



IAPH Tool Box for Greenhouse Gases

Introduction

[About The Toolbox](#)

[Navigating the Tool Box](#)

Welcome to the International Association of Ports and Harbors (IAPH) Air quality and Greenhouse Gas Tool Box. The purpose of this Tool Box is to provide ports, both members and non members of the IAPH, quick access to the tools needed to start the planning process for addressing port-related air quality and climate change related issues.

Balancing port operations and development with environmental considerations can be challenging, especially with issues like air quality and climate change that are complex and evolving. This Tool Box provides information on air and climate issues and their relationship to port and maritime activities. Based on actual port experiences, it describes strategies to reduce emissions and guidance on how to develop a Clean Air Program and a Climate Protection Plan. Strategies such as repowering older engines, applying effective technologies for efficiency and emission control, and using alternative and cleaner fuels in maritime operations will dramatically reduce air pollution and greenhouse gas emissions. Undertaking such bold strategies will improve local air quality, safeguard public health, and protect ports and the planet from the effects of climate change.

Every port in every country has different needs and capabilities. The resources in this toolbox are intended to help initiate, inspire, and inform your internal discussions about what course of action is right for you. You are invited to explore this Tool Box and join other ports around the world in seeking solutions to these challenging problems.

About The Toolbox

In prior years, this Tool Box has dealt primarily with the reduction of air emissions associated with local health impacts; however, with the increased concern for the effects of global climate change, the Tool Box has been expanded to include additional tools focusing on greenhouse gas (GHG) mitigation.

In April 2008, the IAPH requested its Port Environment Committee, in consultation with regional Port Organizations, to provide a mechanism for assisting the ports in mitigating climate change. Through this request, in July 2008 a group of 55 ports from all over the world adopted the [C40 World Ports Climate Declaration](#) to work together to reduce the



threat of global climate change. This group is now known as the [World Ports Climate Initiative \(WPCI\)](#).

The mission of the WPCI is to:

- raise awareness in the port and maritime community of need for action
- initiate studies, strategies and actions to reduce GHG emissions and improve air quality
- provide a platform for the maritime port sector for the exchange of information thereon
- make available information on the effects of climate change on the maritime port environment and measures for its mitigation

In support of this mission, the WPCI has developed a website and formed subgroups focusing on “Themes” that will provide guidance to ports looking to monitor and reduce their GHG emissions. These themes currently include:

- Carbon Footprinting and Modeling Tools
- On-shore Power Supply
- Environmental Shipping Index
- Cargo-handling Equipment
- Intermodal Transport
- Lease Agreement Template

The Tool Box complements and supports the WPCI website by providing a resource for GHG case studies and emission reduction strategies. As with a priority pollutant emissions inventory, establishing a carbon footprint will guide ports to strategies that have the greatest reduction potential at their facility. The WPCI Carbon Footprinting Working Group is currently preparing a Guidance Document that will assist ports interested in developing their carbon footprint.

[back to top](#)

Navigating the Tool Box

This Tool Box is constructed with two main sections: air quality and greenhouse gases. These topics are accessible from tabs on the main page. The additional tab, “Integration,” describes how and when strategies from each of the toolboxes create “co-benefits;” strategies that accomplish the goals of both subjects. Links embedded among many of the strategies in each toolbox also provide a path for understanding co-benefits. Key sections of each Tool Box are described below:



Priority Pollutants Tool Box

Learn what ports are doing to improve air quality through successful clean air programs. Click "[Case Studies](#)" to learn more about port clean air programs.

Looking to reduce diesel emissions from cargo handling equipment or trucks? There are a number of strategies that can help you improve air quality. Click "[Improving Air Quality Through Effective Strategies](#)" to learn more.

Ready to create your own port clean air program? This Tool Box provides steps you can take to begin putting your program into action. Click "[Creating Your Clean Air Program](#)" to get started!

Need information on engine standards, air quality monitoring or a glossary of terms? This Tool Box provides valuable resources to help address questions you might have. Visit our "[Air Quality Tools and Resource Library](#)."

Greenhouse Gas Tool Box

Learn about the [International Context](#) for efforts to curb the threat of climate change and what international maritime and other partnerships are supporting the cause.

