is the handling of fresh fruit and vegetables from all over the world, with 70% of all the bananas eaten in the UK arriving via the Port. In 2011, the port opened a new £16.5m passenger terminal. The terminal is designed to reduce energy and carbon emissions through heating provided by thermal sea energy and cooling by the coastal breeze, captured by wind catchers on the roof.

Portsmouth International Port has five linkspans for the purpose of loading/unloading Ro-Ro (roll-on-roll-off) type ferry vessels. Linkspan number 2 recently reached the end of its operational lifetime and has been replaced with an energy efficient linkspan as part of the PECS project. The new linkspan is designed to incorporate carbon saving features which allows the port to continue providing a service to customers and controlling its CO_2 emissions at the same time.

2.2.Pilot test and validation

2.2.1. Boundaries and scope

A PORT BOUNDARY IS PRIMARILY DETERMINED BY THE GEOPOLITICAL BOUNDARY OF THE PORT ADMINISTRATIVE AREA (*FIGURE 1*). FOR THE PURPOSES OF THE CARBON FOOTPRINT, ALL ACTIVITIES WITHIN THIS BOUNDARY ARE CONSIDERED SCOPE 1 EMISSIONS SOURCES; TRANSBOUNDARY SOURCES INCLUDING ELECTRICITY, STEAM, AND HEAT ARE CONSIDERED SCOPE 2; AND FURTHER TRANSBOUNDARY SOURCES INCLUDING WASTE, OUT-OF-BOUNDARY TRANSPORT, AND GOODS AND SERVICES ARE CONSIDERED SCOPE 3 (

Table 1).

For the purpose of context the method present in D1.1.4 provides the ability to audit and carbon footprint emissions and energy from scope 1, 2, and 3 sources.

Within the context of the PECS project, linkspan 2 is considered the intervention and is thus reported separately (to monitor effectiveness of the intervention against the baseline scenario) and within the context of the wider port environment.

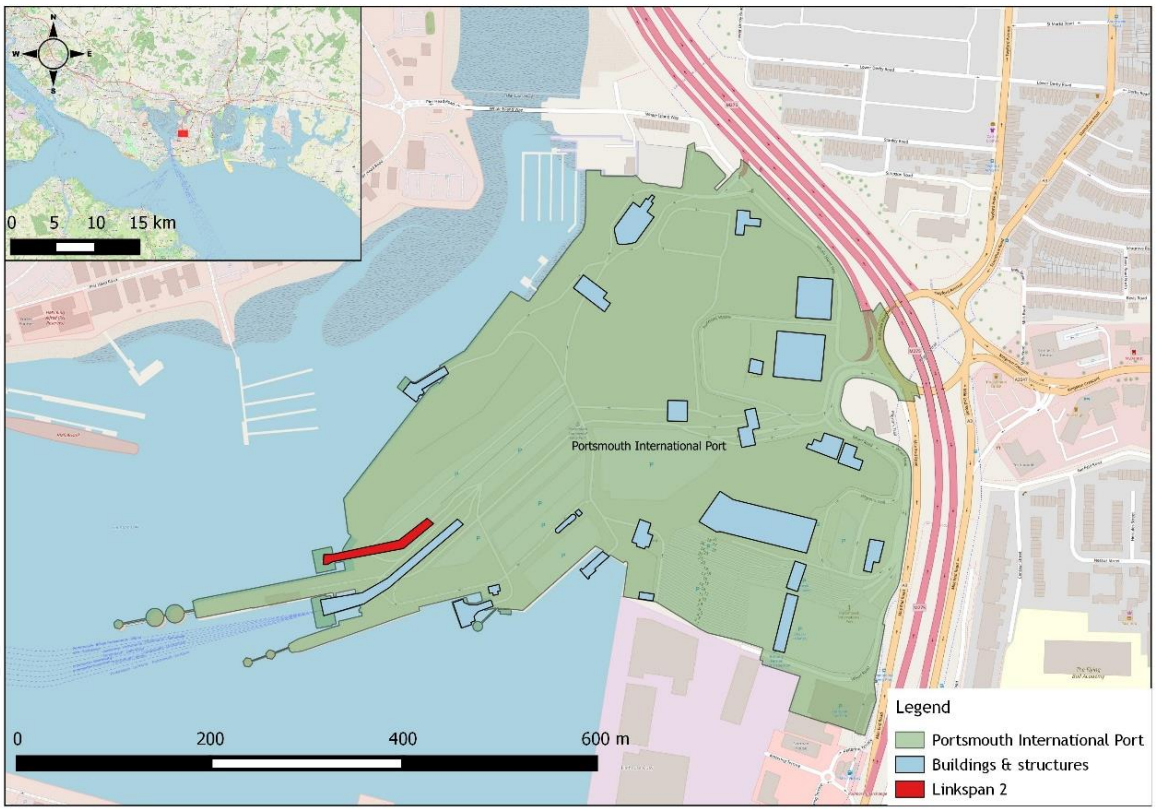

Figure 1: Portsmouth International Port and location of Portsmouth, UK (insert). The PECS project intervention, linkspan 2 is highlighted.

