ICLEI - Local Governments for Sustainability USA
U.S. Community Protocol
Dash: Greenhouse Gas Emissions 2022

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What is the Dash Emissions Profile?

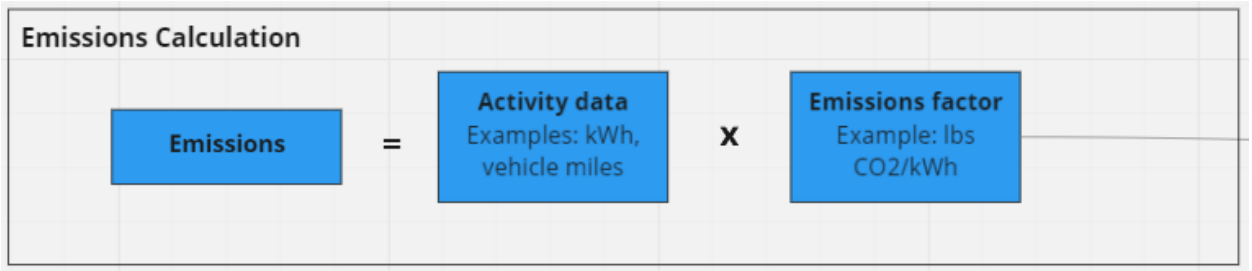
The Dash Emissions Profile includes community-wide greenhouse gas (GHG) emissions from energy use in buildings and from on-road transportation, which together typically represent at least 80% of emissions in a US Community Protocol Standard inventory for communities in the US. The Dash emissions profile is intended to be a floor rather than a ceiling, to give information for action and a sense of the scale of community GHG emissions.

Definitions

Climate mitigation:	The actions, solutions, and innovations implemented to reduce greenhouse gas emissions
Greenhouse gas (GHG):	Gasses that contribute to the atmospheric greenhouse effect [i.e. Carbon dioxide, methane, nitrous oxide, chlorofluorocarbons, etc.]
Local government operations emissions:	Emissions associated with the buildings, facilities, and vehicles operated by a local government; may also include local government purchasing and commuting and travel by local government employees.
Community-wide emissions:	Emissions generated within the community boundary, or from activities (such as electricity use or solid waste generation) that occur within the community boundary.
Vehicle miles traveled (VMT):	The amount of miles traveled by vehicles over a designated period of time. VMT may be for a specific group of vehicles, for all vehicle travel within a geographic boundary, or for a group of vehicle trips, such as those that begin or end within a geographic boundary.
Activity data:	A measure that models the level of an activity taking place resulting in GHG emissions.
Emissions factor:	A value that correlates the amount of a pollutant released to an activity associated with the release of the pollutant.

Emissions Calculations

Emissions in community-wide inventories are calculated by multiplying a measurement of some activity, such as kilowatt hours of electricity (kWh) used or vehicle miles traveled (VMT), by an emissions factor associated with that activity. The Dash emissions profile includes CO_2, CH_4 and N_2O emissions from the included activities. The following sections identify data sources for both activity data and emissions factors for each sector included in USCP Dash. In order to allow streamlined development of the emissions profile, links to data available through online sources are provided wherever possible. However, it is recommended that communities request electricity and natural gas usage data from their utilities if possible, even though this data may take several weeks or months to receive.



ClearPath Tool

It is possible to complete the calculations for a Dash Emissions Profile in a spreadsheet or other tool, however, ICLEI's ClearPath climate planning tool will make the process easier. ClearPath includes preloaded emissions factors for electricity, natural gas and vehicles, and for many communities also has preloaded vehicle miles traveled and energy usage data from the Google Environmental Insights Explorer.

