

Local Government Operations Protocol Version 1.1: Summary of Changes from Version 1.0 May, 2010

The Local Government Operations (LGO) Protocol is designed to provide a standardized set of guidelines to assist local governments in quantifying and reporting greenhouse gas (GHG) emissions associated with their government operations.

The LGO Protocol was developed in partnership by the California Air Resources Board (ARB), California Climate Action Registry (CCAR), and ICLEI – Local Governments for Sustainability (ICLEI), and in collaboration with The Climate Registry and dozens of stakeholders. The LGO Protocol provides the principles, approach, methodologies, and procedures needed to develop a local government operations GHG emissions inventory. It is designed to support the complete, transparent, and accurate reporting of a local government’s GHG emissions. The LGO Protocol guides participants through emissions calculation methodologies and reporting guidance applicable to all U.S. and Canadian local governments.

The field of GHG reporting is rapidly evolving. The LGO Protocol is updated periodically to reflect updated science, knowledge, and technology, as well as feedback from users. The substantive changes from version 1.0 (September 2008) to version 1.1 (May 2010) are summarized below.

Acronym List

We added the term NF_3 , nitrogen trifluoride, to the acronyms list.

Chapter 6

- **In section 6.1.1, we added two new equations that calculate methane and nitrous oxide emissions in gallons.** Equations 6.4 and 6.6 (below) express fuel use in gallons, which is more common for petroleum products than the other term provided, MMBtu.

Equation 6.4	Calculating CH₄ Emissions From Stationary Combustion (gallons)
Fuel/Sector A	
$\text{CH}_4 \text{ Emissions} = \text{Fuel Use} \times \text{Emission Factor} \div 1,000$ <p>(metric tons) (gallons) (kg CH₄/gallon) (kg/metric ton)</p>	
Fuel/Sector B	
$\text{CH}_4 \text{ Emissions} = \text{Fuel Use} \times \text{Emission Factor} \div 1,000$ <p>(metric tons) (gallons) (kg CH₄/gallon) (kg/metric ton)</p>	
Total CH₄ Emissions (metric tons)	
$= \text{CH}_4 \text{ from Type A} + \text{CH}_4 \text{ from Type B} + \dots$ <p>(metric tons) (metric tons) (metric tons)</p>	

Equation 6.6	Calculating N₂O Emissions From Stationary Combustion (gallons)
Fuel/Sector A	
$\text{N}_2\text{O Emissions} = \text{Fuel Use} \times \text{Emission Factor} \div 1,000$ <p>(metric tons) (gallons) (kg N₂O/gallons) (kg/metric ton)</p>	
Fuel/Sector B	
$\text{N}_2\text{O Emissions} = \text{Fuel Use} \times \text{Emission Factor} \div 1,000$ <p>(metric tons) (gallons) (kg N₂O/gallons) (kg/metric ton)</p>	
Total N₂O Emissions (metric tons) =	
$\text{N}_2\text{O from Type A} + \text{N}_2\text{O from Type B} + \dots$ <p>(metric tons) (metric tons) (metric tons)</p>	

- **In section 6.2.2.3, we clarified language on estimating electricity using a comparable facility and square footage.** The document now includes the specific table reference from U.S. Energy Information Administration Commercial Building Energy Consumption Survey (CBECS). The language now instructs reporter to refer to Table III.6.1 at: www.eia.doe.gov/emeu/cbecs/building_types.html.
- **In Section 6.2.5, we clarified the guidance on Scope 2 emissions for local governments who generate electricity.** Many governments generate and purchase electricity. In general, Scope 2 emissions should only be reported if the Scope 1 emissions associated with that electricity purchase is not included in the inventory report. This section now clearly spells out how to decide which emissions to include in an inventory.

Chapter 9

- **Table 9.3 U.S. Waste Characterization was updated.** The table now includes the most up to date information available as of January 2010.
- **Table 9.2 Primary Equations from FOD Model was updated.** We added the term 'x 16/12' which was inadvertently left out of the version 1.0 of the LGO Protocol. This term is a conversion factor that converts the carbon generation to methane generation

Chapter 10

- **We updated all of the equations in this chapter to include the conversion to CO₂e.**
- **In section 10.3.1.2, we added an explanation of the F_{ind-com} factor.** This factor, which was added to several equations in Chapter 10, accounts for industrial and commercial wastewater discharge. It should be used by local governments who discharge significant industrial contributions of BOD₅ to their municipal treatment lagoons. This term should make the calculations in this chapter more straightforward.
- **In Equations 10.3 and 10.4 we removed the F_{removed} term.** This term was redundant with the MCF_{anaerobic} term.
- **In Equations 10.3 and 10.4 we changed the F_p term to 0.325.** This update is consistent with the guidance from the U.S. Environmental Protection Agency.
- **The F_{ind-com} factor was added to several equations.** We added this term to the following equations to simplify the calculations: Equation 10.4, 10.7, 10.9, and 10.10.

Appendix G

- We updated the emission factors where new information was available. U.S. emission factors are now consistent with the factors in the U.S. Environmental Protection Agency’s Mandatory Reporting of Greenhouse Gas Rule (U.S. EPA MRR). Updates were made to the following tables:
 - Table G.1 Default Factors for Calculating Carbon Dioxide Emissions from Fossil Fuel Combustion – Values were updated and new fuel types were added.
 - Table G.2 Default Factors for Calculating Carbon Dioxide Emissions from Non-Fossil Fuel Combustion – Values were updated and new fuel types were added.
 - Table G.3 Default Methane and Nitrous Oxide Emission Factors by Fuel Type and Sector – Fuel types were added and units were changed from grams to kilograms to be consistent with U.S. EPA MRR.
 - Table G.4 Methane and Nitrous Oxide Emission Factors for Stationary Combustion for Petroleum Products by Fuel Type and Sector kg/gallon– This new table. Previously these emission factors were only available measured in kg/MMbtu. This table provides factors in gallons, a more common metric.
 - Table G.6 Utility-Specific Verified Electricity CO₂ Emission Factors (was G.5) – New emission factors were added through year 2007.
 - Table G. 7California Grid Average Electricity Emission Factors (was G.6) – New emission factors were added through year 2007.
 - Table G.8 2007 eGRID Electricity Emission Factors by eGRID Subregion – The is a new table with the most recent eGRID emission factors calculated with 2005 data.
 - Figure G.2 2002 eGRID Subregions – This figure was inadvertently left out of version 1.0 of the LGO Protocol. The figure displays the 2002 eGRID subregions that correspond to the emission factor categories in Table G.10.
 - Table G.9 2006eGRID Electricity Emission Factors by eGRID Subregion (2004 data) – This table was G.7.
 - Table G.10eGRID Electricity Emission Factors by eGRID Subregion (2000 data) – This table was G.8.
 - Table G.11 Default CO₂ Emission Factors for Transport Fuels (was G.9) – Values were updated to enable consistency with the U.S. EPA MRR.
 - Table G.12 Default CH₄ and N₂O Emission Factors for Highway Vehicles by Model Year (was G.10) – Default emission factors were added through year 2008.

- Table G.13 Default CH₄ and N₂O Emission Factors for Alternative Fuel Vehicles (was G.11) – A new factor for BD20 was added.
- Table G.14 Default CH₄ and N₂O Emission Factors for Non-Highway Vehicles – This table was G.12
- Table G.15 Alternate Methodology CH₄ and N₂O Emission Factors for Highway Vehicles by Inventory Year– This table was G.13
- Table G.16 -Table G.20 – New tables were added with Canadian-specific emission factors.
- Table G.21 – This new table was added with electricity emission factors for Mexico.