Technical Appendix - Philippines:

Methods for estimating community-scale sectoral data from national and regional statistics for the purpose greenhouse gas accounting and climate action planning

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Stationary Energy Sector

This document details the calculation approaches and data sources for producing community-level activity data and emission factors for the buildings and stationary energy sector. This sector contains the following subsectors:

Table 1: Stationary Energy Sector categories.

Waste Sector	
Residential buildings	Estimated
Commercial buildings	Not Currently Estimated
Municipal buildings	Not Currently Estimated
Industry	Not Currently Estimated
Agriculture, forestry and fisheries	Not Currently Estimated
Fugitive emissions	Not Currently Estimated

Residential Buildings

Subsector Summary

The residential buildings subsector encompasses all GHG emitting activities from energy use in households, including heating, cooling, cooking, and lighting. The two primary categories of GHG emitting activities within the subsector are:

1. Scope 1 emissions from fuel combustion associated with residential buildings within the community boundary;
2. Scope 2 emissions from consumption of grid-supplied electricity.

Inclusions

For the Philippines, the following data points are estimated based on national annual sales to residential customers:

- ***Liquified Petroleum Gas*** and ***Kerosene*** consumption by household for each community,
- ***Grid-supplied electricity*** consumption by household for each community.

Additionally, a weighted average household intensity (MMBtu/household) is calculated to take into consideration the relative fuel and electricity intensities of the differing housing type mixes for each region, relative to national household intensities. This is done so estimates are reflective of the housing context within individual communities, avoiding a uniform per-household intensity across all communities.

Exclusions

Due to lack of data availability and country-specific relevance, estimates for the following activity data points are not produced:

- ***Natural gas and distillate fuel oil*** consumption by household,
- ***Off-highway motor gasoline*** consumption, e.g. for use in lawn and gardening equipment
- ***District heating, cooling*****,** or other non-electricity grid-supplied energy.

Activity Data Coverage

The specific data points and energy sources covered by the methodology are outlined in the table below.

Table 2: Residential energy sector activity data, units, and scope.

Activity Data	GHGDP Definition	Units	Scope
Liquified Petroleum Gas	All Liquified Petroleum Gas consumption within community boundary for a single year for all households.	MJ	Scope 1
Kerosene	All Kerosene consumption within community boundary for a single year for all households.	MJ	Scope 1
Grid Electricity	All Grid-supplied Electricity consumption within community boundary for a single year for all households.	MJ	Scope 2

Calculations methodologies

Scope 1: Liquified Petroleum Gas (LPG)

LPG is commonly used in the Philippines residential energy sector for household heating, cooking and hot water systems.

Methodology Notes

Household LPG consumption is estimated by allocating and weighting the Philippines national LPG sales information to the residential sector to individual housing units. The initial input data is provided in the 2016 Compendium of Energy Statistics developed by the Philippines Department of Energy (DOE 2016). The allocation and weighting are based on contextual information, such as the total households by community, provided by the Philippines Statistics Authority Census of Population and Housing Report (PSA 2015). This includes:

- The number of households within each community and region that use LPG for heating, cooking, or hot water systems, among other uses and the proportion of these households relative to national totals.
- A calculated weighted average household LPG use intensity (liters/household) for the community based on its respective region and relative to the national weighted intensity.

Household LPG consumption is allocated to communities not simply based on number of households, but also by a weighted average household intensity. This weighting factor takes into consideration the relative LPG intensity of different housing types, housing in different regions, and different LPG uses across the country. Regional LPG use per household values is also reported in the DOE's 2016 Compendium of Energy Statistics (DOE 2016). The intensity metrics are provided from the PSA's Housing Energy Consumption Survey administered for year's 2004 and 2011. Because 2011 is the more recent year with available data, those values are used in this methodology (PSA 2013).

Community allocated LPG consumption

Equation 1 is used to allocate national residential LPG sales to individual communities.

