



City of Oslo
Port Authority



Port of Oslo

CO₂ Emission report for the calendar year 2007

(Based on the ISO 14064 standard)



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Management summary

The Port of Oslo is Norway's largest general cargo port and its leading container and passenger gateway. The main categories of users are shipping companies, agents, forwarders, importers, exporters and ferry passengers both foreign and local.

Being located in the centre of the capital's industrial and commercial heartland, the Port of Oslo has been working strategically and systematically on environmental issues for several years. The key environmental policy elements – in relation to greenhouse gas emissions - are the ISO 14001 and energy efficiency programme.

The project of calculating the carbon footprint of the Port of Oslo gives an opportunity to use the existing data in a systematic way, supporting not only energy efficiency increase in buildings but also offering a broader perspective of the Port of Oslo's impact on climate. By calculating a carbon footprint the Port of Oslo will get detailed information about the sources of emissions. Based on this, the Port of Oslo can easier provide measures for reductions and create a reduction target for the years to come.

The development of the Carbon Footprint of the Port of Oslo is based on the ISO14064-1 standard, which has been derived from the WBCSD/WRI GHG Protocol. The Port of Oslo chose the operational control approach to be able to calculate the carbon footprint that can actually be influenced by the Port Authority. The inventory was developed for the calendar year 2007.

The data analysed relate mostly to the energy production and consumption both in stationary and non-stationary sources. The emission sources currently included in the carbon footprint only generate CO₂ emissions. Relatively small emissions like technical gases as a by-product of combustion and so called F-gases from cooling installations were neglected. To ensure transparency, emission sources were divided in the following scopes:

- direct emissions (scope 1) resulting from fossil fuels combustions on the site
- energy indirect emissions (scope 2) for consumption of electricity imported to the site (indirect emissions),
- other indirect emissions (Scope 3) for consumption of fuels for commuting (indirect emissions).

The greenhouse gas emissions in the period 1 January 2007 – 31 December 2007 are listed in the table below:

Item	GHG in tCO ₂ eq
Scope 1: Direct emissions	456
Scope 2: Energy indirect emissions	49
Scope 3: Other indirect emissions	199
Total	704

The total estimated CO₂ emissions from the Port of Oslo activities are 704 t CO₂e. Most of the emissions result from fossil fuel combustion for energy production (mostly for non-stationary sources) in the area of Port of Oslo. Commuting is the second largest CO₂ emission source. Electricity consumption in the harbour constitutes the smallest part of the carbon footprint as Norwegian power mix is by far dominated by hydropower, which is an emission free source.

Elaborating on the carbon footprint for 2007 is the first step on the way to decreasing the climate impact of the Port of Oslo. Implementation of the footprint (setting targets,

possibly broadening the scope and defining measures are yet to be done (carbon management is on ongoing process).

Port of Oslo would like to share the results of the work carried out so far regarding calculating the carbon footprint with other ports at the C40 World Ports Climate Conference 2008.

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1 Introduction

1.1 About Port of Oslo

Port of Oslo is Norway's largest general cargo port and its leading container and passenger gateway.

Port of Oslo is located at the centre of the capital's industrial and commercial heartland, in the 100 kilometres long Oslofjord. Most of the consumer goods and industrial cargoes imported across its quays are destined for the Oslo region, which itself contains a third of the country's population.

In 2007 over 5.200 ships docked at the port with a total of 6.3 million tonnes of cargo and almost 7 million passengers. Since 2003 the port has experienced an increase in container traffic of 20 percent. The port has two container terminals. The terminal operations are privatised, but the crane-handling is carried out by the ports staff.

Oslo is Norway's largest ferry port and three daily cruise ferries to Denmark and Germany provide a link between Norway and continental Europe. Oslo is also one of the fastest growing cruise destinations in Europe.

The port of Oslo is in its largest – ever restructuring programme and the years ahead will bring major changes both to the look of the city and the port it self. The aim is to create a more area-efficient port – both for the port users and for the City of Oslo. Large sections of the old port near the city centre will be released for urban development concentrating the cargo handling in the south of the port.

