Energy Conservation (Industry) Sector Appendix-7 Energy Efficiency Improvement Appendix-8 Electricity and Heat Supply Appendix-9 Fuel Switching

Input Sheet: New facilities

Project Name Sample1 [Energy efficiency of the industrial facilities_New facilities]

1. The electricity and fuel consumption in the absence of the project

Input the estimated data of the necessary electricity and fuel consumption required to generate the production capacity (output etc.) of new facilities based on the actual data of the similar facilities into the following cells.

Item	Entry field	Unit	
Electricity consumption in the project	464	MWh∕y	
	Crude Oil	50	kL/y
Fuel consumption in the	Coal		t∕y
absence of the project	Gas		m ³ /y
	Others		

2. The electricity and fuel consumption after the project start

Input the planned data for the calculation before the project start and input the monitoring data for the calculation after the project start into the following cells.

Item		Entry field	Unit
Electricity consumption after start	350	MWh∕y	
Crude		35	kL/y
Fuel consumption after the project start	Coal		t∕y
	Gas		m ³ /y
	Others		

3. CO2 emission factor of the electric power (t-CO2/MWh)

Emission factor of the general power facilities shall be used as CO2 emission factor of electric power which connects to the grid. Data availability is validated in the following order in regards of the selection of general i) Data obtained from the interview with power management entity ii) National default

	Item	Entry field	Unit
-	n factor of electric power cts to the grid	0.895	t-CO ₂ /MWh
Source:	Data obtained from xx	company of	xx country through intervi

4. Net calorific value according to fuel type and CO2 emission factor

Data availability is validated in the following order because it should preferably be calculated using data and information unique to the project.

i) The unique data of the project obtained from the interview with power management entity

ii) National default iii) IPCC Guideline default data

Item	Net calori	Net calorific value		Net calorific value CO ₂ emission		ssion factor
Crude Oil	36.3	GJ/kL	73.3	t-CO ₂ /TJ		
Coal	26.7	GJ/t	98.3	t-CO ₂ /TJ		
Gas	0.0384	GJ/m ³	56.1	t-CO ₂ /TJ		
Others				t-CO ₂ /TJ		

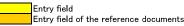
Data obtained from xx through interview

2006 IPCC Guidelines for National Greenhouse Gas Inventories Volume 2 Energy,table2.2

5. The production capacity before the project start

Input the production capacity before and after the project start into the following. (If the facility is newly constructed, input the same data for before and after the project start.)

	Entry field	Unit		
The production capacity before the project start	12,000	t		
The production capacity after the project start	14,000	t		
Source: Data obtained from xx through interview				



Appendix-7-1

Result Sheet: New facilities

Sample1[Energy efficiency of the industrial facilities_New facilities]

GHG emission reduction with the project $(t-CO_2/y) = BE_y - PE_y$ $(t-CO_2/y)$

1. Baseline emission $BE_y = (BEelec_y + BE_{iy}) \times (P_{out} / B_{out})$

8E _y	Baseline emission: GHG emission without replacement, upgrading and improvement of the facilities	640	t–CO ₂ /y
BE _{el,y}	GHG emission from electric power generation before the project start	415	t-CO ₂ /y
Be _{i,y}	GHG emission from fuel power generation before the project start	133	t-CO ₂ /y
P _{out}	The production capacity before the project start	12000	t
B _{out}	The production capacity after the project start	14000	t

2. Project emission $PE_y = PE_{el,y} + PE_{i,y}$

PE _y	Project emission: GHG emission after the project start	406	t-CO ₂ /y
PE _{el,y}	GHG emission from electric power consumption after the project start	313	t-CO ₂ /y
<i>PE</i> _{<i>i,y</i>}	GHG emission from fuel power consumption after the project start	93	t-CO ₂ /y

ER _y	GHG emission reduction with the project	234	t-CO ₂ /y
BE _y	Baseline emission: GHG emission without replacement, upgrading and improvement of the facilities	640	t-CO ₂ /y
PE _y	Project emission: GHG emission after the project start	406	t-CO ₂ /y

Input Sheet: New facilities

Project Name Sample1 [Use of thermoelectric energy of the waste energy in industry]

1. Quantity of electric power and heat from recovery and utilization of the waste energy Input the estimated data of the necessary electricity and fuel consumption required to generate the power production capacity (output etc.) of new facilities based on the actual data of the similar facilities into the following cells.

Item	Entry field	Unit
Quantity of electric power generation from recovery and utilization of the waste energy	69,000	MWh∕y
Quantity of heat from recovery and utilization of the waste energy	100	TJ∕y

2. CO2 emission factor of the electric power $(t-CO_2/MWh)$

Emission factor of the general power facilities shall be used as CO2 emission factor of electric power which connects the grid. Data availability is validated in the following order in regards of the selection of general i) Interview with power management entity ii) National default

Emission obtained from the interview with power management entity shall be used for the private generating far

Item	Entry field	Unit		
CO ₂ emission factor of the electric power which connects the grid	0.968	t − CO₂∕MWh		
power from private generating		t−CO ₂ ∕MWh		
CO ₂ emission factor of the electric power used for calculation	0.968	t–CO ₂ /MWh		
Source: Data obtained from xx through interview				

3. CO₂ emission factor of heat generation (t-CO₂/TJ)

Item	Entry field	Unit			
CO ₂ emission factor per unit of energy of the	Fuel type	73.3	t-CO ₂ /TJ		
boiler fuel consumption in the absence of	Crude Oil				
project					
Boiler efficiency		50	%		
Rate of heat generation from boiler out of the h		1			
generation recovered and utilized from the was	te energy		-		
in the absence of project					
CO ₂ emission factor per heat generated	146.6	t-CO ₂ /TJ			
Source: 2006 IPCC Guidelines for Nation	nal Greenho	ouse Gas Inve	entories Volume 2 En		

4. Amount of electricity and fuel consumption after the project start Input the estimated data of the necessary electricity and fuel consumption required to generate the power production capacity (output etc.) of new facilities based on the actual data of the similar facilities into the following cells.

Item	Entry field	Unit	
Amount of electricity con after the project start	364	MWh∕y	
Amount of fuel	Crude Oil	80	kL/y
	Coal		t∕y
	Gas		m³/y
	Others		

5. Net calorific value according to fuel type and CO2 emission factor Data availability is validated in the following order because it should preferably be calculated using data and information unique to the project.

i) The unique data of the project obtained from the interview with power management entity
 ii) National default
 iii) IPCC Guideline default data

Item	Net calor	ific value	CO ₂ emis	sion factor	
Crude Oil	36.3	GJ/kL	73.3	t–CO ₂ /TJ	
Coal	26.7	GJ/t	98.3	t-CO ₂ /TJ	
Gas	0.0384	GJ∕m³	56.1	t-CO ₂ /TJ	
Others				t−CO₂/TJ	
Source: Data obtai	ned from x	x through i	nterview		
2006 IPCC	Guideline	s for Nation	na <mark>l Greenh</mark> o	ouse Gas Inve	entories Volume 2 Energy table1.2,t

Entry field
Entry field of the reference documents
Automatic calculation
Default value (revise by manual entry acco

e (revise by manual entry according to the project situation)

Result Sheet: New facilities

Sample1 [Use of thermoelectric energy of the waste energy in industry]

GHG emission reduction with the project $(t-CO_2/y) = BE_y - PE_y$ $(t-CO_2/y)$

1. Baseline emission $BE_y = BE_{el,y} + BE_{ther,y}$

BE _y	Baseline emission: GHG emission without recovery and utilization of the waste energy	81,473	t–CO ₂ /y
BE _{el,y}	GHG emission generated by electric supply with recovery and utilization of the waste energy after the project start	66,813	t–CO ₂ /y
BE _{ther,y}	GHG emission generated by heat supply with recovery and utilization of the waste energy after the project start	14,660	t–CO ₂ /y

2. Project emission $PE_y = PE_{el,y} + PE_{i,y}$

PE _y	Project emission: GHG emission after the project start	565	t-CO ₂ /y
PE _{el,y}	GHG emission with electric consumption after the project start	352	t-CO ₂ /y
<i>PE</i> _{<i>i</i>,<i>y</i>}	GHG emission with fuel consumption after the project start	213	t-CO ₂ /y

ER _y	GHG emission reduction with the project	80,907	t-CO ₂ /y
BE _y	Baseline emission: GHG emission without recovery and utilization of the waste energy	81,473	t−CO ₂ ∕y
PE _y	Project emission: GHG emission after the project start	565	t−CO ₂ ∕y

Input Sheet: New facilities, Existing facilities

Project name Sample1 [Fuel switching in the industrial facilities_new facilities]

1. The production capacity before the project

Input the planned data for the calculation of the production capacity before the project start and the monitoring date for the calculation of the production capacity after the project start. (If the facility is newly constructed, input the same data for before and after the project start.)

Item	Entry field	Unit
Production capacity and others before the project start	850	t
Production capacity and others after the project start	1,035	t

2. Fuel consumption before and after the project start

Input the planned data for the calculation of the fuel consumption before the project start and input the monitoring data for the calculation of the fuel consumption after the project start into the following cells.

Item	Entry field	Unit	
Fuel consumption before project activity	Crude Oil	27,668	kL∕ y
	Coal		t∕y
	Gas		m ³ /y
	Others (Kerose	2,934	kL∕ y
	Crude Oil		kL∕ y
Fuel consumption after	Coal		t∕y
project activity	Gas	2,954,979	m ³ /y
	Others		

3. Net calorific value according to fuel type and CO2 emission factor

Data availability is validated in the following order because it should preferably be calculated using data and information unique to the project.

- i) The unique data of the project obtained from the interview with power management entity
- ii) National default
- iii) IPCC Guideline default data

Item	Net calorific value		CO ₂ emission factor	
Crude Oil	<u>36.</u> 3	GJ/kL	73.3	t-CO ₂ /TJ
Coal	26.7	GJ/t	98.3	t-CO ₂ /TJ
Gas	0.0384	GJ/m ³	56.1	t-CO ₂ /TJ
Others (Kerosene)	35.3	GJ/kL	71.9	t-CO ₂ /TJ

Source: 2006 IPCC Guidelines for National Greenhouse Gas Inventories Volume 2 Energy table1.2,table2.2 Data obtained from xx gas company through interview



Entry field

Entry field of the reference documents Automatic input, automatic calculation

Result Sheet: New facilities, Existing facilities

Sample1【Fuel switching in the industrial facilities_new facilities】

GHG emission reduction with the project $(t-CO_2/y) = BE_y - PE_y$ $(t-CO_2/y)$

1. Baseline emission $BE_y = PG_{PJ,y} \times ((BC_{i,y} \times NCV_i \times COEF_i) \nearrow PG_{BL,y})$

BE _y	Baseline emission: GHG emission without switching fuel	98,703	t−CO₂∕y
PG _{BL,y}	The power production capacity before the project start	850	t
PG _{PJ,y}	The power production capacity after the project start	1,035	t
BC _{iy}	Fuel consumption of fuel i before the project start	-	kL,m3,t etc.⁄y
	Crude Oil	27,668	kL/y
	Coal	0	t/y
	Gas	0	m3∕y
	Others (Kerosene)	2,934	kL/y
NCV _i	Net calorific value of fuel i	-	GJ/kL,m ³ ,t etc
	Crude Oil	36.3	GJ/kL
	Coal	26.7	GJ/t
	Gas	0.0384	GJ/m3
	Others (Kerosene)	35.3	GJ/kL
COEF _i	CO ₂ emission factor per calorific value of fuel i	-	t-CO ₂ /TJ
	Crude Oil	73.3	t−CO₂/TJ
	Coal	98.3	t–CO ₂ /TJ
	Gas	56.1	t–CO ₂ /TJ
	Others (Kerosene)	71.9	t−CO₂∕TJ

PE _y	Project emission: GHG emission after fuel switching	6,366	t-CO ₂ /y
<i>PC</i> _{<i>i,y</i>}	Fuel consumption of fuel i after the project start	-	kL,m3,tetc./y
	Crude Oil	0	kL/y
	Coal	0	t/y
	Gas	2,954,979	m3∕y
	Others	0	0
NCV _i	Net calorific value of fuel i	-	GJ/kL,m ³ ,t etc
	Crude Oil	36.3	GJ/kL
	Coal	26.7	GJ/t
	Gas	0.0384	GJ/m3
	Others (Kerosene)	35.3	GJ/kL
COEF ;	CO ₂ emission factor per calorific value of fuel i	-	t-CO ₂ /TJ
	Crude Oil	73.3	t−CO₂∕TJ
	Coal	98.3	t−CO₂∕TJ
	Gas	56.1	t−CO₂∕TJ
	Others (Kerosene)	71.9	t−CO ₂ ∕TJ

2.Project emission PE_y = PC_{iy} × NCV_i × COEF_i

ER _y	GHG emission reduction with the project	92,338	t-CO ₂ /y
BE _y	Baseline emission: GHG emission without fuel switching	98,703	t-CO ₂ /y
PE _y	Project emission: GHG emission after fuel switching	6,366	t-CO ₂ /y

Energy Sector

Appendix-10 Energy Plant Construction with Fuel Switching Appendix-11 Thermal Power with Electricity and Heat Supply Appendix-12 Thermal Power with Fuel Switching Appendix-13 Thermal Power with Higher Efficiency Appendix-14 Power Transmission with Improved Efficiency Appendix-15 Power Distribution with Improved Efficiency Appendix-16 Rural Electrification

Input Sheet: New facilities, Existing facilities

Project Name Sample1 [Introduction of the district heating and cooling system_new facilities]

1. The amount of heat supply before and after the project

Input the planned data for the calculation of the amount of heat supply before the project start and the measured date for the calculation of the amount of heat supply after the project start. (If the facility is newly

Item	Entry field	Unit
Amount of heat supply before the project starts	398	ТJ
Amount of heat supply after the project starts	1,072	TJ

2. Fuel consumption before and after the project start

Input the planned data for the calculation of the fuel consumption before the project start and input the measured data for the calculation of the fuel consumption after the project start into the following cells.

