COMMUNITY-LEVEL GHG INVENTORY FOR LOCAL GOVERNMENT UNITS IN THE PHILIPPINES

Communities For Resilience (CORE)

USER'S MANUAL

COMMUNITY-LEVEL GHG INVENTORY FOR LOCAL GOVERNMENT UNITS IN THE PHILIPPINES USER'S MANUAL

THE CORE MODULES SERIES

The Communities for Resilience or CORE Program is a flagship capacity-building program of the Climate Change Commission (CCC) for local governments launched in 2016. CORE aims to help local communities adapt to climate change, reduce disaster risk, and acquire enduring resilience. It does so by promoting science-based local development planning through training, peer-to-peer learning, and expert mentoring by academic institutions.

To this end, CCC developed The CORE Modules Series, a series of instructional training modules designed to enhance the competence and proficiency of national and local policymakers and planners in risk governance, particularly in policy development, planning, programming, and budgeting for climate change adaptation and mitigation, and disaster risk reduction.

Introduced as an initial set of seven modules, The CORE Modules Series offer tools and methodologies that had been pilot-demonstrated in several cities and municipalities of the country. Lessons from their application were carefully considered in developing the modules. The National Panel of Technical Experts of the CCC vetted and endorsed The CORE Series modules in November 2017.

The CCC will continually enhance these modules as new knowledge and innovative approaches to building community resilience emerge. Eventually, videos and best practice case studies shall accompany these modules to make the training and learning processes more efficient and effective.

Now, The CORE Modules Series are all yours to help make your community resilient to disasters and climate change! Access and download them at the CCC website, www.climate.gov.ph.

Acknowledgement

This publication is part of the CORE Modules Series initiated and developed by the Climate Change Commission (CCC). This series of instructional training modules is developed based on scientific research, available literature, relevant works of experts, and the technical advice of the National Panel of Technical Experts of the CCC.

The CCC gratefully appreciates the collaboration and contribution of the United States Agency for International Development (USAID) and the Building Low Emission Alternatives to Develop Economic Resilience and Sustainability (B-LEADERS) Project in developing the initial set of CORE Modules Series.

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Preface

Efforts to defeat poverty and promote social justice will be difficult to sustain unless measures are undertaken to help poor and highly vulnerable communities adapt to climate change. Changes in temperature and precipitation patterns, sea level rise, and extreme weather events can easily undermine development gains that the country has attained in recent years.

The Philippines posting the highest average increase in sea level since 1901 immediately puts at risk 13.6 million Filipinos living in coastal areas across the archipelago. Studies from the Philippine Atmospheric, Geophysical and Astronomical Services Administration and the University of the Philippines have also shown that current and future shifts in temperature and rainfall regimes will have significant impacts, mostly adverse, on our agriculture, forestry, water and coastal resources, health, and urban areas – bearing serious implications on our food and water security, energy sufficiency, human security, and ecological and environmental stability.

Meanwhile, destructive weather events will continue to pose a direct threat on our people and overall socio-economic development. From our country's experience with typhoons Yolanda (2013), Pablo (2012), Sendong (2011), Ondoy (2009), and Frank (2008), we already know that reconstruction costs take a substantial chunk off of our national budget. This challenge even becomes more daunting as we center rebuilding efforts on making communities more resilient to both sudden and slow onset of the impacts of climate change.

The country has already made progress in confronting climate change since the enactment of the Philippine Climate Change Act in 2009 and the Philippine Disaster Risk Reduction and Management Act in 2010. For its part, the Climate Change Commission (CCC) has been relentless in promoting climate change action on both domestic and international fronts. But much remains to be done.

As early as 2009, the United Nations Office for Disaster Risk Reduction identified three non-climatic factors responsible for the continuing escalation of disaster risks worldwide, most notably in developing countries. These are poor urban governance, vulnerable rural livelihoods, and declining ecosystems. Because of inherent "multidimensional inequalities," the poor and highly vulnerable communities end up experiencing more the adverse impacts of climate change.

It is in this context that the CCC conceptualized and implemented the Communities for Resilience Program or CORE Program. The CCC understands that building resilience requires a whole-of-society approach and that the starting point for this is the integration of climate change adaptation and mitigation (CCAM) and disaster risk reduction (DRR) into the development policies, plans and programs of the national government and local government units (LGUs), especially in areas that are highly susceptible to the impacts of climate change.

The CORE Program aims to strengthen the risk governance, science-based planning capacity, and overall resilience of LGUs along the country's 18 major river basins – areas which are sensitive to temperature changes, rain-induced floods, drought, sea level rise, extreme weather events, and other water- and weather-related hazards. All in all, the CCC initially brings its flagship capacity-building program on climate change to 48 provinces, 56 cities, and 777 municipalities that are vulnerable to climate change, with the goal of covering all the 80 provinces and 1745 LGUs and cities as it rolls-out the CORE training and capacity building initiatives.

The CORE Program neither aims to reinvent the wheel nor duplicate past and ongoing efforts by other government and non-government actors in the climate change and disaster risk reduction and management communities. Rather, it seeks to build on existing partnerships, adopt tested tools and methodologies, and harmonize different approaches from various sectors, including non-government

organizations, private sector and the academe. Fostering and facilitating the convergence of expertise, resources, and efforts of all stakeholders concerned is a key implementation strategy of the CORE Program.

State Universities and Colleges, in particular, will be tapped for their resources and expertise on research, tools development, and capacity building. Under the CORE Program, regional academic institutions will undergo training in science- and risk-based action planning for climate change to strengthen their capacities in guiding local decision makers and LGU planners on Vulnerability and Risk Assessment, Environment and Natural Resource Accounting, Natural Resource Assessment, Greenhouse Gas Inventory, Climate Change Expenditure Tagging, Geographical Information System, among other technical capacities, and on accessing climate finance such as the Peoples Survival Fund, that supports local climate change initiatives.

This publication is among The CORE Training Modules that shall come in series. The menu of methodologies and tools presented in these instructional training modules is intended to raise national awareness and competence on climate change actions among national and local government institutions, civil society, private sector, and communities, as well as among teachers and students in all levels. To LGUs, it is hoped that this would serve as a useful and practical guide as they prepare or enhance their Local Climate Change Action Plans (LCCAP).

SECRETARY EMMANUEL M. DE GUZMAN
Vice Chairman and Executive Director
Climate Change Commission

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I. INTRODUCTION

1.1 Policies / Rationale

The Climate Change Act, as amended in 2012 (RA 10174), declares that it is the policy of the Philippine Government to strengthen, integrate, consolidate, and institutionalize government initiatives to achieve coordination in the implementation of plans and programs to address climate change in the context of sustainable development.

Section 14 of this Act specifically recognizes the role that local government units (LGUs) play in mainstreaming climate change efforts within the government and requires them to formulate and implement local climate change action plans (LCCAP) that is consistent with local and national policies and frameworks.

To complement this Act, Memorandum Circular No. 2014-135 or the Guidelines for the Formulation of the LCCAP was released by the Department of Interior and Local Government (DILG). Section 3.3.5 of the Memorandum Circular strongly suggests LGUs to identify mitigation options to help reduce their carbon footprints and contribute to efforts in addressing climate change.

Development of a greenhouse gas (GHG) inventory[1] is an activity that can support better planning for mitigation options that LGUs can implement. Thus, capacity-building efforts related to GHG inventories are being supported by the Climate Change Commission (CCC), the lead policymaking body of the government that is tasked to coordinate, monitor, and evaluate programs and action plans of the government related to climate change.

1.2 Purpose

This User's Manual provides a step-by-step guide for LGUs to quantify and manage information and data related to the development of their community-level GHG inventories.

A community-level inventory is a useful planning tool in developing mitigation actions for the entire community. It includes emissions from activities within an LGU's jurisdiction, including emissions from sources and/or activities in different sectors within the community, such as energy, transportation, agriculture, industry, and waste.

This User's Manual is accompanied by a GHG Inventory Quantification Support Spreadsheet <filename: Spreadsheet for Community-Level GHG Quantification in the Philippines>. The two go hand-in-hand, and complement each other. While the Spreadsheet can be treated as a stand-alone document, the User's Manual explains, in simple terms, the information required by the Spreadsheet and provides step-by-step instructions that are especially helpful to first-time users.

Collectively, the Spreadsheet and the User's Manual aim to facilitate and institutionalize the process of planning, collecting and managing data, quantifying, and reporting of an LGU's community-wide GHG emissions.

1.3 Scope and Limitations

A number of categories of emission sources within the community level are included in this version of the User's Manual and the Spreadsheet. Other categories are presently not included but may be included in later versions as greater understanding of LGUs' experiences in these categories become available.

[1] *A GHG inventory is an accounting of GHGs that are emitted to and/or removed from the atmosphere over a period of time.*

The following categories of emission sources are considered in this version:

- Stationary Combustion from commercial and residential buildings
- Purchased Electricity (commercial buildings, residential buildings, others (e.g. streetlights, mass rapid transit etc.))
- Mobile Combustion
- Solid Waste in Landfills (including GHG emissions from solid waste produced from within the community but landfilled outside the community geopolitical boundaries)
- Wastewater Treatment and Discharge
- Agriculture (crops and livestock)
- Industrial Processes and Products Use for Selected industries
- Forestry

In order for LGUs to accurately account for these categories, the specific data to be collected and the sources from which they are to be collected are identified and defined in both the User's Manual and the Spreadsheet. In most cases, data considered are from the same source that provided them for use in the development of LGU GHG inventories under USAID's previous capacity-building efforts. However, in other cases, more specific data that can lead to a more accurate quantification of GHG emissions for a given source are desirable. Thus, this User's Manual also presents optional or alternate options to address better accuracy needs.

1.4 GHG Accounting Protocols and Principles

Present government policies, particularly the Memorandum Circular No. 2014-135 or the Guidelines for the Formulation of the LCCAP, do not require but rather encourage GHG reduction efforts from LGUs. Thus, rules governing the conduct of GHG inventories are dependent on the choices made by the LGUs but are anchored on internationally-recognized standards and protocols on a community-level GHG accounting. The main reference document for the conduct of this type of inventory is the IPCC (Intergovernmental Panel on Climate Change) Guidelines for National GHG inventories. In some cases, the Global Protocol for Community-Scale GHG Emissions (GPC) is also used.

Guidelines from both these documents are used in this Manual as well as in the Spreadsheet, when applicable.

The IPCC Guidelines and the GPC have provided good-practice approaches in ensuring the quality of the GHG inventory report. The IPCC has identified the principles of transparency, accuracy, completeness, consistency, and comparability as indicators of GHG inventory qualities. Meanwhile, the GPC has identified the principles of relevance, completeness, consistency, transparency, accuracy, and measurability as indicators in the conduct of the inventory. Often, trade-offs are encountered in applying these principles, so it is necessary for LGUs to decide which among these will have more weight as they conduct their inventories.

The following principles have governed past LGU GHG inventories and are used as guides in this Manual and Spreadsheet:

Transparency	- Activity data, emission sources, emission factors, and accounting methodologies shall be adequately documented and disclosed to enable verification. The information should be sufficient to enable individuals outside of the inventory process to use the same source data and derive the same results. All exclusions need to be clearly identified and justified.
Relevance	- The reported GHG emissions shall appropriately reflect emissions occurring as a result of activities and consumption from within the city's geopolitical boundary. The inventory shall also serve the decision-making need of the local authority, and take into consideration relevant local and national regulations.
Accuracy	- The calculation of GHG emissions shall not systematically overstate or understate actual GHG emissions. Accuracy should be sufficient to give decision-makers and the public reasonable assurance of the integrity of the reported information. Local authorities shall reduce uncertainties in the quantification process to the extent that it is possible and practical.
Completeness	- All emission sources within the inventory boundary shall be accounted for. Any exclusion of emission sources shall be justified and clearly explained.
Consistency	- Emissions calculations shall be consistent in approach, boundary, and methodology. Consistent methodologies for calculating GHG emissions will enable meaningful trend analysis over time, documentation of reductions, and comparisons between LGUs.
Comparability	- The GHG inventory shall be reported in a way that allows it to be compared with other inventories from other LGUs. This should be reflected in appropriate choice of emissions or removal categories and in the use of the same reporting guidelines as that of other LGUs.

1.5 GHG Inventory Management and Reporting Process

LGUs who wish to conduct their GHG inventories are expected to go through the following process:

- Planning and Design
- Implementation (data collection, calculating emissions, data quality management)
- Reporting
- Improvement o Finalization

Both the Manual and the Spreadsheet are guided by this process of the GHG inventory but puts special emphasis on data quantification and quality management. Nevertheless, it provides

an overall idea of the inventory process which LGUs need to go through. Each LGU will go through this process at its own pace, depending on factors such as human resources, budget, and technical capabilities. Thus, a completely filled-out Spreadsheet, which complies with all the steps in the manual, will allow LGUs to experience going through the wholecycle.

1.6 GHG Emissions Quantification

In order to understand the data needed to quantify GHG emissions, LGUs need to know the general quantification equation used in computing for GHG emissions:

GHG Emission = Activity Data x Emission Factor

Activity Data (A) is any data that pertain to the magnitude of human activity resulting to GHG emissions. These can be volume of fuel (measured in liters), weight of fuel (measured in kilogram units), amount of electricity usage (measured in kilowatt-hour) or distances travelled (measured in kilometers), etc.

Emission Factor (EF) is the average emission rate of a given GHG for a given source, relative to units ofactivity. These are always expressed as ratios. For example, 2.68 kg of CO2 per liter of diesel. The table below dissects this definition and gives an example:

Question: What is the EF of Diesel? Answer: 2.68 kg CO2/L	
Salient points of EF definition	Values/answers based on the question
"given GHG"	CO2
"given source"	Diesel
"Unit of activity"	Liters
"Average emission rate"	2.68 kg CO2/L of diesel

Activity data may be within the control of the LGUs or can be gathered from published local or national databases. EFs are taken from published national or international guidance documents. Sometimes, EF values are not readily available for the given activity data, so additional computations are needed, but the Spreadsheet has collected and encoded these formula for all major GHG sources of emissions.

Therefore, the LGUs should focus only on gathering and making sure that the activity data are complete and accurate. Guidelines on activity data collection are found in Chapter 3.

1.7 Quantification of GHG Removals by Sinks

LGUs with forests need to look into the contribution of these forests in their GHG inventories. Forests are unique in the sense that they can be a source of greenhouse gas emissions or they can remove GHG emissions by absorbing them. The net carbon emissions or removal of the forest and land use sector is dependent on two basic biophysical processes:[2]

a. Changes in forest/woody carbon stocks due to the net annual biomass growth of existing forest and non-forest stands, and possible biomass regrowth in abandoned lands;

b. Land use and forest conversion practices which affect the carbon chemistry of the atmosphere via biomass burning, decay, and soil carbon release and uptake.

The current version of the Spreadsheet and the Manual only considers the first process (Changes in forest/woody carbon stocks) since the methodology for it is simpler and data are available.

1.8 Data Quality Management

Apart from GHG emissions quantification, special emphasis is made on quality assurance (QA) and quality control (QC)[3]. These data quality management concepts are included in the Spreadsheets as well as in this User's Manual to set and/or improve an LGU's internal procedures and systems for collecting and managing GHG emissions-related data. The data quality management concepts also identify opportunities for improvement as well as best practices that LGUs may implement in the future.

It is important to have QA/QC checks to ascertain whether there were data that were incorrectly stated or were omitted that may cause emissions to be misrepresented and thus potentially influencing decisions or actions taken by the users of the GHG inventory report.

Knowing the probabilities of how much of the data collected were misrepresented will provide LGUs a gauge of the accuracy of their data and will aid them in determining how much weight they will put (i.e. how relevant the data is) on those particular data when making decisions.

For starters, LGUs are not expected to have QA/QC procedures in place, especially for those generating first-time inventory reports. However, for some LGUs, procedures may be devised to ensure the quality of data. For these LGUs, the Spreadsheet (visualization provided below) requires answering questions such as "How Much data uncertainty these data have?" or provide for the "basis of data uncertainty" as shown below:

[2] *Tracking Greenhouse Gases: An Inventory Manual, (p. 122).*

[3] *Quality Assurance is a planned system of review procedures conducted by personnel not involved in the inventory development process. Meanwhile, Quality Controlis a system of routine technical activities implemented by the inventory development team to measure and control the quality of the inventory as it is prepared (2006 IPCC Guidelines)*

Data Uncertainty	Account or File Code Where Data is Stored	Date Transcribed from Survey or Data Sourced	Corresponding Quality Control (QC) Reference in Applicable Checklist	Basis of Data Uncertainty

Note that these questions or information do not affect the calculation of the GHG emissions in the Spreadsheet, but are essential for QA/QC. Hence, guidelines are provided in the User's Manual when applicable, but LGUs may opt not to answer them for the time being.

1.9 Reporting GHG Emissions and/or Removal by Sinks

The Spreadsheet can be considered as a predefined template which LGUs can use in reporting their GHG inventories. It can also be a good starting point for LGUs to improve upon as data and emission factors are improved. The advantages of using this template include:

- Concise format allows LGUs to focus on data collection and improving data quality
- Accommodates varying levels of capacities between LGUs by providing essential steps as well as optional steps to cater to more advanced information
- Standardized format allows comparison of results among LGUs
- Once data are properly inputted in the Spreadsheet, an overall GHG Emissions and Removals by Sinks Summary for community-wide GHG emissions by sources is automatically calculated. This snapshot provides an easy reference for LGUs of their emissions by sources.

Below is an example of a GHG Emission Summary Table

GHG Emissions Summary

Emission Source	GHG Emissions (tonnes CO_2e)	Proportion of Total Emissions	Weighted Uncertainty
Scope 1 Emissions (Net of Forestry and Land Use)			
GHG Emissions from Community-Level Residential Stationary Fuel Use	500.00	0.48%	
GHG Emissions from Community-Level Commercial Stationary Fuel Use	600.00	0.58%	
GHG Emissions from Community Mobile Combustion	1100.00	1.06%	
GHG Emissions from Solid Waste Disposal - IPCC FOD Method*	3750.00	3.62%	
GHG Emissions from Other Solid Waste Treatment (ICLEI)*	560.00	0.54%	
GHG Emissions from Solid Waste Open Burning (ICLEI)*	210.00	0.20%	
GHG Emissions from Wastewater Treatment and Discharge	4000.00	3.86%	
GHG Emissions from Community-Level Agriculture (Crops)	500.00	0.48%	
GHG Emissions from Community-Level Agriculture (Livestock)	740.00	0.72%	
GHG Emissions from Solid Waste Disposal - Inside LGU Geopolitical Boundaries (ICLEI)	0.00	0.00%	
GHG Emissions from Wastewater Treatment and Discharge (Other Sources)	0.00	0.00%	
GHG Emissions from Industrial Processes and Product Use	2000.00	1.93%	
Scope 1 Emissions/Removal (Forestry and Land Use)			
GHG Emissions from Forestry and Land Use	19533.36	18.87%	
GHG Removal from Sink		0.00%	
Total Scope 1 Emissions	**33,493**	**32.36%**	**0%**
Scope 2 Emissions			
GHG Emissions from Purchased Electricity at Community-Level Residential Sites	20000.00	19.32%	
GHG Emissions from Purchased Electricity at Community-Level Commercial Sites	50000.00	48.31%	
GHG Emissions from Purchased Electricity at Community-Level for All Other Sources	0.00	0.00%	
Total Scope 2 Emissions	**70,000**	**67.64%**	**0%**
Scope 3 Emissions			
GHG Emissions from Solid Waste Disposal - Outside LGU Geopolitical Boundaries (ICLEI)	0.00	0.00%	
Total Scope 3 Emissions			
Total Emissions and Uncertainty	**103,493**	**100.00%**	**0%**

Instructions | InternalControl | General Info | Summary-Overall | Stat Comb-Residential Data | Stat Comb-Co

Emissions are classified according to SCOPES. Scopes establish the inventory boundaries so that GHG emissions to be accounted for and reported in the inventory are clearly stated. Boundaries define the scale and reach of emissions that will be included by the LGU in its GHG inventory Report. There are 3 scopes used in the inventory reporting[4]:

- Scope 1: All direct emissions from sources within the geopolitical boundary of the community.
- Scope 2: Energy-related indirect emissions that occur outside the community boundary as a consequence of consumption/use of grid-supplied electricity,
- Scope 3:All other indirect emissions that occur outside the boundary as a result of activities within the community's geopolitical boundary, including trans-boundary emissions due to exchange/use/consumption of goods and services

It is best practice for LGUs to report all of their Scopes 1 and 2 emissions. Scope 3 emissions are also relevant, especially those on waste, so they are also commonly reported.

Take note that the Total GHG emission reflected in the summary includes emissions from the forestry sector but excludes removals by sinks. Similarly, the proportion of total emissions considers GHG emissions from forestry and not the removal by sinks. This way of presenting the results will ensure the inclusion of all GHG emission sources necessary for the LGUs to identify and prioritize mitigation actions within their communities.

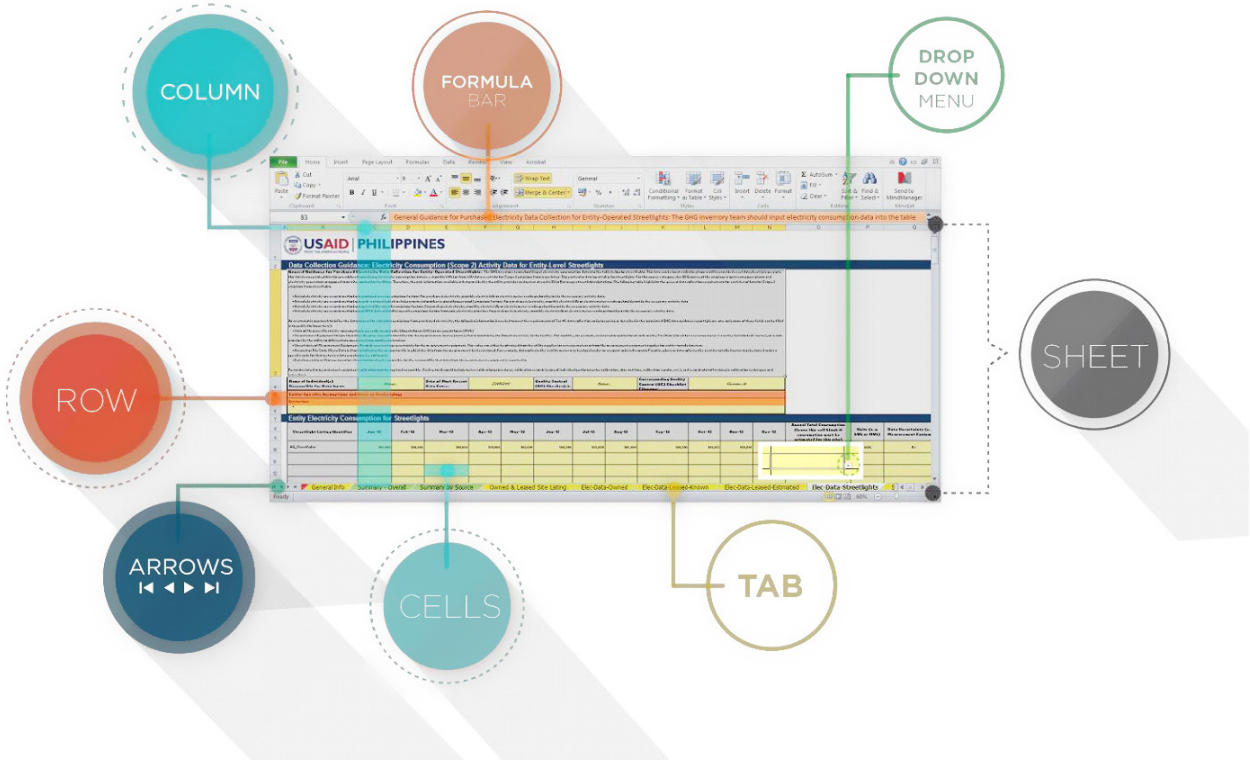
II. The GHG Inventory Quantification Support Spreadsheet

This User's Manual complements the GHG Inventory Quantification Support Spreadsheet. Thus, it is important to first understand the basic features of the Spreadsheet before proceeding with the inventory process.

2.1 Basic Parts of the Spreadsheet Screen

The Spreadsheet was made using Microsoft Excel software. This software should be installed in the LGUs' computers in order to use the Spreadsheet. The following are the basic parts of the Spreadsheet and their specific functions as they appear on the screens:

4 *World Resources Institute, World Business Council for Sustainable Development.(2001).*



Column	Vertical grid pattern in an Excel worksheet. Each column is denoted by a capital letter (e.g. A, B, C….. ZZ…)
Row	A rectangular box which stores data. It is the intersection formed by a column and a row. Each cell can be uniquely identified by its column and row (e.g. A1, J75….ZZ100…) An active cell is a cell outlined by a black/ dark blue border. Data can be typed here.
Cell	A rectangular box which stores data. It is the intersection formed by a column and a row. Each cell can be uniquely identified by its column and row (e.g. A1, J75….ZZ100…) An active cell is a cell outlined by a black/ dark blue border. Data can be typed here.
Formula Bar	The space where data or formula used in active cells are displayed
Worksheet	A single page composed of many cells arranged in a grid pattern, using columns and rows. Each worksheet contains information, data, and formula. They are governed by color-coded "rules" and LGUs are required to follow the step-by-step procedures in order to fill them out.
Data Sheets	For our own purposes, data sheets are worksheets that are used for data collection purposes.
Spreadsheet	Spreadsheet is a collective set of worksheets
Tab	Found at the bottom of the worksheet, it displays the name of a specific worksheet (e.g. summary, elec data –owned etc).

Arrows (◀ ▶ ▲ ▼)	Found at the lower left of the worksheet, clicking these symbols allows the user to view the tabs that are not currently shown.
Drop-down menu	Sometimes, an arrow (▼) automatically appears on the lower right portion of an active cell. This signifies the presence of a drop-down menu. Click on the arrow to view the menu/list and select applicable data.

2.2 Color-coding Scheme

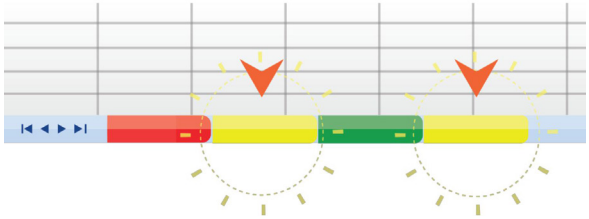
The Spreadsheet uses the following color-coding scheme for easy reference:

As a general rule, yellow tabs and (light) yellow cells indicate data inputs. Users are required to fill these out. For starters, it is highly recommended that LGUs only concern themselves with yellow tabs and cells. Users may go ahead and alter the orange and (light) green only after doing the yellow ones.

Blue and grey cells contain values that are in default or were automatically computed or copied from other cells. They are easy to identify not only because of their colours but by the formula that appears in the formula bar when active cells are clicked. Extra caution is needed to prevent accidental deletion of these formulas as they may affect the whole Spreadsheet.

2.3 Worksheets

Note that the Spreadsheet contains 45 worksheets (or 45 tabs), 22 of which are colored yellow. These yellow worksheets are data input worksheets and require data from the LGUs. Each of these yellow worksheets corresponds to a particular LGUs' source of emissions. Thus, it is good practice to fill out as many of these yellow cells as possible by following the step-by-step guide in Chapter 4 and by collecting as much data as possible by following procedures outlined in Chapter 3. The tabs, found at the bottom part of the screen (visualization provided below), identify the worksheets.



2.4 Software Version with Macros Enabled

Note that the Spreadsheet has codes or "Macros" in it. Macros is a function in Excel that allows it to create repetitive tasks and standardized formats. Hence, it is recommended that LGUs use the most recent version of Microsoft Excel when using this Spreadsheet, to maximize the use of Macros.

III. Activity Data Collection

This Chapter presents a step-by-step procedure in identifying and gathering the correct data needed for the GHG community-level inventory. Activity data are almost always unique to any LGU, but in this Chapter, datasheet templates are presented so that LGUs can focus on actual data gathering.

These datasheets are designed to mirror the worksheets found in the Spreadsheet, and are meant to be used to summarize and record data collected from surveys conducted or to be conducted by LGUs. The purpose of this simplified approach is for the LGU to first gather the correct data and, when complete, input them in the Spreadsheet.

A compilation of the Data Sheets used in this Chapter is found in Annex 1: Data Sheets.