The main categories of users of the port are shipping companies, agents, forwarders, importers, exporters and ferry passengers both foreign and local.

The Oslo Port Authority is a municipal enterprise with a board. The Port Authority's activities consist of:

- Port Administration and regulation within the port district in accordance with the Port Act, rules and regulations.
- Provision of basic infrastructure for shipping, imports and exports, and passenger traffic. In relation to shipping, the services consist of keeping the sea-lane open and providing adequate berths for ships.

The services also consist of planning, developing and maintaining terminals for container traffic, bulk transport and cargo- and passengers traffic, both foreign and coastal.

1.2 Environmental policy of the Port of Oslo

The Port of Oslo is located at the centre of the capital in close location between residential areas and the port motivates a strong focus on environmental issues.

Therefore, the Port of Oslo has been working strategically and systematically on environmental issues for several years. The port has employed dedicated personal with responsibility for environmental issues since 1995, and stated its first environmental targets in 1996. Back in 1997 the Port Authority established its first environmental policy and its objectives. And now it works systematically to reduce the negative environmental impact the port actives has on the surroundings.

The most important environmental focus areas over the years have been:

- Implementation of an environmental management system,

- Waste and ship-waste,
- Dredging of contaminated sediments and cleaning sea bed,
- Noise reduction,
- Emissions to sea,
- Emissions to air,
- Energy consumption,
- Landscape pollution,
- Communication with stakeholders.

The key environmental policy elements –in relation to greenhouse gas emissions - are the ISO 140001 and energy efficiency programme.

1.2.1 Environmental management system

The Port of Oslo has been incorporating its environmental management system since 1997, to implement environmental sustainable principles in port operations. In 1999 it was stated that the Port Authority was going for an ISO 14001- certification. In years 1999-2001 the Port of Oslo has participated in the project "Green Municipality". In June 2001 its management system was approved according to the ISO 14001 standard. These efforts led to the certification by the environmental standard ISO 14000 in 2001.

The Environmental management system has been incorporated in quality & HSE management system as it provides regular operations are secured in routines and demands continuous improvement.

1.2.2 Energy management program

There is an energy efficiency programme ran in the Port of Oslo for improving the energy efficiency of buildings belonging to the Port of Oslo. The programme was implemented by estimating the energy saving potential in 2004, which led the way towards creating an energy efficiency increase programme in the years to come. The programme assumed 15% energy efficiency increase in 75% heated building space in the Port of Oslo's ownership.

1.3 Ambition Port of Oslo

Due to the environmental focus in the Port of Oslo, the project of calculating the carbon footprint of the Port of Oslo offered an opportunity for more work on climate issues and to start on a strategic project aimed exclusively on reducing GHG emissions. The carbon footprint gives an opportunity to use the existing data in a systematic way, supporting not only energy efficiency increase in buildings but also a broader perspective of the Port of Oslo's impact on climate. By calculating a carbon footprint the Port of Oslo will get detailed information about the sources of emissions. Based on this, the Port of Oslo can easier provide measures for reductions and create a reduction target for the years to come.

Port of Oslo would like to share the results of the work carried out so far regarding calculating the carbon footprint with other ports at the C40 World Ports Climate Conference 2008.

Port of Oslo is aware of the fact that the emissions that are currently calculated as part of its footprint contribute only to a small amount to the total emissions of the Oslo port area. Port of Oslo sees this carbon footprint just as a first step towards a carbon management strategy and issues like setting targets and broadening the scope of activities will be part of the discussion in the coming period.

The emission report was drafted in such a way that external verification can take place.

1.4 Carbon footprint

A carbon footprint is defined in this report as the total amount of greenhouse gas emissions to directly and indirectly support human activities, usually expressed in equivalent tons of carbon dioxide (CO₂).

To establish an initial analysis of the carbon footprint for the base year, Port of Oslo Authority utilized the services of both PWC and Ecofys. The latter conducted the GHG-emissions inventory of the Port-authority facilities and operations. PWC consulted on a (more) strategic level.

