

Methodology Background

The City of Boulder completes an annual greenhouse gas (GHG) inventory that meets the standard of the [Global Protocol for Community-Scale GHG Emissions](#) (GPC). World Resources Institute, C40 Cities Climate Leadership Group and ICLEI – Local Governments for Sustainability (ICLEI) partnered to create this GHG Protocol standard for cities, which provides a robust framework for accounting and reporting city-wide greenhouse gas emissions. This protocol is also the required protocol for cities committed to the [Global Covenant of Mayors for Climate & Energy](#), to which the city committed in 2015.

Inventory Methodology

The GPC Protocol provides a transparent GHG accounting methodology for reporting community GHG emissions, and unlike many other protocols, provides a consistent structure that will enable better comparisons among different cities.¹

There are two reporting levels for the community framework:

- **BASIC:** The BASIC methodology covers stationary energy, in-boundary transportation and community-generated waste.
- **BASIC+:** The BASIC+ level includes BASIC emission sources, as well as trans-boundary transportation; energy transmission and distribution losses; industrial processes and product use; and agriculture, forestry and other land uses.

Based on available data, Boulder has chosen the BASIC reporting level, which is consistent with many other cities to date. The categories required to be reported under the BASIC reporting level are:

1. **Scope 1:** GHG emissions from sources located within the city boundaries, including:
 - a. Energy and transportation fuel combustion.
 - b. Fugitive emissions.
 - c. Solid waste treated within the city.
 - d. Wastewater treated within the city.
2. **Scope 2:** GHG emissions occurring as a consequence of the use of grid-supplied electricity, heat, steam and/or cooling within the city boundary.
3. **Scope 3:** GHG emissions that occur outside the city boundary as a result of activities taking place within the city boundaries, including:
 - a. Solid waste treated outside the city.
 - b. Wastewater treated outside the city.

Electricity and natural gas emission factors are sourced from the local utility, Xcel Energy.² All other emission factors are based on ICLEI's *U.S. Community Protocol for Accounting and Reporting of Greenhouse Gas Emissions, Version 1.0*, July 2013 and ICLEI's *Local Government Operations Protocol*.

¹ For more information see: <http://www.ghgprotocol.org/city-accounting>.

² Xcel Energy publishes the applicable emissions factors for electricity and natural gas within the annually Community Energy Report on the website: https://www.xcelenergy.com/working_with_us/municipalities/community_energy_reports

Annual activity data is provided by the sources listed in Table 1.

Table 1. Activity Data Sources

Activity Data	Data Source
Electricity	Xcel Energy's Annual Community Report
Natural Gas	Xcel Energy's Annual Community Report
On-road transportation	City of Boulder staff and Southwest Energy Efficiency Project (SWEET)
Public transit	RTD and City of Boulder staff
Railways	Denver Regional Council of Governments (DRCOG) and Colorado Department of Transportation (CDOT) staff
Aviation	Boulder Municipal Airport staff
Solid waste	City of Boulder staff
Wastewater treatment	Boulder Wastewater Treatment Facility staff
Renewable energy	Xcel Energy's Annual Community Report

Xcel Energy includes industrial energy data with the commercial and institutional sector, therefore this sector is reported as combined. Boulder can expect to receive this data each year in updated Xcel Energy Community Energy reports.

All activity data is entered into the online [ICLEI ClearPath](#) calculation tool, the leading online software platform for completing greenhouse gas inventories. This tool aligns with the GPC reporting requirements and allows simpler emissions reporting to third-party entities including the Global Covenant, Carbon and CDP (formerly the Carbon Disclosure Project).

Boulder’s GHG emissions inventory boundary is the administrative boundary of the city government, or Boulder’s city limits. Given this boundary and the requirements for BASIC level reporting, the GPC does not incorporate emissions from other trans-boundary activities such as purchases of goods and materials or food choices.³ Yet, when examining the overall emissions footprint of a typical household, around 40%⁴ of household emissions are generated by these trans-boundary activities. Because the limitations of the current methodologies and data availability make calculating and tracking emissions from these sources difficult, the City of Boulder has not included them in optional reporting, but the city has prioritized these activities within its [Climate Commitment](#) goals and activities.

Previous Inventory Methodologies

Boulder developed annual inventories from 2005 through 2010 using the Greenhouse Gas Protocol Initiative’s *GHG Protocol Corporate Standard*. Results from the 2010 inventory were published in a comprehensive report titled [Community Guide to Boulder’s Climate Action Plan, 2010/2011 Progress Report](#)⁵.

³ The GPC also does not credit the purchase of Renewable Energy Credits or carbon offsets, nor does it credit the emissions avoided from activities such as recycling. However, it does allow optional reporting of these items as “Informational Items” only.

⁴ Based on modeled household emissions from the CoolClimate Network at: <https://coolclimate.berkeley.edu/calculator>

⁵ Results from the 2010 inventory are not included in the analysis presented in this report.

From 2011 to 2014, Boulder had limited access to energy consumption data for the community and was unable to complete annual GHG inventories. However, in 2015 Boulder could calculate a 2012 GHG inventory using ICLEI’s *U.S. Community Protocol for Accounting and Reporting of Greenhouse Gas Emissions, Version 1.0*, from October 2012.

Following successful lobbying efforts with other Colorado communities to the Colorado Public Utilities Commission to require regulated utilities to provide cities with an annual Community Energy Report containing data necessary for a GHG inventory, Boulder has been able to complete annual inventories beginning 2015 using the Community Energy Report from Xcel Energy. With annual data now accessible and the need to develop all future inventories using the GPC-compliant methodology, Boulder elected to also revise the 2012 inventory to be consistent with the GPC methodology.

Differences Between Inventory Methodologies

Calculation methodologies between the different protocols follow the same logic: Emissions are a product of emission factors and activity data. Although many themes stay consistent between protocols, different protocols may use different emission factors, lump emissions together differently and require different emission sources.

Today, emission factors from the most current version of ICLEI’s *U.S. Community Protocol for Accounting and Reporting of Greenhouse Gas Emissions* and ICLEI’s *Local Government Operations Protocol* are the most widely used and accepted. Most of these factors stay relatively constant over time, except for electricity emission factors that are sourced directly from Xcel Energy.

Most of the factors between Boulder’s baseline year of 2005 and current inventories are similar with a few notable exceptions, as shown in Table 2.

Table 2. Activity Data Source Differences

Data Source	2005	Current Inventories
Electricity emission factor source	EPA’s eGRID	Xcel Energy
Vehicle type distribution source	Colorado Department of Public Health and Environment Air Pollution Control Division	Southwest Energy Efficiency Project (SWEEP)
Waste types	Landfilled waste	Landfilled and composted waste
Waste characterization source	Not required	Boulder County’s 2010 Waste Characterization Study