The Federation of European Private Port Companies and Terminals

EU Ports European Economic Interest Group

Guidance for Greenhouse Gas Emission Footprinting for Container Terminals

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Document Information

Project:	Guidelines for Common Greenhouse Gas Footprinting for Container Terminals
Purpose of this document:	To provide container terminal operators with advice and instruction on the elements to be included and excluded in reporting greenhouse gas emissions, as part of terminal-level carbon footprinting and analyses.
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CONTENTS Page

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The EEEG would like to thank all those who have participated in the first revision of this document. This revision is the result of many meetings (in person and by telephone conference) in which technical views were shared.

Special thanks goes to FEPORT for hosting and organising the meetings, as well as carrying out the editing of the guidelines in line with the principles agreed by the EEEG Group.

We would also like to express our gratitude to the main author of the original version of the guidance document. Having a well organised and clear existing guidance document made the revision process more straight forward.

Thanks also goes to GLEC for participating in the drafting process. They shared their expert knowledge and views from a wider logistics chain perspective. This added an insightful new perspective to our work which has been incorporated into the final text.

We hope this Guidance Document will help terminals while they take their first steps on the path of GHG footprinting, and enable footprint calculation in a consistent way. And, what is more important, we trust it will increase the understanding of key emission sources so that reduction programmes can be implemented.

Good luck,

Stef Capelle

Chairman EEEG a.i.

Glossary of Key GHG and Container Terminal Terms

We encourage the reader to browse the glossary prior to reading the main document. We have tried to use consistent terminology throughout the document and appreciate that some terms and their definitions may vary from those used by other organisations.

Term	Definition
AGV	Automated Guided Vehicle; unmanned internal trailer guided by transponders located under the road surface and used to transfer containers within the terminal. Power source is an all diesel drive, a diesel/electric drive or a battery drive.
ASC	Automated Stacking Crane; unmanned electrically driven rail mounted crane used for stacking and retrieving containers in a predefined container stack.
Base year	The year to which all other subsequent years are compared. This may change over time as data becomes more robust or circumstances change.
Break bulk	A variety of goods that must be loaded individually, and not in intermodal containers, nor in bulk as with grain or oils.
Carbon/carbon emissions	The term 'carbon' in the context of climate change is frequently used incorrectly. Carbon is a non-metallic solid element derived from the Latin word *carbo* (meaning coal). What is usually meant is **CO_2**: a gas. Use of the term 'carbon' as a substitute for CO_2 is wrong but is now standard in the media. For instance, "carbon footprint" is really a "CO_2, or **GHG**, footprint". This Guidance avoids the use of the term 'carbon emissions', preferring instead to use 'GHG emissions', 'GHG footprint' etc.
Carbon footprint	A term commonly used to describe the total amount of **GHG** emissions (but predominantly **CO_2**) for which a company or organisation is responsible. Footprints can also be calculated for individual events and products. Carbon footprints are expressed in tonnes of CO_2 equivalent (**tCO_2e**). CO_2 is the key GHG that Governments, legislation and companies are currently focusing on reducing.
CFC	Chlorofluorocarbons
CH_4	Methane
CO_2-equivalent (CO_2e)	The universal unit of measurement to indicate the global warming potential (**GWP**) of each of the six **GHGs** named in the Kyoto Protocol – carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), sulphur hexaflouride (SF_6) – expressed in terms of the GWP of one unit of carbon dioxide. It is used to normalize the different GHGs to a common unit of measurement.
Container Freight Station (CFS)	Facility where containers are stuffed and unloaded, and cargo is stored prior to onward transportation. The CFS facility may be within the container terminal boundary or in the hinterland.
Container terminal equipment	Fossil fuel, electric or battery powered equipment and machinery that can navigate around a container terminal. It is usually the case that this equipment has a driver (but see **AGV**). Examples include: **RTGs**, **RMG**, straddle carriers, reachstackers, **ECHs**, sprinters, **ITVs**, etc.

<table>
<tr><th>Term</th><th>Definition</th></tr>
<tr><td>Defra</td><td>UK Government Department: Department of Environment, Food and Rural Affairs: http://www.defra.gov.uk.</td></tr>
<tr><td>Direct GHG emissions</td><td>Emissions from sources that are owned or controlled by the reporting company. These are commonly referred to as Scope 1 emissions, when they are within the company's "operational control".</td></tr>
<tr><td>Dry bulk</td><td>Product cargo transported in loose form such as coal, grain, ore and similar products.</td></tr>
<tr><td>ECH</td><td>Empty container handler</td></tr>
<tr><td>EEEG</td><td>EU Ports EEIG Environment Group</td></tr>
<tr><td>EEIG</td><td>European Economic Interest Group</td></tr>
<tr><td>Emission factor (EF)</td><td>A conversion factor allowing GHG emissions to be estimated from a unit of available activity data (e.g. tonnes of fuel consumed, kWh of electricity purchased).</td></tr>
<tr><td>General cargo</td><td>"Packaged" items such as chemicals, foods, furniture, machinery, motor vehicles, footwear and garments etc.</td></tr>
<tr><td>Greenhouse Gas (GHG)</td><td>A generic term covering many gases that have some level of global warming potential. In particular, GHG is taken to cover the basket of six Kyoto gases listed in section 1.2 of this document.</td></tr>
<tr><td>GHG Protocol</td><td>Greenhouse Gas Protocol http://www.ghgprotocol.org/. The GHG Protocol is the most widely used international accounting information source for government and business to understand, quantify, and manage their GHG gas emissions. The GHG Protocol is a partnership between the World Resources Institute and the World Business Council for Sustainable Development.</td></tr>
<tr><td>Global warming potential (GWP)</td><td>A factor describing the degree of harm to the atmosphere of one unit of a given GHG relative to one unit of CO_2. All GHGs have a GWP. This value is used to compare the abilities of different GHGs to trap heat in the atmosphere. GWPs are based on the heat-absorbing ability of each gas relative to that of CO_2, as well as the decay rate of each gas (the amount removed from the atmosphere over a given number of years). GWPs can also be used to define the impact GHGs will have on global warming over different time periods or time horizons (e.g. 20, 100 and 500-years).
<table>
<tr><th colspan="2">Global Warming Potentials (100-year Time Horizon)</th></tr>
<tr><th>Gas</th><th>GWP</th></tr>
<tr><td>Carbon dioxide (CO_2)</td><td>1</td></tr>
<tr><td>Methane (CH_4)*</td><td>21</td></tr>
<tr><td>Nitrous oxide (N_20)</td><td>310</td></tr>
<tr><td>HFC-23</td><td>11,700</td></tr>
<tr><td>HFC-125</td><td>2,800</td></tr>
<tr><td>HFC-134a</td><td>1,300</td></tr>
<tr><td>HFC-143a</td><td>3,800</td></tr>
<tr><td>CF_4</td><td>6,500</td></tr>
<tr><td>C_2F_6</td><td>9,200</td></tr>
<tr><td>C_4F_{10}</td><td>7,000</td></tr>
<tr><td>C_6F_{14}</td><td>7,400</td></tr>
<tr><td>SF_6</td><td>22,900</td></tr>
</table>
Source: UNFCC 2017-10-10</td></tr>
</table>