3.1 General Guidelines on Activity Data

Activity Data (A) for community-level inventory should be derived from the following:

1. Census or Sampling
2. National or regional consumption data of the Philippines

Census or survey

Activity data can be collected by conducting a survey using a census[5] or sampling[6] method within the geopolitical boundaries of the LGU or, in some cases, outside LGU boundaries. The survey for activity data needed for the community-level inventory may be incorporated with other surveys being conducted within the LGU[7].

Guidance Notes:

Fuel data consumed by the community are obtained from fuel suppliers operating within the geopolitical boundaries of the LGU and those fuel suppliers based outside the LGU but servicing the households and businesses within. The activity data collected from these fuel suppliers are often in Peso amount and not in liters sold. The data to be used in the computation of emissions have to be converted to activity data units (i.e. liters, kilograms, cubic meter, kilowatt-hours) using the average price per unit. It is necessary to document the steps taken and assumptions used to convert the Peso amount to activity data units.

[5] *Census is a procedure of systematically collecting data from a whole population.*
[6] *Sampling is a process of choosing a representative sample from a target population*
[7] *An example of this survey is the local census periodically done by the LGUs*

Municipality of Kalayaan, Laguna experience

A census, which covers the entire 4,966 households of Kalayaan, was conducted for its first inventory. Respondents who own or operate businesses (e.g. restaurants, 'sari-sari'stores) in Kalayaan were asked to include total consumption in their responses. The census was conducted from May to June 2012 during the summer season in the Philippines. Questions on the monthly consumption of the following were included in the census: LPG, kerosene, fuelwood, and charcoal for cooking; fuel use for generators; and kerosene for lighting.

Prior to the conduct of this census, the Kalayaan GHG Inventory Team undertook training with the faculty of the University of the Philippines–Los Baños on how to formulate survey questionnaires. This training was supported by the USAID.

A total of 11 surveyors, who were all working full-time for the municipality as interns for the summer, were tasked to carry out the census in the three barangays. In addition, thirty (30) students doing their on-the-job training in the municipality under the Special Program for the Employment of Students (SPES) were tasked to assist the 11 surveyors. Thus, each surveyor had a team of at least two members when carrying out the task. The Kalayaan GHG Inventory Team oversaw the process of surveying and encoding the data.

National or regional consumption data of the Philippines

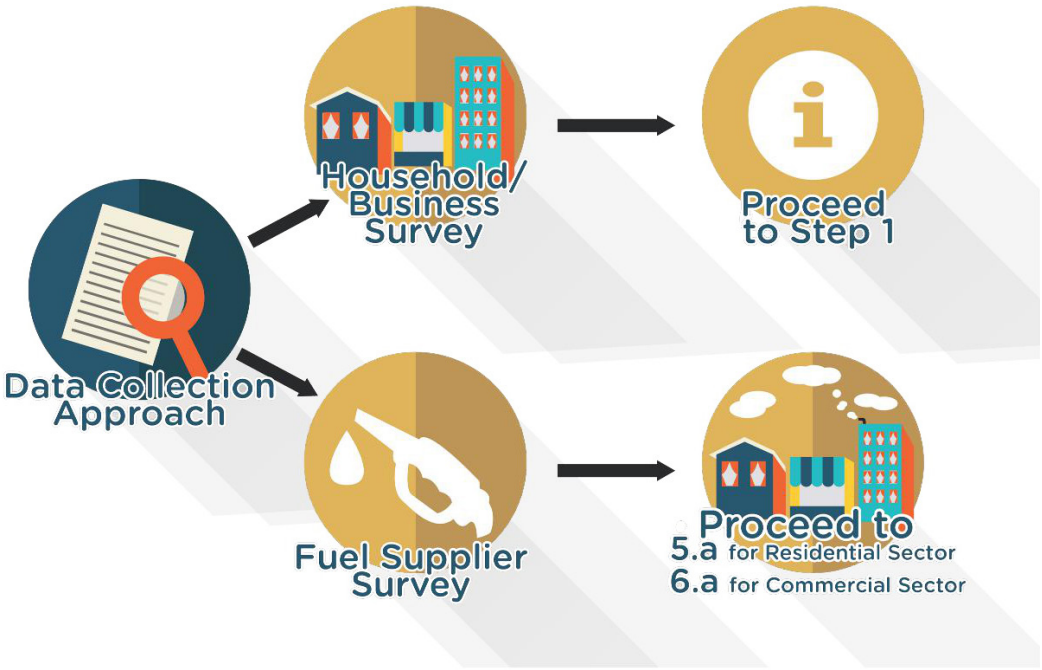
Government agencies such as the Department of Energy (DoE), Environmental Management Bureau of the Department of Environment and Natural Resources (EMB-DENR) or the Land Transportation Office (LTO), and statistical office such the Philippine Statistics Authority (the newly created office which covers the National Statistics Office[8], National Statistical Coordination Board and Bureau of Agricultural Statistics) may be able to provide information needed for the Community-Level Inventory. The Planning Office of the LGU may also have data on household and commercial establishments within the geopolitical boundaries of the LGU.

The Spreadsheet has been developed using activity data based on household and vehicle surveys. If the LGU does not have household and/or vehicle survey, the LGU may proceed directly to the emission data sources and will need to skip some of the columns in the Spreadsheet that are not applicable. The decision tree will provide the guide on the steps to follow for computing emissions depending on the data collection approaches adopted.

[8] *National Statistics Office conducts the Household Energy Consumption Survey(HECS)*

3.2 Stationary Combustion

Stationary Combustion Fuels are those used by residential and commercial sectors for cooking, lighting,heating and cooling within the geopolitical boundaries of the LGU.



Step 1
Request information for the number of residential households (including multi-unit buildings) and registered businesses (for commercial sector) within the LGU boundaries from the concerned Division/Office of the LGU (i.e. Planning Division or Business Licensing Division for commercial establishments), Philippine Statistics Authority, Philippines Business Registry, other government offices, or directly from fuel suppliers.

Step 2
Conduct the survey method chosen (census or sampling). The survey method to be adopted shall depend on the time and resources available, such as personnel and budget.

Step 3
Prepare the summary of the data collected from the residential sector based on the suggested format of Datasheet 3.1 List of households included in the inventory per district/barangay.

Datasheet 3.1 List of households included in the inventory per district/barangay.

	Districts/Barangays included in the Inventory	Total Population	Total Number of Residential Households	Total Number Surveyed (enter "NA" if no data)	Source of Data
1.					Example: • LGU • Philippine Statistics Authority • Household Survey
2.					
3.					
4.					
5.					

Step 4
Prepare the summary of the data collected from the commercial sector, based on the suggested format of *Datasheet 4.1 List of commercial establishments included in the inventory per district/barangay.*

Datasheet 4.1 List of commercial establishments included in the inventory per district/barangay.

	Districts / Barangays included in the Inventory	Total Population	Total Number of Registered Businesses (enter "NA" if no Survey is used)	Total Number of Businesses Surveyed (enter "NA" if no data	Source of Data
1.					Example • Permit and Licensing Division of the LGU • Commercial Establishment Survey
2.					
3.					
4.					
5.					

Step 5
Identify the emission sources of the residential sector. Use *Datasheet 5.1 Emission sources and fuel consumption of the residential sector – Stationary combustion* to record the information collected on fuel consumption of the residential sector for stationary combustion.

Step 5.1
Consolidate all activity data according to district/barangay (Column A) and Application(Column D). Indicate the Data Source Identifier in Column B (title of the source document) and the Type of Data in Column C (i.e. household survey, fuel supplier, national averages). Disaggregate the data according to the type of fuel (blended diesel, gasoline, LPG, fuel wood), annual volume, and unit of measurement (i.e. liters, kilograms) and indicate in Columns E, F, and G respectively. Ensure that there is no double counting when applying combination of data collection approaches. (Skip Step 5.A and proceed to Step 6)

Datasheet 5.1 Emission sources and fuel consumption of the residential sector – Stationary combustion (Examples are provided)

A	B	C	D	E	F	G
District/ Barangay/ LGU	Data Source Identifier	Type of Data	Application	Fuel type	Annual Volume	Unit
Longos	Surveyed Residence Longos 1	Individual Household survey	Cooking	Kerosene	300	Liters
San Antonio	"Data Fuel Sale Data from Fuel supplier San Antonio"	Fuel supplier survey	Generator	Blended Diesel	10,000	Liters

Step 5.A
Identify the emission sources of the residential sector. Use *Datasheet 5.1 Emission sources and fuel consumption of the residential sector – Stationary combustion* to record the information collected on the fuel consumption of the residential sector for stationary combustion.

Step 5.A.1
Consolidate all activity data according to district/barangay (Column A) and Application (Column D) if available. Indicate the Data Source Identifier (title of the source document) and the Type of Data (i.e. fuel supplier, national averages). If disaggregated activity data per district/ barangay and application of fuel are not available, put the name of the LGU in Column A, disregard Application in Column D, consolidate and identify the fuel consumed per fuel type, amount, and units in Columns E, F, G, respectively. Ensure that there is no double counting when applying combination of data collection approaches.

Step 6
Identify the emission sources of the commercial sector. Use *Datasheet 6.1 Emission sources and fuel consumption of the commercial sector – Stationary combustion* to record the information collected on the fuel consumption of the commercial sector for stationary combustion.

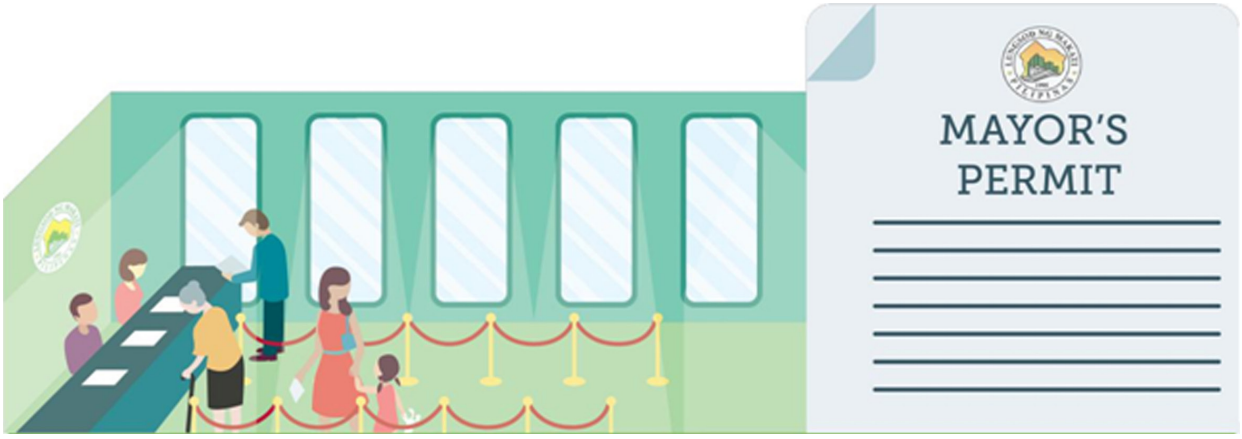
Step 6.1
Consolidate all activity data according to district/barangay (Column A) and Application (Column D). Indicate the Data Source Identifier in Column B (title of the source document) and the Type of Data (i.e. business survey, fuel supplier, national averages). Disaggregate the data according to the type of fuel (blended diesel, gasoline, LPG, fuel wood), annual volume, and unit of measurement (i.e. liters, kilograms) and indicate in Columns E, F, and G respectively. Ensure that there is no double counting when applying combination of data collection approaches. (Skip Step 6.A and proceed to Step 7)

Datasheet 6.1 Emission sources and fuel consumption of the commercial sector – Stationary combustion (Examples are provided)

A	B	C	D	E	F	G
District/ Barangay/ LGU	Data Source Identifier	Type of Data	Application	Fuel type	Annual Volume	Unit
Longos	"Surveyed Businesses Longos 1"	Individual Business Survey	Generator	Blended Diesel	3,000	Liters
San Antonio	"Data Fuel Sale Data from Fuel supplier San Antonio"	Fuel supplier	Cooking	LPG	5,000	kg

Step 6.A
Identify the emission sources of the commercial sector. Use *Datasheet 6.1 Emission sources and fuel consumption of the commercial sector – Stationary combustion* to record the information collected on the fuel consumed of the commercial sector for stationary combustion.

Step 6.A.1
Consolidate all activity data according to district/barangay (Column A) and Application (Column D) if available. Indicate the Data Source Identifier (title of the source document) and the Type of Data (i.e. business survey, fuel supplier, national averages). If disaggregated activity data per district/barangay and application of fuel are not available, put the name of the LGU in column A, disregard Application in column D, consolidate and identify the fuel consumed per fuel type, amount and units in Columns E, F, G, respectively. Ensure that there is no double counting when applying combination of data collection approaches.



Makati City experience

Most LGUs do not collect GHG emissions-related data in their communities, but have processes and procedures in place that can be utilized to collect these data. Examples of these procedures include issuances and/or renewals of permits and performance monitoring for certain sectors.

To facilitate easier and more systematic collection of activity data from the business sector, Makati LGU included the submission of relevant activity data (i.e. annual fuel and electricity consumption of the business establishment) for the Community-Level Inventory as part of the requirements when securing or renewing business permits.

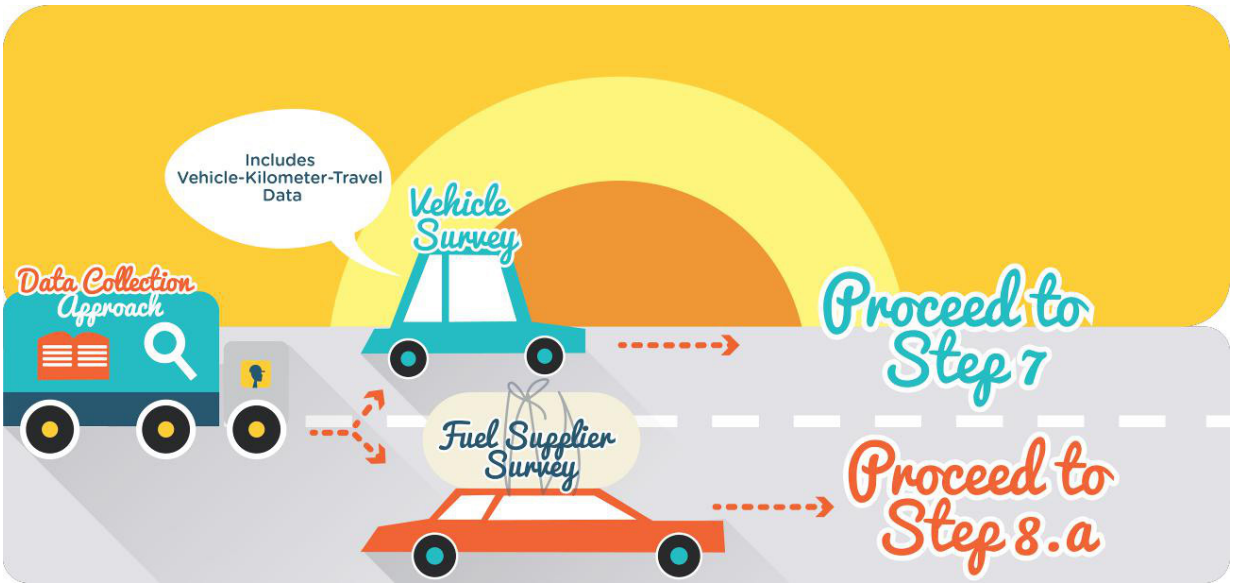
3.3 Mobile Combustion

Mobile Combustion refers to fuels used for on-road transportation[9] within the geopolitical boundaries of the LGU.

There are two methods to collect activity data for mobile combustion, namely, (1) Distance-based Method or (2) Fuel-based Method. The type of vehicle and year model are needed when using the Distance-based Method. Activity data need to be segregated according to fuel type (e.g. gasoline, diesel, LPG, others).

Distance-based method	Activity data are sourced using distance traveled by the vehicle, per fuel type (e.g. 100 kilometers)
Fuel-based method. This is the preferred method.	Activity data are sourced from the amount of fuel consumed by the vehicle, per fuel type (e.g. 100 liters)

9 *On-road transportation are vehicles used for transportation*



Step 7

Request information for the number of registered vehicles by type within the LGU boundaries from the Philippines' Land Transportation Office (Department of Transportation and Communications) or other relevant government agencies, including the LGU for the registered tricycles. Use *Datasheet 7.1 List of all vehicles* included in the inventory per district/barangay to record the data collected.

Datasheet 7.1 List of all vehicles included in the inventory per district/barangay

	"Districts/ Barangays included in the Inventory"	"Total Population"	Total Number of Vehicles Registered within the District	Total Number Surveyed (enter "NA" if no data)	Source of Data
1.					Example • Land Transportation Office (LTO) • LGU for Tricycles
2.					
3.					
4.					
5.					

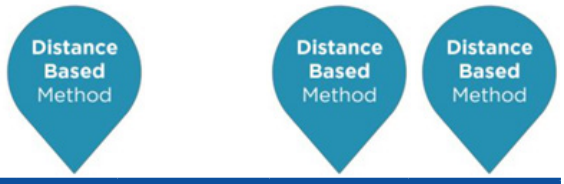
Step 8

Identify emission sources from mobile combustion. Use *Datasheet 8.1 Fuel consumption – Mobile combustion* to record the information collected on the type and amount of fuel consumed per emission source for mobile combustion.

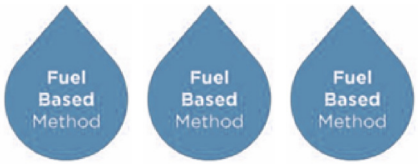
Step 8.1

Consolidate the data collected according to district/barangay (Column A) and Vehicle type(Column D). Indicate the Data Source Identifier in Column B (title of the source document) and the Type of Data (i.e. fuel supplier, national averages). Disaggregate the data according to the type of fuel (i.e. diesel, gasoline, LPG) and indicate in Column E. Use Columns G, H, I for Fuel-based Method OR Columns F, H, I for Distance-based Method. Ensure that there is no double counting when applying a combination of data collection approaches. (Skip Step 8.A and proceed to Step 9).

Datasheet 8.1 Fuel consumption – Mobile combustion (Examples are provided)



A	B	C	D	E	F	G	H	I
District/ Barangay/ LGU	Data Source Identifier	Type of Data	Vehicle Type	Fuel type	Annual Distance Traveled (km)	Annual Fuel Consumption (liters)	Annual Fuel Used for Stationary Combustion (liters)	Annual Fuel Used for Mobile Combustion (liters)
Longos	Fuel Supplier	Fuel supplier	Blended Diesel		3,000			3,000
San Antonio	Transportation Survey	Transportation Survey	Gasoline	5,000				500
San Juan	Fuel Supplier	Fuel supplier	Gasoline		5,000			5,000



Step 8.A
Identify emission sources from mobile combustion. Use *Datasheet 8.1 Fuel consumption–Mobile Combustion* to record the information collected on the type and amount of fuel consumed per emission source for mobile combustion.

Step 8.A.1
Consolidate the data collected according to district/barangay (Column A) and Vehicle type (Column D). If disaggregated activity data per district/barangay and vehicle type are not available, put the name of the LGU in Column A, disregard Column D, consolidate fuel consumed per fuel type and indicate in Column E. Use Columns G, H, I for fuel-based approach OR Columns F, H, I for distance-based approach. Ensure that there is no double counting when applying a combination of data collection approaches.

3.4 Electricity Consumption

Electricity Consumption refers to electricity consumed within the geopolitical boundaries of the LGU. Data on total community electricity consumption should be secured from electricity providers (e.g., utility company or electric cooperatives) or from government offices. Wherever possible, this data should be segregated by the electricity provider into the different sectors of the community (e.g., residential, commercial, industrial, public facilities).

LGU Experience

To facilitate the collection of electricity consumption data, LGUs wroteletters to their respective electricity providers (e.g., MERALCO office or electric cooperative), requesting for electricity consumption data within their geopolitical boundaries segregated according to sectors (e.g., residential, commercial, industrial, public facilities).

Step 9

Use *Datasheet 9.1 Activity data–Electricity consumption-Residential sector* to collect the activity data on electricity consumption of the residential sector. If activity data are not segregated according to district/ barangay, indicate the name of the LGU.

Datasheet 9.1 Activity data –Electricity consumption-Residential sector (Examples are provided)

District/ Barangay/ LGU	Data Source Identifier (e.g. Household Survey Number or Utility Name and Source Identifier)	Data Type (e.g. Household Surveys, electricity provider)	Actual Annual Electricity Consumption (kWh)
Longos	Longos-Utility_ provider_AAA-household_elec	Electricity Utilities Provider	8,000,000
San Antonio	San_Antonio-Utility_provider_BBB-household elec	Electricity Utilities Provider	10,000,000

Step 10

Use *Datasheet 10.1 Activity data–Electricity consumption-Commercial sector* to collect the activity data on electricity consumption of the commercial sector. If activity data are not segregated according to district/barangay, indicate the name of the LGU.

Datasheet 10.1 Activity data –Electricity consumption-Commercial sector (Examples are provided)

District/ Barangay/ LGU	Data Source Identifier (e.g. Household Survey Number or Utility Name and Source Identifier)	Data Type (e.g. Household Surveys, electricity provider)	Actual Annual Electricity Consumption (kWh)
Longos	Longos-Utility_ provider_AAA-household_elec	Electricity Utilities Provider	8,000,000
San Antonio	San_Antonio-Utility_provider_BBB-household elec	Electricity Utilities Provider	10,000,000

Step 11

Use *Datasheet 11.1 Activity data–Electricity consumption-Other sectors* to collect the activity data on electricity consumption of the other sectors. If activity data are not segregated according to district/ barangay, indicate the name of the LGU and the sector.

District/ Barangay/ LGU	Data Source Identifier (e.g. Household Survey Number or Utility Name and Source Identifier)	Data Type (e.g. Household Surveys, electricity provider)	Actual Annual Electricity Consumption (kWh)
Longos	Longos-Utility_ provider_AAA-household_elec	Electricity Utilities Provider	800,000
San Antonio	San_Antonio-Utility_provider_BBB-household elec	Electricity Utilities Provider	220,000

3.5 Agriculture

Agriculture Emissions are those generated by agricultural activities like crop production (mainly rice production) and raising of livestock. More specifically, these are emissions that result from livestock management (i.e. methane (CH4) and nitrous oxide (N2O) emissions from manure production and use) and from soil management (i.e. nitrous oxide emissions from crop management practices). GHG emissions resulting from fuel combustion in on-farm equipment[10] and human sewage disposal are not reported under the agriculture category.

[10] *On-farm equipment such as farm tractors, tree cutters, dryers, etc.*

Guidance Notes:

Livestock-related manure management data collection for LGUs in the Philippines should be based on a default value for farm management of nutrients by livestock type (e.g. cattle, poultry, swine etc.). A complete list of all significant livestock populations that have default emission factor values is provided in the Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories (IPCC Guidelines) Section 4 - Agriculture (i.e. dairy cows, other cattle, buffalo, sheep, goats, camels, horses, mules and asses, swine, and poultry). More detailed categories should be used if data are available.

For crop production in the Philippines, the general IPCC methodology for calculating CH4 emissions from rice production should be used based on the annual harvested areas. Rice production in the Philippines should be disaggregated into one of the four following categories: Dry Season/Irrigated, Dry Season/Non-Irrigated, Wet Season/Irrigated, or Wet Season/Non-Irrigated. For other crops, it is recommended that LGUs acquire regional/custom emission factors from reliable sources (e.g. peer-reviewed scientific journals), since GHG emissions from cropping practices are very dependent on local climatic and soil conditions.

LGU experience

The LGUs that developed the Community-Level Inventory under the Climate Change and Clean Energy (CEnergy) Project of the USAID used emission factors derived from the 2000 National Inventory of the Philippines for the computation of the emissions of livestock production and soil management.

Step 12

Request agricultural land use (total hectares under agricultural crop production), crop-type(including growing season and irrigation practices), and livestock headcounts for any farms inside the LGU's geopolitical boundaries from the national, regional or local statistics office (i.e., Bureau of Agricultural Statistics, local Agriculture Office). This data should include the land area designated to each crop type and corresponding irrigation practice and growing season (e.g., rice, dry season, irrigated), and livestock headcounts for the LGU by animal type. Also, request the statistics office to provide crop-specific emission factors for the Philippines as well as animal-specific (e.g., manure management) emission factors specific to the Philippines if available. Documentation to support the validity of the data acquired must be included in the report.

Batangas City experience

The LGUs that developed the Community-Level Inventory under the Climate Change and Clean Energy (CEnergy) Project of the USAID used emission factors derived from the 2000 National Inventory of the Philippines for the computation of the emissions of livestock production and soil management.

The LGU's local agriculture offices (through their Municipal or City Agriculture Officers) can be good sources of primary data. Oftentimes, the reports that these offices generate are enough inputs for the GHG inventory report in the agriculture sector. This eliminates the need for LGUs to conduct separate surveys for the sole purpose of GHG inventory.

Batangas City LGU secured the data on hectares used for crop production including rice cultivation and the number of livestock from the Local Agriculture Office. The rice cultivation data are already segregated according to irrigation practice and growing season, while the livestock data are segregated according to the type of livestock.

Step 13

Record the Activity data on crop production collected based on the suggested format of *Datasheet 13.1 Agriculture Crop Emission Sources*. If data according to district/barangay are not available, put the name of the LGU. Indicate the Data Source Identifier in Column B and the Type of Data in Column C. The Application in Column D must specify the growing season (dry or wet) and irrigation practice (irrigated or rainfed). Indicate the total hectares cultivated in Column E.

Datasheet 13.1 Agriculture crop emission sources (Examples are provided)

A	B	C	D	E
District/ Barangay/ LGU	Data Source Identifier (e.g. Name of Government Agriculture Agency and Department)	Type of Data (e.g. Agricultural Bureau, Census Averages, Other)	Application (e.g. crop type and approach)	Total Hectares Under Production (hectares, ha)
Longos	Longos-agriculture-bureau-crop-type-area	Data directly from government agricultural agency	Rice (Dry Season, Irrigated)	200
Longos	Longos-agriculture-bureau-crop-type-area	Data directly from government agricultural agency	Rice (Dry Season, Rainfed)	500
San Antonio	SanAntonio-crop_ residue-area	Data directly from government agricultural agency	Crop residues (tonnes of dry weight)	800

Step 14

Record the activity data on livestock production collected based on the suggested format of Datasheet 14.1 Livestock emission sources. If data according to district/barangay are not available, put the name of the LGU. Indicate the Data Source Identifier in Column B and the Type of Data in Column C. The Application in Column D must specify the type of livestock (e.g., buffalo, poultry, cattle, etc.). Indicate the number of heads/population in Column

Guidance Notes:

Headcount (of livestock) refers to average population in a given year, not on the total annual population. Care must be taken to determine the average population as GHG emissions may be overestimated if total annual population is used. A good indicator to determine total population is annual sales, while census of animals undertaken by the local DA office usually indicates average annual population.

Datasheet 14.1 Livestock emission sources (Examples are provided)

A	B	C	D	E
District/ Barangay/ LGU	Data Source Identifier (e.g. Name of Government Agriculture Agency and Department)	Type of Data (e.g. Agricultural Bureau, Census Averages, Other)	Application (e.g. crop type and approach)	Total Hectares Under Production (hectares, ha)
Longos	Longos-agriculture-bureau-crop-type-area	Data directly from government agricultural agency	Buffalo	200
Longos	Longos-agriculture-bureau-crop-type-area	Data directly from government agricultural agency	Poultry	1800
San Antonio	SanAntonio-crop_ residue-area	Data directly from government agricultural agency	Cattle	100
San Antonio	SanAntonio-crop_ residue-area	Data directly from government agricultural agency	Goat	1300

3.6 Solid Waste

Solid Waste refers to municipal solid waste ("MSW") generated within the LGU's geopolitical boundaries that may cause GHG emissions inside the LGU's geopolitical boundaries (i.e., the LGU operates or has substantial control over the solid waste facility) or the solid waste is transported to a disposal site outside the LGU's geopolitical boundaries and causes GHG emissions.