The development of the Carbon Footprint of the Port of Oslo Authority is based on the ISO14064-1 standard¹, which has been derived from the WBCSD/WRI GHG Protocol².

The carbon footprint or GHG inventory was developed for the calendar year 2007. This was the most recent year of available data and was a generally representative year in terms of climate, traffic and operational characteristics.

The data analysed relate mostly to the energy production and consumption both in stationary and non-stationary sources. The emission sources that are currently included in the carbon footprint only generate CO₂ emissions, no other GHG gases.

GHG emissions can be divided into the following categories:

- Direct emissions (scope 1) are those emissions that were emitted from sources of which the Port of Oslo has operational control. These emissions are mostly originating from the combustion of fossil fuels. Preferable emissions are calculated by multiplying the fuel consumption per fuel (or unit mechanical power used) with the relevant national carbon emission factor.
- Energy indirect emissions (scope 2) are related to the import of power, heat and steam on sites controlled by the Port of Oslo. The origin of imported power is not known for all sources. These emissions have been calculated using international emission factors for Norway from the IEA statistics.
- Other indirect emissions (scope 3) are non-direct or energy indirect emissions that can be attributed to operations of the Port of Oslo.

More detailed information on the emissions sources can be found in chapter 2.3.

In most cases, actual measurements and accounting data were used. Where not possible to use actual measurements and accounting data, estimations were made.

1.5 Purpose and objectives of the emission report

This emissions report has several objectives. For the Port of Oslo it is a starting point in developing a carbon program and starting yearly reporting on the Port of Oslo carbon footprint. The emission report can be used to inform external stakeholders and as a source of inspiration for other ports.

¹ ISO 14064 International Standard, first edition 2006-03-01, Greenhouse gases — Part 1: Specification with guidance at the organization level for quantification and reporting of greenhouse gas emissions and removals, ISO 2006, Geneva, Switzerland.

² The GHG Protocol, A Corporate Accounting and Reporting Standard, Revised Edition, World Resources Institute and World Business Council for Sustainable Development, March 2004, Geneva, Switzerland

1.6 Responsibility report

At present, it is the environmental department that is responsible for developing a carbon footprint for the Port of Oslo and producing the annual emissions report. This can however change during further implementation of the program.

1.7 Reporting period

The emission report is valid for calendar year 2007 and will be updated yearly.

1.8 Conventions

Greenhouse gas emissions are referred to as GHG emissions. An inventory of GHG emissions is referred to as a carbon footprint. Activities that lead to GHG emissions have to be quantified; these are internationally referred to as activity data. Activity data are multiplied with an emission factor in order to estimate the GHG emissions.

2 GHG emission design and development

2.1 Key choices

Establishment of a carbon footprint requires the following steps:

Step	General description of the activity	Activity for the Port of Oslo
1.	Establishing the goal that the carbon footprint has to achieve	See description in paragraph 1.5
2.	Application of the standard for the emission inventory	The development of the Carbon Footprint of the Port of Oslo is based on the ISO14064-1 standard, which has been derived from the WBCSD/WRI GHG Protocol. More detail can be found in paragraph 1.4
3.	Clarifying of the choices that are available within the framework of the applied standard	See description in the following paragraphs
4.	Development of a GHG emission protocol that is specific for Port of Oslo Authority	The monitoring protocol for Port of Oslo Authority was developed parallel to the data gathering process document.
5.	Reporting format for the reporting of the carbon footprint	The emission report was drafted according to the monitoring protocol and contains all the calculations from the monitoring protocol in order to inform the readers of the emission report in detail

2.2 Organisational boundaries

Part of GHG inventory design is to establish the organisational boundaries that are applicable. An important choice is whether to apply the so called

- operational control approach or
- the equity approach.

The operational control approach is best suited for voluntary GHG emission reduction programs. The equity approach is more suited for determining the risk a company runs regarding carbon emissions.

The Port of Oslo chose the operational control approach³ to be able to calculate the carbon footprint that can actually be influenced by the Port Authority.