Term	Definition
HCFC	Hydrochlorofluorocarbons (HCFCs) are enabling the phase-out of **CFCs**. Their **GWP** is less than **HFCs**.
HFC	Hydroflourocarbons (HFCs) are man-made chemicals containing the element fluorine used predominantly as refrigerants and aerosol propellants. They are colourless, odourless and chemically non-reactive gases. These **GHGs** are primarily being used as replacements to ozone-damaging **CFCs** and **HCFCs**.
HSE	Health, Safety and Environment
H&S	Health and Safety
Indirect emissions	Emissions that are a consequence of the operations of the company but occur from sources owned or controlled by another company or third party, for example, as a consequence of the purchase of electricity, heat, or steam (Scope 2) or by other third parties (Scope 3).
Internal transfer vehicle (ITV)	Also known as a trailer tractor, toe tractor, bombcart, or tug, the ITV is an internal movement vehicle used to move containers around within the terminal.
Inventory Management Plan (IMP)	An IMP describes the process for completing a comprehensive and company-wide **GHG** inventory. It is used by companies to document the process for collecting, calculating, and maintaining GHG data. Companies may have a single IMP document that addresses all of the elements that go into developing their inventory, or they might have an equivalent collection of procedures and other relevant information. An IMP can evolve over time and be continually improved as the company's knowledge and coverage of GHGs increases.
ISO	International Organisation for Standardisation
MHC	Mobile harbour crane
Mobile sources of emissions	Mobile sources are any combustion of fuels in transportation, terminal equipment (e.g. Straddle Carriers, Reach Stackers) and other vehicles such as cars, trucks, buses, trains, aeroplanes, boats, ships, barges and vessels. Cranes, if powered by a fossil fuel (i.e. Mobile Harbour Crane) will also count as mobile. Any cranes that run on a fixed rail and are connected to an electrical supply fall into the "fixed" category (the GHG Protocol refers to mobile and fixed sources of emissions).
N_2O	Nitrous oxide
Non-container cargo	Cargo dealt with by the terminal that is non-containerised, i.e., general cargo, break bulks etc.
Out-of-gauge (OOG) cargo	Cargo dimension exceeding a standard container's internal dimension which is transported on a flat-bed or open container.
Operational boundaries	The boundaries that determine the core direct and indirect emissions associated with operations owned or controlled by the company. These boundaries allow the company to establish which operations and sources cause direct and indirect emissions, and to decide which optional emissions to include that are consequences of its operations.
Optional emissions	Emissions that are a consequence of the activities of the company but are not part of direct or indirect emissions as defined by the GHG Protocol (e.g. employee commuting). Emissions in this category can be referred to as **Scope 3** emissions.
Organisational boundary	The boundaries that determine the operations owned or controlled by the company depending on the consolidation approach taken.

Term	Definition
PFC	Perfluorocarbons (PFCs) are fluorocarbons, compounds derived from hydrocarbons. PFCs are one of the six gases which make up the 'basket' of **GHGs** that the GHG protocol aspires to measure and report on. PFCs are found in some high voltage equipment, refrigeration and medical equipment.
Reach Stacker (RS)	A reach stacker is a vehicle used for handling containers in the terminal yard.
Rail mounted gantry (RMG) crane	A container-carrying crane that moves on fixed rails. Considered to be a "stationary" source of emissions when comparing "fixed" and "mobile" sources under GHG Protocol definitions.
Rubber-tyred gantry (RTG) crane	A container-carrying crane with tyres that moves along a grid in the container stack. Considered to be a "mobile" source of emissions when comparing "fixed" and "mobile" sources under GHG Protocol definitions.
Scope 1	Direct **GHG** emissions from sources owned or controlled by the company, as defined by the **GHG Protocol**.
Scope 2	Emissions associated with the generation of electricity, heating/cooling, or steam purchased for the company's own consumption, as defined by the **GHG Protocol**.
Scope 3	Indirect emissions (also optional emissions) other than those covered in **Scope 2**, as defined by the **GHG Protocol**.
SF_6	Sulphur hexafluoride (SF_6) is an inorganic, colorless, odorless, non-toxic and non-flammable gas (under standard conditions). SF_6 is used in the electrical industry as a gaseous dielectric medium for high-voltage (35 kV and above) circuit breakers, switchgear, and other electrical equipment, often replacing oil filled circuit breakers that can contain harmful PCBs. Its GWP is 22,000.
Stationary sources of emissions	Stationary emissions are part of **Scope 1**emissions (alongside mobile sources) as outlined in the **GHG Protocol**. Stationary emissions are commonly from diesel or petrol combusted on site.
Structural change	A change in the company's organisational or operational boundaries that results from a transfer of ownership or control of emissions from one company to another. Structural changes usually arise from a transfer of ownership of emissions, such as mergers, acquisitions, divestitures, but can also include outsourcing/in-sourcing.
TEU	Twenty-foot Equivalent Unit
Transshipment	Cargo which is offloaded from the vessel and may be trucked into the yard, to be reloaded onto another vessel at a later date.

Executive Summary

Greenhouse gas (GHG) emissions footprinting is a complex subject, and particularly so in the context of container terminals, which have multiple emission sources and sometimes complicated organisational and operational boundaries. It is hard to arrive at a 'right' answer and it is likely that, faced with the same information, different organisations might generate different GHG footprints.

These Guidelines have been prepared by a group of container terminal operator sector experts to throw some light on this subject, against the background of increasing interest by stakeholders in the shipping and logistics supply chain community. It sets out an agreed approach to calculate a GHG footprint for a container terminal that is broadly in line with the principles contained within the GHG Protocol, itself probably the most widely-accepted international work on the subject, and the GLEC Framework which carries the 'Built on GHG Protocol' mark and provides additional detailed guidance for the logistics sector.

The EEEG supports consistency in calculation methods and reporting. The guidance is not intended to enable companies and organisations up and down the supply chain to publicly compare the GHG footprints of one terminal operator against the other. In preparing the Guidelines, a fundamental concept is that it is neither logical nor correct to compare one terminal against another on the basis of its GHG footprint, since the local conditions and operating modes differ at every terminal (e.g. size and geographical area of the site, age of equipment portfolio, types of trade and activities, the climate, daylight hours and modal split). The aim for every container terminal should be to improve its efficiency and carbon performance from year-to-year whilst calculating GHG emissions on a consistent basis.

The distinction between container terminals and ports should be noted carefully. Preparing a GHG footprint for a port authority is a related but broader subject. Readers are referred to the International Association of Ports & Harbors (IAPH)/ World Ports Climate Initiative (WPCI) document on this subject (at http://wpci.iaphworldports.org/carbon-footprinting/index.html). In the event that a port does wish to calculate total emissions for the port area, it should be noted that there is a differentiation between terminal emissions and port emissions.

It is also worth noting that terminals may decide to allow their emissions calculations to be used by logistics service providers in order for them to calculate a full carbon footprint for their logistics chains. The direct impact of a terminal may be relatively limited[1], but the location and connectivity may be deemed to impact indirectly on the overall emissions of the chain through the opportunities available for modal choice. In this discussion it is also important to note that a terminal does not have a direct relationship with the cargo owner, but rather with the carrier.

Although the intention in producing this document is that it will enable consistency within the container terminal industry in how GHG footprints are prepared, it is, however, only guidance, and container terminal operators are free to develop and use their own methodology if they wish.

The authors hope that any comments or questions on the content of the methodology presented here will be sent to them for the purposes of continual improvement using the contact details on page (v).

[1] See Section 1.3.3

1 INTRODUCTION

1.1 Background to the Guidance

The EU Ports EEIG Environment Group (EEEG) was initiated by the EU Port European Economic Interest Group (EEIG) in 2009 as a platform from which to discuss carbon dioxide (CO_2) and other greenhouse gas (GHG) emissions in relation to container terminal activities. The EEEG comprises leading European container terminal operators, many of which also operate internationally.
On this basis, the EEEG has been set up with the following key aims and purposes:

- To develop a standard method of measurement of terminal-level GHG emissions, including the definition of scopes and boundaries, and in line with internationally-accepted standards, by discussion of GHG calculation methods and agreement on minimum information to be reported.
- To obtain technical information and data to support the reduction of GHG emissions, including that driven by any impending legislation.
- To share best practice in GHG emissions reduction, including low-carbon technologies, tools and techniques.
- To be a voice for container terminal operators on carbon and GHG-related issues.
- To consider wider environmental sustainability issues relating to terminal operators as may be agreed from time to time by the EEEG or at the request of the EEIG.

In line with the aims of the EEEG, this document presents the EEEG guidance for common GHG footprint calculations for container terminals, which has been developed through a series of workshops with group members participating. Each of the members supports the principles described in this document.

1.2 Context with International Standards

In the context of GHG reporting, the most comprehensive and relevant documents currently available are considered to be the internationally-recognised standard developed by the World Resources Institute (WRI) and the World Business Council for Sustainable Development (WBCSD), The Greenhouse Gas Protocol (“the GHG Protocol”) and the GLEC Framework for Logistics Emissions Methodologies which will adopt the EEEG guidance in its next update. See also the References section . The GHG Protocol is, however, a corporate standard for portfolio level reporting whereas this EEEG Guidance is aimed at the individual container terminal level. This guidance is written and set-up in accordance with many of the underlying principles and concepts in the Greenhouse Gas Protocol and the GLEC Framework.

1.3 Key Definitions

1.3.1 Greenhouse Gases

The participating companies have agreed to use the term “GHG emissions” when referring to the huge range of GHGs that are found naturally and also emitted to the atmosphere from

anthropogenic sources. The Kyoto Protocol references seven key GHGs, which the GHG Protocol also highlights as the key GHG emissions it aims to focus on. Table 1 below shows which GHGs are included under different initiatives.