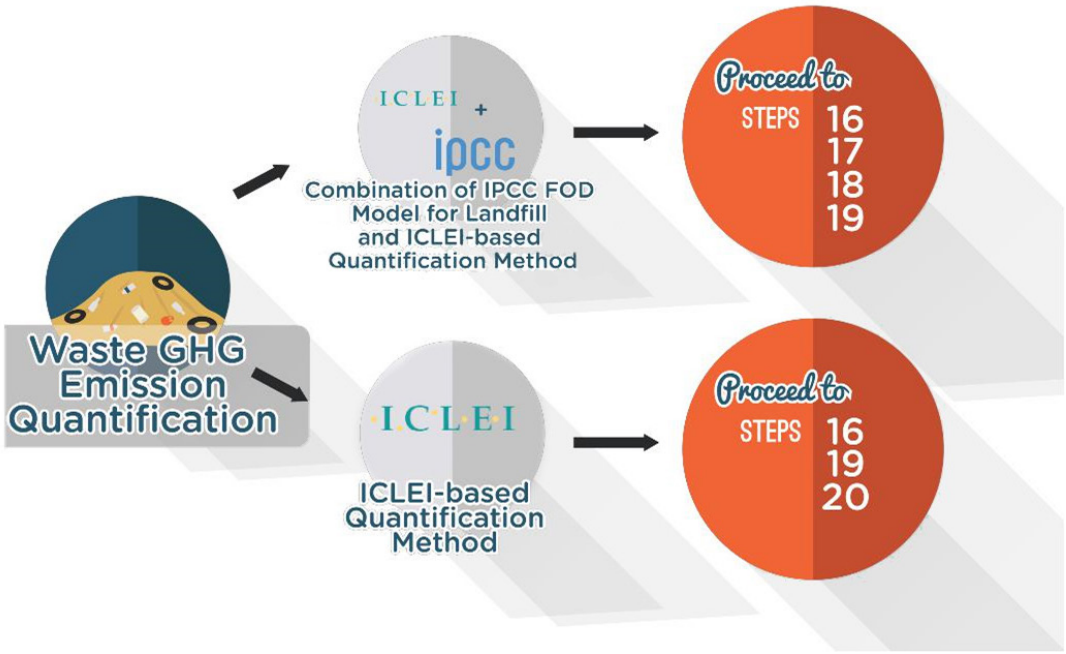
Emissions from waste facilities should be calculated using any of the following in cases where the waste is landfilled:

1. First order decay (FOD) model at disposal sites; or
2. ICLEI - based waste quantification methodology (which estimates future emissions of current waste generation).

A combination of the IPCC FOD method may be used for solid waste disposal at managed sites and the ICLEI methods for waste disposal via open burning, composting, anaerobic digestion, or other/uncategorized, which are IPCC compliant.

The user must however **choose only one method** for determining GHG emissions from disposal at solid waste disposal sites (SWDS) like landfill.

Step 15
Choose the methodology to be used in estimating emissions from solid waste and follow the decision tree depending on the chosen methodology.



Step 16
Collect the data needed for the quantification of the waste emissions from the concerned unit/ division of the LGU (e.g. Environment and Natural Resources Office). Use *Datasheet 16.1 Solid waste disposal data entry parameters (IPCC FOD Method)* to record the data collected. Identify the sources of the data. You may use the IPCC Default Values if no data are available.

Datasheet 16.1 Landfill solid waste disposal data entry parameters (IPCC FOD Method) (Sample LGU-specific values are provided using the IPCC default values)

	IPPC Default Value		User-Defined
Starting year	1950		1950
DOC (Degradable organic carbon)			
(Weight fraction, wet basis)	Range	Default	User-Defined
Food waste	0.08-0.20	0.15	0.15
Garden	0.18-0.22	0.2	0.2
Paper	0.36-0.45	0.4	0.4
Sewage sludge	0.04-0.05	0.05	0.05
Textiles	0.20-0.40	0.24	0.24
Wood and straw	0.39-0.46	0.43	0.43
DOCf (fraction of DOC dissimilated)		0.5	0.5
Methane generation rate constant (k)			
(years-^{1})	Range	Default	User-Defined
Disposable nappies	0.15–0.2	0.17	0.17
Food waste	0.17–0.7	0.4	0.4
Garden	0.15–0.2	0.17	0.17
Paper	0.06–0.085	0.07	0.07
Sewage sludge	0.17–0.7	0.4	0.4
Textiles	0.06–0.085	0.07	0.07
Industrial waste	0.15–0.2	0.17	0.17
Delay time (months)		6	6
Fraction of methane (F) in developed gas		0.5	0.5
Conversion factor, C to CH4		1.33	1.33
Oxidation factor (OX)		0	0
Parameters for carbon storage			
% paper in industrial waste		0%	0%
% wood in industrial waste		0%	0%

Step 17

Identify the distribution of waste by waste management type using the *Datasheet 17.1 Solid waste disposal data entry for Methane Correction Factor (MCF)* calculation (IPCC FOD Method)

Guidance Notes:

LGUs are familiar with RA 9003 classification but may not be familiar with the IPCC classification, which provides the default MCF values for specific types of solid waste management. This table provides LGUs with conversion guides in order to apply appropriate IPCC default values.

R.A. 9003	IPCC 2006/WORKSHEET
Controlled disposal facilities	Unmanaged, deep type
Sanitary Landfills	Anaerobic, managed
Open dumpsites	Unmanaged, deep type

Datasheet 17.1 Solid waste disposal data entry for Methane Correction Factor (MCF) calculation (Sample values are provided)

	Unmanaged, shallow	Unmanaged, deep	Managed	Managed, semi-aerobic	Uncategorized	Total (100%)
	MCF	MCF	MCF	MCF	MCF	
IPCC default	0.4	0.8	1	0.5	0.6	
User Defined Value	0.4	0.8	1	0.5	0.5	
Distribution of Waste by Waste Management Type - Annex A1.1						
User Defined Value (Philippines)	44%	0%	0%	28%	28%	
Year	%	%				
1950	44%	0%	0%	28%	28%	100%
1951	44%	0%	0%	28%	28%	100%
1952	44%	0%	0%	28%	28%	100%
1953	44%	0%	0%	28%	28%	100%
1954	44%	0%	0%	28%	28%	100%
2006	44%	0%	0%	28%	28%	100%
2007	44%	0%	0%	28%	28%	100%
2008	44%	0%	0%	28%	28%	100%
2009	44%	0%	0%	28%	28%	100%
2010	44%	0%	0%	28%	28%	100%

2011	44%	0%	0%	28%	28%	100%
2012	44%	0%	0%	28%	28%	100%
2013	44%	0%	0%	28%	28%	100%
2014	44%	0%	0%	28%	28%	100%

Guidance Notes:

If 50-year data on waste distribution per management type are not available, use the most recent waste characterization data. It is good practice to fill out the most recent years, depending on availability of data, as newer wastes generate more emissions than older wastes.

Step 18

Identify and record waste diversion and composition rates using the *Datasheet 18.1 Waste diversion rates* and *Datasheet 18.2 Waste composition rates*

Datasheet 18.1 Waste diversion rates

Year	Population	"Waste per Capita (tonnes/ capita/yr)"	% to Solid Waste Disposal Site (SWDS)	" % MSW composted"	"% MSW sent to anaerobic digestion"	% MSW open burned	% Total MSW other/ unspecified
IPCC default							
1950							
1951							
1952							
1953							
2011							
2012							
2013							
2014							

Datasheet 18.2 Waste compositions (% tonnes)

Year	Food (%)	Garden (%)	Paper (%)	Wood (%)	Textile (%)	Nappies (%)	Sludge (%)	Plastics and other Inert (%)
1950								
1951								
1952								
1953								
2011								
2012								
2013								
2014								

Step 19

Collect the data needed for the quantification of the waste emissions from the concerned unit/division of the LGU (e.g. Environment and Natural Resources Office). Use *Datasheet 19.1 General solid waste composting activity data* to record the data collected for composting activity and *Datasheet 19.2 General solid waste open burning activity data for open burning.*

Datasheet 19.1 General solid waste composting activity data

Data Source Identifier	Population	Total solid waste (Actual) for district / barangay	Fraction of total solid waste sent for anaerobic digestion facilities	Fraction of total solid waste sent for composting
	Inhabitants	Tonnes	%	%
LGU				

Datasheet 19.2 General solid waste open burning activity data

Data Source Identifier	Population	Total solid waste (Actual) for district / barangay	Amount of total solid waste open burned
	Inhabitants	Tonnes	Tonnes
LGU			

Step 20

(For ICELI method) Collect the data needed for the quantification of waste emissions from the concerned unit/division of the LGU (e.g., Environment and Natural Resources Office). Use *Datasheet 20.1 Landfill solid waste disposal data entry (ICLEI method) by landfill type* to record the data collected.

Datasheet 20.1 Landfill solid waste disposal data entry (ICLEI method) by landfill type

Data Source Identifier	Population	Total solid waste (Actual) for district / barangay	Fraction of solid waste sent to specific disposal site	Specific Landfill Site	Location of landfill site (outside or inside LGU)
	Inhabitants	Tones	%		
LGU				Unmanaged -shallow	
				Managed – semi-aerobic	
				Uncategorized	

3.7 Wastewater

Waste water emissions included are those associated with Methane (CH4) and Nitrous Oxide (N2O) emissions from waste water and sewage. LGUs should account for CH4 and N2O emissions from any wastewater systems and disposal activities coming from the following sources:

1. Waste water **generated inside** the LGU's geopolitical boundaries (Scope 1).
2. Wastewater **generated/received from outside** the geopolitical boundaries of the LGU, **but treated within** the boundaries of the LGU (Scope 1).
3. Wastewater **generated by the LGU** but is **treated outside** the geopolitical boundaries of the LGU (Scope 3)

LGU Experience

Wastewater generated/received from outside the geopolitical boundaries of the LGU, but treatedwithin the boundaries of the LGU and Wastewater generated by the LGU but is treated outside thegeopolitical boundaries of the LGU are real cases but are not properly documented. LGUs are encouraged to check their boundaries to determine if there are these cases, and report as appropriate.

Emissions from wastewater treatment should be calculated by using the first order decay (FOD) model utilized by the IPCC.

The type of data required to quantify emissions from wastewater generally consists of determining the types of wastewater systems inside the LGU's geopolitical boundaries and the number of residents and entities using each type of wastewater management system. Default methane correction factors (IPCC, 2006) for each treatment system and a default maximum methane producing capacity factor (IPCC, 2006) are generally used to determine emissions from

wastewater treatment and discharge. Default emission factor values to determine N2O emissions for human sewage (e.g. g N2O/person/year) are also generally used, although country-specific or test sample-specific data may also be used.[11]

Guidance Notes:

For example, N2O emissions specific to the LGU can be calculated by determining the annual per capita protein consumption, the fraction of nitrogen in protein, factor of non-consumed protein added to wastewater, nitrogen removed with sludge etc. Furthermore, LGU-specific CH4 emission factors can be used by sourcing the maximum CH4 producing capacity (Bo) for domestic wastewater. However, since sewage systems and sludge treatment are rare in the Philippines, the majority of wastewater treatment systems will be of "uncollected" forms (e.g. uncollected septic tanks) LGU-specific CH4 emission factors or N2O emissions may be difficult to determine.

Step 21

Collect the data needed for the quantification of the wastewater emissions from the concerned government agencies (e.g. Department of Environment and Natural Resources (DENR), National Water Resources Board (NWRB), or unit/division of the LGU (e.g. local or barangay sanitation unit). Use *Datasheet 21.1 Wastewater management system* to record the data collected. Prepare separate tables for wastewater generated by the LGU and wastewater received from outside the geopolitical boundaries of the LGU. Datasheet 21.1 Wastewater management system (IPCC default values are provided for items 2 -9)

Data Needed	Examples		Is it used in the LGU? (Yes or No)	% of Population using the system
Wastewater systems or types in LGU 1. Systems 2. or types in Untreated	Open-Pits / Latrines	dry climate, ground water table lower than latrine, small family (2-5 people)		
		dry climate, ground water table lower than latrine, communal		
		wet climate/flush water use, ground water table than latrine		
	River Discharge	Stagnant oxygen deficient rivers and lakes		
		Rivers, lakes and estuaries		
	Untreated	River Discharge		
		Sewers (closed and underground)		
		Open sewers		
	Treated	Aerobic –centralized and well managed		
		Sludge anaerobic treatment		
		Aerobic shallow ponds		
		Anaerobic lagoons – shallow, (less than 2 meters)		
		Anaerobic reactors		

11 *Guidance Document, page 23*

Data Needed		Default Values (IPPC)		LGU Specific
		Uncollected	Collected	
1	Per Capita BOD generation (per day) for the LGU (maybe national value or default IPCC value)	40	40	
2	LGU or region-specific correction factor for industrial BOD discharges in sewers (national or IPCC default value)	1.00	1.25	
3	Maximum Methane production capacity factor used in the calculation in reference to the BOD from LGU or region specific data (if available)	.60 kgCH4/ kgBOD		
4	LGU, regional, national maximum methane production capacity factor used in the computation in reference to the COD	.25 kgCH4/ kgCOD		
5	Annual per capita protein consumption (as localized as possible)	.59 g/person/ DAY		
6	Fraction of nitrogen in protein (as localized as possible)	.16 kg N/kg protein		
7	Factor for non-consumed protein added to wastewater	1.1		
8	Nitrogen removed in sludge (value of 0 unless sludge removal is implemented by LGU of specific waste treatment facility	0		
9	Nitrogen removed in sludge (value of 0 unless sludge removal is implemented by LGU of specific waste treatment facility			

3.8 Forest and Land Use Change

Most of the greenhouse gas emissions from forest and land use change are attributed to timber/ wood harvesting and conversion of forest into other land uses such as agriculture, settlements, etc. Forest can be a source of greenhouse gas emissions or removal. The net carbon emissions or removal of the forest and land use sector is dependent on two basic biophysical processes:[12]

a. Changes in forest/woody carbon stocks due to the net annual biomass growth of existing forest and non-forest stands, and possible biomass regrowth in abandoned lands;

b. Land use and forest conversion practices which affect the carbon chemistry of the atmosphere via biomass burning, decay, and soil carbon release and uptake.

The accompanying Spreadsheet covers only the GHG emissions/removals of forest and other land-use due to changes in carbon stocks and not the GHG emissions due to biomass burning and decay.

12 *Tracking Greenhouse Gases: An Inventory Manual,(p. 122).*

Step 22

Collect the data needed for the quantification of the GHG emissions from forest and other landuse change. Use Datasheet 22.1 Forestry and other land use change data for GHG emissions to record the data collected.

Datasheet 22.1 Forestry and other land use change data for GHG emissions (Examples are provided)

District/ Barangay	Data source identifier	Emission type	Emission source	Annual total
Name of LGU		Wood Products Harvesting	Charcoal (cu.m.)	
Name of LGU		Wood Products Harvesting	Construction (cu.m.)	
Name of LGU		Changes in the use of forest lands	Forest converted to Agriculture (ha)	
Name of LGU		Changes in the use of forest lands	Forest converted to settlement (ha)	

Step 23

Collect other data parameters needed for the quantification of the GHG emissions and or removals from forest and other land use change. Use Datasheet 23.1 Parameters for forest and other landuse change to record the data collected. Identify the sources of the data.

Guidance Notes:

Default values are provided for biomass growth rate and carbon content of the biomass and forestland types. However, it is highly recommended to use local/regional/provincial values if available.

Datasheet 23.1 Parameters for forest and other land use change

Data requirements	Default values		User-defined		Source of data
	Biomass growth rate	Carbon content	Biomass growth rate	Carbon content	
1. Wood and wood products harvesting					
a. Fuel wood (cu.m.)		.49			
b. Charcoal (tons)		.49			
c. Construction (cu.m.)		.49			
d. Novelties (tons)		.49			
2. Changes in the use of the forestlands					
a. Used for agriculture (ha)	7.81	.49			
b. Used as grasslands (ha)	7.81	.49			
c. Left as barren areas (ha)	7.81	.49			
3. Forestland remaining					
a. General forestland type[14] (ha)	7.81	.49			
b. Primary forest - Visayas (ha)	2.10*	.045*			
c. Secondary forest - Luzon (ha)	6.50*	.044*			
d. Brushland – for wood- Visayas (ha)	9.40*	.045*			
e. Grassland – Visayas (ha)	0.00*	.045*			
f. Tree plantations – (e.g. S. macrophylla - Luzon (ha)	7.50*	.043*			
4. Lands converted to forestland					
a. Barren to forestland (ha)	7.81	.49			
b. Grassland to forestland (ha)	7.81	.49			
c. Wetlands to forestland (ha)	7.81	.49			
d. Settlement to forestland (ha)	7.81	.49			
e. Cropland to forestland (ha)	7.81	.49			

**Tracking Greenhouse Gases: An Inventory Manual, Table 64. page 129*

Data requirement	Default value (tons/ha)	User-defined (tons/ha)	Source of data
Carbon stock in existing forest	262		

Step 24
Collect the data needed for the quantification of the GHG removals from forest and other landuse change. Use *Datasheet 24.1 Forestry and other land use change data for GHG Removals* to record the data collected.

Datasheet 24.1 Forestry and other land use change data for GHG removals. (Examples are provided)

District/Barangay	Data source Identifier	Removal type	Removal source	Annual total (ha)
Name of LGU		Remaining forestland	Carbon stock in inventory year	
Name of LGU		Change in forestland	Grassland to forest	
Name of LGU		Change in forestland	Barren to forestland	

3.9 Industrial Processes and Product Use

The greenhouse gases from the industry sector are mainly coming from the industrial production processes that chemically or physically transform raw materials. During these industrial processes, different greenhouse gases are produced such as carbon dioxide (CO2), methane, (CH4) and nitrous oxide (N2O). Other greenhouse gases such as hydroflourocarbons (HFCs) are used in products such as refrigeration and aerosol cans. Sulphur hexafluoride (SF6) are used in electrical equipment. The IPCC categorized the industrial process according to the following:

- Mineral Industry
- Chemical Industry
- Metal Industry
- Non-Energy Products from Fuels and Solvent used
- Electronics Industry
- Products Used as Substitute for Ozone Depleting Substances
- Other Product and Manufacture Use
- Others such as Pulp and Paper and Food Industry Not all of these types of industries are present in your community, or the GHG emissions of the industries easily attributable to the community. Annex 3 provides the industry categories that may be included in the GHG inventory if present in the community.

An important step in computing for the GHG emissions from the industrial sector is the identification of GHG intensive industries present in the community using the recommended list as guide. The data requirements may include the volume of inputs (in metric tons) and/or the aggregated production (in metric tons) of each industry identified.

Step 25
Identify the GHG intensive industries present in the community using the recommended list (e.g mineral industry, chemical industry, etc) in Annex 3. Get the names and relevant information of the specific industries and use *Datasheet 25.1 List of industrial processes in the community* to record the data collected.

Datasheet 25.1 List of industrial processes in the community

IPCC category	Name of industries	Contact details	Potential source of data
Mineral	Company Name		Business Permit Division of the LGU; Industry Association; Local Chapter of Chamber of Commerce
	Company Name		
Chemical	Company Name		
	Company Name		

Step 26
Collect the activity data needed for each industry identified using the datasheet as shown in the example below. Please refer to the Annex 1 for the specific datasheets applicable to your sub-sector.

Datasheet 26.1 Mineral industry activity data

Sub-sector		Activity data	Units	Source of data
Cement Production	Name of Company	Type of cement produced	tonnes	
		Mass of cement produced per type	tonnes	
Limestone production	Name of Company	Mass of lime produced per type	tonnes	
Glass production	Name of Company	Production	tonnes	

Guidance Notes:

The Spreadsheet provides GHG emission computation for selected industrial process and product use only. Please refer to the IPCC Volume 3 for the complete list of industries and emission factors. It is highly recommended to use local/national industry emission factors if available.

IV. Steps to Input Data in the Spreadsheet

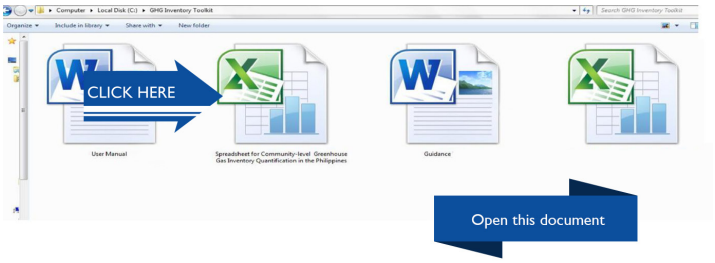
This Chapter presents step-by-step procedures in encoding the data gathered in Chapter 3 in an orderly and correct manner in the Spreadsheet. This chapter is designed to let users go through the Spreadsheet in a chronological order (i.e. 1st tab, 2nd tab, etc). The datasheets prepared in the previous chapter will serve as the source documents for the data input in this chapter. The data encoders are advised to take the necessary steps to ensure that correct data are captured in the Spreadsheets.

Remember that the focus of this Chapter is to fill out the yellow tabs and (light) yellow cells only. Blue and grey cells contain values that are in default or were automatically computed or copied from other cells. LGUs are asked to Not Delete the contents of these cells, as they may affect the whole Spreadsheet.

4.1 General Overview Worksheets

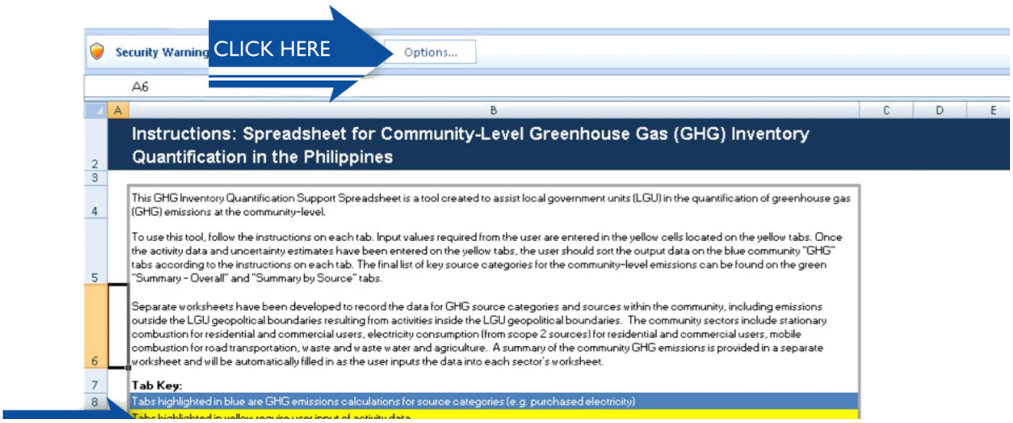
Step 1

Open the Spreadsheet titled **"Spreadsheet for CEnergy_ Community-GHG_Inventory_ Quantification"**



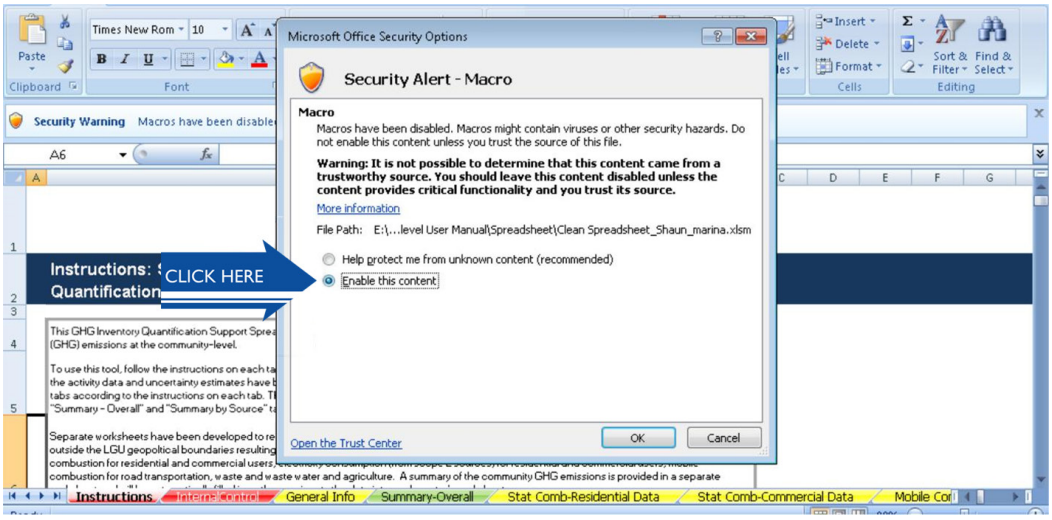
Step 2

Click the **Instruction** tab. Enable the macros by clicking "**Options**".

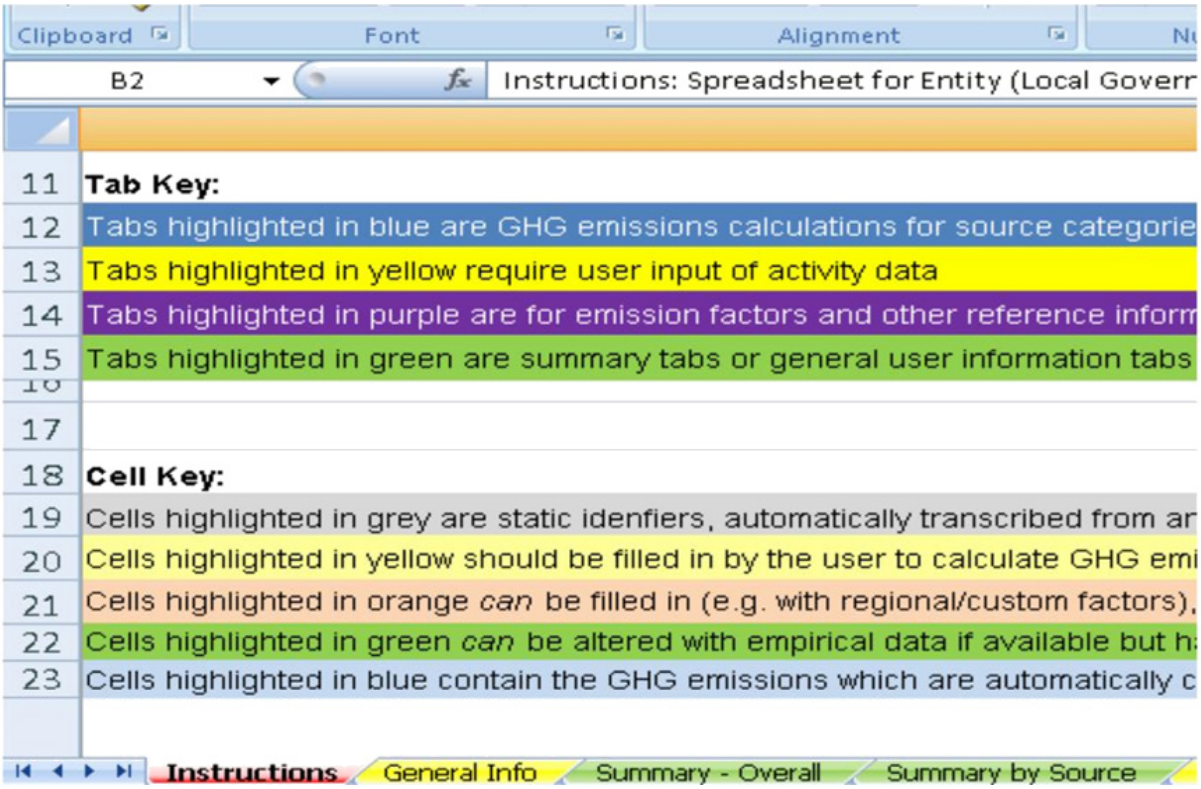


Step 2.1

Choose "**Enable the content**" and click "**ok**".



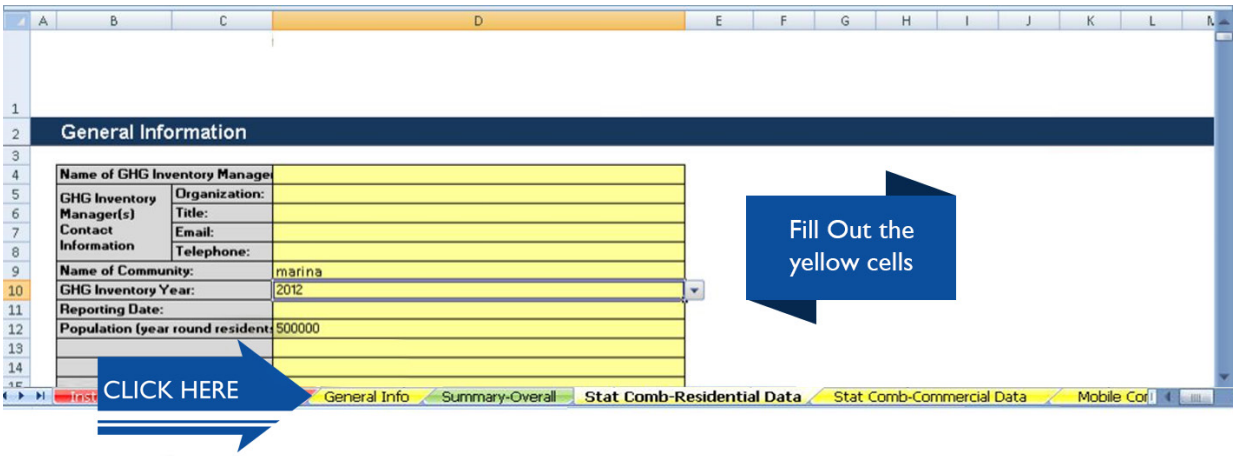
The Instructions tab helps user to familiarize themselves with the general language of the Spreadsheet.