Under the operational control approach, the activities from Oslo itself and its daughter company, HAV Eiendom AS are taken into account. HAV Eiendom AS consists of only one (two persons in the near future) person employed in this company and the company office is located in one of the buildings owned by Oslo Port Authority. The only emission sources from the company are indirect emissions from electricity use for heating and lightening. The electricity use is taken into account in the estimates for electricity usage for buildings owned by Port of Oslo.

³ ISO 14064 International Standard, first edition 2006-03-01, Greenhouse gases — Part 1: Specification with guidance at the organization level for quantification and reporting of greenhouse gas emissions and removals, ISO 2006, Geneva, Switzerland.

The Port of Oslo rents out a lot of space to other companies but cannot control their energy consumption. Therefore, the emissions resulting from energy use in rented out buildings are excluded from the carbon footprint.

2.3 Operational boundaries

The Port of Oslo has calculated all direct and energy indirect emissions and a selection of other indirect emissions (emissions from commuting). The facilities included in the GHG inventory are based on activities under operational control per 31 December 2007 (see annual report 2007).

It is possible to extend the list of activities leading to emissions (e.g. include business travel emissions) in the following years.

In paragraph 1.4 it was described how GHG emissions can be divided into direct emissions, energy indirect emissions and other indirect emissions. In the next paragraphs the emission sources leading to these emissions are described.

2.3.1 Direct emissions (scope 1)

Activities resulting in direct emissions for the Port of Oslo are categorised in the following way:

1. Fuel usage for heating of Port of Oslo buildings;
2. Fuel usage by company owned cars of Port of Oslo;
3. Fuel usage by operational vessels owned by Port of Oslo;
4. Fuel usage by operational machines and cranes owned by Port of Oslo.

There was no capture and storage of GHG on the Port of Oslo in the calendar year 2007. There was no combustion of biomass in operations controlled by the Port of Oslo. There was no export of energy from sites that are under the control of Port of Oslo.

2.3.2 Energy indirect emissions (scope 2)

Activities resulting in energy indirect emissions by the Port of Oslo are categorised in the following way:

1. Electricity usage by cranes owned by Port of Oslo,
2. Electricity usage for the purpose of harbour lightning by Port of Oslo,
3. Electricity usage for buildings owned by Port of Oslo (e.g. heating, lightning),
4. Electricity usage by lighthouses owned by Port of Oslo,
5. Electricity usage from other sources in Port of Oslo.

No heat or steam was imported by the Port of Oslo in the calendar year 2007.

It is worth mentioning that most electricity produced in Norway is based on hydropower (green electricity). However, due to significant imports possibilities it is not possible to estimate the amount of green power actually consumed by the Port of Oslo.

2.3.3 Other indirect emissions (scope 3)

The Port of Oslo chose to report emissions related to commuting employees as data availability was sufficient for these emissions.

Activities resulting in other indirect emissions reported by the Port of Oslo are categorised in the following way:

1. Kilometres driven (by car) by commuting employees;
2. Kilometres driven (by train) by commuting employees;
3. Kilometres driven (by bus) by commuting employees;

4. Kilometres driven (by motorcycle) by commuting employees;
5. Kilometres driven (by boat) by commuting employees;

2.3.4 Emission sources that were currently not taken into account

Port of Oslo took into account only emissions for which data availability was good and for which it was feasible during a short time span to calculate GHG emissions according to the ISO 14064 standard.

Explicitly not taken into account are technical gases that are produced as a by-product during combustion processes and F-gases as a result of cooling processes. These emissions have a negligible impact on the total carbon footprint. In years to come Port of Oslo will decide on broadening the scope of emission sources based on stakeholder expectations, feasibility and reduction possibilities.

3 Results

3.1 Main results

The Port of Oslo has calculated the greenhouse gas emissions of installations and activities that are under its operational control. The methodology for estimating, consolidation and reporting of these emissions are according the WBCSD/WRI GHG Protocol.