Table 1 GHGs under different scenarios

All GHGs	Basic carbon dioxide footprint	Kyoto Protocol & GHG Protocol target emissions	Container Terminal Operators' Guidelines
Carbon dioxide (CO_2)	✓	✓	✓
Methane (CH_4)	×	✓	✓
Nitrous oxide (N_2O)	×	✓	✓
Hydrofluorocarbons (HFCs)	×	✓	To be considered in the future
Perfluorocarbons (PFCs)	×	✓	To be considered in the future
Sulphur hexafluoride (SF_6)	×	✓	To be considered in the future
Nitrogen trifluoride (NF3)	×	✓	To be considered in the future
Hundreds of other GHGs	×	×	×

Most organisations begin with reporting just carbon dioxide (CO_2). The next step is to try to include nitrous oxide (N_2O) and methane (NH_4) in the GHG footprint. CO_2e (carbon dioxide equivalent) is a quantity describing all GHG in terms of the amount of CO_2 that would have the same global warming potential (GWP) Often the term isused in GHG footprinting to describe the basket of the six most important GHG, expressed in terms of carbon dioxide.

For the purposes of this report and when embarking upon calculating a quantified carbon footprint, container terminal operators should focus on the three GHGs that we are able to measure: carbon dioxide, methane and nitrous oxide. Scientists are increasingly focused on the role of potent, short-term greenhouse gases, such as methane (which is 25 times as potent as CO_2—though there's far less of it). As we think about how to combat climate change in the short term, taking these gases into account makes sense.

Information Box 1 shows how a company can calculate and show both CO_2 and carbon dioxide equivalent (CO_2e) emissions. We recommend that both CO_2 and CO_2e are reported, but on different lines. It is a future intention to try and calculate good estimates for the other three GHGs in the basket of six, when more detailed information is available on calculating leakages from their sources (e.g. air conditioning equipment).

Information Box 1 – Carbon dioxide equivalent

CO2 equivalent (CO2e) is the concentration of CO2 that would cause the same level of radiative forcing as a given type and concentration of GHG (e.g. methane, nitrous oxide). Scientifically, CO2e is expressed as parts per million by volume, ppmv. For the purposes of this Guideline, a calculation of CO2e takes into account the three key GHGs: CO2, methane and nitrous oxide.

Individual sources of Scope 1 fossil fuels and resources have discrete emission factors (EF) that are used to convert a unit into GHGs.

GHG emissions are calculated by multiplying a unit, such as a litre of fuel, by the EF*. Emission factors from combustion can be expressed as the combination of the emissions that result solely at the point of combustion (often called tank-to-wheel) and the upstream emissions that result from producing the fuel (often called well-to-tank emissions). Combining these two elements results in a full well-to-wheel emission factor. Use of the well to wheel emission factor is particularly important in situations where comparisons are made between different fuel types, particularly where electricity is being compared against conventional fossil fuels, because they can have quite different production cycles.

The choice of tank-to-wheel or well-to-wheel approach can have a significant difference on the ultimate value because the fuel production can easily represent 20% or more of the total emissions.

When considering the combustion of conventional fossil fuels the tank to wheel element should be reported as a scope 1 emission whilst the well-to-tank element should be reported as a scope 3 emission.

The emission factors to be used to calculate GHG emissions as a result of the combustion of diesel fuel are as follows:

Scope 1, tank to wheel element: 2.67 kg CO2e per litre of diesel fuel

Scope 3, well to tank element: 0.57 kg CO2e per litre of diesel fuel

Remember CO2e takes into account other GHGs besides CO2. The above figures include the relatively small amounts of other GHGs that are emitted as a result of the combustion.

Combustion of 100 litres of diesel fuel produces:

Scope 1: 267 kg CO2e, plus

Scope 3: 57 kg CO2e

Nitrogen oxides (NO_x) and particulates (e.g. PM_5 and PM_{10}) are not GHG and are more likely to be taken into account in air quality studies. They are therefore not included in this guidance.

1.3.2 Guidance

Reference is made to both this report (“Guidelines”) and its contents (i.e. “guidance”). The terms are interchangeable throughout the report.

1.3.3 Role in the Supply Chain

We would also like to note that direct GHG emissions from container terminals represent only a small proportion of total emissions associated with the global supply chain. Studies indicate that within global container supply chains the GHG emissions for handling containers at the points of export and import in the terminals account for somewhere around 2% on intercontinental routes (Heriot-Watt University *et al*., 2011, and Garrat & Rowlands, 2011 – see Information Box 2). On shorter routes, this percentage may change.

Information Box 2 – Context of container terminals in the supply chain
Supply chain research by Garrat and Rowlands (2011) has discussed the role of carbon dioxide emissions of sea transport in the context of between 100 and 120M TEU boxes per year. They refer to an average trip length of approximately 9,000km. Based on the shipping model developed by MDS Transmodal and Box Trade Intelligence, this results in the emission of 1,410kg of CO2 per TEU. They go on to say that most containers do not originate from anywhere near the port where the sea leg starts. The same is true of their destination. Therefore a land leg of 200km is included. The emission of the land leg (by truck) is calculated at 1.0kg per km. The transport of this 20ft. container with an average of 14.5 metric tonnes of consumer goods results in the emission of approximately 1,850kg of CO2. Approximately 45kg of this can be attributed to the terminal handling, or just over two percent.

Nonetheless, terminal operators acknowledge their responsibility to improving sustainability, and aim to have strategies and actions in place to measure, monitor, manage and improve performance in GHG emissions from their business activities.

2 PRINCIPLES AND OBJECTIVES

2.1 Objectives of the EEEG GHG Footprinting Guidelines

The EEEG Guidelines for Common GHG Footprinting for Container Terminals, as presented in this report, have been developed via a series of workshops and meetings with the group members. The guidance has been designed with the following objectives:

- To provide a common methodology that can be followed by marine and inland container terminal operators to calculate their GHG emissions;
- To encourage more consistency and transparency in the reporting of GHG emissions associated with container terminals; and
- To provide stakeholders with an improved understanding of the methods used to calculate GHG emissions at container terminals.

The EEEG supports consistency in calculation methods and reporting. The guidance is not intended to enable companies and organisations up and down the supply chain to publicly compare the GHG footprints of one container terminal operator against the other. That is why the EEEG guidance document follows the principles of the GHG Protocol.

Indeed, in preparing the Guidelines, a fundamental concept is that it is neither logical nor correct to compare one terminal against another on the basis of its GHG footprint, since the local conditions and operating modes differ at every terminal (e.g. size and geographical area of the site, age of equipment portfolio, types of trade and activities, the climate, daylight hours and modal split). The aim for every container terminal should be to improve its efficiency and carbon performance from year-to-year whilst calculating on a consistent basis. This is why performance in GHG emissions must also be reported against a base year.

Guidance on supply chain GHG emissions calculation and reporting is not contained in this document; this is covered in the aligned GLEC Framework for Logistics Emissions Methodologies, which will adopt the EEEG guidance from version 2.0 onwards.

Guidance for measurement and reporting of embodied GHG in construction materials and activities is not included in this document. We acknowledge that this topic is certainly very worthy of future discussion.

2.1.1 Benefits of Common Footprinting and Reporting

A common GHG footprinting and reporting methodology will have the following benefits:

- To collate consistent GHG-related performance data at the terminal level.
- To assist terminals new to the discipline of GHG footprinting in collating energy and GHG related data.
- To provide stakeholders and companies in the logistics supply chain with data that has been collated in a consistent manner, in the context of sharing performance improvements.
- To have a combined dataset representative of a group of terminal operators; this would inform better collaboration within parts of, or along the entire supply chain.

- To pave the way for contributing reliable and quantified data to a container terminal operator's overall sustainability performance.

2.2 Reporting Principles

The various internal and external stakeholders of container terminals require reporting on GHG issues at a range of different levels and for a variety of purposes. GHG reporting can be undertaken at the global portfolio level, the regional level, national level and at the individual terminal level.

The work on this guidance has been progressed with a focus at the "terminal level". It is not a corporate standard that covers the portfolio of an international container terminal operating company.