Item		Entry field	Unit
	Crude Oil	12	kL/y
Fuel consumption before project activity	Coal		t∕y
	Gas		m ³ /y
	Others		
	Crude Oil		kL/y
Fuel consumption after	Coal		t∕y
project activity	Gas	3,068	m³⁄y
	Others		

3. Net calorific value according to fuel type and CO2 emission factor

Data availability is validated in the following order because it should preferably be calculated using data and information unique to the project.

- i) The unique data of the project obtained from the interview with power management entity
- ii) National default
- iii) IPCC Guideline default data

Item	Net calorific value		CO ₂ emission factor		
Crude Oil	36.3	GJ/kL	73.3	t-CO ₂ /TJ	
Coal	26.7	GJ/t	98.3	t-CO ₂ /TJ	
Gas	0.0384	GJ/m ³	<u>56.</u> 1	t-CO ₂ /TJ	
Others				t-CO ₂ /TJ	
Source: 2006 IPCC Guide	lines for Na	ational Gree	enhouse Ga	s Inventories	Volume 2 Energy table1.2,table2.2



Entry field of the reference documents

Calculation result sheet: New facilities

Sample1【Introduction of the district heating and cooling system_new facilities】

GHG emission reduction with the project $(t-CO_2/y)$ $ER_y = BE_y - PE_y$ $(t-CO_2/y)$

1. Baseline emission $BE_y = PG_{PJ,y} \times ((BC_{i,y} \times NCV_i \times COEF_i) \swarrow PG_{BL,y})$

BE _y	Baseline emission: GHG emission without the district heating and cooling system	86	t−CO₂∕y
PG _{BL,y}	Amount of heat supply before the project starts	398	TJ
PG _{PJ,y}	Amount of heat supply after the project starts	1,072	TJ
<i>BC _{i,y}</i>	Fuel consumption of fuel i before project activity	-	kL,m3,t etc./y
	Crude Oil	12	kL/y
	Coal	0	t/y
	Gas	0	m3∕y
	Others	0	0
NCV _i	Net calorific value of fuel i	-	GJ/kL,m ³ ,t etc
	Crude Oil	36.3	GJ/kL
	Coal	26.7	GJ/t
	Gas	0.0384	GJ/m3
	Others	0.0	0
COEF _i	$\rm CO_2$ emission factor per calorific value of fuel i	-	t–CO ₂ /TJ
	Crude Oil	73.3	t–CO ₂ /TJ
	Coal	98.3	t–CO ₂ /TJ
	Gas	56.1	t–CO ₂ /TJ
	Others	0	t–CO ₂ /TJ

PE _y	Project emission: GHG emission after introduction of the district heating and cooling system	7	t−CO₂∕y
<i>РС _{і,у}</i>	Fuel consumption of fuel i after the project start	-	kL,m3,t etc <mark>./y</mark>
	Petroleum	0	kL/y
	Coal	0	t/y
	Gas	3,068	m3/y
	Others	0	0
NCV _i	Net calorific value of fuel i	_	GJ/kL,m ³ ,t etc
	Petroleum	36.3	GJ/kL
	Coal	26.7	GJ/t
	Gas	0.0384	GJ/m3
	Others	0.0	0
COEF ;	CO ₂ emission factor per calorific value of fuel i	-	t-CO ₂ /TJ
	Petroleum	73.3	t-CO ₂ /TJ
	Coal	98.3	t–CO ₂ /TJ
	Gas	56.1	t-CO ₂ /TJ
	Others	0	t-CO ₂ /TJ

2. Project emission $PE_y = PC_{i,y} \times NCV_i \times COEF_i$

ER _y	GHG emission reduction with the project	79	t−CO₂∕y
BE _y	Project emission: GHG emission without introduction of the district heating and cooling system	86	t−CO₂∕y
PE _y	Project emission: GHG emission after introduction of the district heating and cooling system	7	t−CO₂∕y

Input Sheet: New facilities

Project Name Sample1 [Use of thermoelectric energy of the waste energy in thermal power facilities]

1. Quantity of electric power and heat from recovery and utilization of the waste energy

Input the planned data of the necessary electricity and fuel consumption required to generate the power production

Item	Entry field	Unit
Quantity of electric power generation from recovery and utilization of the waste energy	12,100	MWh/y
Quantity of heat from recovery and utilization of the waste energy	326	TJ/y

2. CO2 emission factor of the electric power $(t-CO_2/MWh)$

Emission factor of the target power facilities shall be used. Data availability is validated in the following order and input into the following cells.

ii) National default

ii) Emission factor of the target power facilities obtained from the interview with power management entity

Item	Entry field	Unit		
CO2 emission factor of the target power facilities	0.969	t-CO ₂ /MWh		
Source: Data obtained from xx through interview				

3. CO_2 emission factor of heat generation (t-CO₂/TJ)

Item		Entry field	Unit
CO ₂ emission factor per unit of energy of the Fuel type		73 <u>.</u> 3	t-CO ₂ /TJ
boiler fuel consumption in the absence of project	Crude Oil		
Boiler efficiency		50	%
Rate of heat generation from boiler out of the heat generation recovered and utilized from the waste energy in		1	_
CO ₂ emission factor per heat generated		146.6	t-CO ₂ /TJ
Source: 2006 IPCC Guidelines for National Greenh	iouse Gas I	ventories Vo	lume 2 Energy

4. mount of electricity and fuel consumption after the project start

Input the estimated data of the necessary electricity and fuel consumption required to generate the power production capacity (output etc.) of new facilities based on the actual data of the similar facilities into the following cells.

Item	Entry field	Unit	
Amount of electricity consum the project start	654	MWh/y	
	Crude Oil	244	kL∕y
Amount of fuel consumption	Coal		t∕y
after the project start	Gas		m ³ /y
	Others		

5. Net calorific value according to fuel type and CO2 emission factor

Data availability is validated in the following order because it should preferably be calculated using data and information unique to the project.

i) The unique data of the project obtained from the interview with power management entity

ii) National default

iii) IPCC Guideline default data

Item	Net calorific value		CO ₂ emission factor		
Crude Oil	36 . 3	GJ/kL	73.3 t-CO ₂ /T.		
Coal	26.7	GJ/t	98.3	t-CO ₂ /TJ	
Gas	0.0384	GJ/m ³	56.1	t–CO ₂ /TJ	
Others				t–CO ₂ /TJ	
Source: Data obtained from xx through interview					

2006 IPCC Guidelines for National Greenhouse Gas Inventories Volume 2 Energy table1.2,table2.2



Entry field of the reference documents

Automatic calculation

Result Sheet: New facilities

Sample1【Use of thermoelectric energy of the waste energy in thermal power facili<mark>ties】</mark>

GHG emission reduction with the project $(t-CO_2/y)$ $ER_y = BE_y - PE_y$ $(t-CO_2/y)$

1. Baseline emission $BE_y = BE_{ely} + BE_{ther,y}$

BE _y	Baseline emission: GHG emission without recovery and utilization of the waste energy	59,517	t−CO ₂ ∕y
BE _{el,y}	GHG emission generated by electric supply with recovery and utilization of the waste energy after the project start	11,725	t−CO ₂ ∕y
BE _{ther,y}	GHG emission generated by heat supply with recovery and utilization of the waste energy after the project start	47,792	t−CO ₂ ∕y

2. Project emission $PE_y = PE_{ely} + PE_{i,y}$

PE _y	Project emission: GHG emission after the project start	1,283	t–CO ₂ /y
PE _{el,y}	GHG emission with electric consumption after the project start	634	t-CO ₂ /y
PE _{iy}	GHG emission with fuel consumption after the project start	649	t-CO ₂ /y

ER _y	GHG emission reduction with the project	58,234	t-CO ₂ /y
BE _y	Baseline emission: GHG emission without recovery and utilization of the waste energy	59,517	t−CO ₂ ∕y
PE _y	Project emission: GHG emission after the project start	1,283	t-CO ₂ /y

Input Sheet: New plants, Existing facilities

Project Name Sample1 [Fuel switching in the fossil fuel fired power facilities_New facilities]

1. Generating capacity before and after the project

Input the planned data for the electric generating capacity before the project start and input the planned data for the electric generating capacity after the project start into the following cells. (If the facility is newly constructed, input

Item	Entry field	Unit
Electric generating capacity before the project	4,695,800	MWh∕y
Electric generating capacity after the project	4,928,000	MWh∕y

2. Fuel consumption before and after the project start

Input the monitoring data for the fuel consumption before the project start and input the planned data for the fuel consumption after the project start into the following cells.

Item		Entry field	Unit
	Crude Oi	1,330,569	kL∕ y
Fuel consumption before project	Coal		t∕y
activity	Gas		m³/y
	Others		
	Crude Oil		kL∕ y
Fuel consumption after project	Coal		t∕y
activity	Gas	1,415,982,226	m³/y
	Others		

3. Net calorific value according to fuel type and CO2 emission factor

Data availability is validated in the following order because it should preferably be calculated using data and information unique to the project.

- i) The unique data of the project obtained from the interview with power management entity
- ii) National default
- iii) IPCC Guideline default data

Item		Net c	alorific value	CO ₂ emis	sion factor
Crude Oil		36.3	GJ/kL	73.3	t-CO ₂ /TJ
Coal		26.7	GJ/t	98.3	t-CO ₂ /TJ
Gas		0.0384	GJ∕m ^³	56.1	t-CO ₂ /TJ
Others					t-CO ₂ /TJ
Source: 2006 IPCC Guidelines for National Greenhouse Gas Inventories Volume					

2006 IPCC Guidelines for National Greenhouse Gas Inventories Volume 2 Energy table1.2,table2.2

Entry field

Entry field of the reference documents

Result Sheet: New facilities, Existing facilities

Sample1【Fuel switching in the fossil fuel fired power facilities_New facilities】

GHG emission reduction with the project $(t-CO_2/y)$ $ER_y = BE_y - PE_y$ $(t-CO_2/y)$

1. Baseline emission $BE_{y} = PG_{PJ,y} \times ((BC_{iy} \times NCV_{i} \times COEF_{i}) \nearrow PG_{BL,y})$

BE _y	Baseline emission:		
	GHG emission without fuel switching	3,715,188	t−CO ₂ ∕y
PG _{BL,y}	The power production capacity before the project start	4,695,800	MWh/y
PG _{PJ,y}	The power production capacity after the project start	4,928,000	MWh/y
BC _{i,y}	Fuel consumption of fuel i before the project start	-	kL,m ³ ,t etc./y
	Cruide Oil	1,330,569	kL/y
	Coal	0	t/y
	Gas	0	m3∕y
	Others	0	0
NCV _i	Net calorific value of fuel i	-	GJ/kL,m ³ ,t etc.
	Cruide Oil	36.3	GJ/kL
	Coal	26.7	GJ/t
	Gas	0.0384	GJ/m3
	Others	0.0	0
COEF _i	CO2 emission factor per calorific value of fuel i	-	t−CO₂∕TJ
	Cruide Oil	73.3	t−CO₂∕TJ
	Coal	98.3	t−CO₂∕TJ
	Gas	56.1	t−CO₂∕TJ
	Others	0	t–CO ₂ /TJ

PE _y	Project emission: GHG emission after fuel switching	3,050,366	t–CO ₂ /y
<i>PC</i> _{<i>i</i>,<i>y</i>}	Fuel consumption of fuel i after the project start	-	kL,m3,t etc./y
	Cruide Oil	0	kL/y
	Coal	0	t/y
	Gas	1,415,982,226	m3∕y
	Others	0	0
NCV _i	Net calorific value of fuel i	-	GJ/kL,m ³ ,t etc.
	Cruide Oil	36.3	GJ/kL
	Coal	26.7	GJ/t
	Gas	0.0384	GJ/m3
	Others	0.0	0
COEF;	CO2 emission factor per calorific value of fuel i	-	t–CO ₂ /TJ
	Cruide Oil	73.3	t–CO ₂ /TJ
	Coal	98.3	t–CO ₂ /TJ
	Gas	56.1	t–CO ₂ /TJ
	Others	0	t–CO ₂ /TJ

2.Project emission $PE_y = PC_{iy} \times NCV_i \times COEF_i$

3. GHG emission reduction with the project $ER_y = BE_y - PE_y$ (t-CO₂/y)

_

ER _y	GHG emission reduction with the project	664,822	t–CO ₂ /y
BE _y	Baseline emission: GHG emission without fuel switching	3,715,188	t-CO ₂ /y
PE _y	Project emission: GHG emission after fuel switching	3,050,366	t–CO ₂ /y

Input Sheet: Existing facilities

Project Name Sample1 [Efficiency improvement of the thermal power facilities_Existing facilities]

1. Quantity of power supply (of the target facilities after the project starts) (MWh/y)

Input the planned data for the calculation before the project start and the measured date for the calculation after the project start.

Item	Entry field	Unit
Quantity of power supply of the fossil fuel fired facilities after the project start	1,270,000	MWh∕y

2. Efficiency of power generation

Input the monitoring data for the efficiency of aging facilities in general without the project, at the country or neighboring countries.

Input the planned data for the calculation of the efficiency of the target facilities before the project start and the monitoring date for the calculation of the efficiency of the target facilities after the project start.

Item		
Before project	Efficiency of aging facilities in general, at the country or	0.32
After project	Efficiency of power generation from the target facilities	0.45
Source:	Data obtained from xx through interview	

4. CO_2 emission factor according to fuel type (t- CO_2/TJ)

Data availability is validated in the following order because it should preferably be calculated using data and information unique to the project.