The greenhouse gas emissions in the period 1 January 2007 – 31 December 2007 are listed in the table below:

Item	GHG in tCO₂eq	Remarks
Scope 1: Direct emissions	456	For Port of Oslo under current definition of scope 1, only CO ₂ emissions are relevant. Scope 1 emission sources relevant for Port of Oslo are company owned cars, operational vessels and operational machines.
Scope 2: Energy indirect emissions	49	The Norwegian power production sector is predominantly based on hydro power; however, suppliers use a mix of locally produced (mostly green) power and imported (mostly grey) power. In this report the national grid factor for Norway as reported by the IEA (2005) was applied. Scope 2 emissions relevant for Port of Oslo are electricity usage by cranes owned by Port of Oslo, harbour lighting, buildings, a lighthouse and some other sources
Scope 3: Other indirect emissions	199	Emission sources that are relevant for Port of Oslo are commuting employees using cars, buses, trains, motorcycles and boats
Total	704	

The share of each scope in the total carbon footprint is presented in the graph below.

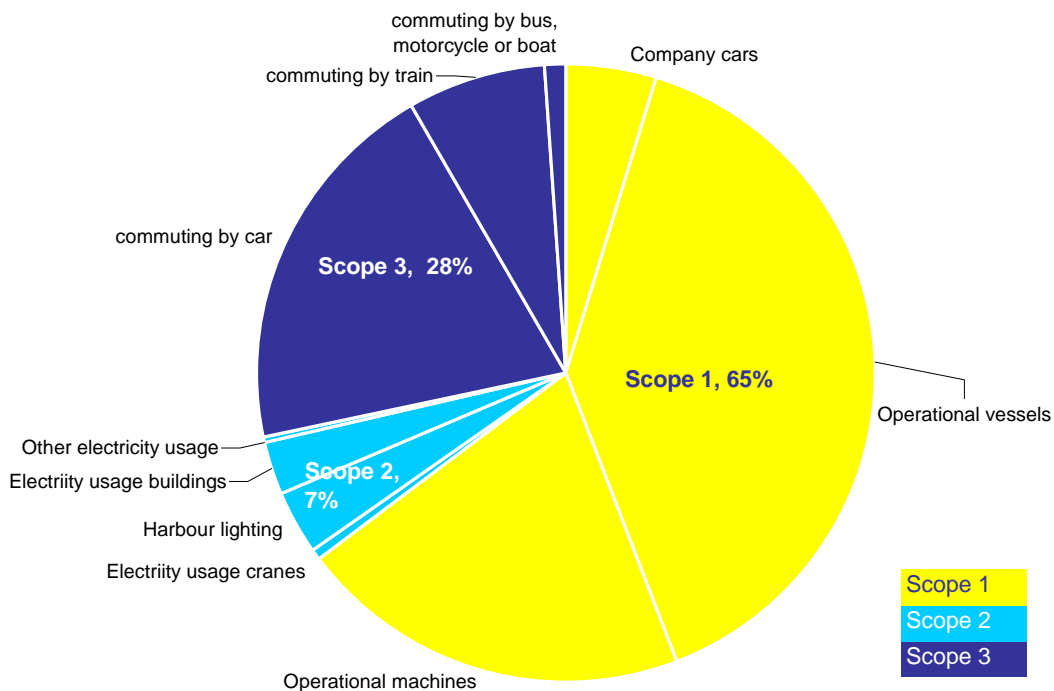


Figure 1 CO₂ emissions Port of Oslo 2007

As it is presented in the picture, most of the emissions result from fossil fuel combustion for energy production (mostly for non-stationary sources) in the area of Port of Oslo. Commuting is the second largest CO₂ emission source. Electricity consumption in the harbour constitutes the smallest part of the carbon footprint as Norwegian power mix is by far dominated by hydropower, which is an emission free source.

3.2 Uncertainties

The calculation of the carbon footprint was done while striving to maintain the highest possible accuracy. Activity data were partly based on measurement and partly based on estimates. If not possible, expert estimates were made both by the Port of Oslo employees and external experts. A detailed description of the uncertainties of all the activity data and the emission factors is given in Annex 1 and 2 respectively.