The principles that underlie the GHG Protocol Corporate Standard are fully embraced by the EEEG in its guidance for GHG footprinting at container terminals. We describe a number of important information points under each principle, below:

Table 2 Principles to be embraced in GHG footprinting at container terminals

Principle	Meaning	Notes
Relevance	Ensure the GHG inventory appropriately reflects the GHG emissions of the company.	Correct choice of an appropriate inventory boundary is essential, i.e, terminal boundary. The exact choice of inventory boundary is dependent on the characteristics of the company etc. Need to consider: • Organisational structures: control (operational and financial), ownership, legal agreements, joint ventures, etc. • Operational boundaries: on-site and off-site activities, processes, services, and impacts • Business context: nature of activities, geographic locations, industry sector(s), purposes of information
Completeness	Account for, and report on, all GHG emission sources and activities within the chosen boundary.	All relevant emissions sources within the chosen inventory boundary need to be accounted for so that a comprehensive and meaningful inventory is compiled.
Consistency	Use consistent methodologies to allow for meaningful comparisons of emissions over time. Transparently document any changes to the data, inventory boundary, methods, or any other relevant factors in the time series.	Users of GHG emissions information will want to track and compare GHG emissions information over time in order to identify trends and to assess the performance of the reporting company. The consistent application of accounting approaches, inventory boundary, and calculation methodologies is essential to producing comparable GHG emissions data over time. The GHG information for all operations within an organisation's inventory boundary needs to be compiled in a manner that ensures that the aggregated information is internally consistent and comparable. If there are changes in the inventory boundary, methods, data or any other factors affecting emission estimates, they need to be transparently documented and justified.

Principle	Meaning	Notes
Transparency	Address all relevant issues in a factual and coherent manner, based on a clear audit trail. Disclose any relevant assumptions and make appropriate references to the accounting and calculation methodologies and data sources used.	Transparency relates to the degree to which information on the processes, procedures, assumptions, and limitations of the GHG inventory are disclosed in a clear, factual, neutral, and understandable manner based on clear documentation and archives (e.g. audit trail). Information needs to be recorded, compiled, and analysed in a way that enables internal reviewers and external verifiers to attest to its credibility. Specific exclusions or inclusions need to be clearly identified and justified, assumptions disclosed, and appropriate references provided for the methodologies applied and the data sources used. The information should be sufficient to enable a third party to derive the same results if provided with the same source data.
Accuracy	Ensure that the quantification of GHG emissions is systematically neither over nor under actual emissions, as far as can be judged, and that uncertainties are reduced as far as practicable. Achieve sufficient accuracy to enable users to make decisions with reasonable assurance as to the integrity of the reported information.	Data should be sufficiently precise to enable intended users to make decisions with reasonable assurance that the reported information is credible. GHG emission measurements, estimates, or calculations should be systemically neither over nor under the actual emissions value, as far as can be judged, and that uncertainties are reduced as far as practicable. The quantification process should be conducted in a manner that minimizes uncertainty. Reporting on measures taken to ensure accuracy in the accounting of emissions can help promote credibility while enhancing transparency.

2.3 Amendments

This document is the first revision of the Guidelines which shall continue to be revised periodically as required to maintain, improve and evolve in line with new developments and best practice procedures for GHG footprinting.

3 ORGANISATIONAL BOUNDARIES

3.1 Context

All business operations vary in their legal and organisational structures; they include wholly-owned operations, incorporated and non-incorporated joint ventures, subsidiaries and others. In setting organisational boundaries, a company selects an approach for consolidating GHG emissions and then consistently applies the selected approach to define those operations that constitute the company for the purpose of accounting and reporting GHG emissions.

Container terminals in the EEEG portfolio show great difference in the organisational boundaries. Some focus only on the loading and unloading of containers, while others possess in or off terminal CFS or warehouses and some even act as port authority for the whole port. This makes the determination of a universal organisational boundary impossible.

3.2 The Two Approaches

The GHG Protocol identifies two distinct approaches that can be used to consolidate GHG emissions in corporate reporting: the “equity share” and the “control” approaches. Companies shall account for and report their consolidated GHG data according to either the equity share or control approach as presented below.
If the reporting company wholly owns all its operations, its organisational boundary will be the same whichever approach is used. For companies with joint ownership or joint operations, the organisational boundary and the resulting emissions may differ depending on the approach selected and applied. In both wholly owned and joint operations, the choice of approach may change how emissions are categorised when operational boundaries are set.

3.2.1 Equity share approach

Under the equity share approach, a company accounts for GHG emissions from operations according to its share of equity in the operation. The equity share reflects economic interest, which is the extent of rights a company has to the risks and rewards flowing from an operation. Typically, the share of economic risks and rewards in an operation is aligned with the company’s percentage ownership of that operation, and equity share will normally be the same as the ownership percentage. For instance, a company investing and owning 35% of the ownership shares of Company X would report 35% of the total GHG emissions of Company X.

3.2.2 Control approach

Under the control approach, a company accounts for 100% of the GHG emissions from operations over which it has “control”. It does not account for GHG emissions from operations in which it owns an interest but has no control. Control can be defined in either “financial” or “operational” terms. When using the control approach to consolidate GHG emissions, companies shall choose between either the “operational control” or “financial control” criteria.

- **Financial Control**. The company has financial control over the operation if the it has the ability to direct the financial and operating policies of the latter with a view to gaining economic benefits from its activities. For example, financial control usually exists if the company has the right to the majority of benefits of the operation, however these rights are conveyed. Similarly, a company is considered to financially control an operation if it retains the majority risks and rewards of ownership of the operation's assets.

- **Operational Control**. A company has operational control over an operation if the former (or one of its subsidiaries) has the full authority to introduce and implement its operating policies at the operation. This criterion is consistent with the current accounting and reporting practice of many companies that report on emissions from facilities, which they operate (i.e. for which they hold the operating licence).

3.3 Selecting an Approach

Before determining what activities to include in the GHG inventory, the first action is to choose between the equity and control approach for the container terminal.

The company should be careful in its planning and avoid double-counting. If the financial owner of the terminal takes the equity approach and the company that runs the day-to-day terminal activities (i.e. the control approach), there is a potential risk of double-counting (see also section 5.2). The danger of double-counting can be reduced if the GHG inventory is a management decision and is done with the help of the financial department. To clarify ownership and responsibility issues, companies involved in joint operations may want to draw up contracts to specify how the ownership of emissions and the responsibility for managing emissions and associated risk is distributed amongst the parties.

The EEEG has discussed the advantages and disadvantages of adopting the control approach (i.e., having management control and/or decision-making abilities) versus the financial approach (also known as equity share) in establishing boundaries for GHG emissions' footprinting. The EEEG acknowledges the more proactive benefits of the control approach. In general, the most beneficial approach will be to set the operational boundaries and calculate the footprint for the terminal as a whole. This will allow the most straightforward approach to data sharing at port or supply chain level. If it is then necessary to allocate the emissions according to a financial partition then they can be done as a subsequent action. Where ownership and control is complex (e.g. joint ventures), them the approach taken may need to be considered carefully on a case-by-case basis. This choice should be made together with the financial department of the organisation.

4 OPERATIONAL BOUNDARIES

4.1 Setting the Operational Boundaries at a Container Terminal

4.1.1 Range of activities

The terminal operators in the EEEG group collectively cover the following types of core cargo handling activities:

- Containers – Twenty-foot Equivalent Unit (TEU) throughput. Handling of containers usually accounts for far more than 90% of the activities of the operators.
- Multi-purpose terminals – TEU throughput and non-container trade (e.g. general cargo, bulks, ro-ro, livestock; administration, mooring activities). In recent times container terminals have become more specialized, meaning that such mixed terminals are much less common than previously.
- Non-container trade terminals, i.e., no TEU throughput (e.g. general cargo, break bulk, ro-ro).

4.1.2 Non-containerised cargo activity

This guidance document is written for container terminals. An aligned yet distinct approach designed specifically for the cargo handling type in question should be followed for other terminal types.

For container terminals that handle a small amount non-containerized cargo, we suggest using a conversion factor for the non-containerized cargo.

For container terminals that handle more than 20% of non-containerised cargo (NCC) our recommendation, if at all possible, is that the energy consumption and associated GHG emissions for containers and non-container cargo should be measured separately to avoid the need for extensive allocation of energy and emissions between cargo types.[2].

If a terminal has access to exact weights, or a terminal average for each container from its own operational data then this figure should be used. The EcoTransIt ratio[3] should be used where information on weight is not available in a specific terminal.