- i) The unique data of the project obtained from the interview with power management entity
- ii) National default
- iii) IPCC Guideline default data

[The fuel used in the target facilities]

Input item Entry field Unit Crude Oil 73.3 t-CO₂/TJ

Source: 2006 IPCC Guidelines for National Greenhouse Gas Inventories Volume 2 Energy

En En

Entry field Entry field of the reference documents

Result Sheet: Existing facilities

Sample1 [Efficiency improvement of the thermal power facilities_Existing facilities]

GHG emission reduction with the project $(t-CO_2/y)$ $ER_y = BE_y - PE_y$ $(t-CO_2/y)$

1. Baseline emission $BE_y = EG_{PJ,y} \times EF_{BL,y}$

BE _y	Baseline emission: GHG emission from low efficiency power generators	1,047,274	t–CO ₂ /y
EG _{PJ,y}	Annual energy production after the project starts (transmission edge)	1,270,000	MWh
EF _{BL,y}	CO2 emission factor of the electricity	0.825	t-CO ₂ /MWh

2. Project emission $PE_y = EG_{PJ,y} \times EF_{PJ,y}$

PE _y	Project emission: GHG emission after the project	744,728	t−CO ₂ ∕y
EG _{PJ,y}	Annual energy production after the project starts (transmission edge)	1,270,000	MWh
EF _{PJ,y}	CO2 emission factor of the electricity	0.586	t-CO ₂ /MWh

ER _y	GHG emission reduction with the project	302,546	t–CO ₂ /y
BE _y	Baseline emission: GHG emission from low efficiency power generators	1,047,274	t–CO ₂ /y
PE _y	Project emission: GHG emission after the project	744,728	t–CO ₂ /y

Input Sheet: Existing facilities

Project Name Sample1 [Efficiency improvement of the thermal power facilities_Existing facilities]

1. Quantity of power supply (of the target facilities after the project starts) (MWh/y)

Input the planned data for the calculation before the project start and the measured date for the calculation after the project start.

Item	Entry field	Unit
Quantity of power supply of the fossil fuel fired facilities after the project start	1,270,000	MWh∕y

2. Efficiency of power generation

Input the monitoring data for the efficiency of the target facilities in absence of the project. Input the planned data for the calculation of the efficiency of the target facilities before the project start and the monitoring date for the calculation of the efficiency of the target facilities after the project start.

	Item	Entry field
Before project	Monitoring data before start of the project from the target facilities	0.32
After project	Efficiency of power generation from the target facilities	0.45
Source:	Data obtained from xx through interview	

4. CO_2 emission factor according to fuel type (t- CO_2/TJ)

Data availability is validated in the following order because it should preferably be calculated using data and information unique to the project.

i) The unique data of the project obtained from the interview with power management entity

ii) National default

iii) IPCC Guideline default data

[The fuel used in the target facilities]

Input item Entry field Unit Crude Oil 73.3 t-CO₂/TJ

Source: 2006 IPCC Guidelines for National Greenhouse Gas Inventories Volume 2 Energy

Entry field

Entry field of the reference documents

Result Sheet: Existing facilities

Sample1【Efficiency improvement of the thermal power facilities_Existing facilities】

GHG emission reduction with the project $(t-CO_2/y)$ $ER_y = BE_y - PE_y$ $(t-CO_2/y)$

1. Baseline emission $BE_y = EG_{PJ,y} \times EF_{BL,y}$

BE,	Baseline emission: GHG emission from low efficiency power generators	1,047,274	t-CO ₂ /y
EG _{PJ,y}	Annual energy production after the project starts (transmission edge)	1,270,000	MWh
EF _{BL,y}	CO2 emission factor of the electricity	0.825	t-CO ₂ /MWh

2. Project emission $PE_y = EG_{PJ,y} \times EF_{PJ,y}$

PE,	Project emission: GHG emission after the project	744,728	t-CO ₂ /y
EG _{PJ,y}	Annual energy production after the project starts (transmission edge)	1,270,000	MWh
EF _{PJ,y}	CO2 emission factor of the electricity	0.586	t-CO ₂ /MWh

ER _y	GHG emission reduction with the project	302,546	t-CO ₂ /y
BE _y	Baseline emission: GHG emission from low efficiency power generators	1,047,274	t-CO ₂ /y
PE _y	Project emission: GHG emission after the project	744,728	t-CO ₂ /y

Input Sheet: New facilities, Existing facilities

Project Name Sample1 [Streamlining of the facilities in the transmission grid_new facilities]

1. Transmission power loss (MWh/y)

Acquire the data for power loss by the following measures and input data.

[New facilities]

Input the estimated data for the power loss before the project.

Input the estimated data before the project start when you calculates the power loss after project and input the [Existing facilities]

Input the monitoring data for the power loss before the project.

Input the estimated data before the project start when you calculates the power loss after project and input the monitoring data for power loss after the project.

Item		Entry field	Unit
Fower loss	Before the project	2,494	MWh/y
in the facilities in the transmission	After the project	890	MWh/y

2. Co2 emission factor of electric power $(t-CO_2/MWh)$

Emission factor of the electric power shall be used as CO2 emission factor from electricity in suppressor grid. Data availability is validated in the following order in regards of the selection of suppressor grid and its emission i) Data obtained from the interview with power management entity

ii) National default

Item	Entry field	Unit	
CO2 emission factor of the electric powe	0.52	t-CO ₂ /MWh	
Source: Data obtained from xx through interview			



Entry field Entry field of the reference documents

Result Sheet: New facilities, Existing facilities

Sample1[Streamlining of the facilities in the transmission grid_new facilities]

GHG emission reduction with the project $(t-CO_2/y)$ $ER_y = BE_y - PE_y$ $(t-CO_2/y)$

1. Baseline emission $BE_y = BL_y \times EF_{BL,y}$

BE _y	Baseline emission: GHG emissions without streamlining facilities in the transmission grid	1,297	t−CO₂∕y
BL _y	Transmission power loss before the project starts	2,494	MWh/y
EF _{BL,y}	CO2 emission factor from electricity in suppressor grid	0.520	t−CO ₂ ∕ MWh

2. Project emission $PE_y = PL_y \times EF_{BL,y}$

PE _y	Project emission: GHG emission after the project	463	t-CO ₂ /y
<i>PL</i> _y	Transmission power loss after the project starts	890	MWh∕y
EF _{BL,y}	CO2 emission factor from electricity in suppressor grid	0.520	t-CO ₂ /MWh

ER _y	GHG emission reduction with the project	834	t-CO ₂ /y
BE _y	Baseline emission: GHG emissions without streamlining facilities in the transmission grid	1,297	t−CO ₂ ∕y
PE _y	Project emission: GHG emission after the project	463	t-CO ₂ /y

Input Sheet: New facilities, Existing facilities

Project Name Sample1 [Streamlining of _existing distribution equipment]

1. Distribution power loss (MWh/y)

Acquire the data for power loss by the following measures and input data.

[New facilities]

Input the estimated data for the power loss before the project.

Input the estimated data before the project start when you calculates the power loss after project and input the monitoring data for power loss after the project.

[Existing facilities]

Input the monitoring data for the power loss before the project.

Input the estimated data before the project start when you calculates the power loss after project and input the monitoring data for power loss after the project.

	Item	Entry field	Unit
in the	Before the project	1,295	MWh/y
facilities in	After the project	465	MWh/y

2. CO_2 emission factor of electric power (t- CO_2 /MWh)

Emission factor of the electric power shall be used as CO2 emission factor from electricity in suppressor grid. Data availability is validated in the following order in regards of the selection of suppressor grid and its emission factor.

i) Data obtained from the interview with power management entity

ii) National default

Item	Entry field	Unit
CO_2 emission factor of the electric powe	0.63	t-CO ₂ /MWh
Source: Data obtained from xx through interview		



Entry field

Entry field of the reference documents

Result Sheet: New facilities, Existing facilities

Sample1[Streamlining of _existing distribution equipment]

GHG emission reduction with the project $(t-CO_2/y)$ $ER_y = BE_y - PE_y$ $(t-CO_2/y)$

1. Baseline emission $BE_y = BL_y \times EF_{BL,y}$

BE _y	Baseline emission: GHG emissions without streamlining facilities in the distribution grid	816	t–CO ₂ /y
BL _y	Distribution power loss before the project starts	1,295	MWh/y
EF _{BL,y}	CO2 emission factor from electricity in suppressor grid	0.630	t-CO ₂ /MWh

2. Project emission $PE_y = PL_y \times EF_{BL,y}$

PE _y	Project emission: GHG emission after the project	293	t–CO ₂ /y
PL_y	Distribution power loss after the project starts	465	MWh/y
EF _{BL,y}	CO2 emission factor from electricity in suppressor grid	0.630	t-CO ₂ /MWh

ER _y	GHG emission reduction with the project	523	t-CO ₂ /y
BE _y	Baseline emission: GHG emissions without streamlining facilities in the distribution grid	816	t–CO ₂ /y
PE _y	Project emission: GHG emission after the project	293	t–CO ₂ /y

Input Sheet: Mini-Grid/ Stand-Alone

Project Name Sample1 [Renewable power: Mini-Grid]

1. Fuel consumption before project activity

For fuel consumption before project activity, enter the planned values before project activity, or the actual values after project activity in the corresponding cells.

Item	Entry	Unit	
Fuel consumption before project activity	Diesel oil	6,734	kL/y
	Kerosene	246	kL/y
	Others		

2. CO2 emission factor and net calorific value per fuel type

Data/ information specific to the target country should be preferably used. Data availability should be validated in the following order to enter data in the cells below.

i) Project-specific data obtained through interview to the electric power management entity concerned ii) Published values in the target country

iii) Default values adopted in IPCC guideline

Item	Net calorific value		CO ₂ emission factor	
Diesel oil	36.1	GJ/kL	74.1	t-CO ₂ /TJ
Kerosene	35.3	GJ/kL	71.9	t-CO ₂ /TJ
Others			t-CO ₂ /TJ	
Sources 2006 IBCC Cuidelines for National Creenhouse Cos				

ce: 2006 IPCC Guidelines for National Greenhouse Gas Inventories Volume 2 Energy table1.2,tab



Entry of data sources, etc.

Result Sheet: Mini-grid/ Stand-alone

Sample1 【Renewable power: Mini-Grid】

GHG emission reduction after project activity $(t-CO_2/y)ER_y = BE_y - PE_y$ $(t-CO_2/y)$

1. Baseline emission $BEy = EC_{diesel,y} \times NCV_{diesel,y} \times CEF_{diesel,y} +$

BE _y	Baseline emission: GHG emission without installation of a photovoltaic power plant	18,638	t-CO₂/y
EC _{diesel,y}	Light gas oil consumption when electric consumption from TV and others is covered by diesel power generation.	6,734	kL/y
	Kerosene consumption when electric consumption for lighting is covered by kerosene lamps.	246	kL/y
NCV _{diesel,y}	Net calorific value for Diesel oil	36	GJ/kL
y	Net calorific value for kerosene	35	GJ/kL
CEF _{diesel,y}	CO2 emission factor per net calorific value for diesel oil	74	t-CO ₂ /TJ
CEF kerosene,y	CO2 emission factor per net calorific factor for kerosene	72	t-CO ₂ /TJ

2. Project emission $PE_y = 0$

PE _y	Project emission:	0	t-CO ₂ /y
	GHG emission associated with photovoltaic power generation		

3. GHG emission reduction after project activity $ER_y = BE_y - PE_y$ (t-CO₂/y)

ER _y	GHG emission reduction after project activity	18,638	t-CO ₂ /y
BE _y	Baseline emission: GHG emission without installation of a photovoltaic power plant	18,638	t-CO ₂ /y
PE _y	Project emission: GHG emission associated with photovoltaic power generation	0	t-CO ₂ /y

Renewable Energy

Appendix-17 Hydro Power Appendix-18 Wind Power Appendix-19 Photovoltaic power / Solar heat Appendix-20 Geothermal Power Appendix-21 Biomass

Input Sheet: Grid

Project name Sample 1[Construction of hydropower plant: Grid connected]

1. Quantity of electricity (generated in the target power plant after project implementation)(MWh/y) Enter the planned value before project activity and actual value after project activity.

Parameter	Entry	Unit
Quantity of electricity generated in the target power plant after project activity	121,956	MWh/y

2. Energy mix in the target country

Data/ information specific to the target country should be preferably used for calculation. Data availability should be validated in the following order to enter data in the cells.

i) Project-specific values obtained through interview to electric power management entity concerned.

ii) Published values in the target country

iii) IEA balance table

III) IEA balance table		*Entry to either			
	Quantity of	Fuel consu	mption	Fuel consu	Imption
Fuel type	generated electricity	(kL, m ³ , t)		(converted to crude oil)	
	(GWh/y)	consumed volum	Unit	onsumed volum	Unit
Crude oil	31,222	9,568,000	kL/y		ktoe
Gas	62,475	17,321,000	m ³ /y		ktoe
Coal	479,955	155,516,000	t/y		ktoe
Others					ktoe
Source: Interview to >	(X				

3. CO2 emission factor per fuel type (t-CO₂/TJ)

Data/ information specific to the target country should be preferably used for calculation. Data availability should be validated in the following order to use.

- i) Project-specific data obtained through interview to the electric power management entity concerned
 ii) Published values in the target country
- iii) Default values adopted in IPCC guideline

Fuel type	Net calorific value		CO ₂ emission fact	
Crude oil	36.3	GJ/kL	73.3	t-CO ₂ /TJ
Gas	0.0384	GJ/m ³	56.1	t-CO ₂ /TJ
Coal	26.7	GJ/t	98.3	t-CO ₂ /TJ
Others				t-CO ₂ /TJ
Source: Interview to)	X			

2006 IPCC Guidelines for National Greenhouse Gas Inventories Volume 2 Energy table1.2,table2

4. Emission factor for GHG emissions from reservoir

For hydropower plants with reservoirs, GHG emission factor should be set also for reservoirs

Item	GHG emission factor	
GHG from reservoir	0.09 t-CO ₂ /MWh	
Source: Values speci	fied in 23rd CDM committee	meeting

Entry Entry of source, etc.