The general instructions are provided in this Spreadsheet. This is what it looks like.

Step 3

Click the **General Info** tab. Input the name of your LGU/community in Row 9 and provide all available data required. Use the drop-down menu in Row 10 to indicate the GHG Inventory Year.

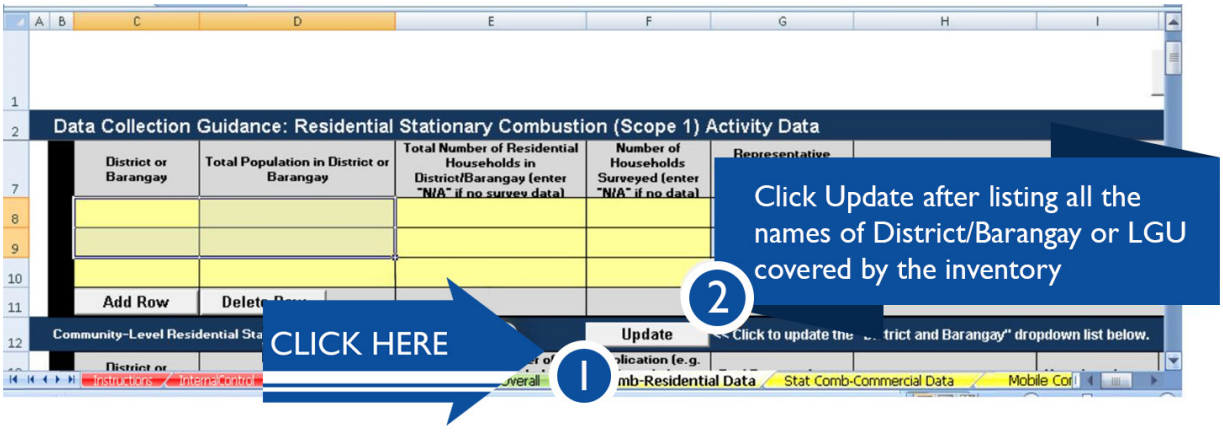


4.2 Stationary Combustion

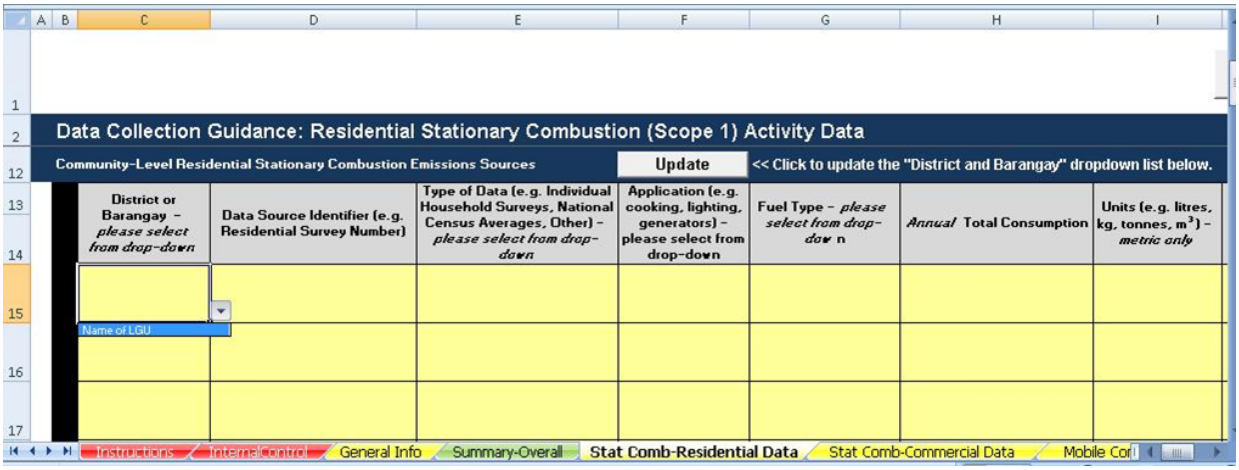
Stationary Combustion refers to fuels used by residential and commercial sectors for cooking, lighting, heating,and cooling within the geopolitical boundaries of the LGU.

Step 4

Click the **Stat-Comb-Residential Data** tab. Read the instructions provided. Click the "*Show/HideInstruction*" button to hide the instructions and get a better view of the Spreadsheet. List in Row 6 the assumptions used, as shown in the example. Refer to *Datasheet 3.1 List of all Households included in the inventory per district/barangay* to fillout the yellow cells starting in Row 8, Column C. If disaggregated data per district/barangay are not available, input the name of the LGU and provide the other data requirements if available. Click the "*Add Row*" and "*Delete Row*" as applicable. Click the "*Update*" button when finished with the encoding of the name/s of the LGU/district/barangay.



Step 4.1
Choose the name of your LGU or district/barangay from the drop-down menu in Row 15, Column C. Refer to *Datasheet 5.1 Emission sources and fuel consumption of the residential sector–Stationary combustion* to fillout the yellow cells starting in Row 15.



Step 4.2
Indicate the Data source identifier in Column D.

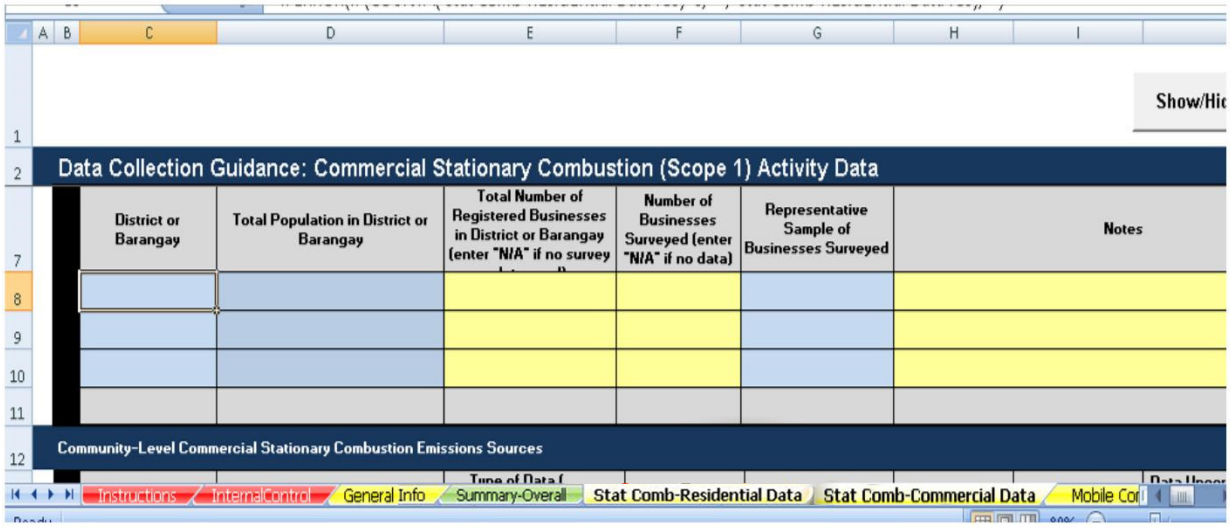
Step 4.3
Use the drop-down menu in Column E to choose the Type of data.

Step 4.4
Use the drop-down menu in Column F to choose the Application. Use 'Other" if specific use of fuel is not listed or is unknown.

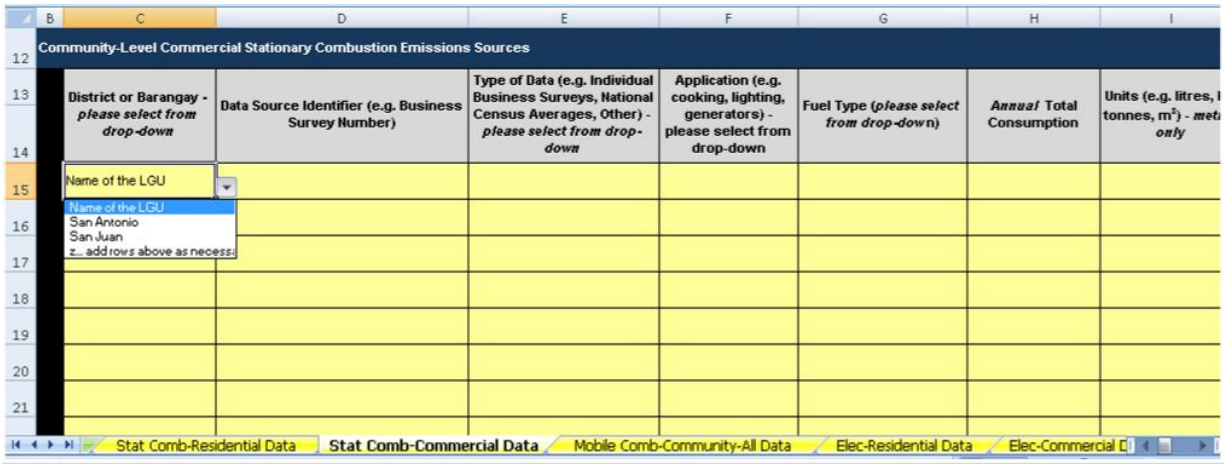
Step 4.5
Use the drop-down menu in Column G to choose the fuel type. Choose the 'Blended diesel residential/commercial' for diesel used in the Philippines.

Step 4.6
Input the Annual total consumption in Column H and identify the units in Column I.

Step 5
Click the Stat-Comb-Commercial Data tab. Read the instructions provided. Click the "*Show/Hide Instruction*" button to hide the instructions and to get a better view of the Spreadsheet. List in Row 6 all the assumptions used, as shown in the example. Refer to *Datasheet 4.1 List of all commercial establishments included in the inventory per district/barangay* to fillout the yellow cells starting in Row 8, Column E if available.



Step 5.1
Choose the name of your LGU or district/barangay from the drop-down menu in Row 15, Column C. Refer to *Datasheet 6.1 Emission sources and fuel consumption of the commercial sector–Stationary combustion* to fillout the yellow cells starting in Row 15.



Step 5.2
Indicate the Data source identifier in Column D.

Step 5.3
Use the drop-down menu in Column E to choose the Type of data.

Step 5.4
Use the drop-down menu in Column F to choose the Application. Use 'Other'' if specific use of fuel is not listed or is unknown.

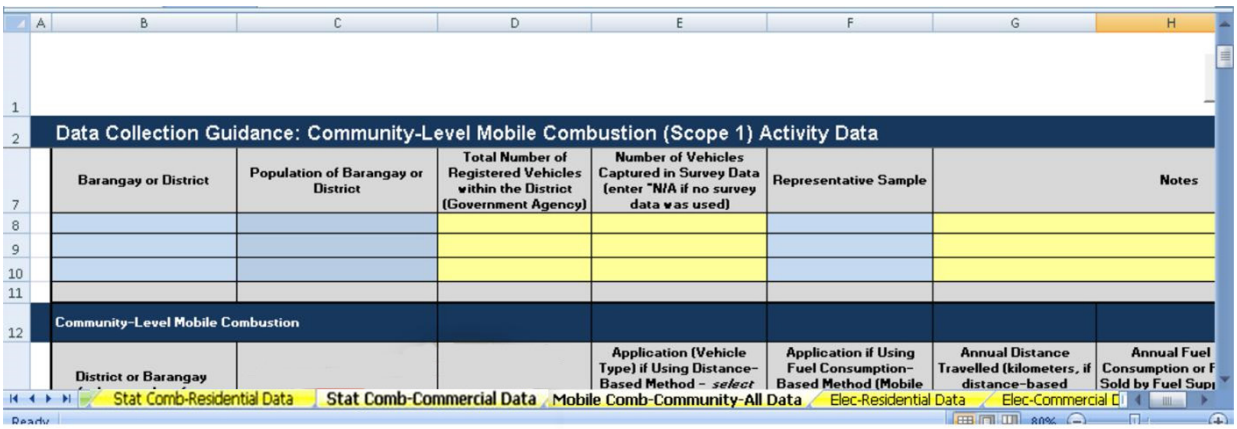
Step 5.5
Use the drop-down menu in Column G to choose the Fuel type. Choose the 'Blended diesel residential/commercial' for diesel used in the Philippines.

Step 5.6
Input the Annual total consumption in Column H and identify the units in Column I.

4.3 Mobile Combustion

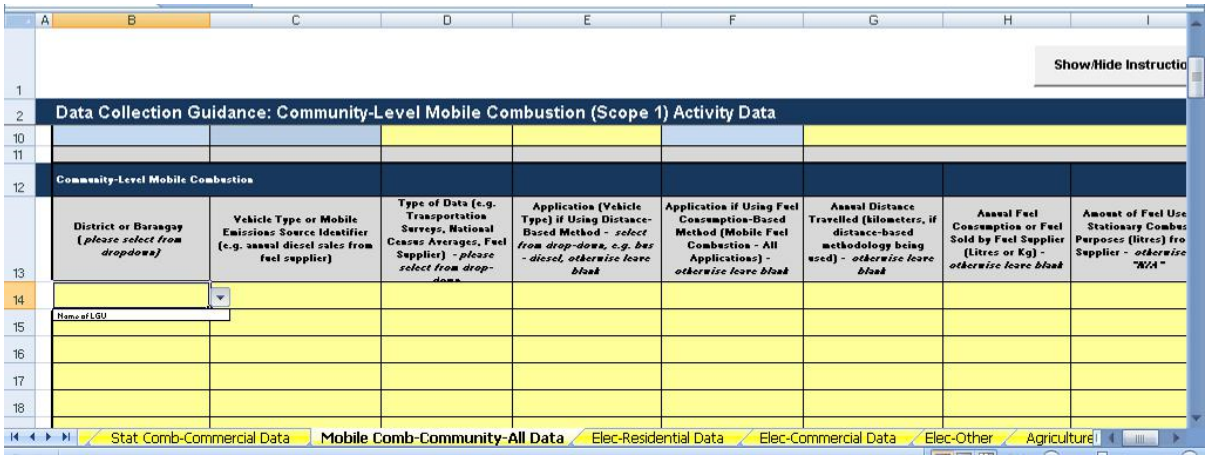
Mobile Combustion refers to fuels used for transportation[13] within the geopolitical boundaries of the LGU.

Step 6
Click the **Mobile-Comb-Community-All Data** tab. Read the instructions provided. Click the "*Show/Hide Instruction*" button to hide the instructions and get a better view of the Spreadsheet. List all the assumptions used in Row 6 as shown in the example. Refer to *Datasheet 7.1 List of all Vehicles included in the inventory per district/barangay* to fillout the yellow cells starting in Row 8, Column D if available.



[13] *Transportation excludes off-road vehicles and other machineries used in farm lands and forests*

Step 6.1
Choose the name of your LGU or district/barangay from the drop-down menu in Row 14, Column C. Refer to *Datasheet 8.1 Fuel consumption–Mobile combustion* to fillout the yellow cells starting in Row 14, Column CI.



Step 6.2
Indicate the Vehicle type or Mobile emissions source identifier in Column C.

Step 6.3
Use the drop-down menu in Column D to choose the Type of data.

Step 6.4
Use the drop-down menu in Column E to choose the Application (if using the Distance-based method).

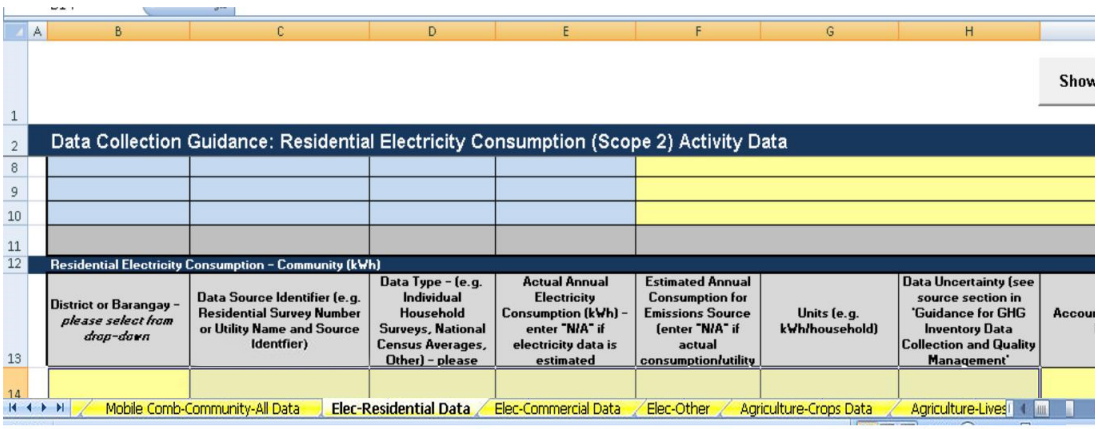
Step 6.5
Use the drop-down menu in Column F to choose the Application (if using the Fuel consumption-based method). Choose 'On-road diesel fuel' for Diesel used in the Philippines.

Step 6.6
Use Column G to input Annual distance traveled and Column H for Annual fuel consumption.

Step 6.7
If the amount for fuel used in Stationary Combustion is known, input the amount in Column I. Column J will automatically reflect the difference between Column H and Column I, which represents the Annual amount of fuel consumed for mobile combustion. However, if the amount of fuel used in Stationary combustion is unknown, leave the cell blank.

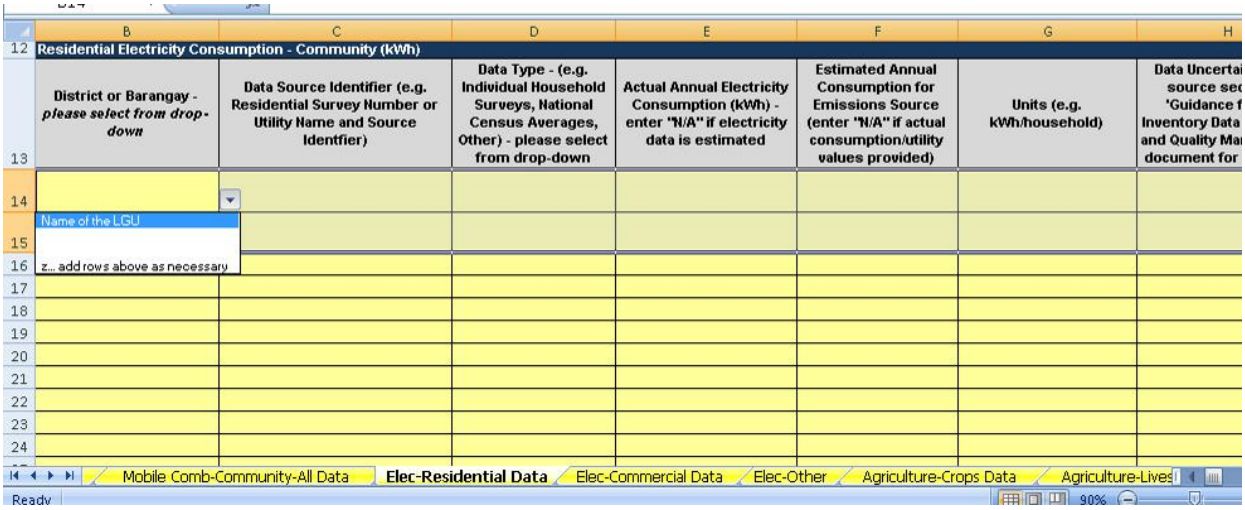
4.4 Electricity Consumption

Step 7
Click the **Elec-Residential Data** tab. Read the instructions provided. Click the *"Show/Hide Instruction"* button to hide the instructions and get better view of the Spreadsheet. List all the assumptions used in Row 6.



Step 7.1

Choose the name of your LGU or district/barangay from the drop-down menu in Row 14,Column B. Refer to *Datasheet 9.1 Activity data–Electricity consumption-Residential sector per district/barangay* to fillout the yellow cells.



Step 7.2

Indicate the Data source identifier in Column C.

Step 7.3

Use the drop-down menu in Column D to choose the Type of data.

Step 7.4

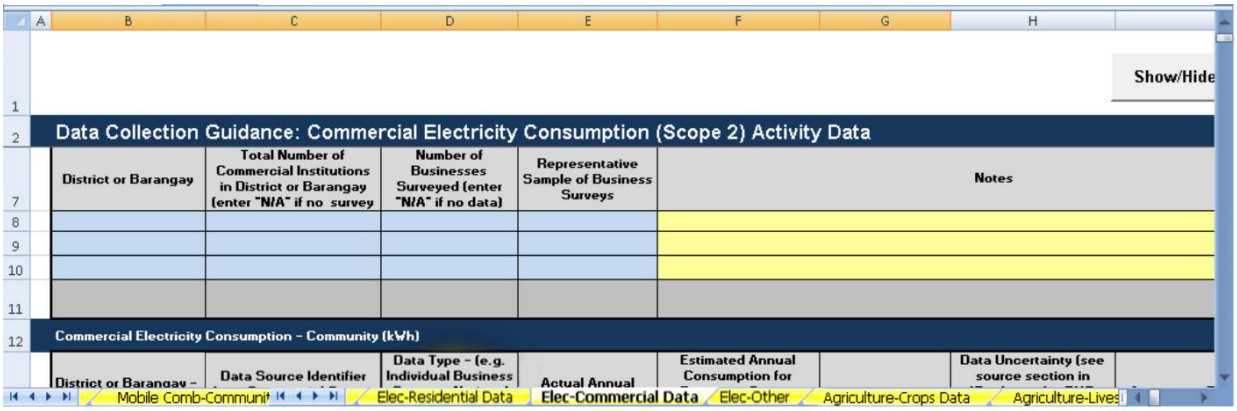
Use Column E if Annual electricity consumption is known and Column F if Annual electricity consumption is estimated.

Step 7.5

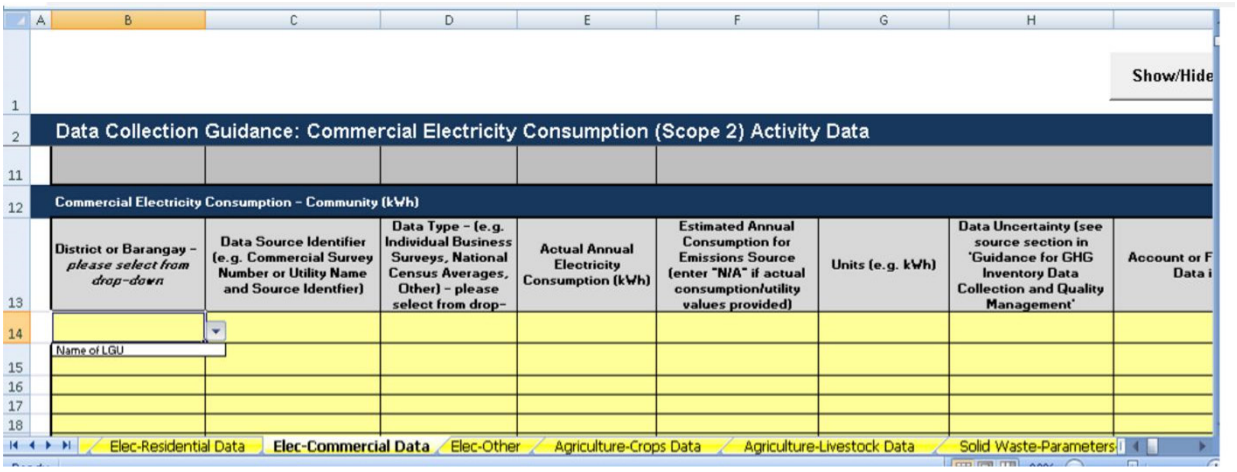
Indicate the unit in Column G.

Step 8

Click the Elec-Commercial Data tab. Read the instructions provided. Click the "*Show/Hide Instruction*" button to hide the instructions and get a better view of the Spreadsheet. List all the assumptions used in Row 6.



Step 8.1
Choose the name of your LGU or district/barangay from the drop-down menu in Row 14,Column B. Refer to *Datasheet 10.1 Activity data–Electricity consumption-Commercial sector per district/barangay* to fillout the yellow cells.



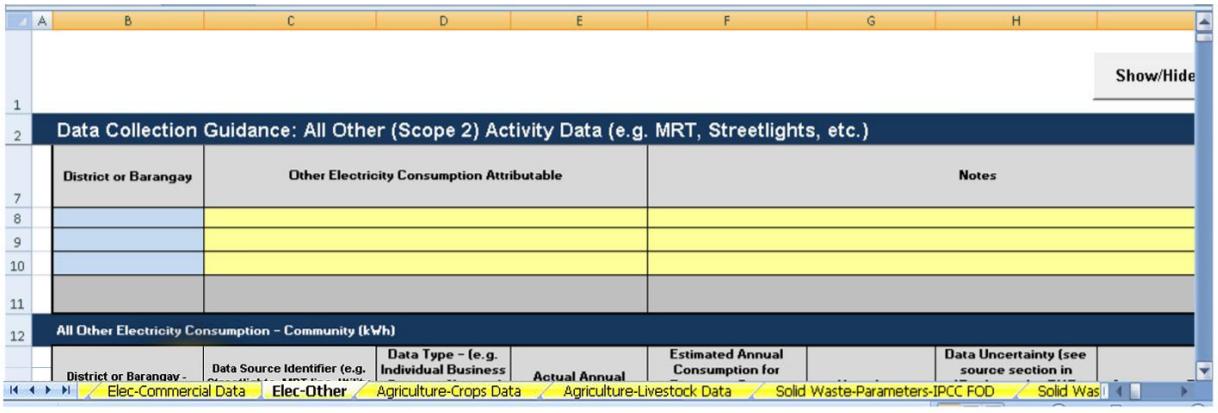
Step 8.2
Indicate the Data source identifier in Column C.

Step 8.3
Use the drop-down menu in Column D to choose the Type of data.

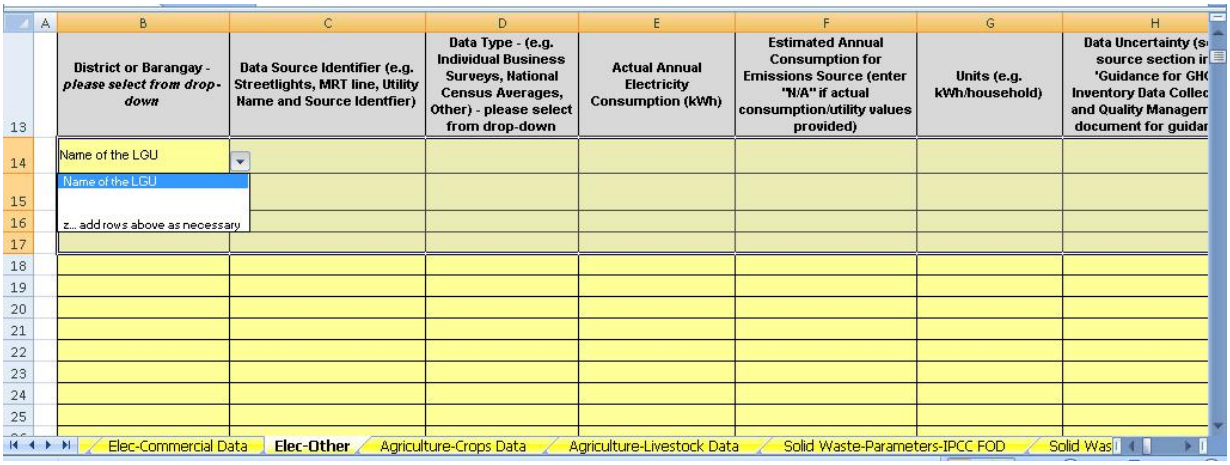
Step 8.4
Use Column E if Annual electricity consumption is known and Column F if Annual electricity consumption is estimated.

Step 8.5
Indicate the unit in Column G.

Step 9
Click the **Elec-Other Data** tab. Read the instructions provided. Click the"*Show/Hide Instruction*"button to hide the instructions and get a better view of the Spreadsheet. List all the assumptions used in Row 6.