Learn about ways to reduce your carbon emissions in "[Strategies for Reducing Greenhouse Gas Emissions](#)".

Start creating your own GHG plan using information and approaches described in "[Developing a Climate Protection Plan](#)."

Share your port's experiences and projects by filling in a simple form -- or find out what others are doing in the "[Climate Change Project Forum](#)."



Greenhouse Gases (GHG's) and Ports: An Overview **Climate Change Background**

Climate change is a global concern. During the 20th century, global average temperatures increased about one degree Celsius. Over the next 100 years, temperatures may increase [another three to seven degrees Celsius](#). This phenomenon has been clearly linked to a build-up of Greenhouse gases (GHGs) in Earth's environment. GHGs affect climate as they concentrate in the atmosphere and trap heat by blocking some of the long-wave energy normally radiated back to space.

While some GHGs occur naturally, there is agreement among climate scientists internationally that human activity has significantly increased the GHG's in the Earth's atmosphere, leading to accelerated global warming. Activities causing this warming include those that occur in and around a port, such as burning fossil fuels for operations, transportation, heating, and electricity. The potential consequences of global warming include longer and hotter summers, longer droughts coupled with brief periods of more intense rainfall, more devastating weather-related disasters, and shortages of water -- all of which threaten public health and worldwide economic vitality.

Climate change poses an extraordinary challenge that demands immediate action. While national and international regulatory bodies are constructing mechanisms that will reduce emissions across sectors, individual organizations can contribute significantly to reducing the threat by examining their own greenhouse gas emissions and finding opportunities to reduce them. For organizations like ports, whose existence is based on activities that are prime targets for regulatory efforts, early action to address these emissions will ameliorate the future effects of increased costs as market-based forces are used to reduce carbon emissions. Being integral in the worldwide logistics chain, a port can also serve as a catalyst for rapid change throughout the industry.

[Back to top](#)

Greenhouse Gas Emissions and Emission Scopes

The maritime transport industry's contribution to global GHG emissions has been estimated to be between 1.4 percent and 4.5 percent. A fraction of those emissions are associated with port operations. The emission sources that are directly controlled by a port authority are an even smaller fraction of overall port-related emissions, which also include emission sources under control of port tenants (i.e., ships, harbor craft, trucks, rail, and cargo handling equipment). In order to address the climate change impacts associated with all port-related operations, this Tool Box considers both direct port authority-related sources as well as the port tenants' sources.