1. Baseline emission (t-CO₂/y)

Project outcome	121,956	MWh/y
Conversion	3600	kJ/kWh
factor	41.868	TJ/ktoe
	10.000	Tcal/ktoe
	860	kcal/kWh

Legend

Ley	ena	
		Auto filled from Input Sheet Default values (calculated automatically for manually entered data) Manual entry
		Calculated value

92,195

92,195

	Quantity of	generated	Fuel	Net calorific	Quantity of	Fuel consumption (converted	Heat efficiency	Caloric CO ₂
	elect	ricity	consumption	value	energy	to crude oil)	Heat efficiency	emission factor
	GWh/y	Ratio	kL,m ³ ,t	GJ/kL,m ³ ,t	TJ	ktoe/y	%	t-CO ₂ /TJ
Petroleum	31222	5.4%	9,568,000	36.3	347,296	8295	32.4%	73.3
Gas	62475	10.9%	17,321,000	0.0	665	16	33814.6%	56.1
Coal	479955	83.7%	155,516,000	26.7	4,152,277	99175	41.6%	98.3
Others	0	0.0%	0	0.0	0	0	0.0%	0.0
Total	573652							

	Fuel price	Suppression priority	Quantity of generated electricity	Quantity unable to suppress	Suppressible quantity
			MWh/y	MWh/y	MWh/y
Petroleum		1	31,222,000	28,683	31,193,317
Gas		2	62,475,000	28,683	62,446,317
Coal		3	479,955,000	28,683	479,926,317
Others		4	0	0	0

		Suppressible	Heat ellicienci		Caloric CO ₂	Fuel suppressed	CO2 emission
	to suppress	quantity	quantity		emission factor	quantity	reduced quantity
	MWh/y	MWh/y	MWh/y	%	t-CO ₂ /TJ	ktoe/y	t-CO ₂ /y
listorical (Petro	0		0		73.3	0.0	0
listorical (Gas	0		0		56.1	0.0	0
listorical (Coal	0		0		98.3	0.0	0
Petroleum	28,683	31,193,317	121,956	32.4%	73.3	32.4	99,437
Gas	28,683	62,446,317	0	33814.6%	56.1	0.0	0
Coal	28,683	##########	0	41.6%	98.3	0.0	0
Others	0	0	0	0.0%	0.0	0.0	0
Total			121,956			32.4	99,437
						(reference value)	Average thermal
						(ieieieiice value)	Average grid

2. Project emission (t-CO₂/y)

[Emissions from reservoir]

l ta ma	mission factouantity of electricantity of emission				
Item	t-CO ₂ /MWh	MWh	t-CO ₂		
GHG	0.09	121,956	10,976		

3. GHG emission reduction after project activity (t-CO₂/y)

	GHG emission
	t-CO ₂ /y
Baseline emission	99,437
Project emission	10,976
GHG emission reduction after project a	88,460

Result Sheet:Grid

Sample 1 【Construction of hydropower plant: Grid connected】

GHG emission reduction after project activity (t-CO₂/y) $ER_y = BE_y - PE_y$ (t-CO₂/y)

1. Baseline emission $BE_y = \Sigma FC_i \times \text{conversion factor (41.868 : TJ/ktoe)} \times COEF_i$

BE _y	Baseline emission: GHG emission associated with fuel consumption which is assumed to be replaced by hydropower generation	99,437	t-CO₂/y
FC _i	Reduction of fuel type i consumption in scope of reduction	-	ktoe/y
	Crude oil	32	ktoe/y
	Gas	0	ktoe/y
	Coal	0	ktoe/y
	Others	0	ktoe/y
COEF _i	CO_2 emission factor per net calorific value of fuel type i	-	t-CO ₂ /TJ
	Crude oil	73.3	t-CO ₂ /TJ
	Gas	56.1	t-CO ₂ /TJ
	Coal	98.3	t-CO ₂ /TJ
	Others	0	t-CO ₂ /TJ

2. Project emission $PE_y = 0$

	Project emission: GHG emission after project activity	10,976	t-CO ₂ /y
PE _{res}	Emission from reservoirs	10,976	t-CO₂/y

3. GHG emission reduction after project activity $ER_y = BE_y - PE_y$ (t-CO₂/y)

ER _y	GHG emission reduction after project activity	88,460	t-CO ₂ /y
BE _y	Baseline emission: GHG emission reduction associated with fuel consumption which is assumed to be replaced by hydropower generation	99,437	t-CO₂/y
РЕ _у	Project emission: GHG emission after project activity	10,976	t-CO ₂ /y

Input Sheet: Mini-Grid/ Stand-Alone

Project Name Virtual 1 [Hydropower: Mini-Grid]

1. Fuel consumption before project activity

For fuel consumption before project activity, enter the planned values before project activity, or the actual values after project activity in the corresponding cells.

Item	Entry	Unit	
Fuel consumption before	Diesel oil	6,734	kL/y
project activity	Kerosene	246	kL/y
project activity	Others		

2. CO2 emission factor and net calorific value per fuel type

Data/ information specific to the target country should be preferably used. Data availability should be validated in the following order to enter data in the cells below.

- i) Project-specific data obtained through interview to the electric power management entity concerned ii) Published values in the target country
- iii) Default values adopted in IPCC guideline

Item		Net calorific value		CO ₂ emission factor			
Diesel oil		36.1	GJ/kL	74.1	t-CO ₂ /TJ		
Kerosene		35.3	GJ/kL	71.9	t-CO ₂ /TJ		
Others					t-CO ₂ /TJ		
Source:	2006 IPCC Guidelines for National Greenhouse Gas Inventories Volume 2 Energy tabl						



Entry of data sources, etc.

Result Sheet: Mini-grid/ Stand-alone

Virtual 1【Hydropower: Mini-Grid】

GHG emission reduction after project activity (t-CO₂/y) $ER_y = BE_y - PE_y$ (t-CO₂/y)

1. Baseline emission $BEy = EC_{diesel,y} \times NCV_{diesel,y} \times CEF_{diesel,y} + EC_{kerosene,y} \times NCV_{kerosene,y} \times CEF_{kerosene,y}$

BE _y	Baseline emission: GHG emission without installation of a hydropower plant	18,638	t-CO ₂ /y
EC _{diesel,y}	Light gas oil consumption when electric consumption from TV and others is covered by diesel power generation.	6,734	kL/y
EC _{kerosene,y}	Kerosene consumption when electric consumption for lighting is covered by kerosene lamps.	246	kL/y
NCV _{diesel,y}	Net calorific value for Diesel oil	36	GJ/kL
у	Net calorific value for kerosene	35	GJ/kL
CEF _{diesel,y}	CO2 emission factor per net calorific value for diesel oil	74	t-CO ₂ /TJ
CEF kerosene,y	CO2 emission factor per net calorific factor for kerosene	72	t-CO ₂ /TJ

2. Project emission $PE_y = 0$

PE _y	Project emission:	0	t-CO₂/v
	GHG emission associated with hydropower generation	0	1-00 ₂ /y

3. GHG emission reduction after project activity $ER_y = BE_y - PE_y$ (t-CO₂/y)

ER _y	GHG emission reduction after project activity	18,638	t-CO ₂ /y
BE _y	Baseline emission: GHG emission without installation of a hydropower plant	18,638	t-CO ₂ /y
PEy	Project emission: GHG emission associated with hydropower generation	0	t-CO ₂ /y

Input Sheet: Grid

Project Name Sample1 [Construction of wind power plant]

1. Quantity of electricity (quantity of electricity generated in the target power plant after project activity)(MWh/y) Enter the planned value before project activity and the actual value after project activity in the cell below.

Parameter	Entry	Unit
Quantity of electricity generated in the	121,956	
target power plant after project activity	121,930	1VI V V I // Y

2. Energy mix of the target grid

Data/ information specific to the target country should be preferably used. Data availability should be validated in the following order to data in the cells below.

i) Project-specific values obtained through interview to the electric power management entity concerned ii) Published values in the target country

iii) IEA Balance table

*Entry	to either	colum	n is mano	latory.

		V		V	
Fuel type Quantity of generated electricity		Fuel consumption (kL, m ³ , t)		Fuel consumption (converted to crude oil)	
	(GWh/y)	consumed volum	Unit	onsumed volum	Unit
Crude Oil	31,222	9,568,000	kL/y		ktoe
Gas	62,475	17,321,000	m ³ /y		ktoe
Coal	479,955	155,516,000	t/y		ktoe
Others					ktoe
Source: Interview to 2	XX				

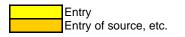
3. CO2 emission factor per fuel type (t-CO₂/TJ)

Data/ information specific to the target country should be preferably used for calculation. Data availability should be validated in the following order to use.

- i) Project-specific data obtained through interview to the electric power management entity concerned ii) Published values in the target country
- iii) Default values adopted in IPCC guideline

Fuel type	Net cale	orific value	CO ₂ emission factor			
Crude Oil	36.3	GJ/kL	73.3	t-CO ₂ /TJ		
Gas	0.0384	GJ/m ³	56.1	t-CO ₂ /TJ		
Coal	26.7	GJ/t	98.3	t-CO ₂ /TJ		
Others				t-CO ₂ /TJ		
Source: Interview to XX						

2006 IPCC Guidelines for National Greenhouse Gas Inventories Volume 2 Energy table1.2,table2



1. Baseline emission (t-CO₂/y)

			_	Legend	
Project	121,956	MWh/y	Г		
outcome					Auto filled from Input Sheet
Conversion	3600	kJ/kWh			Default values (calculated automatically for manually entered dat
factor	41.868	TJ/ktoe			Manual entry
	10.000	Tcal/ktoe			Calculated value
	860	kcal/kWh		<u>.</u>	

	Quantity of	generated	Fuel	Net calorific	Quantity of	Fuel consumption	Heat efficiency	Caloric CO ₂
	elect	ricity	consumptio	value	energy	(converted to crude oil)	Tieat efficiency	emission
	GWh/y	Ratio	kL,m ³ ,t	GJ/kL,m ³ ,t	ТJ	ktoe/y	%	t-CO ₂ /TJ
Petroleum	31222	5.4%	9,568,000	36.3	347,296	8295	32.4%	73.3
Gas	62475	10.9%	17,321,000	0.0	665	16	33814.6%	56.1
Coal	479955	83.7%	155,516,000	26.7	4,152,277	99175	41.6%	98.3
Others	0	0.0%	0	0.0	0	0	0.0%	0.0
Total	573652							

	Fuel price	Suppression	Quantity of generated	Quantity unable	Suppressible
	Fuel price	priority	electricity	to suppress	quantity
			MWh/y	MWh/y	MWh/y
Petroleum		1	31,222,000	28,683	31,193,317
Gas		2	62,475,000	28,683	62,446,317
Coal		3	479,955,000	28,683	479,926,317
Others		4	0	0	0

listorical (Gas 0 0 0 56.1 0.0 0 istorical (Coal 0 0 0 0 98.3 0.0 0		Quantity unable to suppress	Suppressible quantity	Suppressed quantity	leat efficienc	Caloric CO ₂ emission factor	Fuel suppressed	CO2 emission reduced quantity
Iistorical (Gas 0 0 56.1 0.0 0 istorical (Coal 0 0 0 98.3 0.0 0 Petroleum 28,683 31,193,317 121,956 32.4% 73.3 32.4 99,437 Gas 28,683 62,446,317 0 33814.6% 56.1 0.0 0 Coal 28,683 479,926,317 0 41.6% 98.3 0.0 0 Others 0 0 0.0% 0.0 0 0		MWh/y	MWh/y	MWh/y	%	t-CO ₂ /TJ	ktoe/y	t-CO ₂ /y
istorical (Coal 0 98.3 0.0 0 Petroleum 28,683 31,193,317 121,956 32.4% 73.3 32.4 99,437 Gas 28,683 62,446,317 0 33814.6% 56.1 0.0 0 Coal 28,683 479,926,317 0 41.6% 98.3 0.0 0 Others 0 0 0.0% 0.0 0.0 0	listorical (Petro	0		0		73.3	0.0	0
Petroleum 28,683 31,193,317 121,956 32.4% 73.3 32.4 99,437 Gas 28,683 62,446,317 0 33814.6% 56.1 0.0 0 Coal 28,683 479,926,317 0 41.6% 98.3 0.0 0 Others 0 0 0.0% 0.0 0 0	Historical (Gas	0		0		56.1	0.0	0
Gas 28,683 62,446,317 0 33814.6% 56.1 0.0 0 Coal 28,683 479,926,317 0 41.6% 98.3 0.0 0 Others 0 0 0.0% 0.0 0 0	Historical (Coal	0		0		98.3	0.0	0
Coal 28,683 479,926,317 0 41.6% 98.3 0.0 0 Others 0 0 0.0% 0.0 0 0	Petroleum	28,683	31,193,317	121,956	32.4%	73.3	32.4	99,437
Others 0 0 0 0.0% 0.0 0.0 0	Gas	28,683	62,446,317	0	33814.6%	56.1	0.0	0
	Coal	28,683	479,926,317	0	41.6%	98.3	0.0	0
Total 121,956 32.4 99,437	Others	0	0	0	0.0%	0.0	0.0	0
	Total			121,956			32.4	99,437

reference value Average therma 92,195 Average grid 92,195



2. Project emission (t-CO₂/y)

3. GHG emission reduction after project activity (t-CO₂/y)

	GHG emission
	t-CO ₂ /y
Baseline emission	99,437
Project emission	27
GHG emission reduction after project a	99,410

Result Sheet: Grid

Sample1 【Construction of wind power plant】

GHG emission reduction after project activity (t-CO₂/y) $ER_y = BE_y - PE_y$ (t-CO₂/y)

1. Baseline emission $BE_y = \Sigma FC_i \times \text{conversion factor (41.868 : TJ/ktoe)} \times COEF_i$

BE _y	Baseline emission: GHG emission associated with fuel consumption which is assumed to be replaced by wind power plant.	99,437	t-CO ₂ /y
FC ;	Fuel consumption reduction for fuel type i for suppression	-	ktoe/y
	Crude Oil	32	ktoe/y
	Gas	0	ktoe/y
	Coal	0	ktoe/y
	Others	0	ktoe/y
COEF _i	CO2 emission factor per net calorific value for fuel type i	-	t-CO ₂ /TJ
	Crude Oil	73.3	t-CO ₂ /TJ
	Gas	56.1	t-CO ₂ /TJ
	Coal	98.3	t-CO ₂ /TJ
	Others	0	t-CO ₂ /TJ

2. Project emission $PE_y = 0$

PE _y	Project emission:	27	t-CO ₂ /v
	GHG emission after project activity	21	(00 _{2'} y

3. GHG emission reduction after project activity $ER_y = BE_y - PE_y$ (t-CO₂/y)

ER _y	GHG emission reduction after project activity	99,410	t-CO ₂ /y
BE _y	Baseline emission: GHG emission associated with fuel consumption which is assumed to be replaced by wind power generation.	99,437	t-CO₂/y
PE _y	Project emission: GHG emission after project activity	27	t-CO ₂ /y

Input Sheet: Mini-Grid/ Stand-Alone

Project Name Sample1[Wind power: Mini-Grid]

1. Fuel consumption before project activity

For fuel consumption before project activity, enter the planned values before project activity, or the actual values after project activity in the corresponding cells.