Step 9.1
Choose the name of your LGU or district/barangay from the drop-down menu in Row 14, Column B. Refer to *Datasheet 11.1 Activity data–Electricity consumption-Other sector per district/barangay* to fillout the yellow cells.



Step 9.2
Indicate the Data source identifier in Column C.

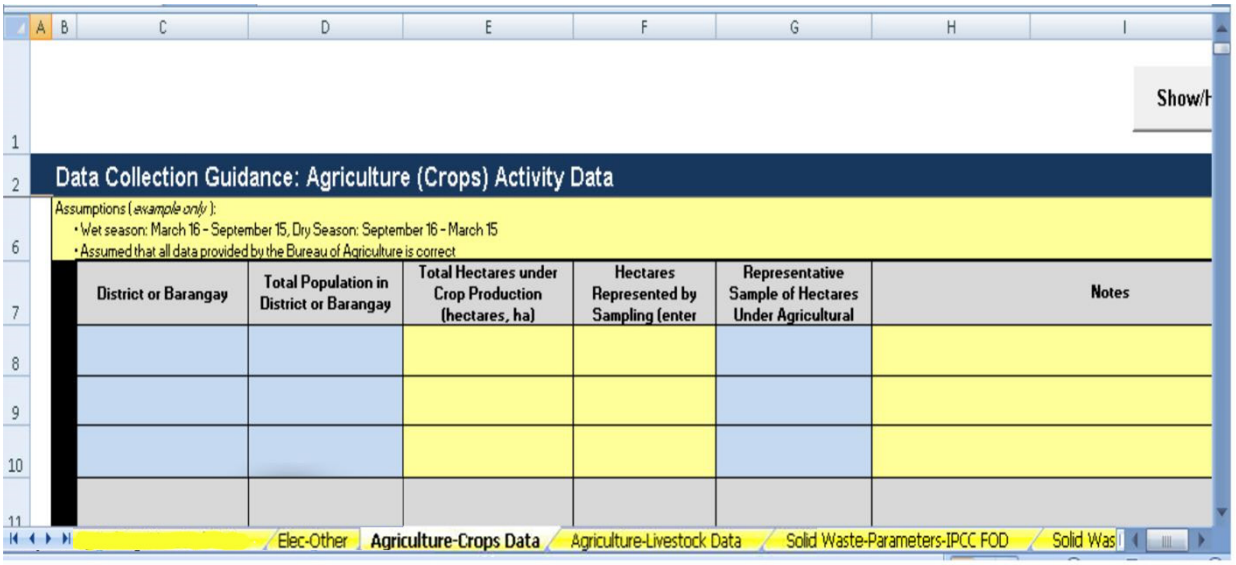
Step 9.3
Use the drop-down menu in Column D to choose the Type of data.

Step 9.4
Use Column E if Annual Electricity Consumption is known and Column F if Annual electricity consumption is estimated.

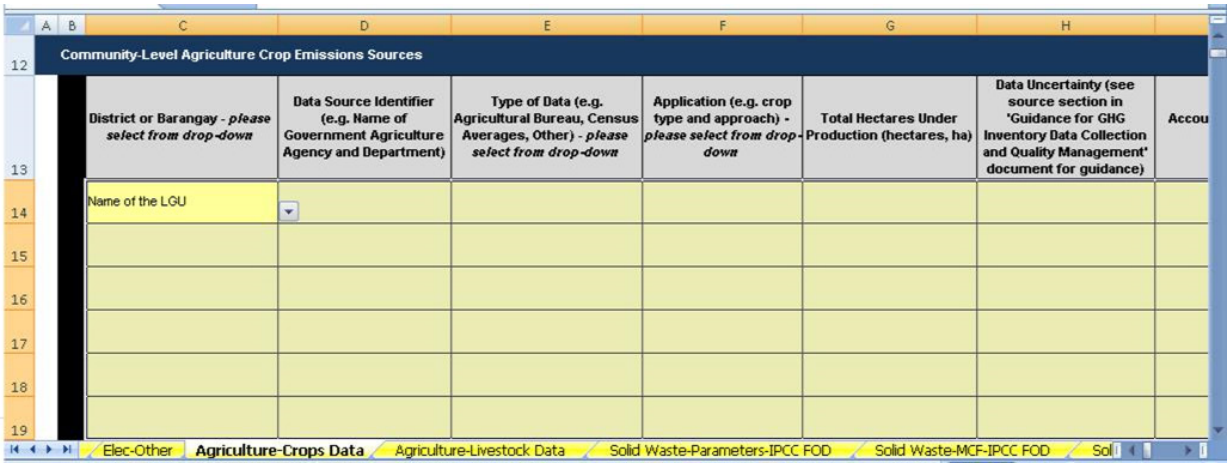
Step 9.5
Indicate the unit in Column G.

4.5 Agriculture

Step 10
Click the Agriculture-Crops Data tab. Read the instructions provided. Click the "*Show/Hide Instruction*" button to hide the instructions and get a better view of the Spreadsheet. List all the assumptions used in Row 6 as shown in the example.



Step 10.1
Choose the name of your LGU from the drop-down menu in Row 14, Column C and accomplish all the other columns based on *Datasheet 13.1 Agriculture crop emission sources* to fill out the yellow cells if available.



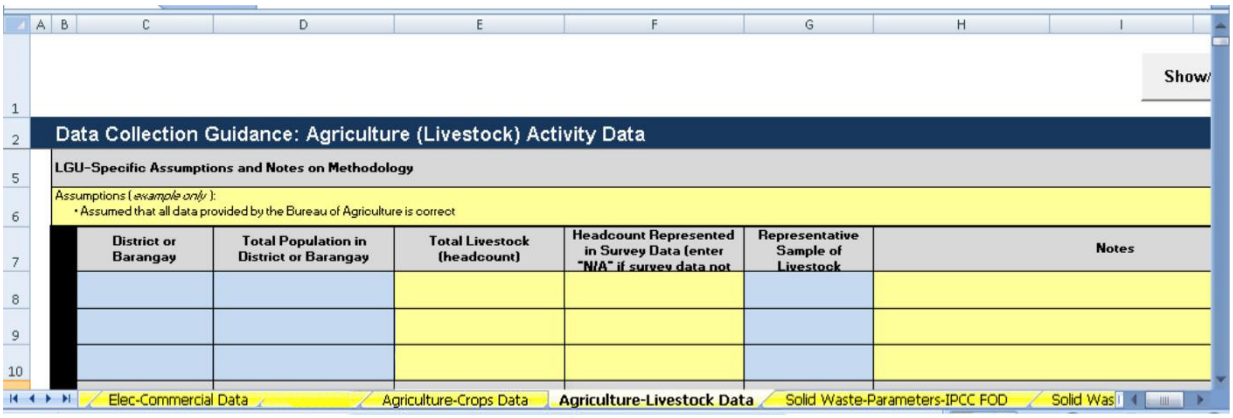
Step 10.2
Indicate the Data source identifier in Column D.

Step 10.3
Use the drop-down menu in Column E to choose the Type of data.

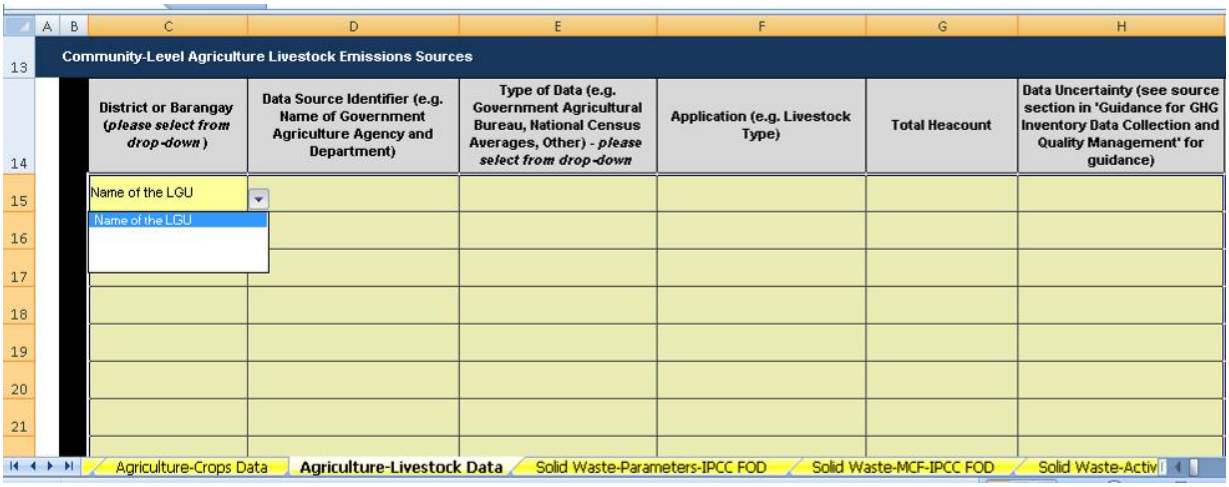
Step 10.4
Use the drop-down menu in Column F to choose the Application.

Step 10.5
Input Total hectares in Column G.

Step 11
Click the Agriculture-Livestock Data tab. Read the instructions provided. Click the "*Show/Hide Instruction*" button to hide the instructions and get a better view of the Spreadsheet. List all the assumptions used in Row 6G.



Step 11.1
Choose the name of your LGU from the drop-down menu in Row 15, Column C and accomplish all the other columns based on *Datasheet 14.1 Livestock emission sources* to fill out the yellow cells if available.



Step 11.2
Indicate the Data source identifier in Column D.

Step 11.3
Use the drop-down menu in Column E to choose the Type of data.

Step 11.4
Use the drop-down menu in Column F to choose the Application.

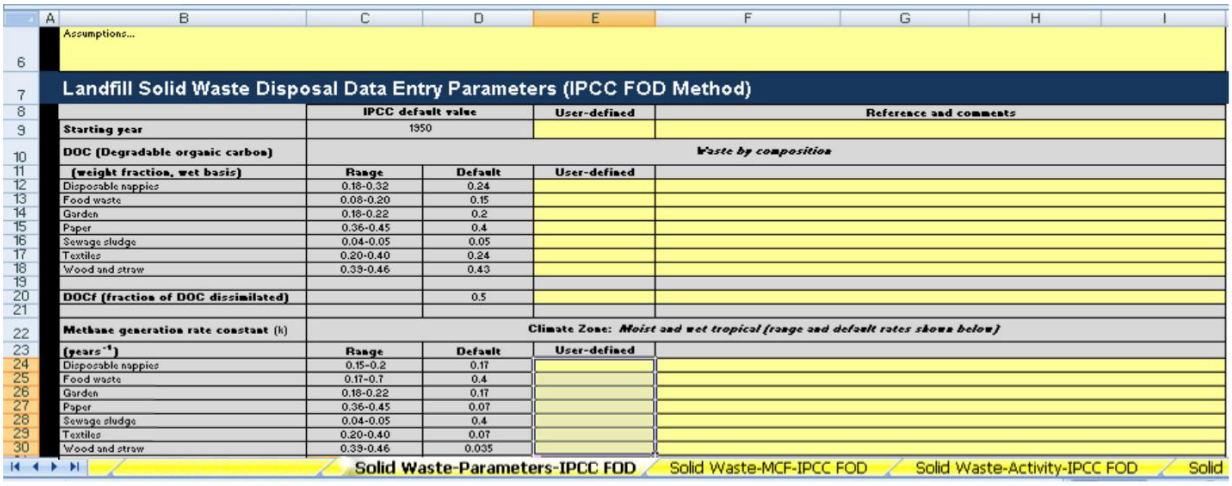
Step 11.5
Input the Total headcount in Column G.

4.6 Solid Waste

Solid Waste refers to municipal solid waste ("MSW") generated within the LGU's geopolitical boundaries that may cause GHG emissions inside the LGU's geopolitical boundaries (e.g. the LGU operates or has substantial control over the solid waste facility) or the solid waste is transported to a disposal site outside the LGU's geopolitical boundaries and causes GHG emissions.

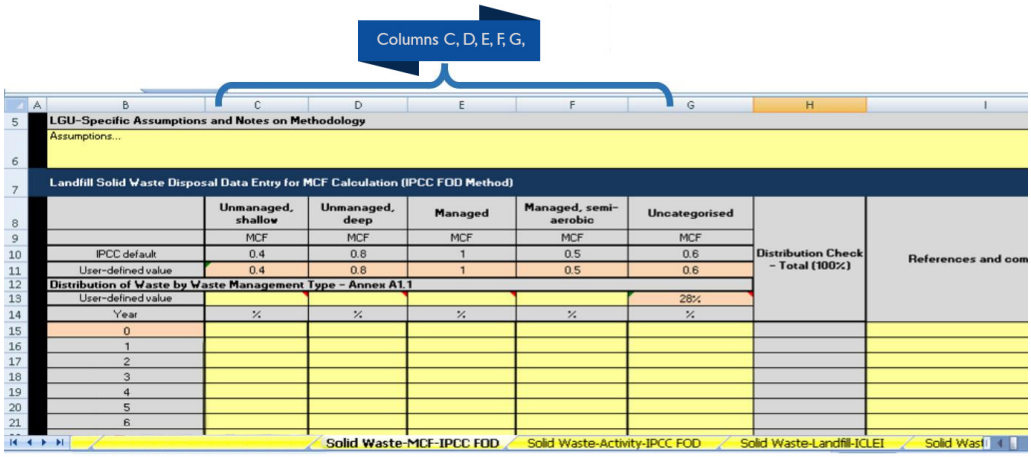
Follow the decision tree depending on the methodology chosen for estimating GHG emissions from solid waste in disposal site.

Step 12
Click the **Solid Waste-Parameters IPCC FOC** tab. Read the instructions provided. Click the"*Show/Hide Instruction*" button to hide the instructions and get a better view of the Spreadsheet. List all assumptions in Row 6 and enter in Column E User-defined data based on *Datasheet 16.1 Landfill solid waste disposal data entry parameters (IPCC FOD Method)*. Note that Column E values can be equal to default values as found in column D. However, use LGU-specific or nationally determined values for these parameters in Column E if available.



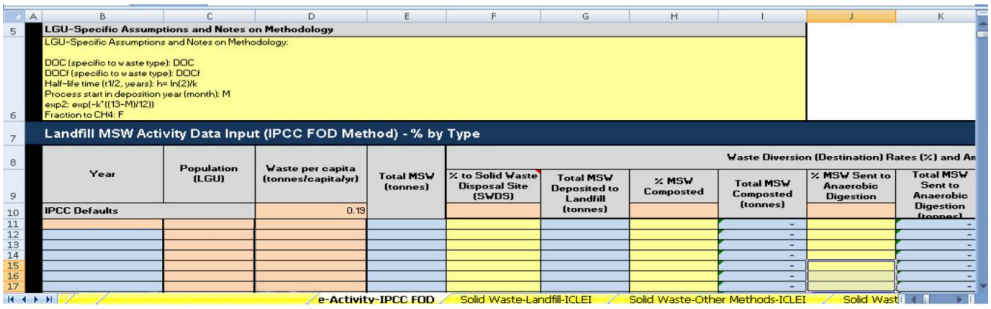
Step 13

Click **Solid Waste-MCF-IPCC-FOD** tab. Read the instructions provided. Click the "Sv" button to hide the instructions and get a better view of the Spreadsheet. Fill out all the yellow cells starting with Row 13, Columns C, D, E, F, and G using Datasheet 17.1 Solid waste disposal data entry for Methane Correction Factor (MCF) calculation as reference.



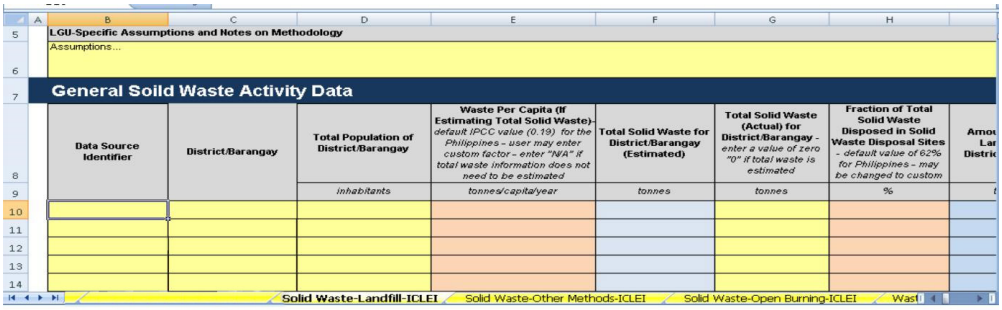
Step 14

Click **Solid Waste-Activity-IPCC-FOD** tab. Read the instructions provided. Click the "*Show/ Hide Instruction*" button to hide the instructions and get a better view of the Spreadsheet. List all the assumptions in Row 6. Fill out all the yellow cells starting with Row 11, Columns F,H, J, L, N, P, R, T, V, X, Z, AB, AD, using the Datasheet 18.1 as reference.



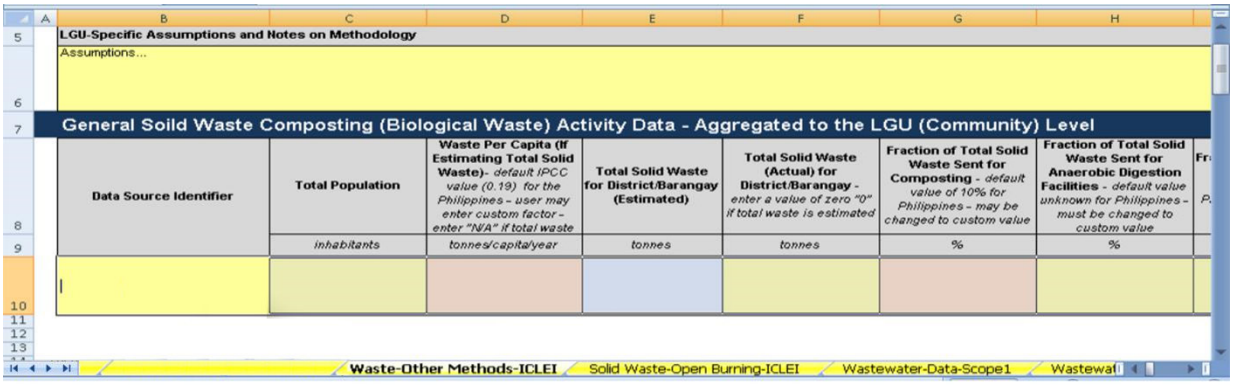
Step 15

Click **Solid Waste-Landfill- ICLEI** tab. Read the instructions provided. Click the"*Show/Hide Instruction*" button to hide the instructions and get a better view of the Spreadsheet. List all the assumptions in Row 6. Fill out all the yellow cells starting with Row 10, Columns B, C, D, G, J, K, and L *Datasheet 20.1 Landfill solid waste disposal data entry (ICLEI method) by landfill* type as reference.



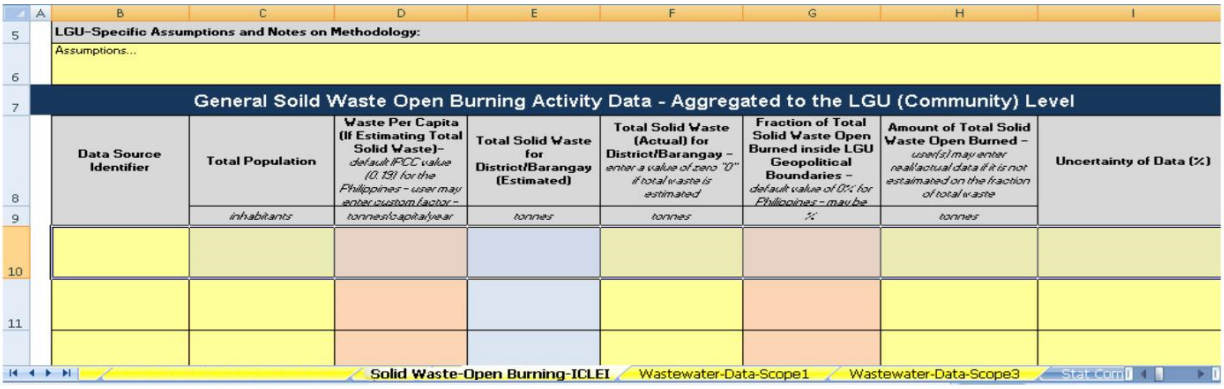
Step 16

Click **Solid Waste-Other Methods - ECLEI** tab. Read the instructions provided. Click the "*Show/Hide Instruction*" button to hide the instructions and get a better view of the Spreadsheet. List all the assumptions in Row 6. Fill out all the yellow cells starting with Row 10, Columns B, C, F, H and I using *Datasheet 19.1 General solid waste composting activity data.*



Step 17

Click **Solid Waste-Landfill-Open-Burning-ECLEI** tab. Read the instructions provided. Click the "*Show/Hide Instruction*" button to hide the instructions and get a better view of the Spreadsheet. List all the assumptions in Row 6. Fill out all the yellow cells starting with Row 10, Columns B, C, F, and H using *Datasheet 19.2 General solid waste open burning activity data* as reference.



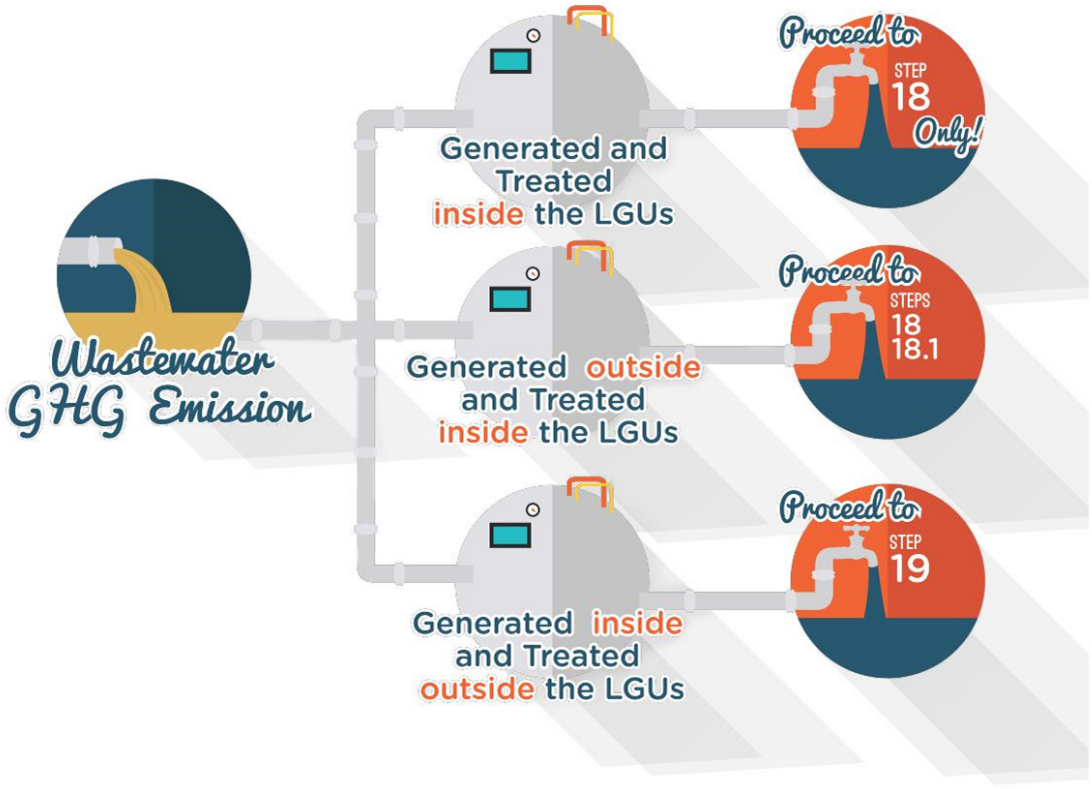
4.7 Wastewater

Wastewater emissions included are those associated with Methane (CH4) and NitrousOxide (N2O) emissions from waste water and sewage. LGUs should account for CH4 and N2O emissions from any wastewater systems and disposal activities coming from the following sources:

1. Wastewater **generated and treated inside** the LGU's geopolitical boundaries (Scope 1).
2. Wastewater **generated/received from outside** the geopolitical boundaries of the LGU, **but treated within** the boundaries of the LGU (Scope 1).
3. Wastewater **generated by the LGU but is treated outside** the geopolitical boundaries of the LGU (Scope 3)

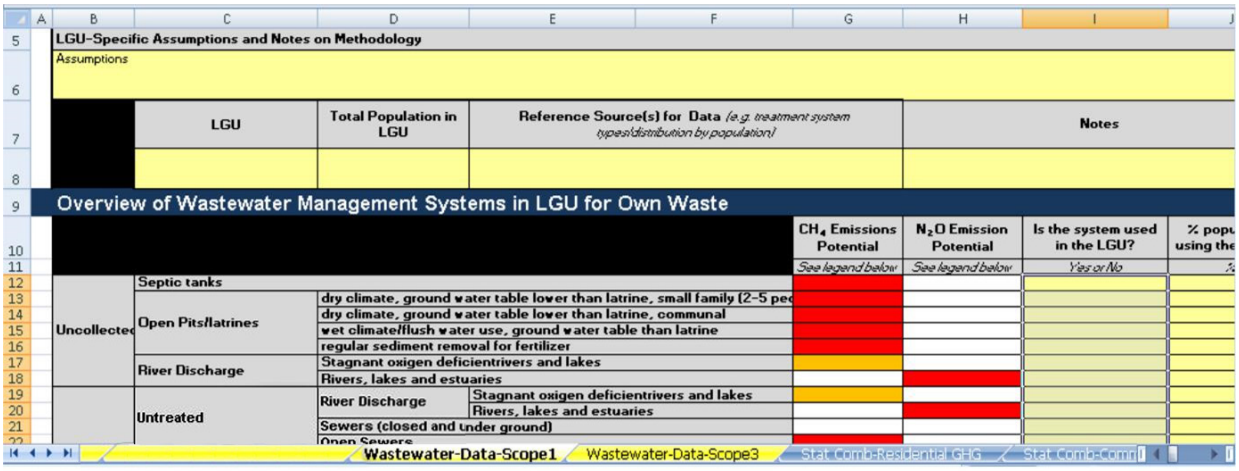
Note that wastewater **generated/received from outside** the geopolitical boundaries of the LGU, but treated within the boundaries of the LGU and wastewater **generated by the LGU** but is **treated outside** the geopolitical boundaries of the LGU are real cases but are not properly documented. LGUs are encouraged to check their boundaries to determine if there are these cases and report as appropriate.

Follow the decision tree below for the steps in computing for the emissions of your wastewater.



Step 18

Click **Wastewater-Data-Scope 1** tab. Read the instructions provided. Click the *"Show/Hide Instruction"* button to hide the instructions and get a better view of the Spreadsheet. List all the assumptions in Row 6. Fill out all the yellow cells in Row 8 starting with Column C, D and Reference sources of data. Fill out Columns I and J starting in Row 12 using *Datasheet 21.1 Wastewater management system* as reference.



LGU-Specific Assumptions and Notes on Methodology

Assumptions

LGU	Total Population in LGU	Reference Source(s) for Data *(e.g. treatment system types/distribution by population)*	Notes

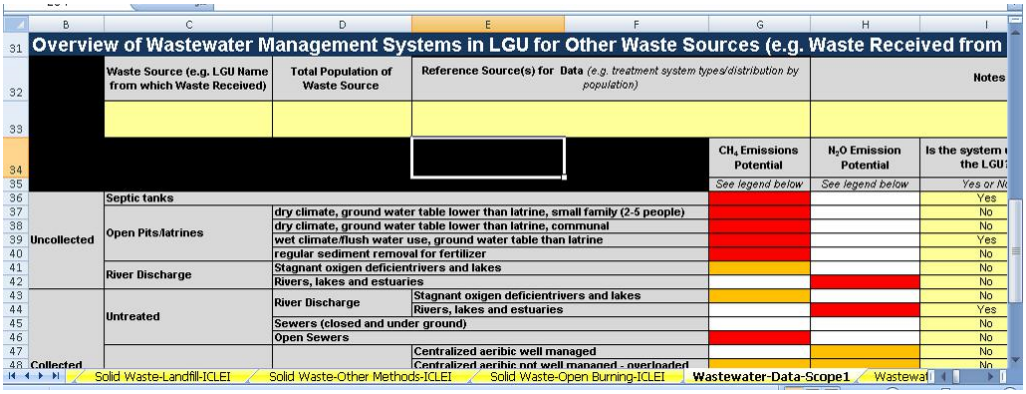
Overview of Wastewater Management Systems in LGU for Own Waste

				CH_4 Emissions Potential	N_2O Emission Potential	Is the system used in the LGU?	% popu using the
				See legend below	See legend below	Yes or No	%
Uncollected	Septic tanks						
	Open Pits/latrines	dry climate, ground water table lower than latrine, small family (2-5 pe					
		dry climate, ground water table lower than latrine, communal					
		wet climate/flush water use, ground water table than latrine					
		regular sediment removal for fertilizer					
	River Discharge	Stagnant oxigen deficientrivers and lakes					
		Rivers, lakes and estuaries					
	Untreated	River Discharge	Stagnant oxigen deficientrivers and lakes				
			Rivers, lakes and estuaries				
		Sewers (closed and under ground)					
		Open Sewers					

Wastewater-Data-Scope1 | Wastewater-Data-Scope3 | Stat Comb-Residential GHG | Stat Comb-Comm

Step 18.1

Proceed to Row 31, Wastewater management in LGU for other waste sources if your LGU/community is receiving wastewater from other sources. Provide data required in Row 33 and answer the questions in column I, starting from Row 36 to Row 53.