2.2.2. Data availability

The application of the energy audit and carbon footprint methodology to Portsmouth International Port, identified several issues relating to the availability of data; likely applicable to other ports. These issues arise where the port does not hold, monitor, or otherwise have a mechanism to capture the required data. The reasons for this lack of data are multifaceted, but primarily arise from no previous requirement (regulatory or otherwise) to maintain records and a lack of resource to capture the data.

In some cases it was possible to provide a proxy estimate, using related national, regional, or other datasets.

Importantly however, the data relating to the PECS intervention, Linkspan 2, are captured within the dataset. Missing data arises from the wider context of the port system. Table 1 details the data missing from the dataset.

TABLE 1 : DATA CATEGORY AND STATUS OF DATA OBTAINED RELATING TO PORTSMOUTH INTERNATIONAL PORT.
Note items given as N/A are not currently relevant/used within the port.

Scope	Category	Status of data availability
1	Stationary fuel combustion	No data currently available
	Industrial processes	No data currently available
	In-boundary ground transport (port owned)	No data currently available
	In-boundary ground transport (non-port owned)	Derived estimate
	In boundary marine transport (port owned)	No data currently available
	In boundary marine transport (non-port owned)	Derived estimate
	Mobile machinery	No data currently available
2	Electricity	Limited coverage
	Steam	N/A
	Heat	N/A
3	Water supply	No data currently available
	Sewerage	No data currently available
	Out of boundary road transport	Derived estimate
	Out of boundary marine transport	Derived estimate
	Waste	No data currently available
	Goods and services	No data currently available

2.2.3. Provisional results of the pilot study

Results are provided for the data category items identified for the 2017 calendar period. Note these results are provisional only and subject to change with development in the PECS project. Results for energy statistics are reported in gigawatt hours (Gwh), and carbon footprint in kg carbon dioxide equivalents ($kgCO_2e$).

TABLE 2 PROVISIONAL ENERGY AUDIT AND CARBON FOOTPRINT FOR PORTSMOUTH INTERNATIONAL PORT

Scope	Category	Energy (kWh)	Carbon footprint ($kgCO_2e$)
1	Stationary fuel combustion	No data	No data
	Industrial processes	No data	No data
	In-boundary ground transport (port owned)	No data	No data
	In-boundary ground transport (non-port owned)		281488
	In boundary marine transport (port owned)	No data	No data
	In boundary marine transport (non-port owned)		3937436
	Mobile machinery	No data	No data
2	Electricity (limited coverage – linkspan 2 only)	161983	98669
	Steam	N/A	N/A
	Heat	N/A	N/A
3	Water supply	No data	No data
	Sewerage	No data	No data
	Out of boundary road transport		4720343
	Out of boundary marine transport	No data	No data
	Waste	No data	No data
	Goods and services	No data	No data

3. Validation

The method presented in D1.1.4 provides a mechanism for the auditing of energy and carbon footprint of ports and marinas. There remain however challenges that need to be addressed. These challenges arise from issues relating to data availability, with others associated with calculation. These key challenges are detailed below and are further explored in D1.2.4.

3.1.Key challenges

The method relies on suitable reliable and complete data to perform calculation of estimates of both energy and carbon footprint. Currently it is clear from the pilot studies that many ports may not collate, nor hold that data required. In the case of the pilot study no data was available for a number of activities across all scopes. For instance, no data was provided relevant to stationary fuel combustion. It is apparent that the necessary records to compile this dataset may be available from financial records but are not currently compiled in a manner to enable use in the method.

In the absence of actual data some progress has been made using proxy estimates from national and regional data sets. This evidently carries significant assumptions and uncertainty; however, it provides for estimated results, giving potential for management outcomes. As procedures are developed for further data acquisition and management these uncertainties may be improved. Significant work is needed with port partners to build the procedures and methods for the compilation of data.