Scope 1

An important fact is that the activity volume (fuel usage) of the largest contributors to the GHG emissions of Port of Oslo (notably operational vessels and operational machines, accounting for 60% of total emissions) had to be assessed by dividing the accounting figures for fuel purchases by the average unit fuel cost in 2007. This could be improved in the future by introducing a monitoring system.

Scope 2

Activity volumes under scope 2 (electricity usage) were based on actual metering and thus relatively reliable.

Scope 3

Most important uncertainty is that emission factors are not specific for the Norwegian situation. This can be improved in a future recalculation of the carbon footprint.

3.3 Baseline emissions

This is the first emission report of the Port of Oslo regarding its GHG emissions. It is not decided yet whether the calendar year 2007 will also be the baseline year against which emission reductions will be measured.

The Port of Oslo will recalculate the baseline if the organizational boundaries change. This will be the case if there are new installations over which the Port of Oslo has operational control. The Port of Oslo will also recalculate the baseline if there changes in quantification methods that would lead to significant changes in GHG emissions.

3.4 Detailed results

3.4.1 Detailed results - scope 1

Scope	Source description	Activity data	Activity unit (per year)	Emission factor	Emission factor unit (per year)	CO ₂ emissions in tonnes	
Scope 1: direct emissions	1	Fuel (oil) usage for the purpose of heating of heating workshop buildings Port of Oslo	-	litre	-	kg CO ₂ / litre	-
	2	Kilometres driven (by car on diesel) by company owned cars Port of Oslo	128,068	passenger km	0.190	kg CO ₂ / passenger km	24
	3	Kilometres driven (by car on petrol) by company owned cars Port of Oslo	43,570	passenger km	0.220	kg CO ₂ / passenger km	10
	4	Fuel (diesel) usage by operational vessels owned by Port of Oslo	105,000	litre	2.630	kg CO ₂ / litre	276
	5	Fuel (diesel) usage by operational machines and cranes owned by Port of Oslo	55,395	litre	2.630	kg CO ₂ / litre	146
	Subtotal scope 1					456	

The data provided for the analysis were data from the Port of Oslo measuring system. Fuel consumption was based on accounting figures related to the complete cost of fuel divided by the average cost of fuel in 2007. There was no oil consumption for heating in 2007.

3.4.2 Detailed results- scope 2

Scope		Source description	Activity data	Activity unit (per year)	Emission factor	Emission factor unit (per year)	CO ₂ emissions in tonnes
Scope 2: indirect emissions (electricity)	1	Electricity usage by cranes owned by Port of Oslo	856,899	kWh	0.0055	kg CO ₂ / kWh	5
	2	Electricity usage for the purpose of harbour lightning by Port of Oslo	4,184,668	kWh	0.0055	kg CO ₂ / kWh	23
	3	Electricity usage for buildings owned by Port of Oslo (e.g. heating , lightning)	3,605,718	kWh	0.0055	kg CO ₂ / kWh	20
	4	Electricity usage by lighthouse owned by Port of Oslo	14,237	kWh	0.0055	kg CO ₂ / kWh	0
	5	Electricity usage from other sources in Port of Oslo	249,046	kWh	0.0055	kg CO ₂ / kWh	1
		Subtotal scope 2					49

The electricity consumption was based on measurements. The Port of Oslo was able to distinguish between power consumption for cranes, lighting of the harbour and lighthouse. Electricity used for heating and lighting of buildings was assumed by the Port of Oslo based on the renting contracts and invoicing to companies renting out space in buildings. The emissions in the category "other sources" are calculated by subtracting the emissions in the other four categories from the total measured consumption and may include intake of power by ships (both owned by the Port of Oslo and other companies) as well as other possible power use.