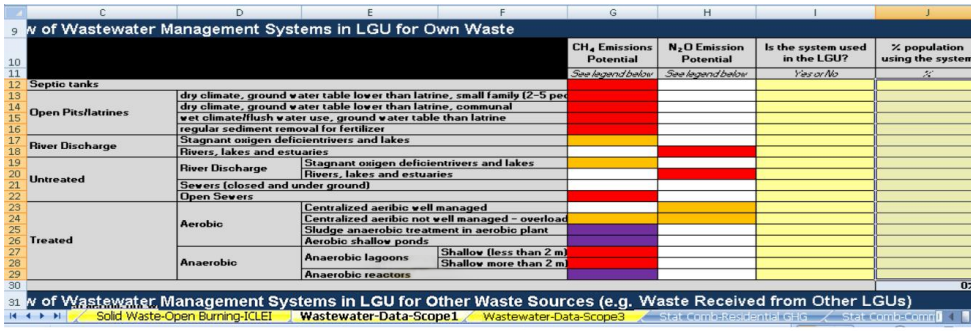


	B	C	D	E	F	G	H	I
31	Overview of Wastewater Management Systems in LGU for Other Waste Sources (e.g. Waste Received from							
32		Waste Source (e.g. LGU Name from which Waste Received)	Total Population of Waste Source	Reference Source(s) for Data *(e.g. treatment system types/distribution by population)*				Notes
33								
34						CH_4 Emissions Potential	N_2O Emission Potential	Is the system the LGU
35						*See legend below*	*See legend below*	*Yes or No*
36		Septic tanks						Yes
37		Open Pits/latrines	dry climate, ground water table lower than latrine, small family (2-5 people)					No
38			dry climate, ground water table lower than latrine, communal					No
39	Uncollected		wet climate/flush water use, ground water table than latrine					Yes
40			regular sediment removal for fertilizer					No
41		River Discharge	Stagnant oxigen deficientrivers and lakes					No
42			Rivers, lakes and estuaries					No
43		Untreated	River Discharge	Stagnant oxigen deficientrivers and lakes				No
44				Rivers, lakes and estuaries				Yes
45			Sewers (closed and under ground)					No
46			Open Sewers					No
47				Centralized aeribic well managed				No
48	Collected			Centralized aeribic not well managed - overloaded				No

Solid Waste-Landfill-ICLEI | Solid Waste-Other Methods-ICLEI | Solid Waste-Open Burning-ICLEI | Wastewater-Data-Scope1 | Wastewat

Step 19

Click **Wastewater-Data-Scope 3** tab. Read the instructions provided. Click the *"Show/HideInstruction"* button to hide the instructions and get better view of the Spreadsheet. List all the assumptions in Row 6. Fill out all the yellow cells in Row 8 starting with Column C, D and Reference sources of data. Fill out Columns I and J using *Datasheet 21.1 Wastewater management system* as reference.

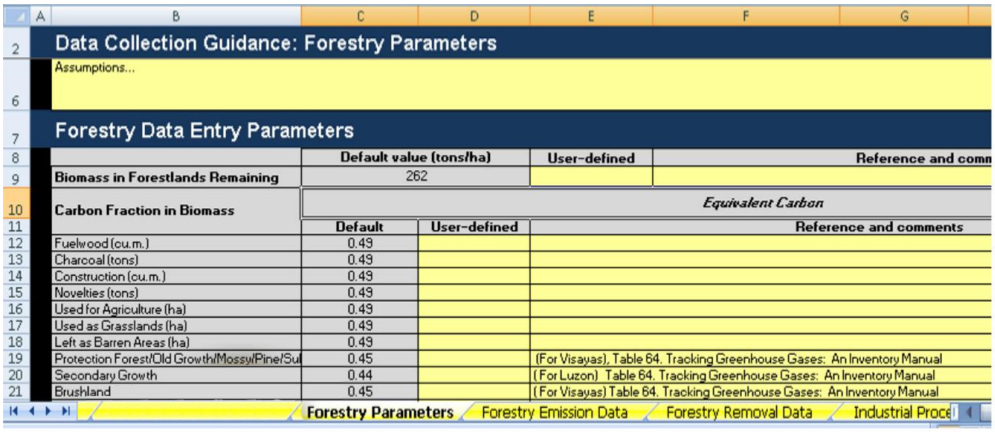


	C	D	E	F	G	H	I	J
9	w of Wastewater Management Systems in LGU for Own Waste							
10					CH_4 Emissions Potential	N_2O Emission Potential	Is the system used in the LGU?	% population using the system
11					*See legend below*	*See legend below*	*Yes or No*	*%*
12	Septic tanks							
13	Open Pits/latrines	dry climate, ground water table lower than latrine, small family (2-5 pe						
14		dry climate, ground water table lower than latrine, communal						
15		wet climate/flush water use, ground water table than latrine						
16		regular sediment removal for fertilizer						
17	River Discharge	Stagnant oxigen deficientrivers and lakes						
18		Rivers, lakes and estuaries						
19	Untreated	River Discharge	Stagnant oxigen deficientrivers and lakes					
20			Rivers, lakes and estuaries					
21		Sewers (closed and under ground)						
22		Open Sewers						
23	Treated	Aerobic	Centralized aeribic well managed					
24			Centralized aeribic not well managed - overload					
25			Sludge anaerobic treatment in aerobic plant					
26			Aerobic shallow ponds					
27		Anaerobic	Anaerobic lagoons	Shallow (less than 2 m)				
28				Shallow more than 2 m				
29			Anaerobic reactors					
30								0
31	w of Wastewater Management Systems in LGU for Other Waste Sources (e.g. Waste Received from Other LGUs)							

Solid Waste-Open Burning-ICLEI | Wastewater-Data-Scope1 | Wastewater-Data-Scope3

Step 20

Click **Forestry Parameters** tab. Read the instructions provided. Click the *"Show/Hide Instruction"* button to hide the instructions and get a better view of the Spreadsheet. List all the assumptions in Row 6. Fill out Column D (user–defined values) starting in Row 9. Indicate the references and comments. Default values may be used if user-defined values are not available. *(Note: Spreadsheet will automatically use the default values if user-defined values are not entered)*

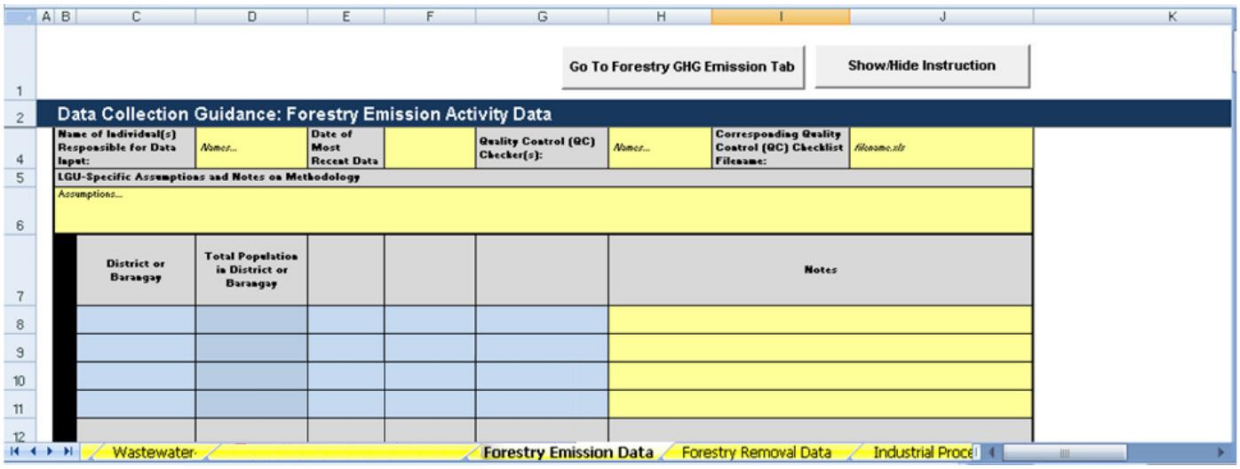


	A	B	C	D	E	F	G
2		Data Collection Guidance: Forestry Parameters					
6		Assumptions...					
7		Forestry Data Entry Parameters					
8			Default value (tons/ha)		User-defined	Reference and comm	
9		Biomass in Forestlands Remaining	262				
10		Carbon Fraction in Biomass	*Equivalent Carbon*				
11			Default	User-defined	Reference and comments		
12		Fuelwood (cu.m.)	0.49				
13		Charcoal (tons)	0.49				
14		Construction (cu.m.)	0.49				
15		Novelties (tons)	0.49				
16		Used for Agriculture (ha)	0.49				
17		Used as Grasslands (ha)	0.49				
18		Left as Barren Areas (ha)	0.49				
19		Protection Forest/Old Growth/Mossy/Pine/Su	0.45		(For Visayas), Table 64. Tracking Greenhouse Gases: An Inventory Manual		
20		Secondary Growth	0.44		(For Luzon) Table 64. Tracking Greenhouse Gases: An Inventory Manual		
21		Brushland	0.45		(For Visayas) Table 64. Tracking Greenhouse Gases: An Inventory Manual		

Forestry Parameters | Forestry Emission Data | Forestry Removal Data | Industrial Proce

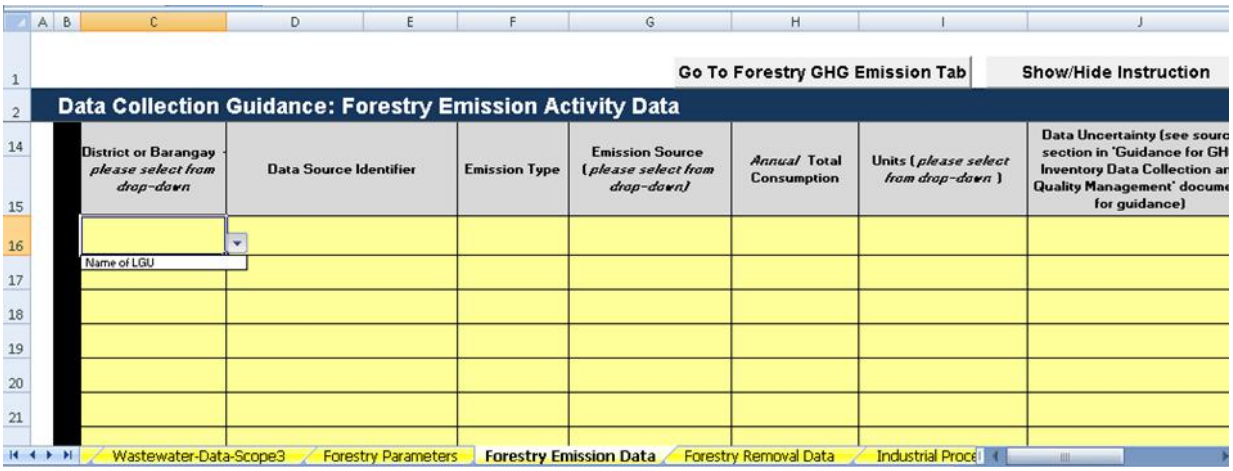
Step 21

Click **Forestry Emission Data** tab. Read the instructions provided. Click the "*Show/Hide Instruction*" button to hide the instructions and get a better view of the Spreadsheet. List all the assumptions in Row 6. The name of your LGU or districts/barangays previously identified should be reflected starting in Row 8, Column C and the total population in Column D. Put additional notes if any in Column I.



Step 21.1

Choose the name of your LGU from the drop-down menu in Row 15, Column C and accomplish all the other columns based on *Datasheet 22.1 Forestry and other land use change data for GHG emissions* to fill out the yellow cells.



Step 21.2

Indicate the Data source identifier in Column D.

Step 21.3

Use the drop-down menu in Column F to choose the Emission type.

Step 21.4

Use the drop-down menu in Column G to choose the Emission source.

Step 21.5

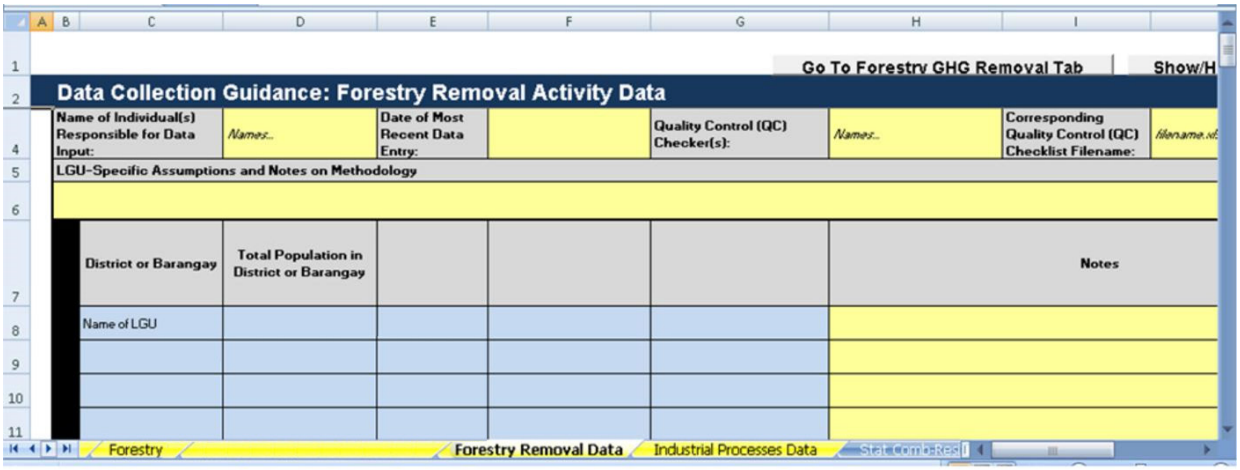
Input the Annual total (in ha) in Column H.

Step 21.6

Use the drop-down menu in Column I to choose the appropriate unit.

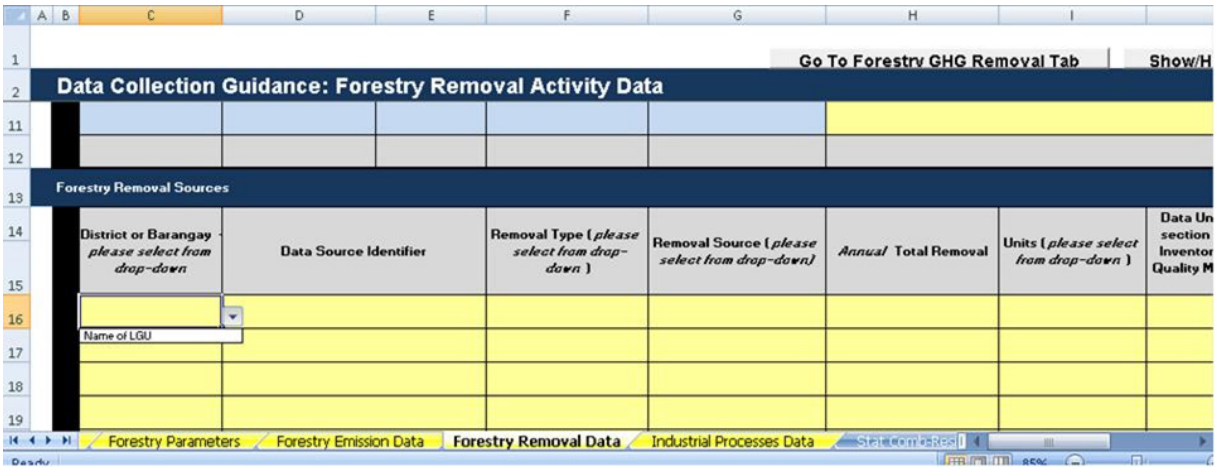
Step 22

Click **Forestry Removal Data** tab. Read the instructions provided. Click the *"Show/Hide Instruction"* button to hide the instructions and get a better view of the Spreadsheet. List all the assumptions in Row 6. The name of your LGU or districts/barangays previously identified should be reflected starting in Row 8, Column C and the total population in Column D. Put additional notes if any in Column I.



Step 22.1

Choose the name of your LGU from the drop-down menu in Row 15, Column C and accomplish all the other columns based on *Datasheet 24.1 Forestry and other land use change data for GHG removal* to fill out the yellow cells.



Step 22.2

Indicate the Data source identifier in Column D.

Step 22.3

Use the drop-down menu in Column F to choose the Emission type.

Step 22.4

Use the drop-down menu in Column G to choose the Emission source.

Step 22.5

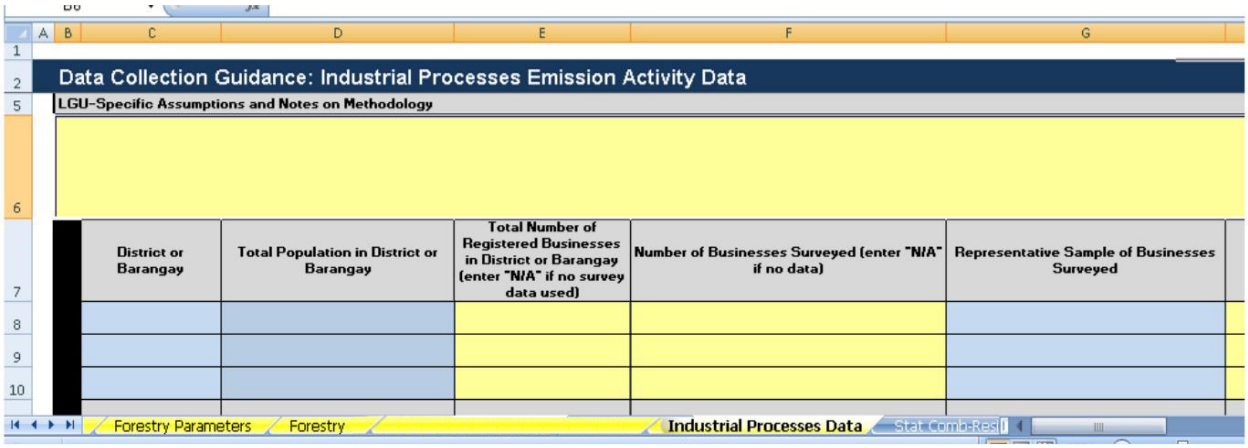
Input the Annual total (in ha) in Column H.

Step 22.6

Use the drop-down menu in Column I to choose the appropriate unit.

Step 23

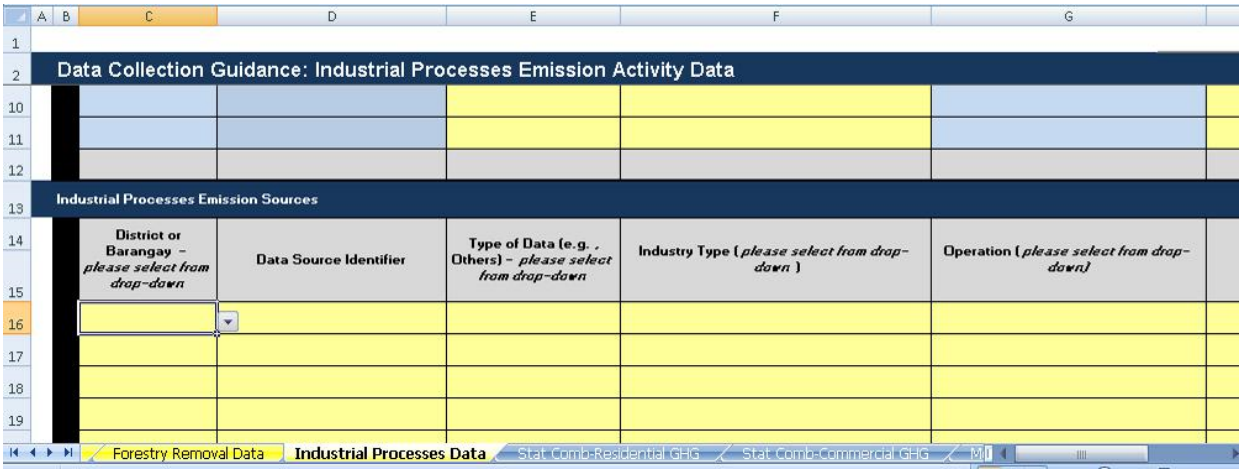
Click IPPU Data tab. Read the instructions provided. Click the *"Show/Hide Instruction"* button to hide the instructions and get a better view of the Spreadsheet. List all the assumptions in Row 6. Fill out all the yellow cells particularly those in Column C, D and Reference sources of data.



Step 23.1

Choose the name of your LGU from the drop-down menu in Row 15, Column C and accomplish all the other columns based on the **applicable datasheets** *(i.e. Datasheet 26.1 Mineral Industry, Datasheet 26.2 Chemical Industry, etc.)*. Select "Others" for paper and food industries. Choose from the drop-down menu in Column G the specific operation of the selected industry. Input the annual production and units in Columns H and I, respectively.

(Note: The Spreadsheet provides quantification of GHG emissions of selected industries only.)



Step 23.2

Indicate the Data source identifier in Column D.

Step 23.3

Use the drop-down menu in Column E to choose the Type of data.

Step 23.4

Use the drop-down menu in Column F to choose the Industry type.

Step 23.5

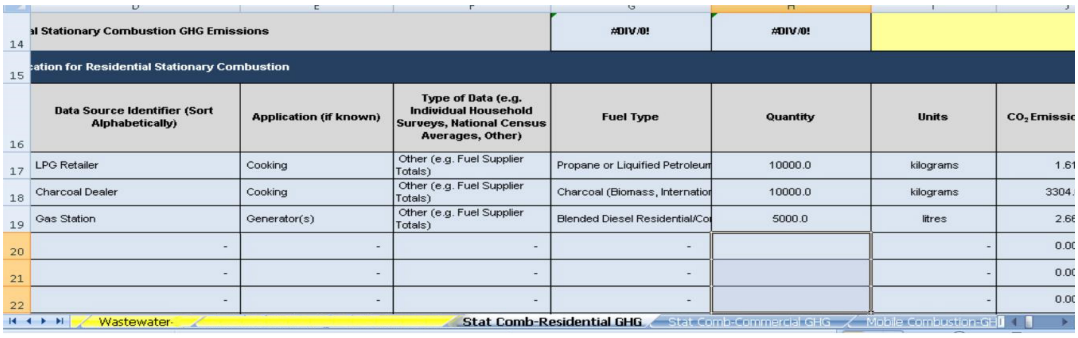
Use the drop-down menu in Column G to choose the Operation.

Step 23.6

Input the Annual total production in Column H.

Step 24

Click the **Stat Comb-Residential GHG** tab. Read the instructions provided. Click the *"Show/ Hide Instruction"* button to hide the instructions and get a better view of the Spreadsheet. Input datarequirements in Row 7. Compare data input starting from Row 17 with your *Datasheet 5.1 Emission sources and fuel consumption of the residential sector – Stationary combustion*. If there are incorrectdata input, go back to the Stat Comb-Residential Data tab and correct data input using the "Go to" button.

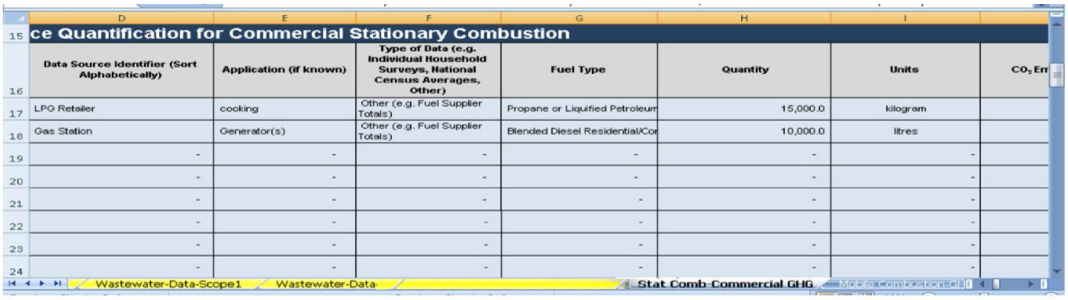


14	l Stationary Combustion GHG Emissions			#DIV/0!	#DIV/0!		
15	ation for Residential Stationary Combustion						
16	Data Source Identifier (Sort Alphabetically)	Application (if known)	Type of Data (e.g. Individual Household Surveys, National Census Averages, Other)	Fuel Type	Quantity	Units	CO_2 Emissic
17	LPG Retailer	Cooking	Other (e.g. Fuel Supplier Totals)	Propane or Liquified Petroleum	10000.0	kilograms	1.61
18	Charcoal Dealer	Cooking	Other (e.g. Fuel Supplier Totals)	Charcoal (Biomass, Internatio	10000.0	kilograms	3304.
19	Gas Station	Generator(s)	Other (e.g. Fuel Supplier Totals)	Blended Diesel Residential/Co	5000.0	litres	2.68
20	-	-	-	-		-	0.0
21	-	-	-	-		-	0.0
22	-	-	-	-		-	0.0

Wastewater | Stat Comb-Residential GHG | Stat Comb-Commercial GHG | Mobile Combustion-GHG

Step 25

Click the **Stat Comb-Commercial GHG** tab. Read the instructions provided. Click the *"Show/ HideInstruction"* button to hide the instructions and get a better view of the Spreadsheet. Inputdata requirements in Row 7. Check data input starting from Row 17 with your *Datasheet 4.1 List of all of commercial establishments included in the inventory per district/barangay*. If there are incorrectdata, go back to the Stat Comb-Commercial Data tab and correct data input using the "Go to" button.

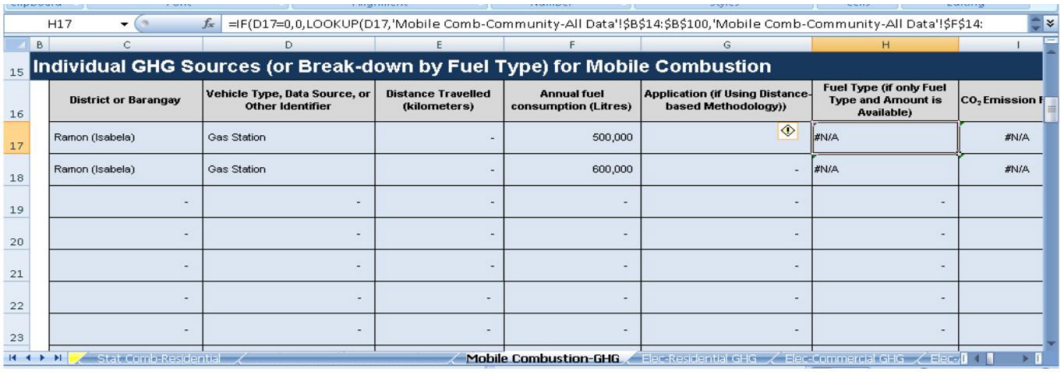


15	ce Quantification for Commercial Stationary Combustion						
16	Data Source Identifier (Sort Alphabetically)	Application (if known)	Type of Data (e.g. Individual Household Surveys, National Census Averages, Other)	Fuel Type	Quantity	Units	CO_2 Em
17	LPG Retailer	cooking	Other (e.g. Fuel Supplier Totals)	Propane or Liquified Petroleum	15,000.0	kilogram	
18	Gas Station	Generator(s)	Other (e.g. Fuel Supplier Totals)	Blended Diesel Residential/Co	10,000.0	litres	
19	-	-	-	-	-	-	
20	-	-	-	-	-	-	
21	-	-	-	-	-	-	
22	-	-	-	-	-	-	
23	-	-	-	-	-	-	
24	-	-	-	-	-	-	

Wastewater-Data-Scope1 | Wastewater-Data | Stat Comb-Commercial GHG | Mobile Combustion-GHG

Step 26

Click the **Mobile combustion - GHG** tab. Read the instructions provided. Click the "*Show/ Hide Instruction"* button to hide the instructions and get a better view of the Spreadsheet. Input *datarequirements* in Row 7. Check data input starting from Row 17 with your *Datasheet 7.1 List of all vehicles included in the inventory per district/ barangay*. If there are incorrect data, go back to the Mobile Combustion Data tab and correct data input using the "Go to" button.