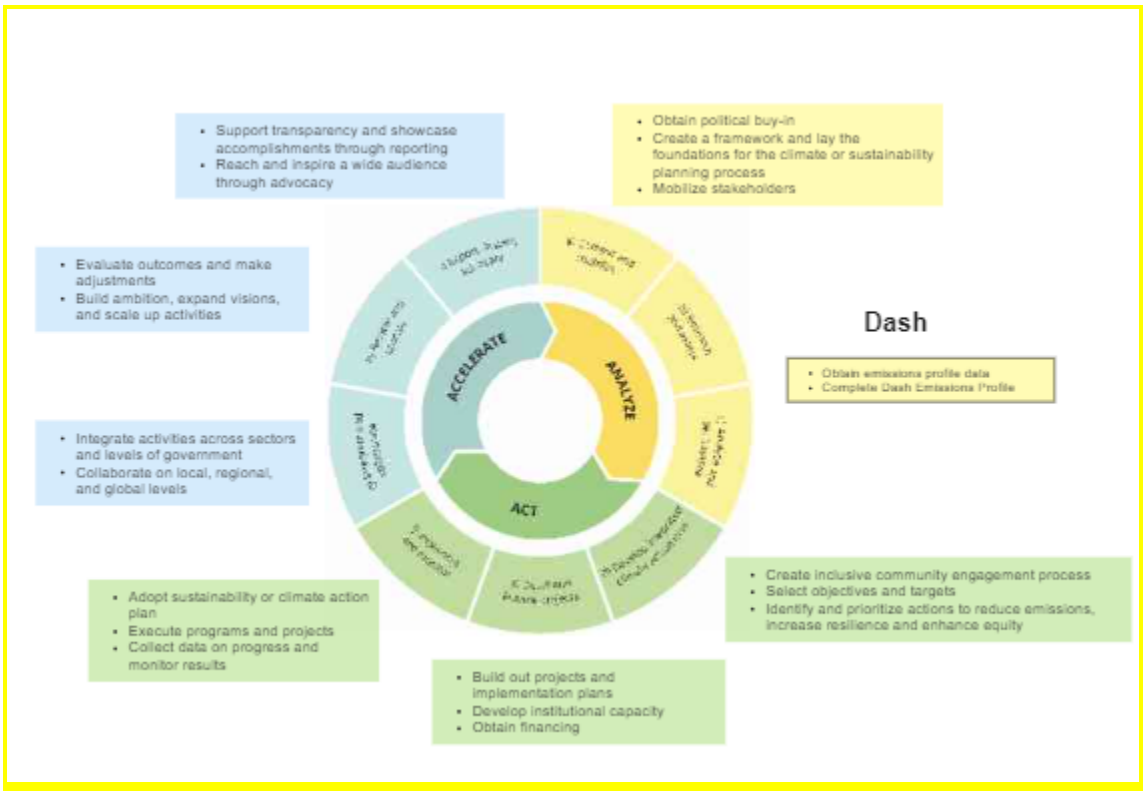
Regional Inventories

An increasing number of regional entities, such as councils of governments, are completing regional GHG inventories. In some cases, these may include an inventory for each local jurisdiction within the region, while others look only at aggregate region-wide or county-level

emissions. If a regional inventory has been conducted for your region, you may be able that data in place of a Dash Emissions Profile, or at least to provide many of the data points needed to complete the emissions profile.

Integrated Planning

The GHG emissions profile or inventory provides information to inform planning and prioritization of actions to reduce emissions in your community, as well as to monitor progress in reducing emissions. ICLEI recommends an integrated planning effort that addresses emissions reductions together with climate adaptation and equity, and is based in significant and inclusive community engagement.



The Climate Mitigation Green Cities Challenge Framework

Building Energy Data Sources

The Dash emissions profile includes electricity and natural gas usage in buildings.

First Choice: Utility Provided Data

Utility Data Available Online

- New York State: Find data through Utility Energy Registry
- Colorado, Minnesota, Michigan, New Mexico, North Dakota, South Dakota, Texas, Wisconsin (communities served by Xcel Energy) view reports.
- As additional states or utilities make energy usage data available through online portals, this information will be updated. If you are aware of an online utility data portal not listed above, please send the information to clearpath@iclei.org so we can add it.

Or Contact your Utility

- Request aggregated communitywide electricity and natural gas usage (kWh and therms/MMBtu/ccf), broken down by customer class (residential, commercial, industrial)
- Typically 1-3 months to receive data from the utility. Check with local governments in your area that have completed GHG assessments to learn about the process.

Second Choice: Modeled Energy Use Sources

NREL Slope Tool

- Residential usage is modeled based on American Community Survey data on housing types and energy expenditures. Commercial use is modeled based on utility level consumption, building square footage and CBECS energy use intensities. (see methodology.)
- Available for incorporated areas only.
- Go to https://maps.nrel.gov/slope/ and select 'data viewer' to access.

Google Environmental Insights Explorer (EIE)

- Usage is modeled based on residential and non-residential square footage from 3D building models using Google Maps data, combined with usage per square foot values

from CURB tool. For more background on EIE approach and data quality, see th technical review.

- Users may input custom usage per square foot.
- Available for most communities with a population over 25,000.
- Go to the Environmental Insights Explorer platform to request free access (if using ICLEI's ClearPath tool, this data is pre-loaded for many communities).