Equation 1: Philippines community-specific residential LPG consumption

$$LPG_{Community} = LPG_{National} \times \left(\frac{Community\ Households}{National\ Households}\right)$$

Table 3: LPG community specific consumption data elements and sources.

Data Element	Definition	Data Source	Units
$LPG_{Community\ Allocated\ Sales}$	Community residential sales of LPG.	Equation 1	MMBtu
$LPG_{National\ Sales}$	National residential sales of LPG.	DOE 2016	MMBtu
$Community\ Households$	Total number of households residing within community boundary.	PSA 2016	#
$National\ Households$	Total number of households in the Philippines.	PSA 2016	#

National LPG Intensity

Equation 2 calculates the national residential LPG consumption intensity:

Equation 2: Philippines community-specific residential LPG weighting factors

$$National\ average\ intensity = \sum(Regional\ LPG\ intensities \times\ Regional\ households_{LPG}) \div National\ households$$

Table 4: National LPG intensity data elements and sources.

Data Element	Definition	Data Source	Units
$National\ average\ intensity$	National average LPG use per household per year.	Equation 2	MMBtu
$Regional\ household\ intensity$	Regional average LPG use per household per year.	DOE 2016	liters/household /year
$Regional\ households_{LPG}$	Total number of households residing within the Region that use LPG.	PSA 2016	#
$National\ households$	Total number of households in the Philippines.	PSA 2016	#

Weighted Consumption

Equation 3 calculates the final community-level residential LPG weighted consumption:

Equation 3: Philippines community-specific weighted residential LPG consumption

$$LPG_{\substack{Community \\ Weighted\ Consumption}} = LPG_{\substack{Community \\ Allocated\ Consumption}} \times \left(\frac{Regional\ household\ efficiency}{National\ average\ efficiency}\right)$$

Table 5: LPG weighted consumption data elements and sources.

Data Element	Definition	Data Source	Units
$LPG_{Community\ Weighted\ Consumption}$	Community residential sales of LPG.	Equation 3	MMBtu
$LPG_{Community\ Allocated\ Consumption}$	Community residential sales of LPG.	Equation 1	MMBtu
$Regional\ household\ intensity$	Regional average LPG use per household per year.	DOE 2016	liters/household/year
$National\ average\ intensity$	National average LPG use per household per year.	Equation 2	liters/household/year

Methodology Assumptions

General assumptions and limitations

- Average energy intensities by household remain consistent within a given region.
- Within a given region, factors of climate and individual housing infrastructure that may otherwise impact relative fuel consumption (e.g. relative mix of LPG, kerosene, or electricity used for heating) do not vary significantly from one community to the next.
- Within a given region, average household size—both square footage and number of household members—does not vary significantly from one community to the next.
- The energy balance table totals (DOE 2016) are assumed to encompass all LPG sales within the region and energy sector.

Temporal assumptions and limitations

- Intensity figures are collected from 2011, the most recent year available.
- Energy sales are from collected from the 2016 Energy Balance Tables.
- Number of households are collected from the 2015 Census of Population and Housing.
- All LPG sold to households is consumed within the year it was delivered.

Potential Improvement

- Factors of climate and nuances in residential building type and infrastructure are not taken into consideration in the current methodology. While this has simplified the initial calculation method, future iterations of the methodology will aim to incorporate factors such as heating degree days and housing infrastructure to add more meaningful spatial resolution to the estimates.
- Similarly, while the current approach assumes that various housing types have the same average consumption from one community to the next, there are other factors such as

average income and family size that may have significant impacts on consumption. As a result, the average single-family household in one community may consume significantly higher amounts of energy in a year than that of another community in the same state. Further research is needed to determine a feasible method for accounting for such discrepancies.