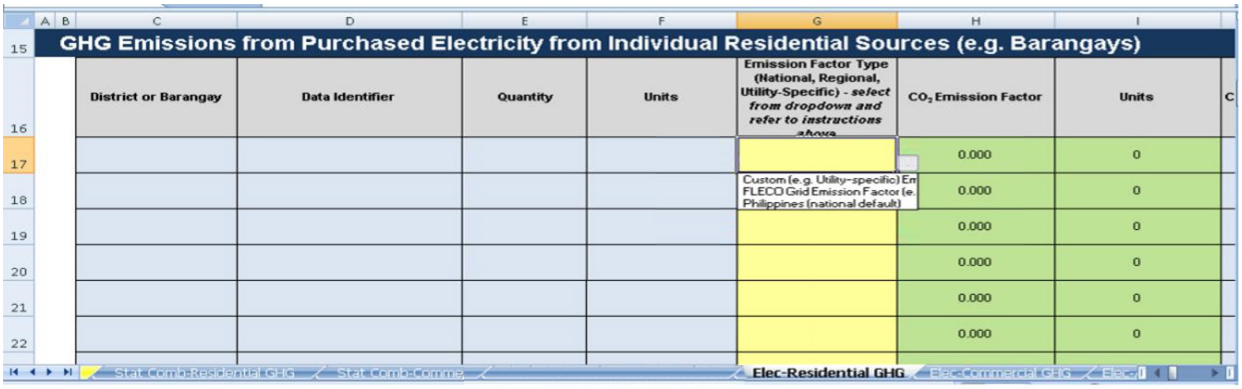
H17 =IF(D17=0,0,LOOKUP(D17,'Mobile Comb-Community-All Data'!$B$14:$B$100,'Mobile Comb-Community-All Data'!$F$14:

15	Individual GHG Sources (or Break-down by Fuel Type) for Mobile Combustion						
16	District or Barangay	Vehicle Type, Data Source, or Other Identifier	Distance Travelled (kilometers)	Annual fuel consumption (Litres)	Application (if Using Distance-based Methodology))	Fuel Type (if only Fuel Type and Amount is Available)	CO_2 Emission
17	Ramon (Isabela)	Gas Station	-	500,000		#N/A	#N/A
18	Ramon (Isabela)	Gas Station	-	600,000	-	#N/A	#N/A
19	-	-	-	-	-	-	
20	-	-	-	-	-	-	
21	-	-	-	-	-	-	
22	-	-	-	-	-	-	
23	-	-	-	-	-	-	

Stat Comb-Residential | Mobile Combustion-GHG | Stat Comb-Commercial GHG | Stat Comb-Commercial GHG

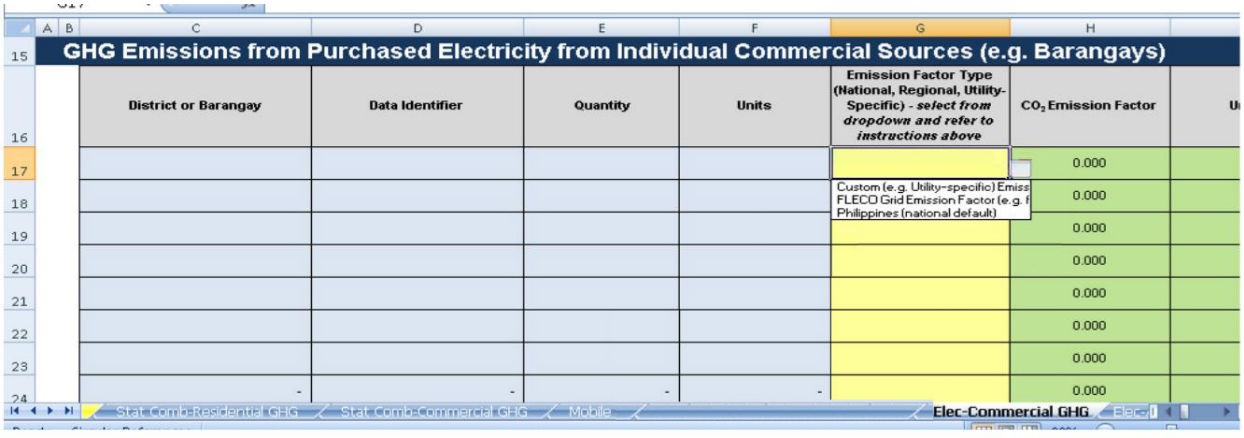
Step 27

Click the Elec-Residential GHG tab. Read the instructions provided. Click the *"Show/Hide Instruction"* button to hide the instructions and get a better view of the Spreadsheet. Check data inputstarting in Row 17 with your *Datasheet 9.1 Activity data–Electricity consumption-Residential sector per district/barangay.* If there are incorrect data, go back to the Elec-Residential Data tab and correct datainput using the "Go to" button. Use the drop-down menu in Column G for the emission factor type. Choose "Philippines" as the emission factor type if regional or grid specific emission factor is not available.



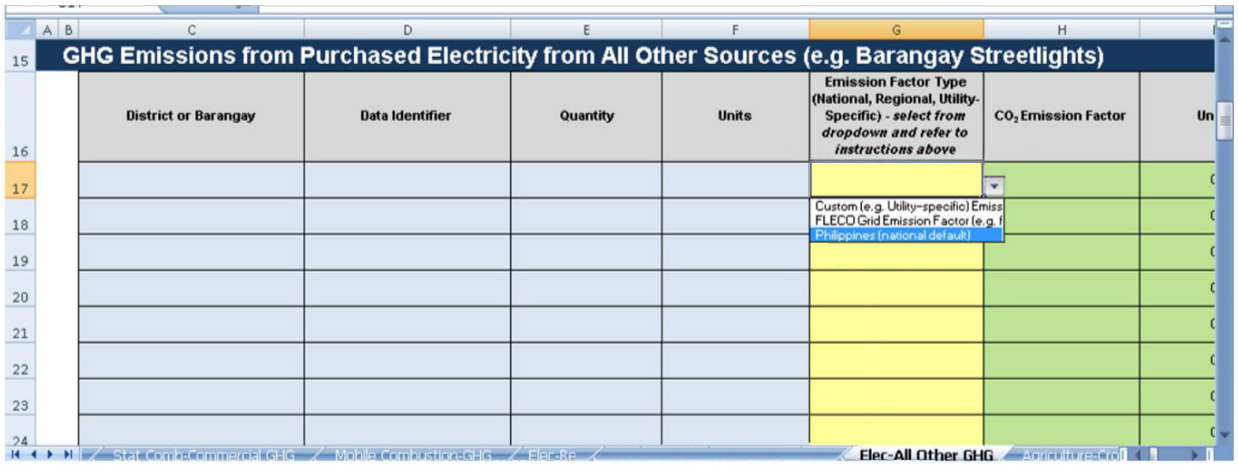
Step 28

Click the **Elec-Commercial GHG** tab. Read the instructions provided. Click the *"Show/Hide Instruction"* button to hide the instructions and get a better view of the Spreadsheet. Check data inputstarting in Row 17 with your *Datasheet 10.1 Activity data–Electricity consumption-Commercial sectorper district/barangay.* If there are incorrect data, go back to the Elec-Commercial Data tab and correctdata input using the "Go to" button. Use the drop-down menu in Column G for the emission factor type. Choose "Philippines" as the emission factor type if regional or grid specific emission factor is not available.



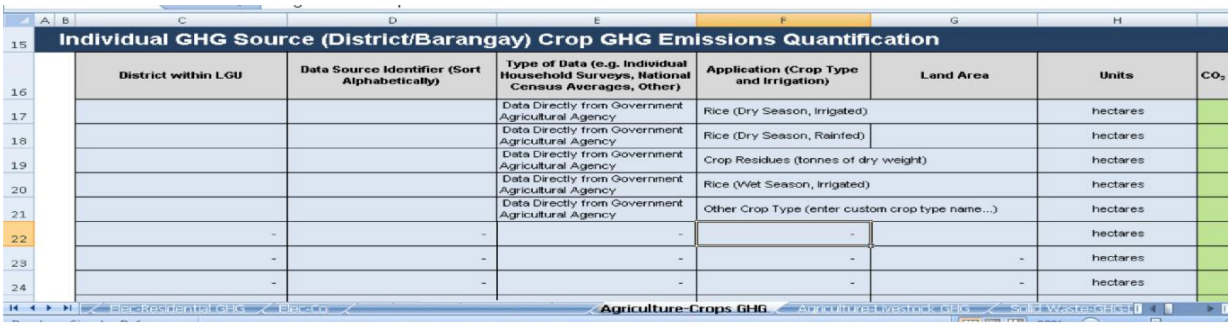
Step 29

Click the **Elec-All Other GHG** tab. Read the instructions provided. Click the *"Show/Hide Instruction"* button to hide the instructions and get a better view of the Spreadsheet. Check data inputstarting in Row 17 with your *Datasheet 11.1 Activity data–Electricity consumption-Other sector perdistrict/barangay.* If there are incorrect data, go back to the Elec-All Other Data tab and correct datainput using the "Go to" button. Use the drop-down menu in Column G for the emission factor type. Choose "Philippines" as the emission factor type if regional or grid specific emission factor is not available.



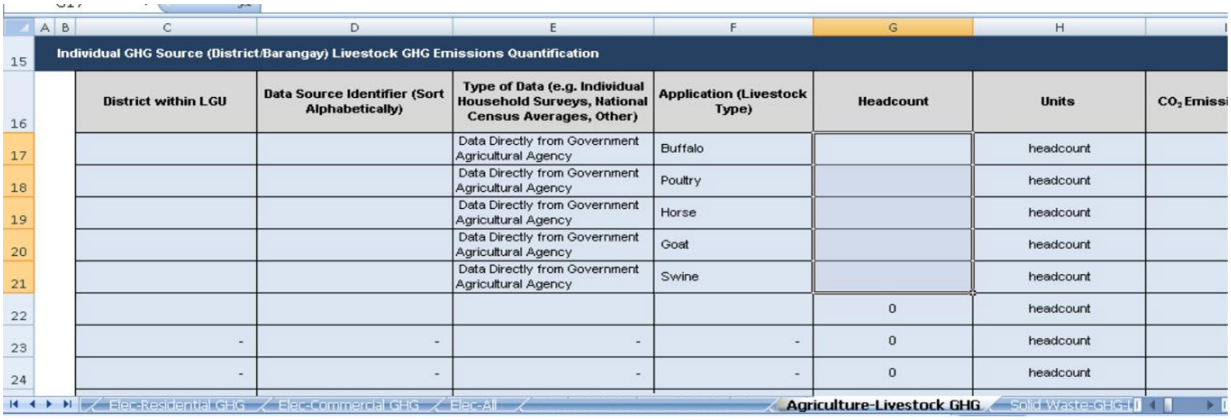
Step 30

Click the Agriculture-Crops GHG tab. Read the instructions provided. Click the *"Show/Hide Instruction"* button to hide the instructions and get a better view of the Spreadsheet. Check data inputstarting in Row 17 with your *Datasheet 13.1 Agriculture crop emission sources*. If there are incorrect data, go back to the Agriculture-Crops Data tab and correct data input using the "Go to" button.



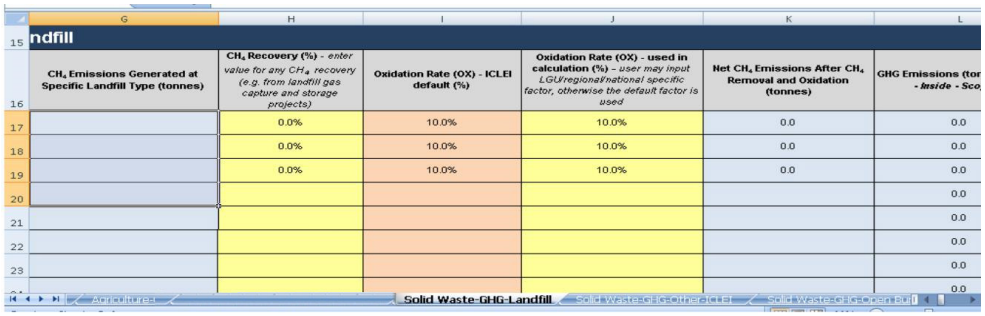
Step 31

Click the **Agriculture-Livestock GHG** tab. Read the instructions provided. Click the *"Show/Hide Instruction"* button to hide the instructions and get a better view of the Spreadsheet. Check data inputstarting in Row 17 with your *Datasheet 14.1 Agriculture livestock emission sources*. If there are incorrect data, go back to the Agriculture-Livestock Data tab and correct data input using the "Go to" button.



Step 32

Click the **Solid Waste-GHG-Landfill** tab. Read the instructions provided. Click the *"Show/HideInstruction"* button to hide the instructions and get a better view of the Spreadsheet. Check data inputstarting in Row 17. If there are incorrect data, go back to the Solid Waste Landfill ICLEI Data tab and correct data input using the "Go to" button. Enter value for any methane (CH4) recovery and capture project in Row 17, Column H if available. Otherwise, enter zero (0) if there is no methane recovery and capture project. Enter oxidation rate used in the computation in Row 17, Column J if available. Otherwise, use the default value of 10%.

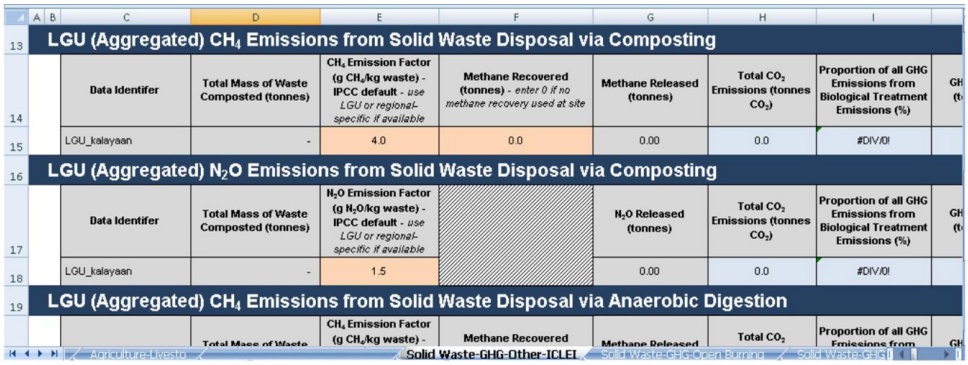


	G	H	I	J	K	L
15	ndfill					
16	CH_4 Emissions Generated at Specific Landfill Type (tonnes)	CH_4 Recovery (%) - *enter value for any CH_4 recovery (e.g. from landfill gas capture and storage projects)*	Oxidation Rate (OX) - ICLEI default (%)	Oxidation Rate (OX) - used in calculation (%) - *user may input LGU/regional/national specific factor, otherwise the default factor is used*	Net CH_4 Emissions After CH_4 Removal and Oxidation (tonnes)	GHG Emissions (tor - *Inside* - Sco
17		0.0%	10.0%	10.0%	0.0	0.0
18		0.0%	10.0%	10.0%	0.0	0.0
19		0.0%	10.0%	10.0%	0.0	0.0
20						0.0
21						0.0
22						0.0
23						0.0
						0.0

Solid Waste-GHG-Landfill

Step 33

Click the **Solid Waste-GHG-Other ICLEI** tab if applicable. Read the instructions provided. Click the *"Show/Hide Instruction"* button to hide the instructions and get a better view of the Spreadsheet. Check data input. If there are incorrect data, go back to the Solid Waste Other ICLEI Data tab and correct data input using the "Go to" button.

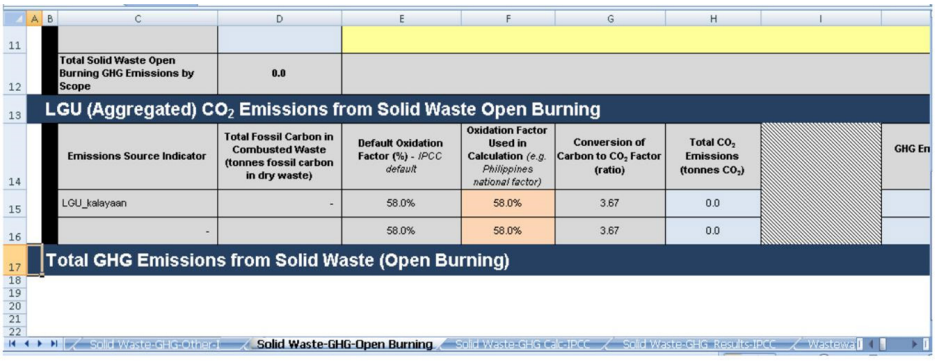


	C	D	E	F	G	H	I
13	LGU (Aggregated) CH_4 Emissions from Solid Waste Disposal via Composting						
14	Data Identifer	Total Mass of Waste Composted (tonnes)	CH_4 Emission Factor (g CH_4/kg waste) - IPCC default - *use LGU or regional-specific if available*	Methane Recovered (tonnes) - *enter 0 if no methane recovery used at site*	Methane Released (tonnes)	Total CO_2 Emissions (tonnes CO_2)	Proportion of all GHG Emissions from Biological Treatment Emissions (%)
15	LGU_kalayaan	-	4.0	0.0	0.00	0.0	#DIV/0!
16	LGU (Aggregated) N_2O Emissions from Solid Waste Disposal via Composting						
17	Data Identifer	Total Mass of Waste Composted (tonnes)	N_2O Emission Factor (g N_2O/kg waste) - IPCC default - *use LGU or regional-specific if available*		N_2O Released (tonnes)	Total CO_2 Emissions (tonnes CO_2)	Proportion of all GHG Emissions from Biological Treatment Emissions (%)
18	LGU_kalayaan	-	1.5		0.00	0.0	#DIV/0!
19	LGU (Aggregated) CH_4 Emissions from Solid Waste Disposal via Anaerobic Digestion						
			CH_4 Emission Factor (g CH_4/kg waste) -	Methane Recovered	Methane Released	Total CO_2	Proportion of all GHG

Solid Waste-GHG-Other-ICLEI

Step 34

Click the **Solid Waste-GHG-Open Burning** tab if applicable. Read the instructions provided. Click the *"Show/Hide Instruction"* button to hide the instructions and get a better view of the Spreadsheet. Check data input. If there are incorrect data, go back to the Solid Waste–Open Burning ICLEI Data tab and correct data input using the "Go to" button.

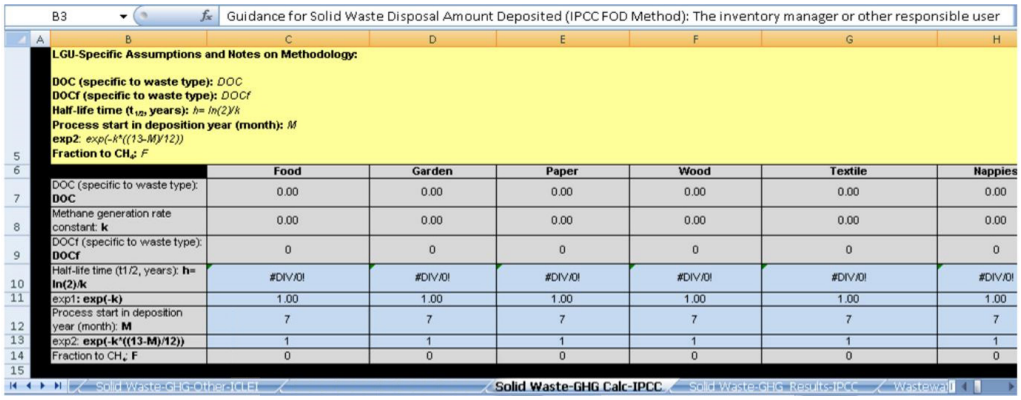


	C	D	E	F	G	H	I
11							
12	Total Solid Waste Open Burning GHG Emissions by Scope	0.0					
13	LGU (Aggregated) CO_2 Emissions from Solid Waste Open Burning						
14	Emissions Source Indicator	Total Fossil Carbon in Combusted Waste (tonnes fossil carbon in dry waste)	Default Oxidation Factor (%) - *IPCC default*	Oxidation Factor Used in Calculation *(e.g. Philippines national factor)*	Conversion of Carbon to CO_2 Factor (ratio)	Total CO_2 Emissions (tonnes CO_2)	GHG En
15	LGU_kalayaan	-	58.0%	58.0%	3.67	0.0	
16	-		58.0%	58.0%	3.67	0.0	
17	Total GHG Emissions from Solid Waste (Open Burning)						
18							
19							
20							
21							
22							

Solid Waste-GHG-Open Burning

Step 35

Click the **Solid Waste-GHGCalc-IPCC** tab. Read the instructions provided. Click the *"Show/Hide Instruction"* button to hide the instructions and get a better view of the Spreadsheet. Review and check data input. Put assumptions in Row 5 as shown in the example.



B3 — Guidance for Solid Waste Disposal Amount Deposited (IPCC FOD Method): The inventory manager or other responsible user

LGU-Specific Assumptions and Notes on Methodology:

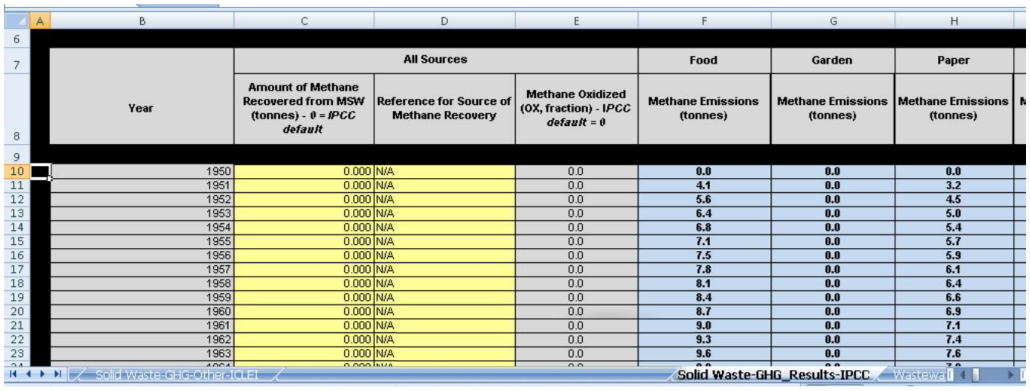
DOC (specific to waste type): *DOC*
DOCf (specific to waste type): *DOCf*
Half-life time ($t_{1/2}$ years): *h= ln(2)/k*
Process start in deposition year (month): *M*
exp2: *exp(-k*((13-M)/12))*
Fraction to CH_4: *F*

	Food	Garden	Paper	Wood	Textile	Nappies
DOC (specific to waste type): **DOC**	0.00	0.00	0.00	0.00	0.00	0.00
Methane generation rate constant: **k**	0.00	0.00	0.00	0.00	0.00	0.00
DOCf (specific to waste type): **DOCf**	0	0	0	0	0	0
Half-life time (t1/2, years): **h= ln(2)/k**	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
exp1: **exp(-k)**	1.00	1.00	1.00	1.00	1.00	1.00
Process start in deposition year (month): **M**	7	7	7	7	7	7
exp2: **exp(-k*((13-M)/12))**	1	1	1	1	1	1
Fraction to CH_4: **F**	0	0	0	0	0	0

Solid Waste-GHG Calc-IPCC

Step 36

Click the **Solid Waste-GHG_Results-IPCC** tab. Read the instructions provided. Click the *"Show/Hide Instruction"* button to hide the instructions and get a better view of the Spreadsheet. Enter the known value for the methane (CH4) recovered from the Municipal Solid Waste disposal site (MSW) and the Reference for the Source of Methane Recovery in Columns C and D, respectively.

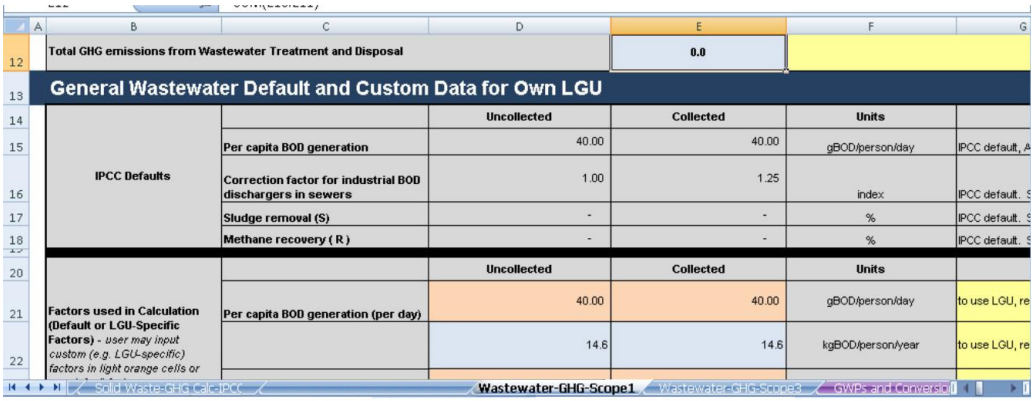


Year	All Sources: Amount of Methane Recovered from MSW (tonnes) - *0 = IPCC default*	All Sources: Reference for Source of Methane Recovery	All Sources: Methane Oxidized (OX, fraction) - *IPCC default = 0*	Food: Methane Emissions (tonnes)	Garden: Methane Emissions (tonnes)	Paper: Methane Emissions (tonnes)
1950	0.000	N/A	0.0	**0.0**	**0.0**	**0.0**
1951	0.000	N/A	0.0	**4.1**	**0.0**	**3.2**
1952	0.000	N/A	0.0	**5.6**	**0.0**	**4.5**
1953	0.000	N/A	0.0	**6.4**	**0.0**	**5.0**
1954	0.000	N/A	0.0	**6.8**	**0.0**	**5.4**
1955	0.000	N/A	0.0	**7.1**	**0.0**	**5.7**
1956	0.000	N/A	0.0	**7.5**	**0.0**	**5.9**
1957	0.000	N/A	0.0	**7.8**	**0.0**	**6.1**
1958	0.000	N/A	0.0	**8.1**	**0.0**	**6.4**
1959	0.000	N/A	0.0	**8.4**	**0.0**	**6.6**
1960	0.000	N/A	0.0	**8.7**	**0.0**	**6.9**
1961	0.000	N/A	0.0	**9.0**	**0.0**	**7.1**
1962	0.000	N/A	0.0	**9.3**	**0.0**	**7.4**
1963	0.000	N/A	0.0	**9.6**	**0.0**	**7.6**

Solid Waste-GHG_Results-IPCC

Step 33

Click the **Wastewater-GHG-Scope 1** tab. Read the instructions provided. Click the *"Show/Hide Instruction"* button to hide the instructions and get a better view of the Spreadsheet. Review and checkdata input/results.