3.4.3 Detailed results– Scope 3

Scope	Source description	Activity data	Activity unit (per year)	Emission factor	Emission factor unit (per year)	CO2 emissions in tonnes	
Scope 3 (reported): other indirect emissions	1	Kilometres driven (by car) by commuting employees	700,712	passenger km	0.200	kg CO ₂ / passenger km	140
	2	Kilometres driven (by train) by commuting employees	102,543	passenger km	0.021	kg CO ₂ / passenger km	2
	3	Kilometres driven (by bus) by commuting employees	273,448	passenger km	0.190	kg CO ₂ / passenger km	52
	4	Kilometres driven (by bicycle) by commuting employees	111,088	passenger km	-	kg CO ₂ / passenger km	-
	5	Kilometres driven (by motorcycle) by commuting employees	42,726	passenger km	0.100	kg CO ₂ / passenger km	4
	6	Kilometres driven (by boat) by commuting employees	8,545	passenger km	0.100	kg CO ₂ / passenger km	1
	Subtotal scope 3					199	

The commuting distances estimates are extrapolated based on a survey done by Port of Oslo among its employees. The survey included 46% of the employees.

4 Conclusions and next steps

The total estimated CO₂ emissions from the Port of Oslo activities are 704 t CO₂e. The relatively low outcome is a result of Port of Oslo being mainly driven by, to a large extent, electricity based on hydro power, which is the major source of energy in Norway. All emission sources in the (conform the ISO 14064 standard) mandatory emission categories "direct emissions" and "energy indirect emissions" were taken into account. Excluded were only negligible emissions from technical gases and F-gases. Due to time constrains (deadline of World Ports Conference), the number of GHG emission sources in category "other indirect emissions" is still rather limited. Port of Oslo will base its future strategy for expanding the scope of the emission sources taken into account in its carbon footprint on stakeholder expectations, feasibility and possibilities to reduce GHG emissions.

Elaborating on the carbon footprint for 2007 is the first step on the way to decreasing the climate impact of the Port of Oslo. Implementation of the footprint (setting targets, possibly broadening the scope and defining measures) has yet to be done. Carbon management itself will be an ongoing process.

Annex 1: Sources and assumptions made for activity data

Scope		Source description	Activity unit (per year)	Source, company	Comments
Scope 1: direct emissions	1	Fuel (oil) usage for the purpose of heating of heating workshop buildings Port of Oslo	litre	Port of Oslo	There was no oil used for heating in the calendar year 2007
	2	Kilometres driven (by car on diesel) by company owned cars Port of Oslo	passenger km	Port of Oslo	Calculated based on data provided by Port of Oslo
	3	Kilometres driven (by car on petrol) by company owned cars Port of Oslo	passenger km	Port of Oslo	Calculated based on data provided by Port of Oslo
	4	Fuel (diesel) usage by operational vessels owned by Port of Oslo	litre	Port of Oslo	Calculated based on data provided by Port of Oslo; total fuel used calculated based on the cost of fuel and average price for the calendar year 2007
	5	Fuel (diesel) usage by operational machines (cranes) owned by Port of Oslo	litre	Port of Oslo	Calculated based on data provided by Port of Oslo; total fuel used calculated based on the cost of fuel and average price for the calendar year 2007

Scope		Source description	Activity unit (per year)	Source, company	Comments
Scope 2: indirect emissions (electricity and heating)	1	Electricity usage by cranes owned by Port of Oslo	kWh	Port of Oslo	Data provided by the Port of Oslo, based on metering in the Port of Oslo
	2	Electricity usage for the purpose of harbour lightning by Port of Oslo	kWh	Port of Oslo	Data provided by the Port of Oslo, based on metering in the Port of Oslo
	3	Electricity usage for buildings owned by Port of Oslo (e.g. heating , lightning)	kWh	Port of Oslo	Assumption made by the Port of Oslo based on metering
	4	Electricity usage by lighthouse owned by Port of Oslo	kWh	Port of Oslo	Data provided by the Port of Oslo, based on metering in the Port of Oslo
	5	Electricity usage from other sources in Port of Oslo	kWh	Port of Oslo	The Port of Oslo provided the figure for total consumption, and partial figures for cranes, lighthouse, lighting and buildings. The "other" electricity consumption category is the difference between the total consumption figure and the above mentioned categories. This can be electricity for cars, intake of power for ships etc. It was assumed that 50% power is this category is consumed within the control of the Port of Oslo and 50% by others; the figure in "annex database activity data" refers only for the Port of Oslo.