Kerosene

Methodology Notes

Household kerosene consumption is estimated by allocating and weighting the Philippines national kerosene sales information to the residential sector to individual housing units. The initial input data is provided in the 2016 Compendium of Energy Statistics developed by the Philippines Department of Energy (DOE 2016). The allocation and weighting are based on contextual information, such as the total households by community, provided by the Philippines Statistics Authority Census of Population and Housing Report (PSA 2015). This includes:

- The number of households within each community and region that use kerosene for heating, cooking, or hot water systems, among other uses and the proportion of these households relative to national totals.
- A calculated weighted average household kerosene use intensity (liters/household) for the community based on its respective region and relative to the national weighted intensity.

Household kerosene consumption is allocated to communities not simply based on number of households, but also by a weighted average household intensity. This weighting factor takes into consideration the relative kerosene intensity of different housing types, housing in different regions, and different kerosene uses across the country. Regional kerosene use per household values is also reported in the DOE's 2016 Compendium of Energy Statistics (DOE 2016). The intensity metrics are provided from the PSA's Housing Energy Consumption Survey administered for year's 2004 and 2011. Because 2011 is the more recent year with available data, those values are used in this methodology (PSA 2013).

Community allocated kerosene consumption

Equation 4 is used to allocate national residential kerosene sales to individual communities.

Equation 4: Philippines community-specific residential kerosene consumption

$$Kerosene_{Community} = Kerosene_{National} \times \left(\frac{Community\ Households}{National\ Households}\right)$$

Table 6: Kerosene community specific consumption data elements and sources.

Data Element	Definition	Data Source	Units
$Kerosene_{Community\ Allocated\ Sales}$	Community residential sales of kerosene.	Equation 4	MMBtu
$Kerosene_{National\ Sales}$	National residential sales of kerosene.	DOE 2016	MMBtu
$Community\ Households$	Total number of households residing within community boundary.	PSA 2016	#
$National\ Households$	Total number of households in the Philippines.	PSA 2016	#

National kerosene Intensity

Equation 5 calculates the national residential kerosene consumption intensity:

Equation 5: Philippines community-specific residential kerosene weighting factors

$$National\ average\ intensity = \sum(Regional\ kerosene\ intensities \times\ Regional\ households_{Kerosene}) \div National\ households$$

Table 7: National kerosene intensity data elements and sources.

Data Element	Definition	Data Source	Units
$National\ average\ intensity$	National average kerosene use per household per year.	Equation 5	MMBtu
$Regional\ household\ intensity$	Regional average kerosene use per household per year.	DOE 2016	liters/household /year
$Regional\ households_{Kerosene}$	Total number of households residing within the Region that use kerosene.	PSA 2016	#
$National\ households$	Total number of households in the Philippines.	PSA 2016	#

Weighted Consumption

Equation 6 calculates the final community-level residential kerosene weighted consumption:

Equation 6: Philippines community-specific weighted residential kerosene consumption

$$Kerosene_{\substack{Community \\ Weighted\ Consumption}} = Kerosene_{\substack{Community \\ Allocated\ Consumption}} \times \left(\frac{Regional\ household\ intensity}{National\ average\ intensity}\right)$$

Table 8: Kerosene weighted consumption data elements and sources.

Data Element	Definition	Data Source	Unit
$Kerosene_{Community\ Weighted\ Consumption}$	Community residential sales of kerosene.	Equation 6	MMBtu
$Kerosene_{Community\ Allocated\ Consumption}$	Community residential sales of kerosene.	Equation 4	MMBtu
$Regional\ household\ intensity$	Regional average kerosene use per household per year.	DOE 2016	liters/household /year
$National\ average\ intensity$	National average kerosene per household per year.	Equation 5	liters/household /year

Methodology Assumptions

General assumptions and limitations

- Average energy intensities by household remain consistent within a given region.
- Within a given region, factors of climate and individual housing infrastructure that may otherwise impact relative fuel consumption (e.g. relative mix of LPG, kerosene, or electricity used for heating) do not vary significantly from one community to the next.
- Within a given region, average household size—both square footage and number of household members—does not vary significantly from one community to the next.
- The energy balance table totals (DOE 2016) are assumed to encompass all kerosene sales within the region and energy sector.