Third Choice: Allocation

- Obtain one of the data sources described above for a higher geographic level (usually county).
- Allocate kWh and therms/MMBtu/ccf to your community based on the number of households for residential usage and on the number of jobs for commercial usage. The number of households (occupied housing units) may be obtained from American Community Survey data through the Census data site; the number of jobs can be obtained from the Census OnTheMap tool.

Example formula for residential kWh where countywide kWh are known:

$$City\ kWh\ =\ county\ kWh\ \times\ \frac{city\ population}{county\ population}$$

Note: Non-Utility Fuels

Non-utility heating fuels such as fuel oil and propane are not included as part of the Dash Emissions Profile because usage is very small in most communities, and because of challenges with obtaining data. However, in some rural communities and towns, particularly in the Northeast region, many or all homes may use these non-utility fuels. If you believe this may be the case for your community, you can find the percentage of households using different fuels by searching 'housing' and your community name at data.census.gov; then refer to the estimation methods for non-utility fuels in the USCP Standard.

Electricity Emissions Factors

EPA eGRID

- Regional data, updated annually (every other year prior to 2018).
- Access via www.epa.gov/egrid/summary-data. Use the map in the document to find your region, and then find the total output emission rates for lbs/MWh of CO_2, CH_4 and N_2O.

Utility or CCA Specific CO_2 Emissions Factor

- Ask your electric utility or community choice aggregator for their emissions factor: typical units are lbs CO_2/MWh
- Check that the utility or CCA is calculating the emissions factor in a consistent manner across inventory years
- Most utilities that provide a factor will only provide a CO_2 emissions factor. In this case, use eGRID factors for CH_4 and N_2O.

Natural Gas Emissions Factors

CO_2 kg/MMBtu	CH_4 g/MMBtu	N_2O g/MMBtu
53.06	1	0.1

Natural gas emissions factors source: EPA Emissions Factors Hub, April 2022 version: https://www.epa.gov/system/files/documents/2022-04/ghg_emission_factors_hub.pdf

On Road Transportation Data (Vehicle Miles Traveled)

First Choice: Frequently Updated Origin-Destination Data

For either source below, data should include total miles of in-boundary trips, and 50% of miles of trans-boundary trips. Pass-through trips should not be included.

Travel Demand Model

- Contact your regional planning agency (such as a COG or MPO) for this data. Some cities and counties have their own travel demand models. Data should include both passenger and freight vehicles.
- Vehicle miles are modeled based on land use; and models are calibrated by data such as road sensor measurements.
- For some planning agencies, the model is integrated with the EPA MOVES model for more accurate estimation of local emissions per mile.

Google Environmental Insights Explorer (EIE)

- Vehicle miles are derived from cell phone location services. For more background on EIE approach and data quality, see this technical review.
- Available for most communities with a population over 25,000.
- Go to the Environmental Insights Explorer platform to request free access (if using ICLEI's ClearPath tool, this data is pre-loaded for many communities).

Second Choice: Allocation or Estimation

Allocation

- Obtain one of the data sources described above for a higher geographic level (usually county).
- Allocate miles to your community based on population, or on daytime population if a lot of people commute into your community and daytime population is available (see example allocation formula in the building energy section).

Estimation

- Some state transportation agencies publish data on vehicle counts at specific road sensor locations. These values can be multiplied by the length of the road segment to estimate VMT.
- This is generally only practical for very small communities.
- This approach will yield an estimate of only in-boundary VMT, rather than trips to/from the community as with the other approaches, which could result in a very different VMT number from other approaches.

