Guidance for County and Regional Inventories

Energy Sector Data Source Appendix to Local Greenhouse Gas Inventory Tool: Community Module

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1. Tool Overview

This Guidance for County and Regional Inventories User's Guide accompanies EPA's Local Greenhouse Gas Inventory Tool: Community Module. It explains how to obtain energy activity data at the city- and county-level to support users with entering data into the Community Module. For more information on using the Modules, please refer to the Local Greenhous Gas Inventory Tool User's Guides, which are available to download here:

https://www.epa.gov/statelocalenergy/download-local-greenhouse-gas-inventory-tool.

2. Energy Consumption Data Entry Sheets

The Local Greenhouse Gas Inventory Tool: Community Module may be used to calculate emissions associated with energy consumption within your community's boundary. Energy sector emissions sources covered by the tool include stationary fuel combustion, mobile fuel combustion, and electricity usage, as shown in Table 1.

Once you enter consumption information in the entry sheet for each respective source, emissions from each source will be calculated in the Summary sheet. Alternatively, emissions can be entered directly into the Additional Sources sheet.

GHG Emissions Source Sector	Inventory Sheet	Input Data (unit)
Energy	Stationary – Entry	Stationary fuel combustion (fuel dependent ¹)
	Mobile – Entry	Mobile fuel ² combustion (gallons)
	Electricity – Entry	Electricity purchased (kWh)

Table 1. Required Data Inputs for Energy Sector Inventory Sheets

3. Obtaining Input Data

The Community Module requires inputting activity data, and users are encouraged to enter energy consumption activity data from utility bill records or other local sources. However, if energy consumption data are not collected or otherwise available locally, there are existing, publicly available databases that may be used for some energy sector emissions sources. This guidance document outlines how one such database may be used to pull in data to the Stationary – Entry and Electricity Use – Entry sheets of the Module.

The U.S. Department of Energy (DOE), in collaboration with the National Renewable Energy Laboratory (NREL), publishes energy activity data and emissions estimates on the <u>State and Local</u> <u>Planning for Energy</u> (SLOPE) platform. The SLOPE platform is a comprehensive tool for accessing energy sector data across various geographies and timescales. The key differences between the two datasets (the Data Viewer and the Scenario Planner) are outlined in Table 2 below.^{3,4}

¹ Units for stationary fuel combustion are dependent on fuel type (e.g., mcf for natural gas, gallons for liquid fuels [e.g., propane, diesel, gasoline], short tons for coal).

² E.g., gasoline, diesel.

³ Data sources and methodology documentation for the SLOPE Scenario Planner can be found here: <u>https://gds-files.nrelcloud.org/auto-sync/slope/SLOPE-Scenario-Planner-Methodology.pdf</u>.

⁴ Data sources and methodology documentation for the SLOPE Data Viewer can be found here: <u>https://www.nrel.gov/docs/fy19osti/72748.pdf</u>.

Category	SLOPE Scenario Planner	SLOPE Data Viewer
Data Types Offered	Energy consumption data and CO ₂ emissions estimates from energy consumption	Energy consumption data
Geographic Disaggregation	County- and state-level	City-, county-, and state-level
Non-Electricity Energy Consumption Data for Residential and Commercial Sectors	Aggregated energy consumption and emissions estimates from all fuels	Natural gas consumption
Data Download Options	One state or county at a time	Bulk download

Table 2. SLOPE Data Source Comparison

While SLOPE includes energy and emission data from both stationary and mobile sources, the SLOPE platform is primarily recommended for obtaining data on stationary energy consumption and emissions. Mobile emissions data are available at the county-level from the <u>National Emissions</u> Inventory (NEI).

SLOPE Scenario Planner (for Counties)

The SLOPE platform offers aggregated, county-level energy consumption and emissions data through the <u>Scenario Planner</u>. Because Scenario Planner aggregates energy consumption and emissions from all fuel types, users may choose to use Scenario Planner non-electricity emissions estimates to supplement, or replace, Data Viewer consumption data (discussed in the next section).