Item	Entry	Unit	
Fuel consumption before	Diesel oil	6,734	kL/y
Fuel consumption before project activity	Kerosene	246	kL/y
	Others		

2. CO2 emission factor and net calorific value per fuel type

Data/ information specific to the target country should be preferably used. Data availability should be validated in the following order to enter data in the cells below.

- i) Project-specific data obtained through interview to the electric power management entity concerned ii) Published values in the target country
- iii) Default values adopted in IPCC guideline

Item		Net calo	rific value	CO ₂ emission factor		
Diesel oil		36.1	GJ/kL	74.1	t-CO ₂ /TJ	
Kerosene		35.3	GJ/kL	71.9	t-CO ₂ /TJ	
Others					t-CO ₂ /TJ	
Source:	2006 IPC	C. Guidelin	es for Nat	ional Gree	nhouse Gas	

urce: 2006 IPCC Guidelines for National Greenhouse Gas Inventories Volume 2 Energy table1



Entry Entry of data sources, etc.

Result Sheet: Mini-grid/ Stand-alone

Sample1 [Wind power: Mini-Grid]

GHG emission reduction after project activity (t-CO₂/y) $ER_y = BE_y - PE_y$ (t-CO₂/y)

1. Baseline emission $BEy = EC_{diesel,y} \times NCV_{diesel,y} \times CEF_{diesel,y} + EC_{kerosene,y} \times NCV_{kerosene,y} \times CEF_{kerosene,y}$

BEy	Baseline emission: GHG emission without installation of a Wind power plant	18,638	t-CO ₂ /y
EC _{diesel,y}	Light gas oil consumption when electric consumption from TV and others is covered by diesel power generation.	6,734	kL/y
EC _{kerosene,y}	Kerosene consumption when electric consumption for lighting is covered by kerosene lamps.	246	kL/y
NCV _{diesel,y}	Net calorific value for Diesel oil	36	GJ/kL
	Net calorific value for kerosene	35	GJ/kL
CEF _{diesel,y}	CO2 emission factor per net calorific value for diesel oil	74	t-CO ₂ /TJ
CEF _{kerosene,y}	CO2 emission factor per net calorific factor for kerosene	72	t-CO ₂ /TJ

2. Project emission $PE_y = 0$

PEy	Project emission:	
	GHG emission associated with wind power generation	0 $1-CO_2/y$

3. GHG emission reduction after project activity $ER_y = BE_y - PE_y$ (t-CO₂/y)

ER _y	GHG emission reduction after project activity	18,638	t-CO ₂ /y
BE _y	Baseline emission: GHG emission without installation of a wind power plant	18,638	t-CO ₂ /y
PE _y	Project emission: GHG emission associated with wind power generation	0	t-CO ₂ /y

Input Sheet: Grid

Project Name Sample1[Construction of photovoltaic power plant]

1. Quantity of electricity (quantity of electricity generated in the target power plant after project activity)(MWh/y) Enter the planned value before project activity and the actual value after project activity in the cell below.

Parameter	Entry	Unit
Quantity of electricity generated in the	121.956	MWh/v
target power plant after project activity	,	····· "

2. Energy mix of the target grid

Data/ information specific to the target country should be preferably used. Data availability should be validated in the following order to data in the cells below.

i) Project-specific values obtained through interview to the electric power management entity concerned
 ii) Published values in the target country

iii) IEA Balance table

^Entry	to eitner	column	is mand	atory.

		V			
Fuel type	Quantity of generated electricity	Fuel consumption (kL, m ³ , t)		Fuel consumption (converted to crude oil)	
	(GWh/y)	consumed volum	Unit	onsumed volum	Unit
Crude Oil	31,222	9,568,000	kL/y		ktoe
Gas	62,475	17,321,000	m ³ /y		ktoe
Coal	479,955	155,516,000	t/y		ktoe
Others					ktoe
Source: Interview to 2	XX				

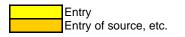
3. CO2 emission factor per fuel type (t-CO₂/TJ)

Data/ information specific to the target country should be preferably used for calculation. Data availability should be validated in the following order to use.

- i) Project-specific data obtained through interview to the electric power management entity concerned ii) Published values in the target country
- iii) Default values adopted in IPCC guideline

Fuel type	Net cale	orific value	CO ₂ emission factor		
Crude Oil	36.3	GJ/kL	73.3	t-CO ₂ /TJ	
Gas	0.0384	GJ/m ³	56.1	t-CO ₂ /TJ	
Coal	26.7	GJ/t	98.3	t-CO ₂ /TJ	
Others				t-CO ₂ /TJ	
Source: Interview to 2	XX				

2006 IPCC Guidelines for National Greenhouse Gas Inventories Volume 2 Energy table1.2,table2



1. Baseline emission (t-CO₂/y)

				Legend	
Project	121,956	MWh/y			
outcome			-		Auto filled from Input Sheet
Conversion	3600	kJ/kWh			Default values (calculated automatically for manually entered dat
factor	41.868	TJ/ktoe			Manual entry
	10.000	Tcal/ktoe			Calculated value
	860	kcal/kWh			

	Quantity of	generated	Fuel	Net calorific	Quantity of	Fuel consumption	Heat efficiency	Caloric CO ₂
	elect	ricity	consumptio	value	energy	(converted to crude oil)	Tieat efficiency	emission
	GWh/y	Ratio	kL,m ³ ,t	GJ/kL,m ³ ,t	ТJ	ktoe/y	%	t-CO ₂ /TJ
Petroleum	31222	5.4%	9,568,000	36.3	347,296	8295	32.4%	73.3
Gas	62475	10.9%	17,321,000	0.0	665	16	33814.6%	56.1
Coal	479955	83.7%	155,516,000	26.7	4,152,277	99175	41.6%	98.3
Others	0	0.0%	0	0.0	0	0	0.0%	0.0
Total	573652							

	Fuel price	Suppression		Quantity unable	Suppressible
	Fuel price	priority	electricity	to suppress	quantity
			MWh/y	MWh/y	MWh/y
Petroleum		1	31,222,000	28,683	31,193,317
Gas		2	62,475,000	28,683	62,446,317
Coal		3	479,955,000	28,683	479,926,317
Others		4	0	0	0

listorical (Petro	MWh/y	MWh/y	NANA/I.		emission factor	suppressed	reduced quantity
,	0		MWh/y	%	t-CO ₂ /TJ	ktoe/y	t-CO ₂ /y
listeries (Ose	0		0		73.3	0.0	0
listorical (Gas	0		0		56.1	0.0	0
listorical (Coal	0		0		98.3	0.0	0
Petroleum	28,683	31,193,317	121,956	32.4%	73.3	32.4	99,437
Gas	28,683	62,446,317	0	33814.6%	56.1	0.0	0
Coal	28,683	479,926,317	0	41.6%	98.3	0.0	0
Others	0	0	0	0.0%	0.0	0.0	0
Total			121,956			32.4	99,437

reference value	Average therma	92,195
Telefence value	Average grid	92,195



2. Project emission (t-CO₂/y)

3. GHG emission reduction after project activity (t-CO2/y)

	GHG emission t-CO ₂ /y
Baseline emission	99,437
Project emission	27
GHG emission reduction after project a	99,410

Result Sheet: Grid

Sample1 【Construction of photovoltaic power plant】

GHG emission reduction after project activity $(t-CO_2/y)ER_y = BE_y - PE_y$ (t-CO₂/y)

1. Baseline emission $BE_y = \Sigma FC_i \times \text{conversion factor (41.868 : TJ/ktoe)} \times \text{COEF}_i$

BE _y	Baseline emission: GHG emission associated with fuel consumption which is assumed to be replaced by photovoltaic power plant.	99,437	t-CO ₂ /y
FC _i	Fuel consumption reduction for fuel type i for suppression	-	ktoe/y
	Crude Oil	32	ktoe/y
	Gas	0	ktoe/y
	Coal	0	ktoe/y
	Others	0	ktoe/y
COEF _i	CO2 emission factor per net calorific value for fuel type i	-	t-CO ₂ /TJ
	Crude Oil	73.3	t-CO ₂ /TJ
	Gas	56.1	t-CO ₂ /TJ
	Coal	98.3	t-CO ₂ /TJ
	Others	0	t-CO ₂ /TJ

2. Project emission $PE_y = 0$

PE _y	Project emission: GHG emission after project activity	27	t-CO ₂ /y

3. GHG emission reduction after project activity $ER_y = BE_y - PE_y$ (t-CO₂/y)

ER _y	GHG emission reduction after project activity	99,410	t-CO₂/y
BE _y	GHG emission associated with fuel consumption which is assumed to be replaced byphotovoltaic power	99.437	t-CO ₂ /y
PE _y	Project emission: GHG emission after project activity	27	t-CO ₂ /y

Input Sheet: Mini-Grid/ Stand-Alone

Project Name Sample1[photovoltaic power: Mini-Grid]

1. Fuel consumption before project activity

For fuel consumption before project activity, enter the planned values before project activity, or the actua values after project activity in the corresponding cells.

Item	Entry	Unit	
Fuel consumption before project activity	Diesel oil	6,734	kL/y
	Kerosene	246	kL/y
project activity	Others		

2. CO2 emission factor and net calorific value per fuel type

Data/ information specific to the target country should be preferably used. Data availability should be validated in the following order to enter data in the cells below.

i) Project-specific data obtained through interview to the electric power management entity concerned ii) Published values in the target country

iii) Default values adopted in IPCC guideline

Item	Net calo	rific value	CO ₂ emission facto	
Diesel oil	36.1	GJ/kL	74.1	t-CO ₂ /TJ
Kerosene	35.3	GJ/kL	71.9	t-CO ₂ /TJ
Others				t-CO ₂ /TJ
Source: 2006 IDC	C Cuidalia	on for Not	anal Croo	nhouse Coo

e: 2006 IPCC Guidelines for National Greenhouse Gas Inventories Volume 2 Energy table1.2,tab



Entry of data sources, etc.

Result Sheet: Mini-grid/ Stand-alone

Sample1 [photovoltaic power: Mini-Grid]

GHG emission reduction after project activity (t-CO₂/y) $ER_y = BE_y - PE_y$ (t-CO₂/y)

1. Baseline emission $BEy = EC_{diesel,y} \times NCV_{diesel,y} \times CEF_{diesel,y} \neq EC_{kerosene,y} \times NCV_{kerosene,y} \times CEF_{kerosene,y}$

BE _y	Baseline emission: GHG emission without installation of a photovoltaic power plant	18,638	t-CO ₂ /y
EC _{diesel,y}	Light gas oil consumption when electric consumption from TV and others is covered by diesel power generation.	6,734	kL/y
EC _{kerosene,y}	Kerosene consumption when electric consumption for lighting is covered by kerosene lamps.	246	kL/y
NCV _{diesel,y}	Net calorific value for Diesel oil	36	GJ/kL
NCV _{kerosene,} y	Net calorific value for kerosene	35	GJ/kL
CEF _{diesel,y}	CO2 emission factor per net calorific value for diesel oil	74	t-CO ₂ /TJ
CEF _{kerosene,y}	CO2 emission factor per net calorific factor for kerosene	72	t-CO ₂ /TJ

2. Project emission $PE_y = 0$

GHG emission associated with photovoltaic power generation	PE _y	Project emission: GHG emission associated with photovoltaic power generation	0	t-CO ₂ /y
--	-----------------	---	---	----------------------

3. GHG emission reduction after project activity $ER_y = BE_y - PE_y$ (t-CO₂/y)

ER _y	GHG emission reduction after project activity	18,638	t-CO ₂ /y
BE _y	Baseline emission: GHG emission without installation of a photovoltaic power plant	18,638	t-CO₂/y
PE _y	Project emission: GHG emission associated with photovoltaic power generation	0	t-CO ₂ /y

Input Sheet: Grid

Project Name Virtual 1[Construction of photovoltaic power plant]

1. Quantity of electricity (quantity of electricity generated in the target power plant after project activity)(MWh/y) Enter the planned value before project activity and the actual value after project activity in the cell below.

Parameter	Entry	Unit
Quantity of electricity generated in the target power plant after project activity	121,956	MWh/y

2. Energy mix of the target grid

Data/ information specific to the target country should be preferably used. Data availability should be validated in the following order to data in the cells below.

- i) Project-specific values obtained through interview to the electric power management entity concerned
- ii) Published values in the target country iii) IEA Balance table

A Balance table		^Entry to either co	rentry to either column is mand		
		₩	N	/	
	Quantity of	Fuel consumption	on I	Fuel consump	

Fuel type	Quantity of generated electricity	Fuel consu (kL, m ³		Fuel consur (converted to c	
	(GWh/y)	onsumed volum	Unit	Consumed volume	Unit
Crude Oil	31,222	9,568,000	kL/y		ktoe
Gas	62,475	17,321,000	m ³ /y		ktoe
Coal	479,955	155,516,000	t/y		ktoe
Others					ktoe
Source: Interview to 2	XX				

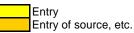
3. CO2 emission factor per fuel type (t-CO₂/TJ)

Data/ information specific to the target country should be preferably used for calculation. Data availability should be validated in the following order to use.