Transportation Emissions Factors

First Choice: Travel Demand Model Integrated with MOVES, or EMFAC

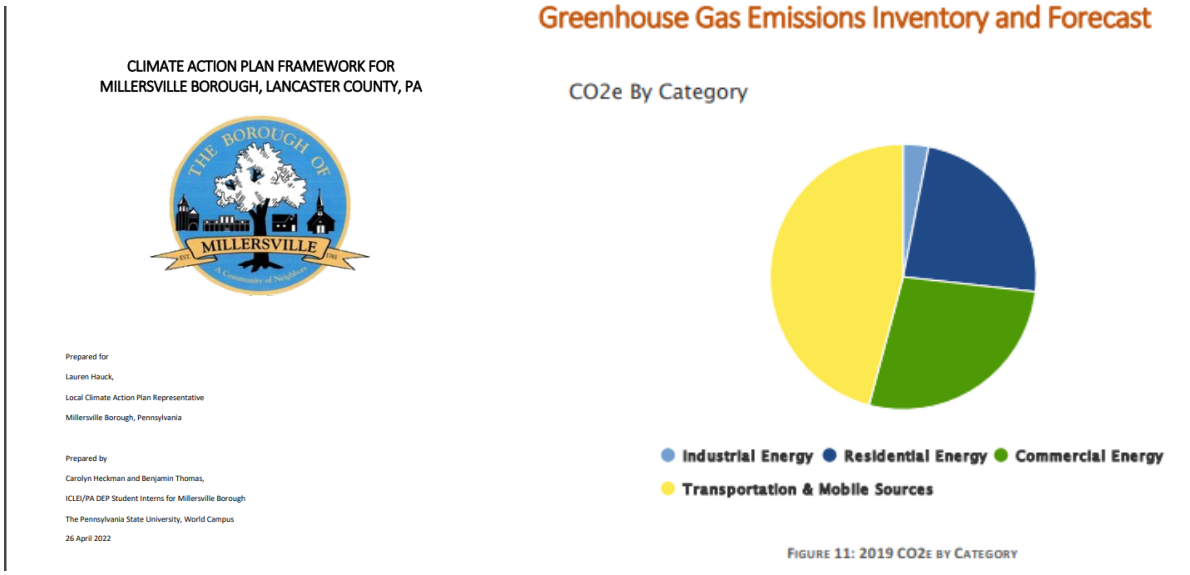
- If your regional planning agency calculates GHG emissions using MOVES integrated with the travel demand model in a way that aligns with origin-destination vehicle miles (100% of miles for in-boundary trips plus 50% of miles for trans-boundary trips), use those emissions. Communities in California should use emissions factors from EMFAC.

Second Choice: Vehicle type mix, miles per gallon, and per-mile emissions factors

- If emissions calculated using MOVES are not available, communities outside California should use vehicle type mix, MPG, and emissions factors from this document. These values are calculated by ICLEI based on data from the Bureau of Transportation Statistics and Energy Information Administration.

Example Dash Emissions Profile - Millersville, PA

Millersville used the Dash emissions profile to produce a Climate Action Framework document.



Optional Emissions Information

The following information is not required as part of a Dash Emissions Profile; rather this section references additional resources that can help to understand the emissions associated with your community, if there is community interest in these areas. Communities may also choose to add any emissions methods from the US Community Protocol Standard or Plus.

Household consumption - Cool Climate Calculator

Consumption-based inventories estimate the global emissions associated with the purchase and use of products and services. This method is typically applied at the household level, allowing individuals to answer the question, “what is my carbon footprint?” A household carbon footprint can be understood as the greenhouse gas emissions resulting from the production, use and disposal of everything the household consumes in a year, including household energy, transportation, food, goods and services.

You can quickly get an estimate of an average consumption-based household carbon footprint in your community using the Cool Climate Calculator. This information can be presented in parallel with your community emissions profile, and can be particularly helpful in guiding residents to reduce emissions associated with their own households.

In early 2023 ICLEI expects to release the draft US Community Protocol Plus, which will include more detailed guidance for understanding emissions from material flows into a community. This guidance is expected to focus on food and construction materials used in the community.

Large industrial emitters

If there is community interest in large industrial emitters, data can be found through the EPA FLIGHT tool. Note that if emissions in the FLIGHT tool are from combustion of natural gas, there may be double counting with utility supplied natural gas usage data.

Streamlined Solid Waste Approach

A streamlined solid waste approach is provided for communities that want to include a quick estimate of solid waste emissions with their emissions profile. The streamlined solid waste approach includes emissions from waste sent to a landfill or incinerator; other waste related emissions, such as from composting, are not included.

Waste generation

Communities in California should use Cal Recycle Jurisdiction Review Reports to get annual solid waste tonnage. Download the 'Jurisdiction Disposal Tonnage Trend' report and use the staff reviewed value.

Communities outside California should request annual tonnage from the appropriate city department or the receiving solid waste facility, or use 0.52 tons per person (calculated from EPA waste facts and figures for 2018).

Waste Composition, Landfill and Incineration Parameters

- If a previous GHG inventory has been conducted for the community, use the same emissions per ton of waste as the previous inventory.
- If there is no previous inventory, for landfilled waste assume 100% mixed MSW composition with typical landfill gas collection, and US average moisture (use ICLEI's ClearPath tool, or refer to factors in EPA WARM documentation).
- If there is no previous inventory, for waste sent to an incinerator (including waste to energy facility) use the emissions factor of 0.32652 metric tons CO_2/short ton of solid waste (this value is derived from Equation SW.2.2.a in the USCP Standard).