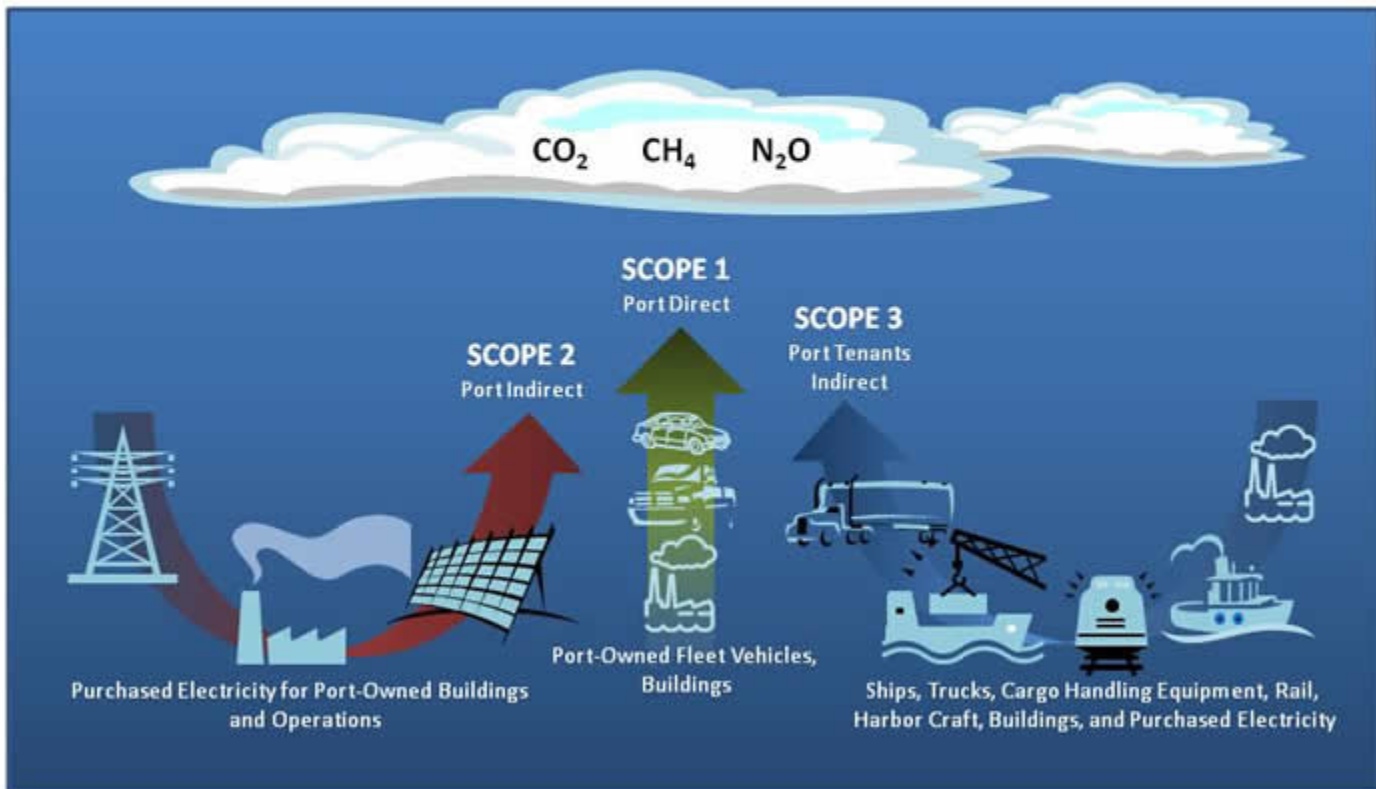


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GHG emissions for an organization like a port are often categorized in terms of “scopes” that indicate how directly (or indirectly) the emissions are generated. Such categorization is a common element of emissions models and different protocols may define the boundaries of the scopes in a variety of ways. Scope determination is a central consideration for [WPCI’s Carbon Footprinting](#) working group and will further define how port sources are categorized. This Tool Box covers topics and measures that affect emissions falling under all three traditional emission scopes. The traditional definition of scopes, as outlined in The Climate Registry’s Local Government Operations Protocol, is illustrated below as it may apply to emissions associated with a port.

[Back to top](#)

An Illustration of Scopes as They Pertain to Port Operations





Under this definition, Scope 1 includes all direct GHG emissions from a port's directly-controlled stationary and mobile sources. Examples of Scope 1 sources include port-owned fleet vehicles and port employees commute vehicles, stationary generators, and buildings (i.e., natural gas combustion). Scope 2 includes indirect GHG emissions associated with the import and consumption of purchased electricity by a port for its directly-controlled sources (i.e., electricity used for port-owned buildings and operations). Scope 3 accounts for emissions associated with the operation of port tenants. Although inclusion of Scope 3 emissions in a port's GHG inventory goes beyond what other organizations may include, they are an important part of developing a plan for management of GHG emissions on a port-wide basis. Scope 3 emissions include a port tenants' direct emissions from stationary sources (i.e., natural gas combustion in buildings), mobile sources (i.e., ships, trucks, rail, cargo handling equipment, and harbor craft), and indirect source emissions associated with purchased electricity (i.e., buildings, electric wharf cranes, and shore power for ships).

Scope 1 and 2 emission categories will likely represent a very small fraction of the port's overall emissions, while Scope 3 emissions associated with port tenants will likely account for the vast majority of the port-wide emissions. However, GHG emission reductions from all port-related sources are necessary to minimize the overall impact of the port-related operations on climate change. While Scope 1 and 2 emissions may be lower in magnitude, they are easier for a port to control and therefore may also be a good place to begin. Implementation of strategies for all port-related sources will achieve significant GHG reductions that will help reduce the adverse impacts of global climate change.

The actual scope of emissions at individual ports will differ significantly based on a wide variety of governance and operational models.