- i) Project-specific data obtained through interview to the electric power management entity concerned
- ii) Published values in the target country
- iii) Default values adopted in IPCC guideline

Fuel type	Net calorific value		CO ₂ emission factor			
Crude Oil	36.3	GJ/kL	73.3	t-CO ₂ /TJ		
Gas	0.0384	GJ/m ³	56.1	t-CO ₂ /TJ		
Coal	26.7	GJ/t	98.3	t-CO ₂ /TJ		
Others				t-CO ₂ /TJ		
Source: Interview to XX						

2006 IPCC Guidelines for National Greenhouse Gas Inventories Volume 2 Energy table1.2,table2.2



1. Baseline emission (t-CO₂/y)

				Legend	
Project	121,956	MWh/y			
outcome		_			Auto filled from Input Sheet
Conversion	3600	kJ/kWh			Default values (calculated automatically for manually entered dat
factor	41.868	TJ/ktoe			Manual entry
	10.000	Tcal/ktoe			Calculated value
	860	kcal/kWh	1		
			-		

	Quantity of generated electricity		Fuel	Net calorific	Quantity of	Fuel consumption	Heat efficiency	Caloric CO ₂
			consumptio	value	energy	(converted to crude oil)	Heat efficiency	emission
	GWh/y	Ratio	kL,m ³ ,t	GJ/kL,m ³ ,t	ТJ	ktoe/y	%	t-CO ₂ /TJ
Petroleum	31222	5.4%	9,568,000	36.3	347,296	8295	32.4%	73.3
Gas	62475	10.9%	17,321,000	0.0	665	16	33814.6%	56.1
Coal	479955	83.7%	155,516,000	26.7	4,152,277	99175	41.6%	98.3
Others	0	0.0%	0	0.0	0	0	0.0%	0.0
Total	573652							

	Fuel price	Suppression	Quantity of generated	Quantity unable	Suppressible
	Fuel price	priority	priority electricity		quantity
			MWh/y	MWh/y	MWh/y
Petroleum		1	31,222,000	28,683	31,193,317
Gas		2	62,475,000	28,683	62,446,317
Coal		3	479,955,000	28,683	479,926,317
Others		4	0	0	0

listorical (Gas 0 0 0 56.1 0.0 0 istorical (Coal 0 0 0 0 98.3 0.0 0		Quantity unable to suppress	Suppressible quantity	Suppressed quantity	leat efficienc	Caloric CO ₂ emission factor	Fuel suppressed	CO2 emission reduced quantity
Iistorical (Gas 0 0 56.1 0.0 0 istorical (Coal 0 0 0 98.3 0.0 0 Petroleum 28,683 31,193,317 121,956 32.4% 73.3 32.4 99,437 Gas 28,683 62,446,317 0 33814.6% 56.1 0.0 0 Coal 28,683 479,926,317 0 41.6% 98.3 0.0 0 Others 0 0 0.0% 0.0 0 0		MWh/y	MWh/y	MWh/y	%	t-CO ₂ /TJ	ktoe/y	t-CO ₂ /y
istorical (Coal 0 98.3 0.0 0 Petroleum 28,683 31,193,317 121,956 32.4% 73.3 32.4 99,437 Gas 28,683 62,446,317 0 33814.6% 56.1 0.0 0 Coal 28,683 479,926,317 0 41.6% 98.3 0.0 0 Others 0 0 0.0% 0.0 0.0 0	listorical (Petro	0		0		73.3	0.0	0
Petroleum 28,683 31,193,317 121,956 32.4% 73.3 32.4 99,437 Gas 28,683 62,446,317 0 33814.6% 56.1 0.0 0 Coal 28,683 479,926,317 0 41.6% 98.3 0.0 0 Others 0 0 0.0% 0.0 0 0	Historical (Gas	0		0		56.1	0.0	0
Gas 28,683 62,446,317 0 33814.6% 56.1 0.0 0 Coal 28,683 479,926,317 0 41.6% 98.3 0.0 0 Others 0 0 0.0% 0.0 0 0	Historical (Coal	0		0		98.3	0.0	0
Coal 28,683 479,926,317 0 41.6% 98.3 0.0 0 Others 0 0 0.0% 0.0 0 0	Petroleum	28,683	31,193,317	121,956	32.4%	73.3	32.4	99,437
Others 0 0 0 0.0% 0.0 0.0 0	Gas	28,683	62,446,317	0	33814.6%	56.1	0.0	0
	Coal	28,683	479,926,317	0	41.6%	98.3	0.0	0
Total 121,956 32.4 99,437	Others	0	0	0	0.0%	0.0	0.0	0
	Total			121,956			32.4	99,437

reference value	Average therma	92,195
reference value	Average grid	92,195



2. Project emission (t-CO₂/y)

3. GHG emission reduction after project activity (t-CO2/y)

	GHG emission
	t-CO ₂ /y
Baseline emission	99,437
Project emission	27
GHG emission reduction after project a	99,410

Result Sheet: Grid

Virtual 1 【Construction of photovoltaic power plant】

GHG emission reduction after project activity (t-CO₂/y) $ER_y = BE_y - PE_y$ (t-CO₂/y)

1. Baseline emission $BE_y = \Sigma FC_i \times \text{conversion factor (41.868 : TJ/ktoe)} \times COEF_i$

BE _y	Baseline emission: GHG emission associated with fuel consumption which is assumed to be replaced by photovoltaic power plant.	99,437	t-CO ₂ /y
FC _i	Fuel consumption reduction for fuel type i for suppression	-	ktoe/y
	Crude Oil	32	ktoe/y
	Gas	0	ktoe/y
	Coal	0	ktoe/y
	Others	0	ktoe/y
COEF _i	CO2 emission factor per net calorific value for fuel type i	-	t-CO ₂ /TJ
	Crude Oil	73.3	t-CO ₂ /TJ
	Gas	56.1	t-CO ₂ /TJ
	Coal	98.3	t-CO ₂ /TJ
	Others	0	t-CO ₂ /TJ

2. Project emission $PE_y = 0$

РЕ _у	Project emission: GHG emission after project activity	27	t-CO ₂ /y
	GHG emission alter project activity		

3. GHG emission reduction after project activity $ER_y = BE_y - PE_y$ (t-CO₂/y)

ER _y	GHG emission reduction after project activity	99,410	t-CO ₂ /y
BE _y	Baseline emission: GHG emission associated with fuel consumption which is assumed to be replaced by photovoltaic power generation.	99.2.37	t-CO ₂ /y
PE _y	Project emission: GHG emission after project activity	27	t-CO ₂ /y

Input Sheet: Mini-grid/ Stand-alone

Project Name Virtual 2 [Solar Water Heater: Installation of Stand-alone Type]

1. Requirements for electric water heaters

For requirements for electric water heaters to be installed during the project, enter the planned values before project activity and the actual values after project activity in the cells below.

Parameter	Value	Unit
Quantity of water supplied	768,000	kL/y
Heated water temperature	35	°C
Working ratio	80	%
Source: Interview to XX		

Data type

2. Efficiency of electric water heater to be installed in the project

Enter the planned value obtained from case studies for efficiency of electric water heater to be installed in the project.

Parameter	Value	Unit
Efficiency of electric water h	100	%
Source: Interview to 2	κX	

3. CO2 emission factor for electricity (t-CO₂/MWh)

Employ the emission factor for a typical power plant in the target grid as the emission factor for grid-connected electricity. Data availability should be validated in the following order in selecting a typical power plant and

rgy

i) Interview to the electric power management entity concerned

ii) Published values in the target country

Parameter	Entry	Unit
CO ₂ emission factor for electricity	0.967	t-CO ₂ /MWh
Source: 2006 IPCC Guidelines for Nat	tional Greenhou	se Gas Inventories Volu



Entry for sources, etc.

Result Sheet: Mini-grid/ Stand-alone

Virtual 2【Solar Water Heater: Installation of Stand-alone Type】

GHG emission reduction after project activity (t-CO₂/y) $ER_y = BE_y - PE_y$ (t-CO₂/y)

1. Baseline emission $BE_y = EC_{BL,y} \times EF_{BL,y}$

BE _y	Baseline emission: GHG emission accompanied with electricity consumption which is assumed to be replaced by solar water heater.	25,005	t-CO ₂ /y
EC _{BL,y}	Electricity consumption to gain heated water quantity which solar water heater will supply.	25,005	MWh/y
	Heated water quantity to be supplied by solar water heater	768,000	kL/y
	Water temperature rise	35	°C
	Working ratio of solar water heater	80	%
	Efficiency of electric water heater	100	%
EF _{BL,y}	Co2 emission factor for grid-connected electricity	0.967	t-CO₂/MWh

2. Project emission $PE_y = 0$

PEy	Project emission:	27	t-CO ₂ /y
	GHG emission after project activity	21	(C C 2' y

3. GHG emission reduction after project activity $ER_y = BE_y - PE_y$ (t-CO₂/y)

ER _y	GHG emission reduction after project activity	24,978	t-CO ₂ /y
BE _y	Baseline emission: GHG emission accompanied with electricity consumption which is assumed to be replaced by solar water heater.	25,005	t-CO ₂ /y
PE _y	Project emission: GHG emission after project activity	27	t-CO ₂ /y

Input Sheet 20. Geothermal Power Project Name Virtual 1 [Construction of geothermal power plant

1. Quantity of electricity (generated in the target power plant after project implementation)(MWh/y) Enter the planned value before project activity and actual value after project activity.

Parameter	Entry	Unit
Quantity of electricity generated in the target power plant after project activity	473,040	MWh/y

2. Energy mix in the target country

Data/ information specific to the target country should be preferably used for calculation. Data availability should be validated in the following order to enter data in the cells.

- i) Project-specific values obtained through interview to electric power management entity concerned.
- ii) Published values in the target country iii) IEA balance table

*Entry to either column is mandatory.

		↓		\checkmark	
Fuel type	Quantity of generated electricity	Fuel consu (kL, m ³	•	Fuel consu (converted to	
	(GWh/y)	consumed volum	Unit	onsumed volum	Unit
Petroleum	31,222	9,568,000	kL/y		ktoe
Gas	62,475	17,321,000	m³/y		ktoe
Coal	479,955	155,516,000	t/y		ktoe
Others					ktoe
Source: Interview to)	XX				

3. CO2 emission factor per fuel type (t-CO₂/TJ)

Data/ information specific to the target country should be preferably used for calculation. Data availability should be validated in the following order to use.
i) Project-specific data obtained through interview to the electric power management entity concerned
ii) Published values in the target country

iii) Default values adopted in IPCC guideline

Fuel type	Net calorific value		CO ₂ em	CO ₂ emission factor	
Petroleum	36.3	GJ/kL	73.3	t-CO ₂ /TJ	
Gas	0.0384	GJ/m ³	56.1	t-CO ₂ /TJ	
Coal	26.7	GJ/t	98.3	t-CO ₂ /TJ	
Others				t-CO ₂ /TJ	

2006 IPCC Guidelines for National Greenhouse Gas Inventories Volume 2 Energy table1.2,table2.2

4. Fuel consumption in geothermal power plant

Acquire amounts of fuel consumption used in the geothermal power plant during the project and enter values in the cells below.

[Fuel used in the target power plant]

	Fuel co	nsumption	
Fuel type	(kL,	m ³ , t)	
	Consumption	Unit	
Petroleum	5	kL/y	
Gas		m ³ /y	
Coal		t/y	
Others			
Source: Interview to >	Χ		

5. GHG emission factor from vapor emission

For CO2/CH4 emission from vapor emitted during the project, enter the planned values before project activity and the actual values after project activity for the average mass of vapor in the cells below.

Parameter	Value	Unit
Average CO2 mass in vapor generated	0.005	t-CO ₂ /t
Average CH4 mass of vapor generated	0.000	t-CO ₂ /t
Global warming factor of methane	21	—
Vapor generated in the year y	1,000	t/y
Source: Interview to XX		

Entry Entry of source, etc.

1. Baseline emission (t-CO₂/y)

Project outcome	473,040	MWh/y
Conversion	3600 41.868	kJ/kWh T l/ktoe
lactor	10.000	Tcal/ktoe
	860	kcal/kWh

Legend

Logona	
	Auto filled from Input Sheet
	Default values (calculated automatically for manually entered data)
	Manual entry
	Calculated value
	-

	Quantity of elect	generated ricity	Fuel consumptio	Net calorific value	Quantity of energy	Fuel consumption (converted to crude oil)	Heat efficiency	Caloric CO ₂ emission	emission	factor for
	GWh/y	Ratio	kL,m ³ ,t	GJ/kL,m ³ ,t	ТJ	ktoe/y	%	t-CO ₂ /TJ	kg-CO	₂ /kWh
Petroleum	31222	5.4%	9,568,000	36.3	347,296	8295	32.4%	73.3	0.815	Average thermal
Gas	62475	10.9%	17,321,000	0.0	665	16	33814.6%	56.1	0.001	0.756
Coal	479955	83.7%	155,516,000	26.7	4,152,277	99175	41.6%	98.3	0.850	
Others	0	0.0%	0	0.0	0	0	0.0%	0.0		
Total	573652								Grid	0.756

	Fuel price	Suppression	Quantity of generated electricity		
	-	priority	electricity	to suppress	quantity
			MWh/y	MWh/y	MWh/y
Petroleum		1	31,222,000	28,683	31,193,317
Gas		2	62,475,000	28,683	62,446,317
Coal		3	479,955,000	28,683	479,926,317
Others		4	0	0	0

		Quantity unable	Suppressible	Suppressed	Heat efficienc	Caloric CO ₂	Fuel	CO2 emission
		to suppress	guantity	quantity	leat enicienc	emission factor	suppressed	reduced quantity
		MWh/y	MWh/y	MWh/y	%	t-CO ₂ /TJ	ktoe/y	t-CO ₂ /y
0	listorical (Petro	0		0		73.3	0.0	0
0	Historical (Gas)	0		0		56.1	0.0	0
0	Historical (Coal	0		0		98.3	0.0	0
1	Petroleum	28,683	31,193,317	473,040	32.4%	73.3	125.7	385,692
2	Gas	28,683	62,446,317	0	33814.6%	56.1	0.0	0
3	Coal	28,683	479,926,317	0	41.6%	98.3	0.0	0
4	Others	0	0	0	0.0%	0.0	0.0	0
	Total			473,040			125.7	385,692
							(reference value	Average therma
								Average grid

2. Project emission (t-CO₂/y)

[Vapor emission]