[2] NCC shows a great variety and often needs more handling per tonne than containers. If less than 80% is containerised, it becomes difficult to justify the facility as a container terminal and it is probably more relevant to refer to it as a General Cargo Terminal or Multi-purpose Terminal. To establish what percentage of cargo is container, the operator should convert non-containerised cargo to TEU's. The EEEG will consider expanding the guidance document to include a chapter on NCC in a later version. The main objective of EEEG was to have a guidance document for container terminals.

[3] EcoTransIT provides a default ratio that 2 out of every 7 containers shifted are 20' whilst 5 out of every 7 are 40' containers. As a result the average container lift represents approx. 1.7 TEUs, which is equivalent to 17T net weight of cargo.

When calculating the ratio of containerised to non-containerised cargo (NCC) in a terminal, a terminal should calculate this by converting non-containerised cargo to TEU's, using a conversion factor based on an average gross weight of 12.45 metric tonnes equals to 1 TEU.

4.2 Alignment with International Standards

We have developed this guidance in line with the key "principles" of the GHG Protocol. There are specific guidelines to prevent "double-counting" of emissions by multiple entities of one company that may be reporting GHG emissions.

4.2.1 The Three Scopes

According to the GHG Protocol, emission sources associated with a company's business operations (as outlined in the following tables) are divided and reported according to three scopes:

- **Scope 1** refers to a company's direct GHG emissions from assets that it controls or owns. In a container terminal or its surrounding area. These are dominated by the combustion of fossil fuels (e.g. diesel) from both stationary (e.g. diesel generator) and mobile (e.g. straddle carrier) sources. These are reported as **Scope 1**.

- **Scope 2 and 3** refer to different types of indirect GHG emissions that are a consequence of the activities of the reporting company but occur at sources owned or controlled by another company.

- At a container terminal, these are sources from finished energy "purchase" (i.e. electricity, chilled water, hot water or steam). These are reported as **Scope 2** emissions.

- Multiple **Scope 3** categories exist. This is an "optional" reporting category. That being stated, this guidance is only concerned with those that relate directly to the value chain of a container terminal. Which scope 3 subcategory a particular source falls under depends on the nature of the source and the organizational relationships at the terminal. As such the choice of which scope three categories are included in the calculation and how they are reported rests with the individual terminal.

Under these Guidelines, Scope 3, as mentioned above, is an "optional" reporting category that allows for the treatment of all other indirect emissions. Some examples of Scope 3 activities are: the extraction and production of purchased materials; transportation of purchased fuels; subcontractor activities; business travel/commuting; water use; sewage disposal; refrigerated leakage; and waste to landfill.

Reporting in line with this Guidance requires reporting of Scopes 1 and 2 emissions; the EEEG advocates allowing companies to determine for themselves which categories of Scope 3 emissions are relevant to their operational activities. If a terminal wishes to calculate their emissions in line with the GLEC Framework, they will need to include their "well to tank" emissions. Operators can calculate these separately from their "tank to wheel" emissions if they wish, using the emission factors provided.

4.2.2 Typical Container Terminal Activities

Table 3 below lists some example activities within a container terminal to demonstrate which of the Scopes (described above) they would fall within.

A more comprehensive list of activities that take place in container terminals is included in Appendix 1. The activities are presented in a table that a terminal operator can proactively use to document which activities are included in its GHG footprint and add appropriate notes.

Table 3 Example activities under the Scopes of GHG footprinting

Scope	Activity	Reason
Scope 1 (direct emissions)	Rubber-tyred gantry (RTG) crane moving containers	Diesel used to drive engine; impact is within site boundary
	Reach Staker (RS) for handling containers within terminal	Diesel to drive and lift container
	Diesel powered straddle carrier moving containers within yard	Diesel to drive and lift container
	Empty Container Handler (ECH) transporting an empty container from position A to B within the Terminal	Diesel consumption
	Heating unit in Technical Workshop during the winter	Combustion of gasoil to power heating unit results in emissions
	Mobile Harbour Crane (diesel)	Diesel consumption
	Trucks for container moves between different areas in the yard	Diesel consumption
	Automated Guided Vehicles (AGV)	Diesel consumption
Scope 2 (indirect emissions)	Use of Quay Crane (QC)	Electrically-powered and that is supplied by external utility company; impact is at the power station, i.e., off-site, hence indirect
	Use of rail mounted gantry (RMG) crane	Electricity used to power RMG for moving containers in the block
	Automated Staking Cranes	Electricity used to power automated stacking cranes
	Automated Guided Vehicles (AGV)	Electricity
	Recharging electric forklift in Container Freight Stations (CFS) within Terminal	Consumption of electricity in charging the battery
	Terminal security lighting	Consumption of electricity to power mast lights
	Air conditioning in offices	Use of electricity from grid
	Terminal Vehicles	Electricity
	Straddle Carriers	Electricity
	Mobile Harbour Cranes	Electricity
Scope 3 (optional indirect emissions)		
	Travel by taxi and train from Terminal to Head office at a different location	Mileage and impact of transport modes has an indirect impact.

Scope	Activity	Reason
	Commuting and air travel by staff	Mileage and impact of transport modes has an indirect impact.
	Fuel Production and Distribution	Direct consequence of energy use – must be included for a true and fair comparison of electricity and diesel use.

At present, most terminal operators are not monitoring any Scope 3 emissions. Some companies are measuring certain elements of Scope 3 emissions, for example, air and rail business travel. However, these are not reported publicly. Investigations to date suggest that the vast majority of GHG emissions relating to the container terminal are from Scopes 1 and 2.

4.3 Schematic of a Terminal

The schematic drawing (Figure 1) is intended to give a pictorial representation of a typical container terminal with colour codes to indicate whether each item is included or excluded from the GHG footprint.

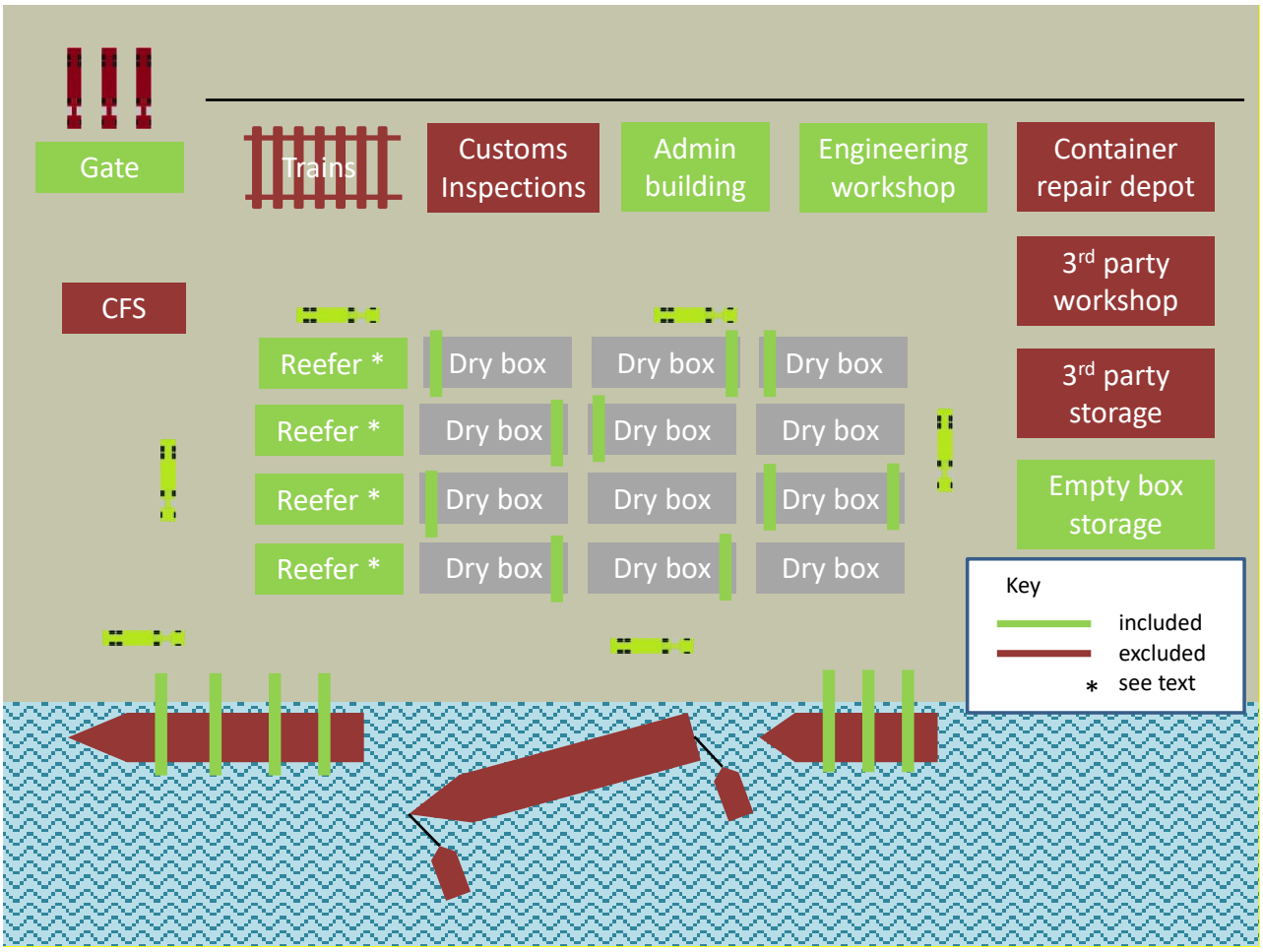

Figure 1:Schematic drawing of a typical container terminal

4.4 Reefers

Emissions associated with electricity (and diesel, e.g., when powered by generators) consumed by refrigerated containers (known as reefers) within a container terminal, are considered the ultimate responsibility of the shipping line; the terminal operators do not own or control the reefers.