Temporal assumptions and limitations

- Intensity figures are collected from 2011, the most recent year available.
- Energy sales are from collected from the 2016 Energy Balance Tables.
- Number of households are collected from the 2015 Census of Population and Housing.
- All kerosene sold to households is consumed within the year it was delivered.

Potential Improvement

- Factors of climate and nuances in residential building type and infrastructure are not taken into consideration in the current methodology. While this has simplified the initial calculation method, future iterations of the methodology will aim to incorporate factors such as heating degree days and housing infrastructure to add more meaningful spatial resolution to the estimates.
- Similarly, while the current approach assumes that various housing types have the same average consumption from one community to the next, there are other factors such as average income and family size that may have significant impacts on consumption. As a result, the average single-family household in one community may consume significantly higher amounts of energy in a year than that of another community in the same state. Further research is needed to determine a feasible method for accounting for such discrepancies.

Grid Electricity

Methodology Notes

Residential grid-electricity consumption is estimated allocating and weighting the Philippines national grid-electricity sales information to the residential sector to individual housing units. The initial input data is provided in the 2016 Compendium of Energy Statistics developed by the Philippines Department of Energy (DOE 2016). The allocation and weighting are based on contextual information, such as the total households by community, provided by the Philippines Statistics Authority Census of Population and Housing Report (PSA 2015). This includes:

- The number of households within each community that use grid-electricity for heating or lighting, among other uses and the proportion of these households relative to national totals.
- A calculated weighted average household grid-electricity use intensity (kWh/household) for the community based on its respective region and relative to the national weighted intensity.

Household grid-electricity consumption is allocated to communities not simply based on number of households, but also by a weighted average household intensity. This weighting factor takes into consideration the relative grid-electricity intensity of different housing types, housing in different regions, and different grid-electricity uses across the country. Regional grid-electricity use per household values is also reported in the DOE's 2016 Compendium of Energy Statistics (DOE 2016). The intensity metrics are provided from the PSA's Housing Energy Consumption Survey administered for year's 2004 and 2011. Because 2011 is the more recent year with available data, those values are used in this methodology (PSA 2013).

Community allocated grid-electricity consumption

Equation 4 allocates national residential grid-electricity sales to each community.

Equation 7: Philippines community-specific residential grid-electricity consumption

$$Electricity_{Community} = Electricity_{National} \times \left(\frac{Community\ Households}{National\ Households}\right)$$

Table 9: Grid-electricity community specific consumption data elements and sources.

Data Element	Definition	Data Source	Units
$Electricity_{Community\ Allocated\ Sales}$	Community residential sales of grid-electricity.	Equation 4	MWh
$Electricity_{National\ Sales}$	National residential sales of grid-electricity.	DOE 2016	MWh
$Community\ Households$	Total number of households residing withing community boundary.	PSA 2016	#
$National\ Households$	Total number of households in the Philippines.	PSA 2016	#

National kerosene Intensity

Equation 5 calculates the Philippines national residential grid-electricity consumption intensity:

Equation 8: Philippines community-specific residential grid-electricity weighting factors

$$National\ average\ intensity = \sum (Regional\ electricity\ intensity \times Regional\ households_{electricity}) \div National\ households$$

Table 10: National grid-electricity intensity data elements and sources.

Data Element	Definition	Data Source	Unit
$National\ average\ intensity$	National average grid-electricity use per household per year.	Equation 5	kWh/household /year
$Regional\ household\ intensity$	Regional average grid-electricity use per household per year.	DOE 2016	kWh/household /year
$Regional\ households_{electricity}$	Total number of households residing within the Region that use grid-electricity.	PSA 2016	MWh
$National\ households$	Total number of households in the Philippines.	PSA 2016	#

Weighted Consumption

Equation 6 calculates community-level residential grid-electricity weighted consumption:

Equation 9: Philippines community-specific weighted residential grid-electricity consumption

$$Electricity_{\substack{Community \\ Weighted\ Consumption}} = Electricity_{\substack{Community \\ Allocated\ Consumption}} \times \left(\frac{Regional\ household\ intensity}{National\ average\ intensity}\right)$$

Table 11: Grid-electricity weighted consumption data elements and sources.