Parameter	Emission facto	apor emissio	Emission	
Falametei	t-CO2/t	t	t-CO ₂ /y	
CO2	0.005	1,000	5	
CH4	0	1,000	0	
GHG	—	_	5	\backslash

	uel consumptio	Net calorific	Caloric CO ₂	CO ₂	
		value	emission	emission	
	kL,m ³ ,t	GJ/kL,m ³ ,t	t-CO ₂ /TJ	t-CO ₂ /y	
Petroleum	5	36.3	73.3	13	
Gas	0	0.0	56.1	0	
Coal	0	26.7	98.3	0	
Others	0	0.0	0.0	0	
Total				13	

3. GHG emission reduction after project activity (t-CO₂/y)

	GHG emission t-CO ₂ /y
Baseline emission	385,692
Project emission	18
GHG emission after project activity	385,674

Result Sheet

Virtual 1 【Construction of geothermal power plant

GHG emission reduction after project activity $(t-CO_2/y)_{ER_y} = BE_y - PE_y$ (t-CO₂/y)

1. Baseline emission $BE_y = \Sigma FC_i \times \text{conversion factor (41.868 : TJ/ktoe)} \times C$	COEF
--	------

BE _y	Baseline emission: GHG emission from fuel consumption which is assumed to be replaced by geothermal power generation	385,692	t-CO ₂ /y
FC _i	Fuel reduction of fuel type i for suppression	-	ktoe/y
	Petroleum	126	ktoe/y
	Gas	0	ktoe/y
	Coal	0	ktoe/y
	Others	0	ktoe/y
COEF _i	CO2 emission factor per net calorific value for fuel type i	-	t-CO ₂ /TJ
	Petroleum	73.3	t-CO ₂ /TJ
	Gas	56.1	t-CO ₂ /TJ
	Coal	98.3	t-CO ₂ /TJ
	Others	0	t-CO ₂ /TJ

2. Project emission $PE_y = PES_y + PEFF_y$

PE _y	Project emission: GHG emission after project activity	18 <mark>t-CO₂/y</mark>
PES _y	Emission from reservoir	5 <mark>t-CO₂/y</mark>
PEFF _y	Emission associated with fuel consumption	13 <mark>t-CO₂/y</mark>

3. GHG emission reduction after project activity $ER_y = BE_y - PE_y$ (t-CO₂/y)

ER _y	GHG emission reduction after project activity	385,674	t-CO ₂ /y
BE _y	Baseline emission: GHG emission associated with fuel consumption which is assumed to be replaced by geothermal power generation	385,692	t-CO₂/y
PE _y	Project emission: GHG emission after project activity	18	t-CO ₂ /y



Project Name Sample: Electric power generation through use of biomass residues

1. Quantity of Electlicity and heat generation of using of biomass residues

Input the planned data for the calculation of the fuel consumption before the project start and input the monitoring data for the calculation of the fuel consumption after the project start into the following cells.

Parameter	Entry	Unit
Quantity of electric power generation through use of biomass residues after the project starts	150,150	MWh/y
Quantity of heat generation through use of biomass residues after the project starts		TJ∕y

2. CO₂ Emission factor or electricity (t-CO₂/MWh)

In the environment where the facilities are installed with private generating facilities, or where the facilities are newly constructed and private generating facilities are planned to be installed, select whichever higher by comparing with the CO_2 emissions factor for the grid supplying electricity. The emissions factor of grid should be determined base on one or two typical plants among existing power plants in the target grid.

Data availability is validated in the following order in selecting the target power plant and obtaining the emissions factor specific to the target:

i) Interview to the electric power management entity concerned

i) Published values in the target country If private generating facilities are available, interview to the electric power management entity concerned

Parameter	Entry	Unit
CO ₂ emission factor of the electric power which connects the grid	0.927	t−CO₂∕MWh
CO ₂ emission factor of the electric power from private generating facility		t−CO ₂ ∕MWh
CO ₂ emission factor of the electric power used for calculation	0.927	t−CO₂/MWh
Source: 2006 IPCC Guidelines for	National Gre	enhouse Gas Inventorie

ource: 2006 IPCC Guidelines for National Greenhouse Gas Inventories Volume 2 Energy

3. CO_2 emission factor of heat generation (t-CO₂/TJ)

Parameter		Entry	Unit
CO ₂ emission factor per unit of energy of the boiler	Fuel type	73.3	t-CO ₂ /TJ
fuel consumption in the absence of project	<mark>crude oil</mark>		
Boiler efficiency		100	%
Rate of heat generation from boiler out of the heat g recovered and utilized from the waste energy in the		1	_
CO_2 emission factor per heat generated		73.3	t-CO ₂ /TJ
Source:			

4. Amount of electricity and fuel consumption after the project start

Input the planned data for the calculation of the fuel consumption before the project start and input the monitoring data for the calculation of the fuel consumption after the project start into the following cells.

Parameter		Entry	Unit
Amount of electricity consumption after		750	MWh/y
	Crude Oil	178	kL/y
Amount of fuel	Coal		t/y
consumption after the project start	Gas		m³/y
	Others		

5. Net calorific value according to fuel type and CO 2 emission factor

Data availability is validated in the following order because it should preferably be calculated using data and information unique to the project.

i) The unique data of the project obtained from the interview with power management entity

ii) National default iii) IPCC Guideline default data

Parameter	Net calorific value		Net calorific value CO ₂ emission fac		sion factor
Crude Oil	36.3	36.3 GJ/kL		t-CO ₂ /TJ	
Coal	26.7	GJ/t	98.3	t-CO ₂ /TJ	
Gas	0.0384	0.0384 GJ/m ³		t-CO ₂ /TJ	
Others			t-CO ₂ /T		
Source:					



Result Sheet

Sample:Electric power generation through use of biomass residues

GHG emission reduction with the project $(t-CO_2/y) = BE_y - PE_y$ $(t-CO_2/y)$

1. Baseline emission $BE_y = BE_{el,y} + BE_{ther,y}$

BE _y	Baseline emission: GHG emission without using of biomass residues	145,053	t-CO ₂ /y
BE _{el,y}	GHG emission generated by electric supply with utilization of the biomass residues after the project start	139,189	t-CO ₂ /y
BE ther,y	GHG emission generated by heat supply with utilization of the biomass residues after the project start	5,864	t-CO ₂ /y

2. Project emission $PE_y = PE_{el,y} + PE_{i,y}$

PE _y	Project emission: GHG emission after the project start	1,169	t-CO ₂ /y
PE _{el,y}	GHG emission with electric consumption after the project start	695	t-CO ₂ /y
<i>PE _{i,y}</i>	GHG emission with fuel consumption after the project start	474	t–CO ₂ /y

3. GHG emission reduction with the project $ER_y = BE_y - PE_y$ (t-CO₂/y)

ER _y	GHG emission reduction with the project	143,884	t-CO ₂ /y
BE _y	Baseline emission: GHG emission without utilization of biomass resideues	145,053	t–CO ₂ /y
PE _y	Project emission: GHG emission after the project start	1,169	t–CO ₂ /y

Sewerage, Urban Sanitation

Appendix-22 Landfill Disposal of Waste Appendix-23 Intermediate Treatment of Waste Appendix-24 Wastewater Treatment Appendix-25 Sewerage

22. Landfill Disposal of Waste

Input sheet

· · · · · · · · · · · · · · · · · · ·			
Project name SAMPLE:Landfill Disposa	of Waste		
			Default value in red
			Default value in red
1. Information for LFG recovery after the project starts			
(1) Quantity of LFG recovered and destroyed after the	project sta	rts (m³/h) *	
Enter the monitoring data after project activity. Parameter	Entry	Unit	
Quantity of LFG recovered	Linuy	m ³ /h	
(2) Average methane fraction of the LFG after the pro-	ect starts		
Enter the monitoring data after project activity.	,	(,	
Enter the ACM0001 default value (0.5) when a	ctual measu	rement is not	available.
Parameter	Entry	Unit	
Average methane fraction of the LFG	0.5	%	2
(3) Methane density at temperature or pressure at reco	very after	the project sta	arts(t-CH₄/m³)
Enter the monitoring data after project activity.		1	
Enter the ACM0001 default value (0.0007168) Parameter			it is not available.
Methane density at recovery	Entry	Unit t-CH₄/m ³	
 * Enter the data in the following (4) - (12) when the pla after the project starts(1) is not determined. 	nned data		ered
 * Enter the data in the following (4) - (12) when the pla after the project starts(1) is not determined. (4) Model correction factor to account for model uncert Enter 0.9 as default value. 	nned data tainties	of LFG recov	ered
 * Enter the data in the following (4) - (12) when the pla after the project starts(1) is not determined. (4) Model correction factor to account for model uncertainty Enter 0.9 as default value. 	nned data		ered
* Enter the data in the following (4) - (12) when the pla after the project starts(1) is not determined. (4) Model correction factor to account for model uncert Enter 0.9 as default value. Parameter Model correction factor to account for model uncertainties	nned data tainties	of LFG recov	ered
 * Enter the data in the following (4) - (12) when the pla after the project starts(1) is not determined. (4) Model correction factor to account for model uncertainties Parameter Model correction factor to account for model uncertainties (5) Oxidization rate 	nned data tainties Entry 0.9	of LFG recov	
 * Enter the data in the following (4) - (12) when the pla after the project starts(1) is not determined. (4) Model correction factor to account for model uncertaint value. Parameter Model correction factor to account for model uncertainties (5) Oxidization rate Enter the default value 0.1 (covered with soil) or starts 	nned data tainties Entry 0.9	of LFG recov	
 * Enter the data in the following (4) - (12) when the pla after the project starts(1) is not determined. (4) Model correction factor to account for model uncertaint value. Parameter Model correction factor to account for model uncertainties (5) Oxidization rate Enter the default value 0.1 (covered with soil) on Parameter 	nned data tainties Entry 0.9 r 0 (not cov Entry	of LFG recov	
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 * Enter the data in the following (4) - (12) when the pla after the project starts(1) is not determined. (4) Model correction factor to account for model uncertainties (4) Model correction factor to account for model uncertainties (5) Oxidization rate Enter the default value 0.1 (covered with soil) on Parameter (6) Fraction of methane in LFG from landfill Enter 0.5 as default value. 	nned data tainties Entry 0.9 r 0 (not cov Entry 0.0 Entry 0.5	of LFG recov	
 * Enter the data in the following (4) - (12) when the pla after the project starts(1) is not determined. (4) Model correction factor to account for model uncertainties (4) Model correction factor to account for model uncertainties (5) Oxidization rate Enter the default value 0.1 (covered with soil) or Parameter (6) Fraction of methane in LFG from landfill Enter 0.5 as default value. Parameter (7) Fraction of degradable organic carbon (DOC) that c 	nned data tainties Entry 0.9 r 0 (not cov Entry 0.0 Entry 0.5	of LFG recov	
 * Enter the data in the following (4) - (12) when the pla after the project starts(1) is not determined. (4) Model correction factor to account for model uncertainties (4) Model correction factor to account for model uncertainties (5) Oxidization rate Enter the default value 0.1 (covered with soil) or Parameter (6) Fraction of methane in LFG from landfill Enter 0.5 as default value. (7) Fraction of degradable organic carbon (DOC) that c Enter 0.5 as default value. 	nned data tainties Entry 0.9 r 0 (not cov Entry 0.0 Entry 0.5 an decom	of LFG recov	
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 * Enter the data in the following (4) - (12) when the pla after the project starts(1) is not determined. (4) Model correction factor to account for model uncertainties (4) Model correction factor to account for model uncertainties (5) Oxidization rate Enter the default value 0.1 (covered with soil) or Parameter (5) Oxidization rate (6) Fraction of methane in LFG from landfill Enter 0.5 as default value. Parameter (7) Fraction of degradable organic carbon (DOC) that c Enter 0.5 as default value. 	nned data tainties Entry 0.9 r 0 (not cov Entry 0.0 Entry 0.5 an decom	of LFG recov	
 * Enter the data in the following (4) - (12) when the pla after the project starts(1) is not determined. (4) Model correction factor to account for model uncertainties (4) Model correction factor to account for model uncertainties (5) Oxidization rate Enter the default value 0.1 (covered with soil) or Parameter (5) Oxidization rate (6) Fraction of methane in LFG from landfill Enter 0.5 as default value. Parameter (7) Fraction of degradable organic carbon (DOC) that c Enter 0.5 as default value. 	nned data tainties Entry 0.9 r 0 (not cov Entry 0.0 Entry 0.5 an decom	of LFG recov	
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 * Enter the data in the following (4) - (12) when the pla after the project starts(1) is not determined. (4) Model correction factor to account for model uncertainties (4) Model correction factor to account for model uncertainties (5) Oxidization rate Enter the default value 0.1 (covered with soil) or Parameter (5) Oxidization rate (6) Fraction of methane in LFG from landfill Enter 0.5 as default value. Parameter (7) Fraction of degradable organic carbon (DOC) that c Enter 0.5 as default value. 	nned data tainties Entry 0.9 r 0 (not cov Entry 0.0 Entry 0.5 an decom	of LFG recov	

(9) Total weight of waste in landfill (t)

Enter the planned data before project activity.

Parameter	Entry	Unit
Annual average weight of waste (= total weight of waste landfilled/duration of disposal in the landfill)	50,000	t/y
Year starting disposal in the landfill (A) (year of Christian Era)	1983	У
Completion year of disposal in the landfi I (year of Christian Era)	2007	У
Year starting the project (year of Christian Era)	2009	У
Final year of estimation of GHG emission reductions (year of Christian Era) (B)	2019	У

*(A)-(B)<50 (10) Composition of solid waste (%)

Enter the planned data before project activity

Parameter	Entry	Unit
Wood	4.2	%
Paper	22.1	%
Organic, garbage, beverage (exclude sludge)	51.1	%
Fabric	5.1	%
Yard waste, park waste	0.0	%
Glass, plastic, metal, other inert waste	17.5	%

(11) Fraction of degradable organic carbon according to waste type (weight based)

Data/ information specific to the target country should be preferably used for calculation. Data availability should be validated in the following order to enter data in the cells.

ii) National default

iii) IPCC Guideline default data

Parameter	Entry	Unit
Wood	43	%
Paper	40	%
Organic, garbage, beverage (exclude sludge)	15	%
Fabric	24	%
Yard waste, park waste	20	%
Glass, plastic, metal, other inert waste	0	%

(12) Decay rate of degradable organic carbon in waste type j

Data/ information specific to the target country should be preferably used for calculation. Data availability should be validated in the following order to enter data in the cells.

ii) National default

iii) IPCC Guideline default data

Entry	Unit
0.020	-
0.040	-
0.060	-
0.040	-
0.050	-
	0.020 0.040 0.060

2. LFG production and thermal production

(1) The amount of electricity and thermal energy using LFG after the project starts (MWh/y)

Enter the planned data before the project starts or input the monitoring data after the project starts.