Example Scenario Planner use case: A user developing a county-level inventory without access to residential and commercial electricity and non-electricity energy consumption data from other sources (i.e., non-natural gas fuel consumption from other data sources) may elect to use the Scenario Planner to estimate aggregated energy emissions.

Using SLOPE Scenario Planner for Emissions Estimates

Step 1. To use the Scenario Planner, first navigate to the website: <u>https://maps.nrel.gov/slope/</u>, and select the "Scenario Planner" tab (Figure 1).

Figure 1. SLOPE Platform

SLOPE: State and Local Planning for Energy	
Home Scenario Planner Data Viewer Stories About	Log In
Plan Your Energy Future	
The State and Local Planning for Energy (SLOPE) Platform is an easy-to-access online platform to data-driven state and local energy and decarbonization planning. SLOPE includes two distinct tools jurisdictions' planning needs: • Scenario Planner: Compare scenarios for the future of energy, costs, and emissions for countie	s to support
states.	
 Data Viewer: Explore city, county, and state data on renewables, efficiency, and transportation. 	

Step 2. Then, select the data type (i.e., CO_2 emissions), case scenario (Reference Case), and search for a particular county of interest in the Control Panel (see Figure 2). To view emissions for a certain year, select the year in the axis at the bottom of the page (see Figure 3).

× Control Panel						
Comparison View	V					
SCENARIO 1 SCE	NARIO 2					
Location ⑦ Q Search for a state or county						
Energy System Metrics ⑦ O Energy Consumption O CO ₂ Emissions O System Costs (state only)						

Figure 2. Control Panel Data Inputs





Scenaric ^{c02}	Scenario 1: Reference Case CO ₂ Emissions - United States								
	Details for Ye	ar 2020							
	Residential	Commercial	Industrial	Transportation	Total				
Electricity - CO ₂ Million Metric Tons (MMT)	407.1	398.6	350.6	3.833	1160				
Non-Electricity - CO ₂ Million Metric Tons (MMT)	347.5	190.8	508.2	1874	2921				
		72,722,12		1999					

Figure 4. Scenario Planner Emissions Results

Step 3. Emissions results shown in Figure 4 can then be entered directly on the Additional Sources Inventory Sheet of the Community Module, where they will be summed alongside emissions estimated elsewhere in the Module. Please see the Local Greenhouse Gas Inventory Tool User's Guides for additional information on entering emissions into the Additional Sources sheet.

SLOPE Data Viewer (for Cities or Counties)

The SLOPE <u>Data Viewer</u> contains nationwide electricity and natural gas consumption projections for 2017-2050, developed from a 2016 baseline. Energy consumption data are available at the state-, county-, and city-level and are disaggregated by economic sector (e.g., residential, commercial, industrial). SLOPE Data Viewer energy consumption data can be pulled directly into the data entry sheets of the Community Module, as detailed below.

Example Data Viewer use case: A user developing a city- or county-level inventory without access to energy or electricity consumption data may elect to use the Data Viewer.

Using SLOPE Data Viewer for Consumption Estimates

The following figures illustrate how to download natural gas and electricity consumption data by county from SLOPE Data Viewer.

Step 1. To use Data Viewer, first navigate to the website: <u>https://maps.nrel.gov/slope/</u>, and select the "Data Viewer" tab (Figure 5).

Figure 5. SLOPE Platform



Step 2. Next, select the "Net Electricity and Natural Gas Consumption" database layer (Figure 6).

Figure 6. Data Viewer Energy Consumption Data								
SLOPE: State and Local Planning for Energy								
Home Scenario Planner Data Viewer Stories About	Log In							
Layer Database Data Viewer Interference of the second sec								
Social Vulnerability Index Household Energy and Transportation Burden LMI Single Family Home Bill Savings Potential								

Step 3. After selecting the correct layer, download the aggregate data by clicking the download icon (Figure 7). A zip folder with three Excel csv files, containing state-, county-, and city-level data, respectively, will automatically download.