Data Element	Definition	Data Source	Units
$Electricity_{Community\ Weighted\ Consumption}$	Community residential sales of grid-electricity.	Equation 6	MWh
$Electricity_{Community\ Allocated\ Consumption}$	Community residential sales of grid-electricity.	Equation 4	MWh
$Regional\ household\ intensity$	Regional average grid-electricity use per household per year.	DOE 2016	kWh/household /year
$National\ average\ intensity$	National average grid-electricity per household per year.	Equation 5	kWh/household /year

Methodology Assumptions

General assumptions and limitations

- Average energy intensities by household remain consistent within a given region.

- Within a given region, factors of climate and individual housing infrastructure that may otherwise impact relative fuel consumption (e.g. relative mix of LPG, kerosene, or grid-electricity used for heating) do not vary significantly from one community to the next.
- Within a given region, average household size—both square footage and number of household members—does not vary significantly from one community to the next.
- The energy balance table totals (DOE 2016) are assumed to encompass all grid-electricity sales within the region and energy sector.

Temporal assumptions and limitations

- Intensity figures are collected from 2011, the most recent year available.
- Energy sales are from collected from the 2016 Energy Balance Tables.
- Number of households are collected from the 2015 Census of Population and Housing.
- All grid-electricity sold to households is consumed within the year it was delivered.

Potential Improvement

- Factors of climate and nuances in residential building type and infrastructure are not taken into consideration in the current methodology. While this has simplified the initial calculation method, future iterations of the methodology will aim to incorporate factors such as heating degree days and housing infrastructure in order to add more meaningful spatial resolution to the estimates.
- Similarly, while the current approach assumes that various housing types have the same average consumption from one community to the next, there are other factors such as average income and family size that may have significant impacts on consumption. As a result, the average single-family household in one community may consume significantly higher amounts of energy in a year than that of another community in the same state. Further research is needed to determine a feasible method for accounting for such discrepancies.

Citations

DOE 2016. Compendium of Philippine Energy Statistics and Information 1990-2016, Department of Energy, Republic of the Philippines. 2016. https://www.doe.gov.ph/sites/default/files/pdf/energy_statistics/doe_compendium_energy_statistics.pdf.

PSA 2016. Housing Characteristics in the Philippines, 2015 Census of Population and Housing, Philippines Statistics Authority, Republic of the Philippines. 2016. https://psa.gov.ph/population-and-housing/node/129804.

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Waste Sector

This document details the calculation methodologies and data sources for producing community-level activity data and emission factors for the Philippines waste sector greenhouse gas (GHG) emissions. This sector contains the following subsectors:

Table 12: Waste Sector categories.

Waste Sector	
Solid waste	Estimated
Biological waste	Not Currently Estimated
Incinerated and burned waste	Not Currently Estimated
Wastewater	Not Currently Estimated

Solid Waste

Subsector Summary

This subsector accounts for the GHG emissions from the Municipal Solid Waste (MSW) disposed of at landfill facilities or open dump sites. GHG emissions estimates from solid waste disposal are influenced by three factors:

3. The mass of community-generated waste treated at landfill facilities or open dump sites;
4. The methane correction factor; and
5. The amount of methane recovered.

Methane (CH_4) is the primary GHG emitted during the MSW treatment processes. The methods for estimating the mass of waste, methane correction factors, degradable organic carbon emission factors, and methane recovered for the Philippines are outlined below.