It is clear that while reefer refrigeration is a critical business activity, the container terminal operator cannot easily control the technology inside the box nor the storage time on the terminal. The operator simply provides the electricity, which in turn is most commonly supplied by a landlord port authority or energy provider. The port authority or energy provider also owns the electricity infrastructure (e.g. local grid). These points make it practically impossible for the container terminal operator to manage, control and modify that electricity supply.

Nonetheless, the provisions of the GHG Protocol make it clear that emissions associated with reefer electricity consumption should be reported as a scope 2, indirect emission.

If a terminal operator is able to measure the overall reefer consumption per year, they can separate the related emissions from other emissions and report them separately in order to identify the contribution made by reefers to their scope 2 emissions .

Energy consumption for reefers varies by temperature settings, dwell time, air ventilation frequency, type of reefer, sunlight exposure and outside temperatures. Estimating the reefer's energy consumption accurately without proper metering would be impossible and should not be attempted for the purposes of this Guidance.

The philosophy of GHG footprinting that the EEEG wants to adopt is to take a professional and responsible approach to improve performance, and this includes reefer-related emissions. Future advice will be given on how leakage from refrigeration gases might be included in GHG footprinting, however it should be noted that the terminal has no control over the mechanical or operational condition of any reefer it receives nor does it control any substantive technical or operational aspect of the reefers including age, technology used, mechanical integrity, efficiency or repair history. All of these criteria are under the direct control of the owner.

All terminal operators in the EEEG agree that electricity used for cooling reefers should be included in Scope 2, until the point where a terminal can obtain more detailed information, for instance in terms of allocating electricity usage more accurately. We encourage terminal operators globally to further investigate reefer related issues with their customers and thus enhance GHG reporting for the benefit of the supply chain.

Reference should also be made to section 5.4.2 where there is a worked example of the treatment of reefer energy consumption.

NB: Some terminals may supply reefers with electricity via generators, in which case the fuel used is accounted for under Scope 1, with no account of the electricity in scope 2.

4.5 Other Activities

4.5.1 On-site Contractors

If a terminal wishes to determine whether GHG emissions from contractors need to be reported as scope 3, it should first be determined whether they fall within the organisational boundaries of the terminal operator. It should be noted that these Scope 3 emissions usually add up to a very small percentage of the total terminal emissions. All GHG emissions within the operational boundary have to be accounted for, if possible. Contract services that fall outside of organisational boundary definition and qualify as Scope 3 as those that are typically non-routine and do not directly support operations. Examples of these services might include building, electrical and civil maintenance, various construction projects, service contractors (HVAC, lighting, waste disposal, delivery, etc.).

Incorporation of the GHG emissions from contractor equipment and facilities is especially important if the contractor carries out work that would otherwise have to be done by the company. Examples of on-site contractors or outsourced activities are Security, Maintenance, Lorries, CFS, reefer maintenance, etc. All such emissions should be incorporated in the GHG inventory as Scope 3 emissions.

Some contract services fall outside of organisational boundary definitions and are typically non-routine and do not directly support operations. Examples of these services might include building, electrical and civil maintenance, various construction projects, service contractors (HVAC, lighting, waste disposal, delivery, etc.).

On site contractors usually have their offices, storage sheds and canteens in the terminal. They therefore fall within the physical boundary of the container terminal. The reasons that they have been commissioned to do that work inside the terminal would seem to justify being included within the operational boundary. They use electricity off the terminal grid and sometimes use fuel from the company fuel station. Examples of subcontractor activities include maintenance, technical workshop, and specialist services.

Use of estimated figures in the GHG inventory should be avoided if possible. If it cannot be measured accurately, or if estimates are made and it is unclear who has ultimate responsibility for the emissions, these should be placed in Scope 3.

4.5.2 Off-site Contractors

Some companies use off-site contractors to transport containers to railheads or other intermodal facilities. Sometimes the marine terminal does not have sufficient capacity to store all the containers and the terminal has hired another facility to store inland bound containers. The transport between the two facilities is often also outsourced. The terminal operator decides which container is transported to the storage area at any particular time. It has full operational control over the transport services. This is a good example of an activity outside the organisational boundaries (the terminal operator does not own shares in the transport company, but it does have full operational control).

This explains why, once the organisational boundary is set, it is not a matter of the physical activity being on-site or off-site, but whether the company has “control”. Some examples are shown below.

- Company A has outsourced all security activities. Company A is not financially involved in the company that supplies the security services. This means there is no equity share or financial operational control over the activities of the security company. If Company A wishes to report GHG emissions of the security company in the GHG inventory, this must be done in Scope 3.

- Company B formed a 50:50 joint venture with a transport company to transport containers to warehouses in the CFS just outside the terminal. They buy a couple of trucks together. In an equity share program, Company B will account for 50% of the GHG emissions from the trucks in the GHG inventory in Scope 1. If Company B has chosen the control approach, they can first consider the financial structure. Company B has the ability to direct the financial and operational policies to gain economic benefit from the activities. 100% of the emissions from the joint venture have to be included in Scope 1 and 2 of the GHG inventory of Company B.

4.6 Exclusions

The following should be excluded from the container terminal's GHG footprint:

- Sites currently being developed (i.e. planned and/or constructed). This is likely to change in the future as investigations are underway to research the quantification of both "embodied" and "activity-based" carbon emissions from marine and land-based civil engineering works, contractor activities and the company presence at the development site. Quantification of construction or project-related GHG emissions is not discouraged, rather it is recommended that these are investigated and, if appropriate, shown on a separate reporting line.

- Third party facilities where only labour/stevedoring services are supplied. In this case, the business supplies a labour resource to third party terminals and therefore owns no significant equipment.

- Other businesses or activities owned by the container terminal that are not related to the core business of moving/handling containers. Examples might include a telecommunications company and warehousing (non-container).

4.7 Commencing a GHG Footprint

Companies should be careful not to publish a full GHG inventory too soon. Terminals not fully operational(e.g. still in the construction phase of development) or on which there is still a lot of testing going on (e.g. commissioning stage), may have a substantially higher carbon footprint.

When reporting "absolute" GHG emissions (i.e. tonnes of GHG), it may be simpler to start reporting the footprint when full operations are up-and-running as at 1st January in any year. However, when normalised (i.e. GHG emissions per normalisation unit), the calculation can be made at any time. Reports from the first year of operation should not be used as a baseline.

5 ANALYSIS AND REPORTING OF GHG EMISSIONS

5.1 Scopes of Reporting

Container Terminals embarking on GHG footprinting should focus upon Scopes 1 and 2 first and not include Scope 3. Preliminary investigations suggest that in some cases Scope 3 emissions may comprise less than 1% of carbon emissions at a terminal. However, as knowledge about Scope 3 activities increases and techniques for data capture evolve, Scope 3 emissions may become more frequently reported.

One important point to consider in collating Scope 3 emissions is the *de minimis* rule in the GHG Protocol that states a company can eliminate activities that require a disproportionate effort to collect data for which the outcome does not have a significant effect on the overall carbon footprint. It is for this reason that most container terminals are focusing on Scopes 1 and 2, which maycompromise almost the totality of all GHG emissions, unless a significant amount of subcontracting has taken place.