Step 4. Open the Excel file of interest (for county-level data, the file name is "energy_consumption_expenditure_business_as_usual_county.csv"). Within the file, isolate consumption data by filtering for the county, state, sector, year, and energy source of interest (Figure 8). Natural gas consumption is listed as "ng," and electricity consumption is listed as "elec" in the "Source" column.

_	<u> </u>										
	А	В	с	D		E	F	G	н	I	J
1	County Name	State Name	State Geography ID	Sector		Year	Geography ID	Source	Consumption MMBtu	Expenditure US Dollars	
2	Autauga	Alabama	G01	residentia		2050	G0100010	ng	258593.0607	4499106.762	
3	Autauga	Alabama	G01	residentia		2049	G0100010	ng	260373.2958	4500541.167	
4	Autauga	Alabama	G01	residentia		2048	G0100010	ng	262216.0837	4487470.373	
5	Autauga	Alabama	G01	residentia		2047	G0100010	ng	264065.2698	4483988.535	
6	Autauga	Alabama	G01	residentia		2046	G0100010	ng	265858.4366	4487824.593	
7	Autauga	Alabama	G01	residentia		2045	G0100010	ng	267723.941	4493264.754	
8	Autauga	Alabama	G01	residentia		2044	G0100010	ng	269718.4377	4495004.67	
9	Autauga	Alabama	G01	residentia		2043	G0100010	ng	271637.6192	4502661.889	
10	Autauga	Alabama	G01	residentia		2042	G0100010	ng	273596.1299	4506826.152	
11	Autauga	Alabama	G01	residentia		2041	G0100010	ng	275635.3318	4517083.652	
12	Autauga	Alabama	G01	residentia		2040	G0100010	ng	277537.0087	4535889.654	
13	Autauga	Alabama	G01	residentia		2039	G0100010	ng	279523.4611	4545314.454	
14	Autauga	Alabama	G01	residentia		2038	G0100010	ng	281658.7369	4564642.928	
15	Autauga	Alabama	G01	residentia		2037	G0100010	ng	283695.3878	4589159.175	
16	Autauga	Alabama	G01	residentia		2036	G0100010	ng	285893.3869	4596093.496	
17	Autauga	Alabama	G01	residentia		2035	G0100010	ng	288327.7135	4607597.325	

Figure 8. Selecting a Commodity

Step 5. Stationary – Entry sheet (Figure 9). Residential, commercial, and industrial natural gas consumption data from the "Consumption MMBtu" column can be pulled in here. The modules require fuel consumption to be in units of thousands of cubic feet (mcf), so the SLOPE values need to be converted from millions of British thermal units (MMBtu) (see Table 3).

ationary Un	its - Entry		Return to Table of Contents	Check if you have completed this she
Entry & Calculations				
n this sheet, you can enter sta copolitical boundaries. Include onsumption data, refer to the (o use the form below, first ent milar data entries for multiple elds. (If you would like to ente	ionary fuel combustion for each entity the totals from the Local Government Silobal Protocol for Community-Scale Gr er the data for a given unit, then click "A entities. Note: you will receive a confir more than one record at a time, you m	for which you have data. These direct emission calculations within the commercial/institutiona reenhouse Gas Emissions. Add/Update Record." The data will be saved, ar mation message when the record has been su nay proceed to the "Stationary-Data" sheet and	s should be reported for all fuels I sector. For additional informat Id the fields will remain filled in. ccessfully added. At any point, y directly add data there.)	consumed within the community's ion on obtaining or calculating fuel The purpose of this process is to facilitate ou may click "Reset Form" to clear all
you would like to change any	aspect of a previous entry, select "Edit R	Record." A drop-down menu will appear. Select	the entry you would like to char	ge, make changes to the entry fields as
1) Describe the fuel consu	leted, the saved data will be erased.	lick the "Delete Kecord" button. A dropdown m	enu will appear for you to select	the entry to delete. After you confirm
1) Describe the fuel consu	leted, the saved data will be erased. ming unit you are entering Unit Description 1	ick the "Delete Record" button. A dropdown m Facility Type (if applicable)	enu will appear for you to select Sector	the entry to delete. After you confirm
2) Enter the activity data f Fuel Type	Interdit in the saved data will be erased. ming unit you are entering Unit Description I or the year Fuel Use	Facility Type (if applicable)	Sector Hell To c To c	pful Hints Potentially Useful Co version: al Gas/Digester Gas onvert cef to mcf, multiply by 0.01 onvert sef to mcf, multiply by 0.001