Total GHG emissions from Wastewater Treatment and Disposal — **0.0**

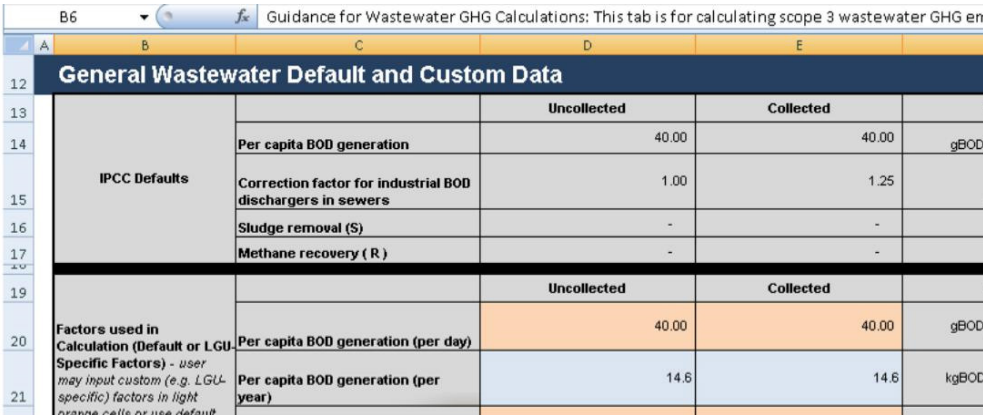
General Wastewater Default and Custom Data for Own LGU

		Uncollected	Collected	Units	
IPCC Defaults	Per capita BOD generation	40.00	40.00	gBOD/person/day	IPCC default, A
	Correction factor for industrial BOD dischargers in sewers	1.00	1.25	index	IPCC default. S
	Sludge removal (S)	-	-	%	IPCC default. S
	Methane recovery (R)	-	-	%	IPCC default. S
		Uncollected	**Collected**	**Units**	
Factors used in Calculation (Default or LGU-Specific Factors) - *user may input custom (e.g. LGU-specific) factors in light orange cells or*	Per capita BOD generation (per day)	40.00	40.00	gBOD/person/day	to use LGU, re
		14.6	14.6	kgBOD/person/year	to use LGU, re

Solid Waste-GHG Calc-IPCC | Wastewater-GHG-Scope1 | Wastewater-GHG-Scope2 | GWP and Conversi

Step 37

Click the **Wastewater-GHG-Scope 3** tab if applicable. Read the instructions provided. Click the *"Show/Hide Instruction"* button to hide the instructions and get a better view of the Spreadsheet. Review and check data input/ results.



B6 — Guidance for Wastewater GHG Calculations: This tab is for calculating scope 3 wastewater GHG en

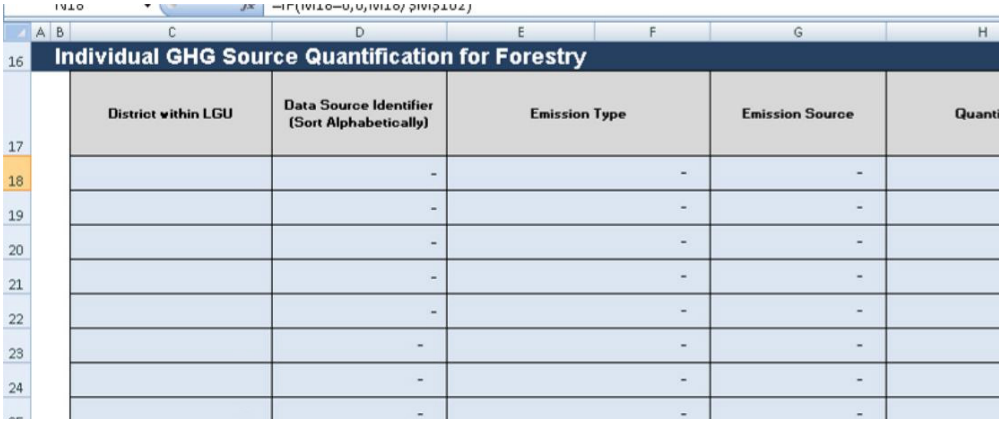
General Wastewater Default and Custom Data

		Uncollected	Collected	
IPCC Defaults	Per capita BOD generation	40.00	40.00	gBOD
	Correction factor for industrial BOD dischargers in sewers	1.00	1.25	
	Sludge removal (S)	-	-	
	Methane recovery (R)	-	-	

	Uncollected	Collected	
Factors used in Calculation (Default or LGU-Specific Factors) - *user may input custom (e.g. LGU-specific) factors in light orange cells or use default* — Per capita BOD generation (per day)	40.00	40.00	gBOD
Per capita BOD generation (per year)	14.6	14.6	kgBOD

Step 38

Click the **Forestry Emission** tab. Read the instructions provided. Click the *"Show/ HideInstruction"* button to hide the instructions and get a better view of the Spreadsheet. Check data inputstarting in Row 17 with your Datasheet 22.1 Forestry and other land use change data for GHGemissions. If there are incorrect data, go back to the Forestry Emission Data tab and correct data inputusing the "Go to" button.

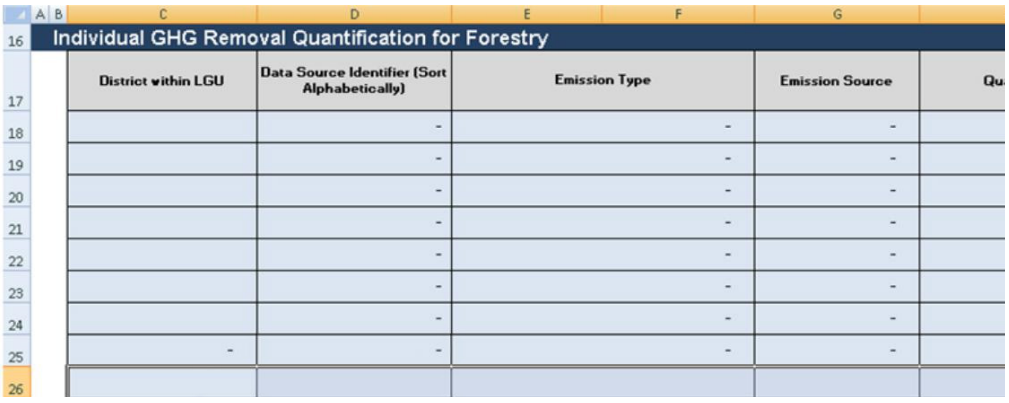


Individual GHG Source Quantification for Forestry

District within LGU	Data Source Identifier (Sort Alphabetically)	Emission Type	Emission Source	Quanti
	-	-	-	
	-	-	-	
	-	-	-	
	-	-	-	
	-	-	-	
	-	-	-	
	-	-	-	
	-	-	-	

Step 39

Click the **Forestry Removal** tab. Read the instructions provided. Click the *"Show/Hide Instruction"* button to hide the instructions and get a better view of the Spreadsheet. Check data inputstarting in Row 17 with your *Datasheet 24.1 Forestry and other land use change data for GHGremovals*. If there are incorrect data, go back to the Forestry Removal Data tab and correct data inputusing the "Go to" button.

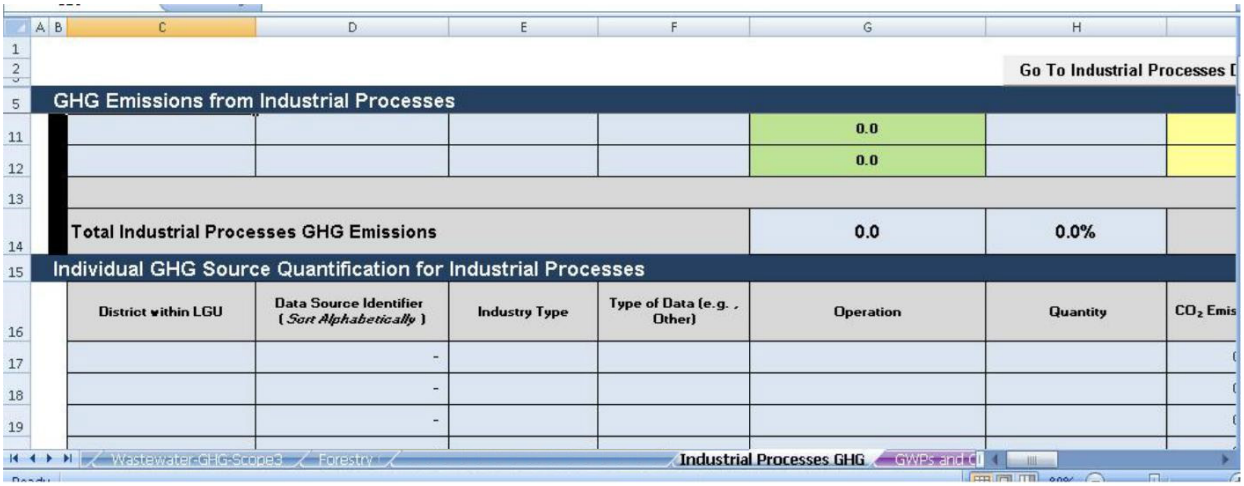


Individual GHG Removal Quantification for Forestry

District within LGU	Data Source Identifier (Sort Alphabetically)	Emission Type	Emission Source	Qu
	-	-	-	
	-	-	-	
	-	-	-	
	-	-	-	
	-	-	-	
	-	-	-	
	-	-	-	
-	-	-	-	

Step 40

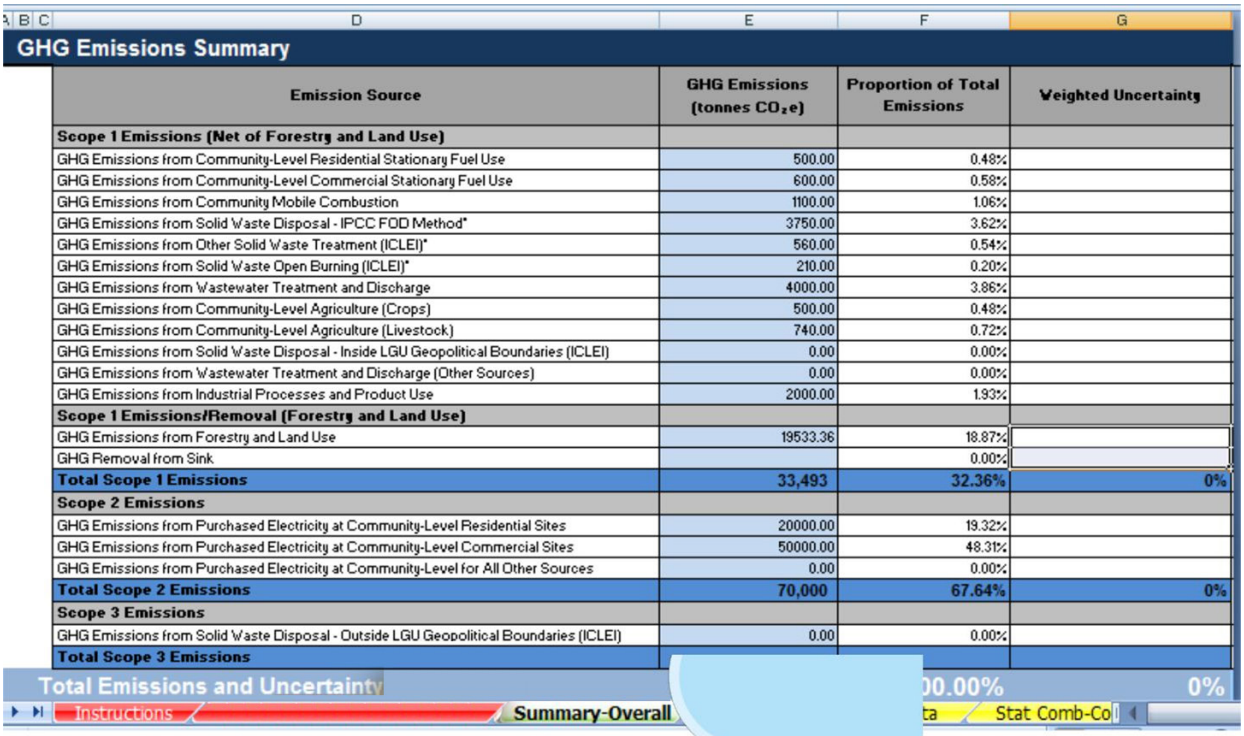
Click the **Industrial Processes GHG** tab. Read the instructions provided. Click the *"Show/ HideInstruction"* button to hide the instructions and get a better view of the Spreadsheet. Check data inputstarting in Row 17 with your applicable datasheets on industrial processes. If there are incorrect data, go back to the Industrial Processes Data tab and correct data input using the "Go to" button.



4.8 Emissions Summary, by Source

Step 41

Click the Summary-Overall to view the summary of the GHG emissions, categorized according to scopes.



GHG Emissions Summary

Emission Source	GHG Emissions (tonnes CO_2e)	Proportion of Total Emissions	Weighted Uncertainty
Scope 1 Emissions (Net of Forestry and Land Use)			
GHG Emissions from Community-Level Residential Stationary Fuel Use	500.00	0.48%	
GHG Emissions from Community-Level Commercial Stationary Fuel Use	600.00	0.58%	
GHG Emissions from Community Mobile Combustion	1100.00	1.06%	
GHG Emissions from Solid Waste Disposal - IPCC FOD Method*	3750.00	3.62%	
GHG Emissions from Other Solid Waste Treatment (ICLEI)*	560.00	0.54%	
GHG Emissions from Solid Waste Open Burning (ICLEI)*	210.00	0.20%	
GHG Emissions from Wastewater Treatment and Discharge	4000.00	3.86%	
GHG Emissions from Community-Level Agriculture (Crops)	500.00	0.48%	
GHG Emissions from Community-Level Agriculture (Livestock)	740.00	0.72%	
GHG Emissions from Solid Waste Disposal - Inside LGU Geopolitical Boundaries (ICLEI)	0.00	0.00%	
GHG Emissions from Wastewater Treatment and Discharge (Other Sources)	0.00	0.00%	
GHG Emissions from Industrial Processes and Product Use	2000.00	1.93%	
Scope 1 Emissions/Removal (Forestry and Land Use)			
GHG Emissions from Forestry and Land Use	19533.36	18.87%	
GHG Removal from Sink		0.00%	
Total Scope 1 Emissions	**33,493**	**32.36%**	**0%**
Scope 2 Emissions			
GHG Emissions from Purchased Electricity at Community-Level Residential Sites	20000.00	19.32%	
GHG Emissions from Purchased Electricity at Community-Level Commercial Sites	50000.00	48.31%	
GHG Emissions from Purchased Electricity at Community-Level for All Other Sources	0.00	0.00%	
Total Scope 2 Emissions	**70,000**	**67.64%**	**0%**
Scope 3 Emissions			
GHG Emissions from Solid Waste Disposal - Outside LGU Geopolitical Boundaries (ICLEI)	0.00	0.00%	
Total Scope 3 Emissions			
Total Emissions and Uncertainty		00.00%	0%

This indicates the total community -level **GHG emissions** for the chosen reporting year of the LGUs.

Annexes

A. Data Sheets

Data Sheets for Community-Level Inventory

Datasheet 3.1 List of households included in the inventory per district/barangay

District/Barangays/ LGU included in the Inventory		Total Population	Total number of residential households	Total number surveyed (enter "NA" if no data)	Source of data
1					Example: 1. LGU 2. Philippine Statistics Authority 3. Household survey
2					
3					
4					
5					

Datasheet 4.1 List of all of commercial establishments included in the inventory per district/barangay

District/Barangays/ LGU included in the Inventory		Total Population	Total number of registered businesses (enter "NA" if no survey is used)	Total number of business surveyed (enter "NA" if no data)	Source of data
1					Example: 1. Permit and Licensing Division of the LGU 2. Commercial establishment survey
2					
3					
4					
5					

Datasheet 5.1 Emission sources and fuel consumption of the residential sector – Stationary combustion

A	B	C	D	E	F	G
District/ Barangay/ LGU	Data Source Identifier	Type of Data	Application	Fuel type	Annual Volume	Unit

Datasheet 6.1 Emission sources and fuel consumption of the commercial sector – Stationary combustion

A	B	C	D	E	F	G
District/ Barangay/ LGU	Data Source Identifier	Type of Data	Application	Fuel type	Annual Volume	Unit

Datasheet 7.1 List of all vehicles included in the inventory per district/barangay

Districts/Barangays included in the Inventory		Total Population	Total Number of Vehicles Registered within the District	Total Number Surveyed (enter "NA" if no data)	Source of Data
1.					Example: 1. Land Transportation Office (LTO) 2. LGU for tricycles
2.					
3.					
4.					
5.					

Datasheet 8.1 Fuel consumption – Mobile combustion (Example is provided)

A	B	C	D	E	F	G	H	I
District/ Barangay/ LGU	Data Source Identifier	Type of Data	Vehicle Type	Fuel type	Annual Distance Traveled (km)	Annual Fuel Consumption (liters)	Annual Fuel Used for Stationary Combustion (liters)	Annual Fuel Used for Mobile Combustion (liters)

Datasheet 9.1 Activity data –Electricity consumption-Residential sector

District/ Barangay	Data Source Identifier (e.g. Household Survey Number or Utility Name and Source Identifier)	Data Type (e.g. Household Surveys, electricity provider)	Actual Annual Electricity Consumption (kWh)

Datasheet 10.1 Activity data –Electricity consumption-Commercial sector

District/ Barangay	Data Source Identifier (e.g. Business Survey Number or Utility Name and Source Identifier)	Data Type (e.g. Business Surveys, electricity provider)	Actual Annual Electricity Consumption (kWh)

Datasheet 11.1 Activity data – Electricity consumption-Other sectors

District/ Barangay	Data Source Identifier (e.g. Streetlights, MRT line, Utility name and Source identifier)	Data Type (e.g. Surveys, National Census averages, Other)	Actual Annual Electricity Consumption (kWh)

Datasheet 13.1 Agriculture crop emission sources

A	B	C	D	E
District/ Barangay	Data Source Identifier (e.g. Name of Government Agriculture Agency and Department)	Type of Data (e.g. Agricultural Bureau, Census Averages, Other)	Application (e.g. crop type and approach)	Total Hectares Under Production (hectares, ha)

Datasheet 14.1 Livestock emission sources

A	B	C	D	E
District/ Barangay	Data Source Identifier (e.g. Name of Government Agriculture Agency and Department)	Type of Data (e.g. Government Agricultural Bureau, National Census Averages, Other)	Application (e.g. Livestock Type)	Total Headcount

Datasheet 16.1 Landfill solid waste disposal data entry parameters (IPCC FOD Method)

	IPPC Default Value		User-Defined
Starting year	1950		
DOC (Degradable organic carbon)			
(Weight fraction, wet basis)	Range	Default	User-Defined
Food waste	0.08-0.20	0.15	
Garden	0.18-0.22	0.2	
Paper	0.36-0.45	0.4	
Sewage sludge	0.04-0.05	0.05	
Textiles	0.20-0.40	0.24	
Wood and straw	0.39-0.46	0.43	
DOCf (fraction of DOC dissimilated)		0.5	

Methane generation rate constant (k)			
(years-1)	Range	Default	User-Defined
Disposable nappies	0.15–0.2	0.17	
Food waste	0.17–0.7	0.4	
Garden	0.15–0.2	0.17	
Paper	0.06–0.085	0.07	
Sewage sludge	0.17–0.7	0.4	
Textiles	0.06–0.085	0.07	
Industrial waste	0.15–0.2	0.17	
Delay time (months)		6	
Fraction of methane (F) in developed gas		0.5	
Conversion factor, C to CH4		1.33	
Oxidation factor (OX)		0	
Parameters for carbon storage			
% paper in industrial waste		0%	
% wood in industrial waste		0%	

Datasheet 17.1 Solid waste disposal data entry for Methane Correction Factor (MCF) calculation

	Unmanaged, shallow	Unmanaged, deep	Managed	Managed, semi-aerobic	Uncategorized	Total (100%)
	MCF	MCF	MCF	MCF	MCF	
IPCC default	0.4	0.8	1	0.5	0.6	
User Defined Value	0.4	0.8	1	0.5	0.5	
Distribution of Waste by Waste Management Type - Annex A1.1						
User Defined Value (Philippines)	44%	0%	0%	28%	28%	
Year	%	%	%	%	%	
1950						100%
1951						100%
1952						100%
1953						100%
1954						100%
2006						100%
2007						100%
2008						100%
2009						100%
2010						100%
2011						100%
2012						100%
2013						100%
2014						100%

Datasheet 18.1 Waste Diversion Rates

Year	Population	Waste per Capita (tonnes/ capita/yr)	% to Solid Waste Disposal Site (SWDS)	"% MSW composted"	% MSW sent to anaerobic digestion	% MSW open burned	% Total MSW other/ unspecified
IPCC default		0.19					
1950							
1951							
1952							
1953							
2011							
2012							
2013							
2014							

Datasheet 18.2 Waste compositions (% tonnes)

Year	Food (%)	Garden (%)	Paper (%)	Wood (%)	Textile (%)	Nappies (%)	Sludge (%)	Plastics and other Inert (%)
IPCC default								
1950								
1951								
1952								
1953								
2011								
2012								
2013								
2014								

Datasheet 19.1 General solid waste composting activity data

Data Source Identifier	Population	Total solid waste (Actual) for district / barangay	Fraction of total solid waste sent for anaerobic digestion facilities	Fraction of total solid waste sent for composting
	Inhabitants	Tones	%	%
LGU				

Datasheet 19.2 General solid waste open burning activity data

Data source identifier	Population	Total solid waste (Actual) for district/barangay	Amount of total solid waste open burned
	inhabitants	tonnes	tonnes
LGU			

Datasheet 20.1 Landfill solid waste disposal data entry (ICLEI method) by landfill type

Data Source Identifier	Population	Total solid waste (Actual) for district / barangay	Fraction of solid waste sent to specific disposal site	Specific Landfill Site	Location of landfill site (outside or inside LGU)
	Inhabitants	Tones	%		
LGU				Unmanaged -shallow	
				Managed – semi-aerobic	
				Uncategorized	

Datasheet 21.1 Wastewater management system

Data Needed	Examples		Is it used in the LGU? (Yes or No)	% of Population using the system
1. Wastewater systems or types in LGU	Open-Pits / Latrines	dry climate, ground water table lower than latrine, small family (2-5 people)		
		dry climate, ground water table lower than latrine, communal		
		wet climate/flush water use, ground water table than latrine		
	River Discharge	Stagnant oxygen deficient rivers and lakes		
		Rivers, lakes and estuaries		
	Untreated	River Discharge		
		Sewers (closed and underground)		
		Open sewers		
	Treated	Aerobic –centralized and well managed		
		Sludge anaerobic treatment		
		Aerobic shallow ponds		
		Anaerobic lagoons – shallow, (less than 2 meters)		
		Anaerobic reactors		

	Data Needed	Default Values (IPPC)		LGU Specific
		Uncollected	Collected	
1	Per Capita BOD generation (per day) for the LGU (maybe national value or default IPCC value)	40	40	
2	LGU or region-specific correction factor for industrial BOD discharges in sewers (national or IPCC default value)	1.00	1.25	
3	Maximum Methane production capacity factor used in the calculation in reference to the BOD from LGU or region specific data (if available)	.60 kgCH4/ kgBOD		
4	LGU, regional, national maximum methane production capacity factor used in the computation in reference to the COD	.25 kgCH4/ kgCOD		

5	Annual per capita protein consumption (as localized as possible)	.59 g/ person/ DAY		
6	Fraction of nitrogen in protein (as localized as possible)	.16 kg N/kg protein		
7	Factor for non-consumed protein added to wastewater	1.1		
8	Nitrogen removed in sludge (value of 0 unless sludge removal is implemented by LGU of specific waste treatment facility	0		
9	Nitrogen removed in sludge (value of 0 unless sludge removal is implemented by LGU of specific waste treatment facility			

Datasheet 22.1 Forestry and other land use change data for GHG emissions (Examples are provided)

District/Barangay	Data source identifier	Emission type	Emission source	Annual total
Name of LGU		Wood Products Harvesting	Charcoal (cu.m.)	
Name of LGU		Wood Products Harvesting	Construction (cu.m.)	
Name of LGU		Changes in the use of forest lands	Forest converted to Agriculture (ha)	
Name of LGU		Changes in the use of forest lands	Forest converted to settlement (ha)	

Datasheet 23.1 Parameters for Forest and Other Land-Use Change

Data requirements	Default values		User-defined		Source of data
	Biomass growth rate	Carbon content	Biomass growth rate	Carbon content	
1. Wood and wood products harvesting					
a. Fuel wood (cu.m.)		.49			
b. Charcoal (tons)		.49			
c. Construction (cu.m.)		.49			
d. Novelties (tons)		.49			
2. Changes in the use of the forestlands					
a. Used for agriculture (ha)	7.81	.49			
b. Used as grasslands (ha)	7.81	.49			
c. Left as barren areas (ha)	7.81	.49			
3. Forestland remaining					
a. General forestland type (ha)	7.81	.49			
b. Primary forest - Visayas (ha)	2.10*	.045*			
c. Secondary forest - Luzon (ha)	6.50*	.044*			
d. Brushland – for wood - Visayas (ha)	9.40*	.045*			
e. Grassland – Visayas (ha)	0.00*	.045*			
f. Tree plantations – (e.g. S. macrophylla- Luzon (ha)	7.50*	.043*			
4. Lands converted to forestland					
a. Barren to forestland (ha)	7.81	.49			
b. Grassland to forestland (ha)	7.81	.49			
c. Wetlands to forestland (ha)	7.81	.49			
d. Settlement to forestland (ha)	7.81	.49			
e. Cropland to forestland (ha)	7.81	.49			

Data requirement	Default value (tons/ha)	User-defined (tons/ha)	Source of data
Carbon stock in existing forest	262		

Datasheet 24.1 Forestry and other land-use change data for GHG removals. (Examples are provided)

District/Barangay	Data source Identifier	Removal type	Removal source	Annual total (ha)
Name of LGU		Remaining forestland	Carbon stock in inventory year	
Name of LGU		Change in forestland	Grassland to forest	
Name of LGU		Change in forestland	Barren to forestland	

Datasheet 26.1 Mineral industry activity data

Sub-sector	Name of Company	Activity data	Units	Source of data
Cement Production		Type of cement produced	tonnes	
		Mass of cement produced per type	tonnes	
Limestone production		Mass of lime produced per type	tonnes	
Glass production		production	tonnes	

Datasheet 26.2 Chemical industry activity data

Sub-sector	Name of Company	Activity data	Units	Source of data
Ammonia Production		Volume of NH3 produced		
Soda Ash Production		Volume of soda ash		
Petrochemical and Carbon Black Production		Production capacity Methanol produced	tons	
		Ethylene produced	tons	
		Ethyl		

Datasheet 26.3 Metal industry activity data

Sub-sector	Name of Company	Activity data	Units	Source of data
Iron and Steel Production from integrated facilities		Amount of steel produced by process type		
Iron and Steel Production from non integrated facilities				

Datasheet 26.4 Electronic industry activity data

Sub-sector	Name of Company	Activity data	Units	Source of data
Integrated Circuit or Semiconductor				
TFT Flat Panel				
Photovoltaic				
Heat Transfer Fluid				

Datasheet 26.5 Other industry activity data

Sub-sector	Name of Company	Activ
Ex. Pulp and Paper		Product
Ex. Food Industries		
Others		

Other		Plant p

Annex B. Potential Data Sources

Data requirement	Potential data sources
List of household	LGU, Philippine Statistics Authority; Household Survey
List of commercial establishments	Permit and Licensing Division of the LGU; Commercial Establishment Survey
Fuel consumption	Department of Energy; Gasoline Station; LPG Retailers/Distributors; Charcoal and Fuelwood Retailers/Distributors
List of vehicles	Land Transportation Office; LGU for tricycles
Electricity consumption	Energy provider; electric cooperatives
Agricultural crops	Agriculture Office based in the LGU; Philippine Statistics Office
Agricultural livestock	Agriculture Office based in the LGU; Philippine Statistics Office
Amount of solid waste	LGU
Waste Characterization Study (WACS)	LGU; National Solid Waste Management Commission
Population	LGU; Philippine Statistics Office
List of industry	Permit and Licensing Division of the LGU; National Inventory Report of the country
Forest data	LGU; Forest Management Bureau; NAMRIA; National GHG Inventory Report of the country

Annex C. List of Existing IPPU Categories in the Philippines

List of Existing Industrial Processes and Product Use (IPPU) Categories in the Philippines, as of year 2010 that can be attributed directly to the LGUs

Source: EMB-DENR

Categories	Are these industries present within my LGU? Y= Yes; N=No
2A Mineral industry	
2A1: Cement Production	
2A2: Lime Production	
2A3: Glass Production	
2B Chemical industry	
2B1: Ammonia Production	
2B7: Soda Ash Production	
2B8: Petrochemical and Carbon Black Production	
2B8a: Methanol	
2B8b: Ethylene	
2B8c: Ethylene Dichloride and Vinyl Chloride Monomer	
2B8d: Ethylene Oxide	
2B8e: Acrylonitrile	
2B8f: Carbon Black	
2C Metal industry	
2C1: Iron and Steel Production	
2C1a: Iron and Steel Production from Integrated Facilities	
2C1a: Iron and Steel Production from Non- integrated Facilities	
2E Electronics industry	
2E1: Integrated Circuit or Semiconductor	
2E2: TFT Flat Panel Display	
2E3: Photovoltaics	
2E4: Heat Transfer Fluid	
2E5: Other	
2F Other industries	
2F1: Pulp and Paper	
2F2: Food Industries	
2F3: Others	

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