BEYOND SMART CITIES

URBAN GREENHOUSE GAS INVENTORY SPECIALIST TRAINING COURSE

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GHG AND CLIMATE CHANGE SPECIALIST CURRICULUM

TRANSPORTATION

FOR GHG & CLIMATE CHANGE PROFESSIONALS

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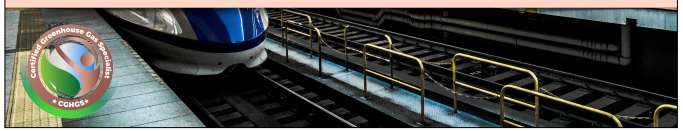

WHAT SHOULD YOU LEARN

- Categorizing transportation emissions by scope
- Defining transport modes
- Calculating on-road transportation emissions
- Calculating railway transportation emissions
- Calculating waterborne navigation emissions
- Calculating aviation emissions
- Calculating off-road transportation emissions

TRANSPORTATION

City transportation systems are designed to move people and goods within and beyond city borders. Transport vehicles and mobile equipment or machinery produce GHG emissions directly by combusting fuel or indirectly by consuming grid-delivered electricity.

Requirements in this chapter:

For BASIC: Cities shall report all GHG emissions from combustion of fuels in transportation occurring within the city boundary in scope 1, and GHG emissions from grid-supplied electricity used for transportation within the city boundary for transportation in scope 2.

For BASIC+: Cities shall report all BASIC sources and scope 3 GHG emissions associated with transboundary transportation.

CATEGORIZING TRANSPORTATION EMISSIONS BY SCOPE

Unlike stationary emission sectors, transit by definition is mobile and can pose challenges in both accurately calculating emissions and allocating them to the cities linked to the transit activity.

Depending on the available data and objectives of the inventory, different methods can be used to quantify and allocate transportation emissions.

- ☑ Scope 1: Emissions from transportation occurring in the city
- ☑ Scope 2: Emissions from grid-supplied electricity used in the city for transportation
- ☑ Scope 3: Emissions from the portion of transboundary journeys occurring outside the city, and transmission and distribution losses from grid-supplied energy from electric vehicle use

DEFINING TRANSPORT MODES

The GPC categorizes emission sources in the transportation sector by transit mode, including:

- ☑ On-road transportation, including electric and fuel-powered cars, taxis, buses, etc.
- ☑ Railway, including trams, urban railway subway systems, regional (inter-city) commuter rail transport, national rail system, and international rail systems, etc.
- ☑ Water-borne transportation, including sightseeing ferries, domestic inter-city vehicles, or international water-borne vehicles.
- ☑ Aviation, including helicopters, domestic inter-city flights, and international flights, etc.
- ☑ Off-road transportation, including airport ground support equipment, agricultural tractors, chain saws, forklifts, snowmobiles, etc.

CALCULATING RAILWAY TRANSPORTATION EMISSIONS

Railways can be used to transport people and goods, and are powered by a locomotive, which typically uses energy through combustion of diesel fuels or electricity (known as electric traction).

The allocation principle for railway broadly reflects an assessment of "induced activity," but reports all in-city railway travel as scope 1 (territorial) while the out-of-boundary portion of transboundary railway journeys can be apportioned on the basis of city passengers or goods.

- Calculating scope 1 (territorial) emissions Scope 1 emissions include emissions from direct combustion of fossil fuels incurred during the length of railway transit within the city boundary for railway lines that have stops in the city boundary. Based on available data and local circumstances, cities may either include or omit emissions from pass-through rail trips that do not stop in the city boundary.

CALCULATING RAILWAY TRANSPORTATION EMISSIONS

- Calculating scope 2 emissions Grid-supplied electricity used to power rail-based transportation systems is accounted for at points of supply (where the electricity is being supplied to the railway system), regardless of trip origin or destination. Therefore, all electricity charged for railway vehicle travel within the city boundary shall be accounted for under scope 2 emissions. Cities can seek this data from the railway operator, utility provider, or scale down regional or national statistics.

- Calculating scope 3 emissions Transboundary railway emissions (from either direct fuel combustion or grid-supplied electricity charged outside the city) can be allocated based on type of railway service and geographic range

CALCULATING WATERBORNE NAVIGATION EMISSIONS

Water transportation includes ships, ferries, and other boats operating within the city boundary, as well as marine-vessels whose journeys originate or end at ports within the city's boundary but travel to destinations outside of the city. While water transportation can be a significant source of emissions globally, most emissions occur during oceanic journeys outside of the boundaries of a port city.

- IPCC Guidelines allow for exclusion of international waterborne navigation and air travel, but these journeys and their associated emissions can be useful for a city to understand the full impact of the transit connecting through the city.

- The GPC requires water transportation wholly occurring within a city to be reported in scope 1 (territorial) for BASIC, while emissions from all departing ships for inter- city/ national/international trips shall be reported in scope 3 under BASIC+. If appropriate data is not available for the sub-sector, the notations of NE or IE must be utilized.

CALCULATING WATERBORNE NAVIGATION EMISSIONS

- Calculating scope 1 (territorial) emissions Scope 1 includes emissions from direct combustion of fossil fuels for all trips that originate and terminate within the city boundary. This includes all riverine trips within the city boundary as well as marine ferries and boats that travel between seaports within the city boundary (including sightseeing ferries that depart from and return to the same seaport within the city boundary).
- Calculating scope 2 emissions Scope 2 includes emissions from any grid-supplied energy that marine-vessels purchase and consume, typically at docks, ports or harbors (this should be distinguished from electricity consumption at other stationary port structures, such as a marina). Cities should seek data from port operators on water vessel consumption.
- Calculating scope 3 emissions In this case, Scope 3 covers emissions from departing transboundary trips powered by direct fuel combustion, apportioned to cover those departing trips that are attributable to the city. Cities can estimate the proportion of passengers and cargo traveling from the city, using official records, manifests, or surveys to determine the apportionment.

CALCULATING AVIATION EMISSIONS

Civil aviation, or air travel, includes emissions from airborne trips occurring within the geographic boundary (e.g., helicopters operating within the city) and emissions from flights departing airports that serve the city.

A significant amount of emissions associated with air travel occur outside the city boundary. Airports located within a city, or under local jurisdiction, typically service the greater region in which the city exists.

These complexities make it challenging to properly account for and attribute aviation emissions. For simplicity, scope 3 includes all emissions from departing flights. Cities may report just the portion of scope 3 aviation emissions produced by travellers departing the city.

Cities should also disaggregate data between domestic and international flights to improve integration with national GHG inventories. Oftentimes, the separation of data between in-boundary (scope 1), domestic, and international aviation may be difficult to obtain. Classification of airports should indicate whether the airports service local, national, or international needs. If appropriate data is not available for the sub-sector, the notations of NE or IE must be utilized.

CALCULATING OFF-ROAD TRANSPORTATION EMISSIONS

Off-road vehicles are those designed or adapted for travel on unpaved terrain. This category typically includes all- terrain vehicles, landscaping and construction equipment, tractors, bulldozers, amphibious vehicles, snowmobiles and other off-road recreational vehicles. For the purposes of the GPC, only activities in the city (scope 1 and scope 2) emissions are included.

Cities should only report under the off-road transportation sub-sector emissions from off-road transportation activities within transportation facility premises such as airports, harbors, bus terminals, and train stations. Other off-road transportation activities within industrial premises and construction sites, agriculture farms, forests, aquaculture farms, and military premises, are reported under Stationary Energy

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