Figure 9. Natural Gas Consumption Data Entry in the Stationary - Entry Sheet

Step 6. Electricity Use – Entry sheet (Figure 10). Residential, commercial, and industrial electricity consumption data from the "Consumption MMBtu" column can be pulled in here. The modules require electricity consumption to be in units of kilowatt hours (kWh), so the SLOPE values need to be converted from MMBtu (see Table 3 and Equation 1 for an example calculation).

Equation 1. Conversion of MMBtu natural gas to thousand cubic feet (mcf) 1,000 MMBtu natural gas x (0.9643) = 964.3 mcf

lectricity Use	- Entry			Return to Conte
ta Entry & Calculations				
On this sheet, you can enter electr electricity purchases through a co electricity consumed within the co the Global Protocol for Communit	icity use for each entity for which you have dat stractual agreement. In this module, contractua mmunity's geopolitical boundaries. Include the -Scale Greenhouse Gas Emissions.	ta in order to calculate indirect emissions associate al agreements can include energy attribute certific e totals from the Local Government calculations wi	ed with the use of grid-supplied e ates (RECs, GOs, etc.), direct con thin the commercial/institutiona	electricity consumed by the community. Electricity use can be entered as purchases from t tracts (PPAS, etc.), and residual grid mix emission rates. These indirect emissions should b I sector. For additional information on obtaining or calculating electricity consumption di
To use the form below, first enter confirmation message when the r	the data for a given unit, then click "Add/Upda ecord has been successfully added. At any poi	ate Record." The data will be saved, and the fields w int, you may click "Reset Form" to clear all fields. (I	vill remain filled in. The purpose of you would like to enter more th	of this process is to facilitate similar data entries for multiple entities. Note: you will recei an one record at a time, you may proceed to the "Electricity-Data" sheet and directly add
If you would like to change any as the "Delete Record" button. A dro	pect of a previous entry, select "Edit Record." A pdown menu will appear for you to select the ϵ	A drop-down menu will appear. Select the entry yo entry to delete. After you confirm that you would l	u would like to change, make cha ike the entry deleted, the saved o	anges to the entry fields as needed, then click "Add/Update Record." To delete a record e data will be erased.
For more information on the meth instruments, see Box 4 within the	odologies for estimating emissions from marke User's Guide. Note: Any electricity consumption	et- and location-based methodologies, see the Use on from electric vehicles should be accounted for	r's Guide for the Local Greenhou as electricity under Scope 2 on t	se Gas Community Inventory Tool. For more guidance on entering electricity data includi his tab.
Describe the electricity co	nsuming unit you are entering			
ID#	Unit Description (e.g., facility name)	Facility Type (if applicable)	Sector	Is this a Contractual Instrument? (e.g., REC)
2) Enter the activity data fo	the year Electricity Purchased (kWh)	Electric Utility Select Electric Utility		

Figure 10. Electricity Consumption Data Entry in the Electricity Use - Entry Sheet

Table 3. Energy Consumption Conversion Factors

Energy Source	SLOPE Units	Community Module Units	Conversion Factor
Natural Gas Consumption	MMBtu	mcf	0.9643 mcf/1 MMBtu
Electricity Consumption	MMBtu	kWh	293.07 kWh/1 MMBtu