5.2 Double-counting and Consolidation

When two or more companies hold interests in the same company but use different consolidation approaches (i.e. one uses the “equity” method and one uses “control”), emissions from that joint operation could be double-counted. Disclosure of emissions should always be explained and justified so that stakeholders can fully understand the situation. Double-counting must be avoided in trading schemes and certain government reporting mechanisms.

5.3 Base Year

It is important to establish a base year against which future years’ emissions can be compared. The data set in the base year should be comprehensive. The base year may need to be adjusted as a result of acquisitions and divestitures in accordance with the rules described in the GHG Protocol. This is more relevant in the case of comparing one year’s “absolute” GHG emissions with the next.

It is most important that the year selected as base year has a robust data set which is as complete as possible (i.e. minimal data gaps and omissions). A comprehensive description of how the choice of base year was made and what constitutes the GHG footprint should be kept.

5.4 Denominator

5.4.1 Unit of activity

There is a variety of parameters that can be applied to carbon emissions over time; these include TEU throughput, total container moves, paid container moves, millions of USD turnover, and

distance travelled by machinery. However, the core business of container terminals is moving containers into the terminal and onward to the next mode of transport.

The EEEG has discussed various measures that could be used. Given that the main focus of GHG emission calculation and reporting is to track the impact of efficiency measures over time it is vital that whatever indicator is used it is used consistently. Changes to the unit of activity will lead to results that are not comparable to previous years.

Three examples that have been identified:

1. Total 'Terminal In and Out Boxes and/or TEUs counts each box/TEU moved over the quayside and over the hinterland modes, i.e., truck, train and barge, as one move each. Each container is counted once as it arrives and once as it leaves the terminal, regardless of mode of transport used. Terminal In and Out Boxes/TEUs, aims to minimize the effects of a change in modal split compared to, say, TEU over the quayside.
2. Total 'number of container visits' to a terminal, which is the method described above, divided by two.
3. 'Total Terminal Moves (TTM)' counts as all container moves on the quay and yard (including shuffle moves, housekeeping moves and the lifts to load/unload rail wagon), based on twist counts; twin-lift should be counted as two lifts. TTM should also include, hatch-cover lifts, and gear-box lift.

The EEEG strongly recommends that a terminal operator presents mutliple denominators as part of its normalised GHG footprinting data. These can be reported on separate lines.

5.4.2 Treatment of Reefers

Reefer consumption may be very significant but not related to the energy used for container handling. As the proportion of electricity consumed by reefers at a terminal varies from year to year, and the influence of the terminal on reefer power consumption is very limited (refer to section 4.4). A terminal operator should use a constant methodology concerning reefer electricity in order to guarantee annual reproducibility. Any changes of methodology must be transparent and traceable.

An optional reporting template is provided in Appendix 3.

5.5 Scope 2 Emission Factors

The latest version of the GHG Protocol states that each company should aim to use the average emission intensity of the electricity grid that they are connected to (often at national level) and/or the emission factor (EF) of their electricity supplier, if they disclose this factor. If the electricity supplier does not disclose its own EF then only the former choice is possible.

Terminals should use the electricity supplier's EF if there is sufficient evidence that it is correct, for instance, that it is certified by an independent or government body. If the electricity supplier is changed, the new EF should be investigated and used.

Several sets of emission factors are available and updated regularly although generally with a 2 to 4 year time lag due to the need to collect, process and check data from a wide range of sources before publication (e.g. the GLEC Framework v1.0 published in 2016 contains the most up-to-date IEA data which is from 2013/14). Other possible sources of country-specific data include:

- National Statistics (for example; Defra in regards to the UK),
- International Energy Agency (IEA)
- World Resource Institute (WRI)/GHG Protocol)
- EcoTransIT Methodology Report

It is generally recommended that the most up-to-date set, relevant to a particular terminal, is used. As part of the commitment to keeping this guidance up to date FEPORT/EEEG will periodically publish an updated table of recommended emissions factors in line with best available sources and related guidance.

It is important to note that for comparisons of one terminal over time, the same referenced EFs must be used, otherwise the external effects of changing EFs would lead to incorrect conclusions over energy efficiency changes. When a body publishing EFs releases a new set of up-to-date EFs, instructions on how to apply these to historical data will be supplied and explained.

5.6 Reporting

Once all the data is gathered and collated, GHG footprints will need to be reported in some form. This could be for internal purposes or for public consumption. This Guidance recommends that, as a minimum, terminal operators publish the annual percentage relative with a clearly stated and consistent unit of measurement to the chosen base year (see Appendix 3). Publication of other metrics, such as total emissions, are optional.

Optional, full public reporting should, as far as possible, be in line with the GHG Protocol's recommendations (noting that if the full list of required information at 5.6.1 is not included, compliance with the Protocol should not be claimed). This ensures that the resulting report is credible, complete, consistent, accurate and transparent. For ease of reference, the relevant sections of the GHG Protocol are quoted below, with amendments and omissions in square brackets for relevance and brevity. If clarification is required on the precise content of each item, the reader is referred to the context within the Protocol itself.

5.6.1 Required Information

"A public GHG emissions report […] shall include the following information:

Description of the [terminal] and inventory boundary

- An outline of the organisational boundaries chosen, including the chosen consolidation approach
- An outline of the operational boundaries chosen, and if scope 3 is included, a list specifying which types of activities are covered

- The reporting period covered.

Information on GHG emissions

- Total scope 1 and 2 emissions […]
- Emissions data separately for each scope
- Emissions data for all seven GHGs separately (CO_2, CH_4, N_2O, HFCs, PFCs, NF_3, SF_6) in tonnes of CO_2 equivalent (see section 1.3.1 for further clarification)
- Year chosen as base year, and an emissions profile over time that is consistent with and clarifies the chosen policy for making base year emissions recalculations
- Appropriate context for any significant emissions changes that trigger base year emissions recalculation (acquisitions/divestitures, outsourcing/insourcing, changes in reporting boundaries or calculation methodologies, etc.)
- Emissions data for direct CO_2 emissions from biologically sequestered carbon (e.g. CO_2 from burning biomass/biofuels), reported separately from the scopes
- Methodologies used to calculate or measure emissions, providing a reference or link to any calculation tools used
- Any specific exclusions of sources, facilities, and/or operations."

5.6.2 Optional information

"A public GHG emissions report should include, when applicable, the following additional information:

Information on GHG emissions and performance

- Emissions data from relevant Scope 3 emissions activities for which reliable data can be obtained
- Emissions data further subdivided, where this aids transparency, by business units/facilities, […] source types (stationary combustion, process, fugitive, etc.), and activity types (production of electricity, transportation, generation of purchased electricity that is sold to end users, etc.)
- Emissions attributable to own generation of electricity, heat or steam that is sold or transferred to another organisation
- A description of performance measured against internal and external benchmarks
- Relevant ratio performance indicators (i.e. Box-in and Box-out; a terminal is also free to normalize again other parameters such as US$M turnover; TEU (number, sales etc)
- An outline of any GHG management/reduction programmes or strategies
- Information on any contractual provisions addressing GHG-related risks and obligations
- An outline of any external assurance provided and a copy of any verification statement, if applicable, of the reported emissions data
- Information on the causes of emissions changes that did not trigger a base year emissions recalculation (e.g. process changes, efficiency improvements, plant closures).
- GHG emissions data for all years between the base year and the reporting year (including details of and reasons for recalculations, if appropriate)

- Information on the quality of the inventory (e.g., information on the causes and magnitude of uncertainties in emission estimates) and an outline of policies in place to improve inventory quality
- Information on any GHG sequestration
- A list of facilities included in the inventory
- A contact person.

Information on offsets

- Information on offsets that have been purchased or developed outside the inventory boundary, subdivided by GHG storage/removals and emissions reduction projects. Specify if the offsets are verified/ certified and/or approved by an external GHG programme […]
- Information on reductions at sources inside the inventory boundary that have been sold/transferred as offsets to a third party. Specify if the reduction has been verified/ certified and/or approved by an external GHG programme." (WRI/WBCSD, 2006)

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Appendix 1: Frequently asked questions

Lubricants

Q. Should the normal consumption of engine/gear oils, greases and lubricants in plant, equipment and vehicle maintenance be included in the GHG footprint?

A. No. Lubricants etc. are not combusted as such but break down naturally and are not considered to be an emissions problem. If, however, lubricants are burned to make heat, that volume of lubricants should be included in the Scope 1 emissions.