Inclusions

For the community level solid waste sector calculations for the Philippines, the following data points are estimated from national or regional totals:

- The ***mass of waste landfilled*** in each community;
- The ***methane correction factor*** (MCF) which is dependent on specific landfill facility characteristics (i.e. whether the landfill is managed, unmanaged, uncategorized);
- The ***degraded organic carbon*** (DOC) value which is calculated using the DOC fractions obtained from the IPCC guidelines for South Asia.
- The ***methane generation potential*** which is calculated using the MCF and DOC values

Exclusions

Due to lack of data availability and country-specific relevance, estimates for the following activity data points are not produced:

- *The amount of **methane recovered*** is not estimated for communities in the Philippines as there is no methane recovery data available at the national level.

Activity Data Coverage

Table 13: Solid Waste Disposal activity data, units, and scope.

Activity Data	Definition	Corresponding Contextual Data
Mass of Waste	The mass of waste disposed at unmanaged, managed, sanitary landfills and open dumps within a community boundary, regardless of where the waste is generated.	% of waste going to landfills Community and Regional Population
	The mass of waste generated within a community boundary but diverted to an external landfill or open dump for disposal	% of waste going to landfills Community and Regional Population

Calculations Methodologies

Solid Waste directed towards landfills

Methodology Notes

The calculation of methane generated from MSW involves multiple parameters. As demonstrated in Equation 1, the regional waste totals (NSWMC 2016) are disaggregated to the community level. This is completed by multiplying each regional waste total by the proportion of total urban population to total regional population (PSA 2015). the total waste for each community is disaggregated further by multiplied by the community level waste totals by default waste type fractions, provided by IPCC (2016). In Equation 11, the community waste totals by waste type are multiplied by the IPCC DOC values to calculate a country-specific weighted DOC factor for the Philippines. Lastly, in Equation 12, the Methane Generation Potential is calculated by multiplying the weighted DOC factor, the default MCF, and chemistry constants, described further.

Mass of Waste

Equation 1 calculates the community-specific mass of waste landfilled in the Philippines:

Equation 10: Philippine Community-Specific mass of Landfilled Waste

$$Landfilled\ Waste_{Community} = Landfilled\ Waste_{Region} \times \left(\frac{Community\ Population}{Regional\ Population}\right)$$

Table 14: Landfill Waste data elements and sources.

Data Element	Definition	Data Source	Units
$Landfilled\ Waste_{Community}$	Mass of community generated waste going to landfills	Equation 1	Tonnes
$Landfilled\ Waste_{Region}$	Mass of regionally generated waste going to landfills	NSWMC 2016	Tonnes
Community Population	Total number of residents living within community boundary	PSA 2015	#
Regional Population	Total number of persons living in a given Region	PSA 2015	#

Methane Correction Factor (MCF)

Methane generation rates are dependent on landfill management practices. However, there is no information provided on the landfill types in the Philippines and therefore, all landfills are classified as uncategorized. This methodology uses the IPCC (2006) default landfill management factors to determine an appropriate community-specific MCF for the Philippines. IPCC (2006) assigns a unitless MCF value of 0.6 for uncategorized landfills.

Degradable Organic Carbon (DOC)

DOC represents the amount of organic carbon in the waste that can be degraded. To calculate a Philippines specific DOC value, the fractions of each waste type to total waste is multiplied by the IPCC (2006) DOC defaults. Equation 11 calculates the methane generation potential of landfilled waste in the Philippines:

Equation 11: Philippines Weighted Degradable Organic Carbon

$$Weighted\ DOC = DOC \times \left(\frac{Mass\ of\ Waste\ type}{Total\ Waste}\right)$$

Table 15: Degradable Organic Carbon data elements and sources.