Scope		Source description	Activity unit (per year)	Source, company	Comments
Scope 3 (reported): other indirect emissions	1	Kilometres driven (by car) by commuting employees	passenger km	Port of Oslo	Emissions from commuting were extrapolated based on a survey by H. Glâmseter (Port of Oslo) covering 46% of employees.
	2	Kilometres driven (by train) by commuting employees	passenger km	Port of Oslo	idem
	3	Kilometres driven (by bus) by commuting employees	passenger km	Port of Oslo	idem
	4	Kilometres driven (by bicycle) by commuting employees	passenger km	Port of Oslo	idem
	5	Kilometres driven (by motorcycle) by commuting employees	passenger km	Port of Oslo	idem
	6	Kilometres driven (by boat) by commuting employees	passenger km	Port of Oslo	idem

Annex 2: Sources en assumptions made on emission factors

Scope		Source description	Emission factor	Source	Comments
Scope 1: direct emissions	1	Fuel (oil) usage for the purpose of heating of heating workshop buildings the Port of Oslo			No oil used,
	2	Kilometres driven (by car on diesel) by company owned cars the Port of Oslo	0.19 kg CO ₂ / passenger km	GHG protocol worksheet	emission factor based on larger cars
	3	Kilometres driven (by car on petrol) by company owned cars the Port of Oslo	0.22 kg CO ₂ / passenger km	GHG protocol worksheet	emission factor based on larger cars
	4	Fuel (diesel) usage by operational vessels owned by the Port of Oslo	2.63 kg CO ₂ / litre	UK DEFRA, updated July 2005	
	5	Fuel (diesel) usage by operational machines and cranes owned by the Port of Oslo	2.63 kg CO ₂ / litre	UK DEFRA, updated July 2005	

Scope		Source description	Emission factor	Source	Comments
Scope 2: indirect emissions (electricity and heating)	1	Electricity usage by cranes owned by the Port of Oslo	0.0055 kg CO ₂ / kWh	IEA	National Norwegian grid emission factor for 2005
	2	Electricity usage for the purpose of harbour lightning by the Port of Oslo	0.0055 kg CO ₂ / kWh	IEA	National Norwegian grid emission factor for 2005
	3	Electricity usage for buildings owned by the Port of Oslo (e.g. heating , lightning)	0.0055 kg CO ₂ / kWh	IEA	National Norwegian grid emission factor for 2005
	4	Electricity usage by lighthouse owned by the Port of Oslo	0.0055 kg CO ₂ / kWh	IEA	National Norwegian grid emission factor for 2005
	5	Electricity usage from other sources in the Port of Oslo	0.0055 kg CO ₂ / kWh	IEA	National Norwegian grid emission factor for 2005
Scope 3 (reported): other indirect emissions	1	Kilometres driven (by car) by commuting employees	0.2 kg CO ₂ / passenger km	GHG protocol worksheet	Average of ranges given in the GHG Protocol worksheet
	2	Kilometres driven (by train) by commuting employees	0.021 kg CO ₂ / passenger km	GHG protocol worksheet	Average of ranges given in the GHG Protocol worksheet
	3	Kilometres driven (by bus) by commuting employees	0.19 kg CO ₂ / passenger km	GHG protocol worksheet	Average of ranges given in the GHG Protocol worksheet
	4	Kilometres driven (by bicycle) by commuting employees	0 kg CO ₂ / passenger km	GHG protocol worksheet	Average of ranges given in the GHG Protocol worksheet
	5	Kilometres driven (by motorcycle) by commuting employees	0.1 kg CO ₂ / passenger km	GHG protocol worksheet	Average of ranges given in the GHG Protocol worksheet
	6	Kilometres driven (by boat) by commuting employees	0.1 kg CO ₂ / passenger km	GHG protocol worksheet	Average of ranges given in the GHG Protocol worksheet