



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.

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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.

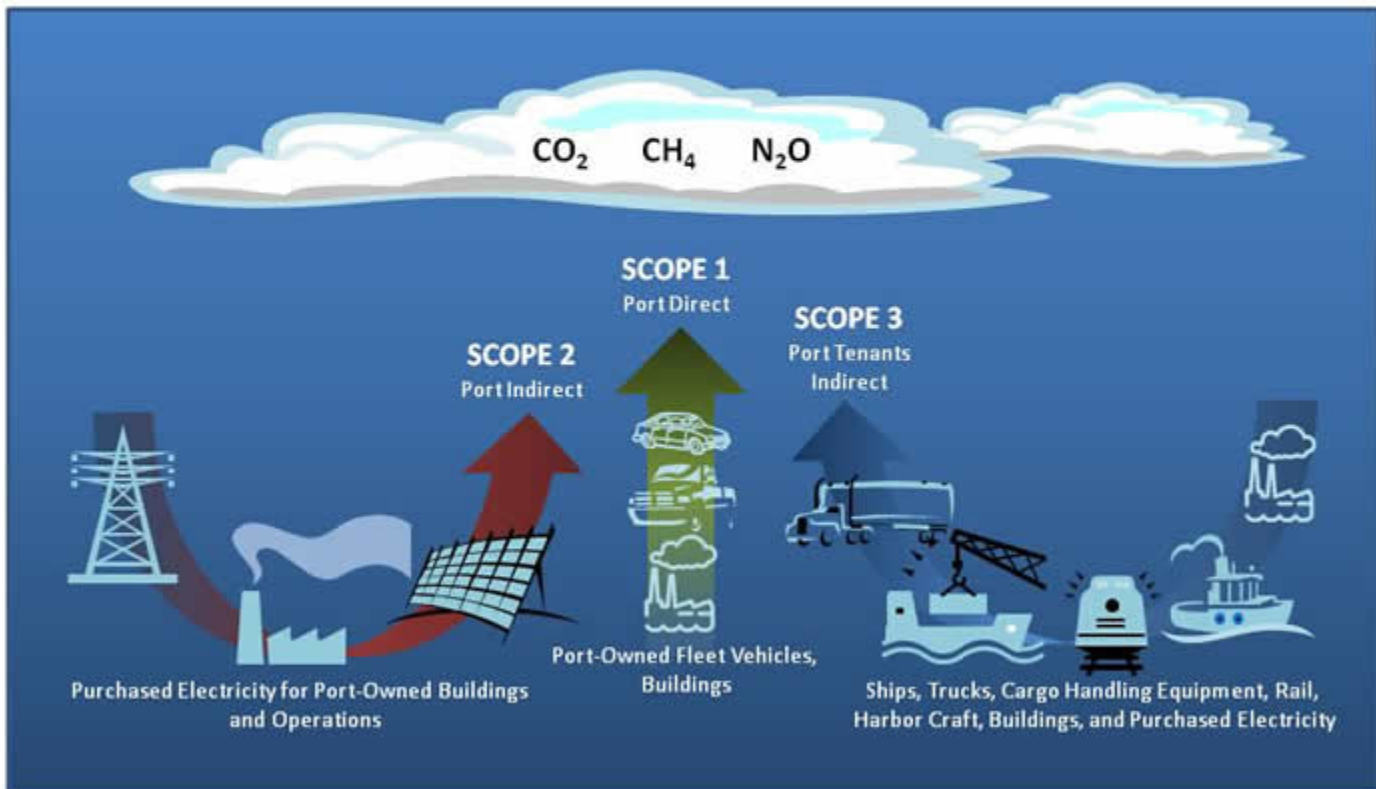


IAPH Tool Box for Greenhouse Gases

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.

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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.