Data Element	Definition	Value	Data Source	Units
$Weighted\ DOC$	Degradable organic carbon – the portion of the Philippines specific waste stream that can decompose under aerobic conditions.	Computed value	Equation 11	Tonnes C/tonne waste
DOC	Degradable organic carbon – the portion of the waste stream that can decompose under aerobic conditions.	Default values by Waste Type	IPCC (2006)	Tonnes C/tonne waste
$Mass\ of\ Waste\ Type$	Mass of waste going to landfills, by waste type	Dependent on Waste Type	NSWMC 2016	Tonnes
$Total\ Waste$	Total mass of organic waste going to landfills		NSWMC 2016	Tonnes

Table 16: Degradable Organic Carbon values

Waste Categories	Waste Fractions	DOC	Weighted DOC
Food waste	45.1	15	10.8
Non-Food garden waste & plant debris	7.2	20	2.3
Paper/Cardboard	8.7	40	5.6
Wood	NO	43	NE
Textiles	1.6	24	0.6
Industrial Waste	NO	15	NE
Rubber/Leather	0.4	-	NE
Plastic	10.6	-	NE
Metal	4.2	-	NE
Glass	2.3	-	NE
Other*	19.9	-	NE

*Other includes special/hazardous waste, and other/residual inert waste
NO: Not Occurring
NE: Not Estimated

Methane Generation Potential

Equation 12 calculates the methane generation potential of landfilled waste in the Philippines:

Equation 12: Philippines Landfilled Waste Methane Generation Potential

$$L_0 = MCF \times DOC \times DOC_F \times F \times \left({}^{16}/_{12}\right)$$

Table 17: Methane Generation data elements and sources.

Data Element	Definition	Value	Data Source	Units
L_0	Methane Generation Potential.	Calculated	Equation 12	Unitless
MCF	Methane Correction Factor (based on management type) – part of the landfilled materials that is left to degrade anaerobically.	Uncategorized = 0.6	IPCC (2006)	Unitless
DOC	Degradable organic carbon – the portion of the waste stream that can decompose under aerobic conditions.	Computed value	Equation 11	Tonnes C/tonne waste
DOC_F	The fraction of DOC ultimately degraded anaerobically.	Assumed equal to 0.6	IPCC (2006)	Unitless
F	The fraction of methane in landfill gas.	Default range 0.4-0.6 (Usually taken to be 0.5)	IPCC (2006)	Unitless
16/12	Methane to Carbon ratio.	16/12	IPCC (2006)	Unitless

Methodology Assumptions

- Landfill characteristics for the Philippines are not available, and therefore the MCF corresponds to the Uncategorized value.
- This methodology only attempts to estimate scope 1 emissions, and does not attempt to estimate scope 3 emissions from the activities of the residents within the community boundary.

Citations

IPCC (2006). IPCC Guidelines for National Greenhouse Gas Inventories. Volume 5: Waste, Chapter 3: Solid Waste Disposal, The National Greenhouse Gas Inventories Programme, The Intergovernmental Panel on Climate Change, H.S. Eggleston, L. Buendia, K. Miwa, T. Ngara, and K. Tanabe (eds.). Hayama, Kanagawa, Japan. http://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/5_Volume5/V5_3_Ch3_SWDS.pdf

- *Provides default values for the fraction of degradable organic content present in waste stream.*

IPCC (2006). IPCC Guidelines for National Greenhouse Gas Inventories. Volume 5: Waste, Chapter 2: Waste Generation, Composition and Management Data, The National Greenhouse Gas Inventories Programme, The Intergovernmental Panel on Climate Change, Riitta Pipatti (Finland), Chhemendra Sharma (India), Masato Yamada (Japan). https://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/5_Volume5/V5_2_Ch2_Waste_Data.pdf

- *Provides default values for the different waste fractions for South-Central Asia*

NSWMC 2016. National Solid Waste Management Status Report, Republic of the Philippines, Department of Environment and Natural Resources, Environmental Management Bureau, National Solid Waste Management Commission.

PSA 2015. Census of Housing and Population Report, Republic of the Philippines, Philippines Statistics Authority, 2015. https://psa.gov.ph/content/census-population-and-housing-report