Port authority activities

Q. If a container terminal also has responsibility for port authority activities, should these be included?

A. If the activities (e.g. administration, mooring) undertaken as part of being the port authority fall within the boundary being used by that terminal/organisation to measure its GHG footprint, then the emissions associated with them should indeed be included under the appropriate scope.

Rented equipment

Q. If a terminal leases a mobile harbour crane from its landlord port authority, how should this be accounted for in the GHG footprint?

A. A MHC is undoubtedly being used solely for a key activity, i.e., moving container boxes or cargo, and efforts should be made to include the GHG emissions. If the MHC is using terminal owned or purchased diesel fuel, the emissions should be allocated to Scope 1. If the fuel is supplied by the lessor (i.e. port authority as part of the rental deal), effort should be made to quantify that fuel consumption. If the leased MHC is undertaking work for a wider variety of activities (e.g. including lifting for third parties and/or the port authority itself as well as the container terminal), there may be a case for including the emissions in Scope 3. If the leased MHC is operated by port authority or third party contracted staff (i.e. rather than container terminal employees) and the fuel consumed cannot be quantified, an estimate could be made in Scope 3.

Inland services

Q. A container terminal operates a facility engaged in CFS activities two kilometres inland from the main terminal. Should this be included in the GHG footprint?

A. This facility is outside the boundary of the main terminal and should be excluded. Nevertheless, the existence of such facilities and other activities associated with the company's operations should be described and explained in documentation relating to the GHG footprint. The reasoning for any exclusions should always be provided.

Support Services

Q. A terminal is also home to a regional or corporate office function. How should this be managed in the GHG footprint?

A. If the fuels and electricity consumed in the regional or corporate function can be measured, monitored and quantified separately and accurately, then they should be excluded from the individual container terminal GHG footprint. They should be included in the regional/corporate GHG footprinting and communication followed to ensure there is no double-counting. From experiences, however, this is unlikely to be the case and staff in that regional function also do some work or have responsibilities in the local container terminal. In this case, it might be more straightforward to include the fuels and electricity in the container terminal footprint and explain this in accompanying documentation. This is another good reason why it is impossible to compare terminal against terminal.

Appendix 2: Typical activities in a container terminal

Table A2 is provided to enable terminals to determine which of their activities are included in their GHG footprint and thus define their organisational and operational boundaries. It may be printed off and used as a checklist if desired.

Table A2: Typical Port Terminal Activities

Ref No.	Activity	Description	Included in footprint (TO BE COMPLETED BY CONTAINER TERMINAL)	Notes
(a)	**Container unloading**	Moving of containers from vessels to quay. Usually executed using fixed (typically on rails) Ship-to-Shore (STS) gantry cranes or Mobile Harbour Cranes (MHC). Also, cranes at the railway interface.		
(b)	**Container moving** (by terminal operator)	Moving of containers from the quayside to storage in a container stack or direct to transportation vehicles (e.g. internal transfer vehicles, AGV, SC).		
(c)	**Container moving**(Sub-contracted)	Moving of containers from the quayside to storage in a container stack or direct to transportation vehicles (e.g.by a sub-contractor's trucks using fuel that the subcontractor purchases outside of the terminal)		
(d)	**Container moving and transport** (External company)	Moving and transporting (out of the terminal) of containers from the quayside or container yard by vehicles owned and operated by an external company (e.g. haulier).		
(e)	**Container storage for MTO and third parties** (in or close to main terminal)	General handling and storage of cargo in containers in terminals, including regular Container Freight Stations (CFS) or warehousing that are located within or directly adjacent to the terminals, and prior to transportation by third parties.		
(f)	**Container storage for MTO and third parties** (separate geographic location)	General handling and storage of cargo in containers in specialised CFS and intermodal facilities that are located in geographically separate areas to the container.		
(g)	**Non-container cargo unloading, e.g., general cargo** (using terminal operator's own equipment)	Moving of general cargo from vessels to quay. Usually carried out using MHCs or other MTO owned/leased/hired equipment.		

(h)	**Non-container cargo unloading** (Ship's cranes)	Moving of general cargo from vessels to quay using the ship's own gear (i.e. specialised crane equipment fixed to, owned by, and operated by the ship's crew)		Third party activity
(i)	**Break bulks**	Loading break bulk (converted to TEU equivalent according to paragraph 4.1.2.)		
(j)	**General cargo moving** (using terminal operator's equipment)	Moving of general cargo from the quayside to storage or onto vehicles within the terminal using owned equipment (e.g. automated RMGs, RTGs, RS)		
(k)	**Non-container cargo moving** (External company)	e.g., Moving of general cargo from the quayside to outside the terminal using an external company's transportation vehicles		
(l)	**Reefers (storage of refrigerated containers) –** (Electricity)	Provision of "electricity" (e.g. obtained from a landlord or self-generated) to refrigerated containers owned by shipping lines. These are stored within the terminal, usually in dedicated electricity plugs. The refrigeration equipment is built-into the reefer container, and is not in the ownership of responsibility of the MTO.		.
(m)	**Reefers (storage of refrigerated containers) –** (Diesel-powered)	Refrigerated containers (owned by shipping lines) powered with diesel fuel from generators. This is usually only the case when there is insufficient capacity from electrical plugs.		
(n)	**General cargo storage for third parties**	General handling and storage of cargo in terminals, Container Freight Stations (CFS) or warehousing, prior to transportation by third parties.		
(o)	**Technical, maintenance and repair workshops**	Mobile equipment (e.g. straddle carrier, reachstacker), crane, trucks and other vehicle maintenance undertaken on site by the MTO's staff (or sometimes outsourced contractors)		
(p)	**Technical, maintenance and repair workshops**	Welding activities in Technical Workshop		

(q)	**Other activities, e.g., cleaning, repair of containers** (by terminal operator's own staff)	Consumption of fuels and electricity etc to run equipment involved in the maintenance of containers falling within MTO's TEU throughput		
(r)	**Other activities, e.g. cleaning, repair of containers** (External company)	Consumption of fuels and electricity etc to run equipment involved in the maintenance of containers belonging to non-MTO TEU throughput		
(s)	**Generation of electricity by diesel generator**	Use of fossil fuel powered generators where electricity supply is not guaranteed		Scope 1 activity
(t)	**Fuels used for heating**	Use of fossil fuels, such as natural gas, for heating a variety of buildings		Scope 1 activity
(u)	**Fuels and electricity used for other vehicles**	Cars, passenger vehicles (e.g. minibus), pick-ups etc.		Scope 1 activity
(v)	**General administration offices including Information Technology, security and lighting**	Electricity and gas and long distance heating used to power, light and heat general office administration, security areas and management functions.	Yes	Scopes 1 & 2 activity. Items in this category can also be broken out onto individual lines, e.g., information technology, security and lighting.

Appendix 3: Example reporting table

	Option A (separate metering for refers)	Option B (all electricity together)
Energy-consuming activities	**CO_2e tonnes**	**CO_2e tonnes**
Reporting year	2016	2016
Scope 1 emissions	12,000	12,000
Scope 2 emissions	17,000	17,000
Scope 3 emissions	5,000	5,000
Total terminal emissions	34,000	34,000
Total terminal emissions related to handling	32,000	
Total in and out boxes	1,500,000	1,500,000
kgCO_2e/box	22.67	22.67
kgCO_2e/box related to handling	21.33	
Baseline year	2014	2014
Baseline year kg CO_2e /box	24	24
Change from baseline year (%)	5.55%	5.55%
Baseline year kg CO_2e /box related to handling	23	
Change from baseline year related to handling (%)	7.26%	

The table above is for internal use only, and illustrates one possible way of presenting results. It shows how reefer-related emissions can be isolated and removed from the calculation of 'kg CO_2e per box', whilst maintaining transparency of the total terminal emissions. If a terminal wishes to publish figures in line with this Guidance, it is only obliged to publish the increase/decrease compared to baseline year. The terminal should include a record of the decisions, process and calculations leading to the figures in the table. It is recommended to keep the table and records for future reference.

Two methods are presented to show differences in the calculation. 'A' has reefer metering in place, and can isolate reefer energy from its other uses. 'B' is not able to do so and therefore shows a higher kg CO_2e per box.

If a terminal operator is able to separate reefer electricity from other emissions under Scope 2, he may choose to publish 'kgCO_2e per box' without reefer consumption and declare that reefer consumption is excluded from that measure. However, the amount of energy so excluded must be declared separately (see also section 4.4).

The table can be replicated and expanded to include as many lines under scopes 1 and 2 as you wish.