Parameter	Entry	Unit
The amount of electricity generated using LFG	1,000	MWh/y
Quantity of thermal energy generated	100	T.1/v

(2) Emission factor of the typical power plant (t-CO₂/MWh)

Data availability should be validated in the following order in selecting the typical power plant and obtaining CO₂ emissions factor specific to the target.

i) Interview to the electric power management entity concerned

ii) Published values in the target country

	Parameter	Entry	Unit			
Emission facto	or of the typical power plant	0.896	t-CO ₂ /MWh			
Source:	Source: Interview to XX company of XX country					

Source: Interview to XX company of XX country (3)CO₂ emission factor of heat generated (t-CO₂/TJ)

				-
Parameter			Unit	
CO ₂ emission factor per unit of energy of the boiler fuel	Fuel type	73.3	t-CO ₂ /TJ	
consumption in the absence of project	Petroleum			
Boiler efficiency			%	
Rate of heat generation from boiler out of the heat generation using				
LFG in absence of project				
CO ₂ emission factor per heat generated			t-CO ₂ /TJ	
Source: 2006 IPCC Guidelines for National Gre	enhouse Ga	as Invento	ries Volume 2 Energ	gy tabl

3. Project Information

(1) The electricity and fuel consumption after the project starts in the LFG recovery facilities (MWh/y)

Enter the planned data before the project starts or input the monitoring data after the project starts.

Parameter	Entry	Unit	
Electricity consumption after the	500	MWh/y	
	Petroleum	500	kL/y
Fuel consumption after the project starts	Coal	50	t/y
	Gas	100	m ³ /y
	Others		

(2) Emission factor of the typical power plant (t-CO₂/MWh)

Data availability should be validated in the following order in selecting the typical power plant and obtaining CO_2 emissions factor specific to the target.

i) Interview to the electric power management entity concerned

ii) Published values in the target country

	Parameter	Entry	Unit
Emission fac	tor of the typical power plant	0.896	t-CO ₂ /MWh
Source:	Interview to XX company of	XX country	,

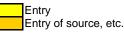
(3) Net calorific value according to fuel type

Data/ information specific to the target country should be preferably used for calculation. Data availability should be validated in the following order to enter data in the cells.

- i) Project-specific values obtained through interview to electric power management entity concerned.
- ii) National default
- iii) IPCC Guideline default data

Parameter	Net calorific	Net calorific value CO ₂ emissi		ion factor
Petroleum	36.3	GJ/kL	73.3	t-CO ₂ /TJ
Coal	26.7	GJ/t	98.3	t-CO ₂ /TJ
Gas	0.0384	GJ/m ³	56.1	t-CO ₂ /TJ
Others				t-CO ₂ /TJ
Source: Interview to	λXr			

2006 IPCC Guidelines for National Greenhouse Gas Inventories Volume 2 Energy table1.2,table2.2



Result Sheet

SAMPLE:Landfill Disposal of Waste

GHG emission reduction after the project starts(t- CO_2/y) ERy = BEy - PEy (t- CO_2/y)

1. Baseline emission $BEy = (MD_{PJ,y} - MD_{reg,y}) \times GWP_{CH4} + BE_{EN,y}$

BE _y	Baseline emission: GHG emission from methane vented to atmosphere without LFG recovery	28,954	t-CO ₂ /y
MD _{PJ,y}	CH ₄ quantity recovered from landfill after the project starts	987	t-CH₄/y
MD _{reg,y}	CH ₄ quantity decomposed and combusted by national regulation before the project starts It shall be "0" where developing countries have a very few regulation.	0	t-CH₄/y
GWP _{CH4}	Methane global warming potential(=21)	21	t-CO ₂ /t-CH ₄
BE _{EN,y}	CO ₂ emissions from generation of energy displaced by the project activity	8,226	t-CO ₂ /y

2. Project emission $PE_y = PE_{EC,y} + PE_{FC,y}$

PE _y	Project emission: GHG emission after the project starts	1,910	t-CO ₂ /y
РЕ _{ЕС,у}	GHG emission from electricity consumption after the project starts	448	t-CO ₂ /y
PE _{FC,y}	GHG emission from fossil fuel consumption after the project starts	1,462	t-CO ₂ /y

3. GHG emission reduction after the project starts ERy = BEy - PEy (t-CO₂/y)

ER _y	GHG emission reduction after the project starts	27,045	t-CO ₂ /y
BE _y	Baseline emission: GHG emission from methane vented to atmosphere without LFG recovery	28,954	t-CO₂/y
PE _y	Project emission: GHG emission after the project starts	1,910	t-CO ₂ /y

Input Sheet : Before the Project starts

Project name

SAMPLE : Intermediate treatment of the waste

		Defaul	t value in red				
1. Infor	mation of the current Biogas						
	(1) Model correction factor to account for model uncertainties						
•••	Enter 0.9 as default value.						
	Parameter		Entry	Unit			
	Model correction factor to account for model						
	uncertainties		0.9	MWh/y			
(2)Ovida	tion factor						
	Enter the default value 0.1 (cov	vered with soil) or	(not covered)				
	Parameter		Entry	Unit			
	Oxidation factor			MWh/y			
(3) Fracti	on of methane in Biogas from	landfill	0.0	y			
	Enter 0.5 as default value.						
	Parameter		Entry	Unit			
	Fraction of methane in Biogas		0.5	-			
(4) Fract	ion of degradable organic cark	oon (DOC) that c	an decompose				
	Enter 0.5 as default value.	(= = = =)					
	Parameter		Entry	Unit			
	Fraction of degradable organic	carbon (DOC)					
	that can decompose		0.5	-			
	ane correction factor in Biogas						
(5) wetha	Methane correction factor in Biogas		no (Poferto Arr	(ondiv)			
	Parameter	raing to landlill ty	Entry	Unit	l i i i i i i i i i i i i i i i i i i i		
	Methane correction factor in Bi	0006		Unit			
(6) 4 חחוו	al weight of waste prevented f	oyas rom disposal at	the SWDS after	- the project	t starts		
(O)Annu	Enter the planned data before						
	Parameter	the project starts	Entry	Unit	alter the project starts.		
	Total weight of waste	1st year	182,500				
		2nd year	182,500	U y			
		3rd year	182,500				
		4th year	182,500				
		5th year	182,500				
		6th year	182,500				
		7th year	182,500				
		8th year	182,500				
		9th year	182,500				
		10th year	182,500				
(7)Com	osition of solid waste	. o , our	,000				
	Enter the planned data before	the project starts	or input the mor	nitorina data	a after the project startss.		
	Parameter		Entry	Unit			
	Wood		3.8				
	Paper		5.9				
	Organic, garbage, beverage (e	xclude sludge)		%			
	Fabric	y ,		%			
	Yard waste, park waste		19.1				
	Glass, plastic, metal, other iner	t waste	24.3				
(8)Fract	ion of degradable organic cark		waste type (we	eight based	d)		
					or calculation. Data availability		
	should be validated in the follo	wing order to ent	er data in the ce	lls.			
	ii) National default						
	iii) IPCC Guideline default data						
	Parameter		Entry	Unit			
	Wood			%			
	Paper			%			
	Organic, garbage, beverage (e	xclude sludge)	15	%			
	Fabric			%			
	Yard waste, park waste		20	%			
	Glass, plastic, metal, other iner	rt waste		%			

(9) Decay rate of degradable organic carbon according to waste type

Data/ information specific to the target country should be preferably used for calculation. Data availability should be validated in the following order to enter data in the cells.

ii) National default

iii) IPCC Guideline default data

Entry	Unit
0.035	-
0.070	-
0.400	-
0.070	-
0.170	-
	0.035 0.070

2. Information of electricity and thermal energy generation by using biogas

$\mathsf{BE}_{\mathsf{EN},y}\ :\ \mathsf{CO}_2$ emissions from generation of energy displaced by the project activity

(1) Amount of electricity and quantity of thermal energy using Biogas after the project starts(MWh/y)

Enter the planned data before the project starts or input the monitoring data after the project starts .

Parameter	Entry	Unit
Amount of electricity produced using Biogas	1,000	MWh/y
Amount of thermal energy produced	100	TJ/y

(2) Emission factor of the typical power plant (t-CO₂/MWh)

Data availability should be validated in the following order in selecting the typical power plant and obtaining CO2 emissions factor specific to the target.

i) Interview to the electric power management entity concerned

ii) Published values in the target country

	Entry	Unit
Emission factor of the typical power plant	0.896	t-CO ₂ /MWh

Interview to XX company of XX country Source:

(3)CO₂ emission factor of heat generated (t-CO₂/TJ)

Parameter		Entry	Unit
CO ₂ emission factor per unit of energy of the boiler fuel	Fuel type	73.3	t-CO ₂ /TJ
consumption in the absence of project	Petroleum		
Boiler efficiency		100	%
Rate of heat generation from boiler out of the heat generation using			_
CO ₂ emission factor per heat generated 73.3 t-CO ₂ /TJ			
Source: 2006 IPCC Guidelines for National Greenhouse Gas Inventories Volume 2 Energy ta			

3. Project information

PE_{elec,y}: GHG emission from electricity consumption after the project starts PE_{fuel,y}: GHG emission from fossil fuel consumption after the project starts (1) The electricity and fuel consumption after the project starts in the Biogas recovery facilities (MWh/y) Enter the planned data before the project starts or input the monitoring data after the project starts .

Parameter		Entry	Unit
Amount of electricity consump	500	MWh/y	
	Petroleum	500	kL/y
Amount of fuel consumption	Coal	50	t/y
after the project starts	Gas	100	m ³ /y
	Others		

(2) Emission factor of the typical power plant (t-CO₂/MWh)

Data availability should be validated in the following order in selecting the typical power plant and obtaining CO₂ emissions factor specific to the target.

i) Interview to the electric power management entity concerned

ii) Published values in the target country

	Parameter	Entry	Unit
Emissi	on factor of the typical power plant	0.896	t-CO ₂ /MWh
Source: Interview to XX company of XX country			

(3) Net calorific value according to fuel type

Data/ information specific to the target country should be preferably used for calculation. Data availability should be validated in the following order to enter data in the cells.

i) Project-specific values obtained through interview to electricity management entity concerned

ii) National default

iii) IPCC Guideline default data

Parameter		Net calor	ific value	CO ₂ emission fact	
Petroleum		36.3	GJ/kL	73.3	t-CO ₂ /TJ
Coal		26.7	GJ/t	98.3	t-CO ₂ /TJ
Gas		0.0384	GJ/m3	56.1	t-CO ₂ /TJ
Others					t-CO ₂ /TJ
Source:	Interview to	XX			

Interview to XX

2006 IPCC Guidelines for National Greenhouse Gas Inventories Volume 2 Energy table1.2,table2.2

0 t/y

PEc,y : GHG emission during the composting process after the project starts

(1) Quantity of organic waste composed (t/y)

	Enter the planned data before the project starts	or input the mon	itoring data	after the project starts .
ſ	Parameter	Entry	Unit	

Quantity of organic waste composed

(2) Emission factor for N₂O and CH₄ from the composting process (t-N₂O/t-compost)

Enter the IPCC default value.

Parameter	Entry	Unit
Emission factor for N ₂ O from the composting process	0.0003	t-N ₂ O/t-waste
Emission factor for CH_4 from the composting process	0.004	t-CH ₄ /t-waste

2006 IPCC Guidelines for National Greenhouse Gas Inventories Volume 5 Waste table4.1 Source

GHG emission from the anaerobic digestion process after the project starts PEa,y :

(1) Amount of organic waste fed into anaerobic digestion after the project starts (t/y)

Enter the planned data.

	Parameter	Entry	Unit		
	Amount of organic waste fed into anaerobic	5,000	t/y		
(2) Emission factor for CH_4 emissions from the anaerobic digestion (t- CH_4 /t-waste)					

- · · 14

Enter the IPCC default value.		
Parameter	Entry	Unit
Emission factor for CH ₄ emissions from the	0.001	t-CH ₄ /m ³ -waste
Courses 0000 IDOO Ouidalia as fan National Orsankausa Osa Inventarias V		

2006 IPCC Guidelines for National Greenhouse Gas Inventories Volume 5 Waste table4.1 Source

PEg,y : GHG emission from the gasification process after the project starts (1) Amount of waste type i fed into the gasifier (t/y)

fter the project starts .

Enter the planned data before the project starts	or input the monitoring data	
Type of waste i	Weight	Unit:t/y
Wood		
Paper		
Organic, garbage, beverage (exclude sludge)		
Fabric		
Yard waste, park waste		
Glass plastic metal other inert waste		

(2) Fraction of carbon content in waste type i (-)

Enter the planned data before the project starts or input the monitoring data after the project starts .

|--|

Wood	
Paper	
Organic, garbage, beverage (exclude sludge)	
Fabric	
Yard waste, park waste	
Glass, plastic, metal, other inert waste	

3) Fraction of fossil carbon in total carbon of waste type (-)) Finer the planned data before the project starts or input the monitoring data after the project starts . Type of waste i Fraction of fossil carbon Wood Graphic, garbage, beverage (exclude sludge) Fabric Graphic, metal, other inert waste Grass, plastic, metal, other inert waste Graphic, garbage, beverage (exclude sludge) Fabric Graphic, metal, other inert waste Graphic Graph	(3) Frac	tion of fossil carbon in total carbon of waste ty	pei(-))		
Type of waste i Fraction of fossil carbon Unit: Pager	(0)1100				
Wood					
Paper		,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	Fraction of fos	sil carbon	Unit: —
Organic, gatzbage, beverage (exclude sludge)		Wood			
Fabric		Paper			
Fabric		Organic, garbage, beverage (exclude sludge)			
Yard waste, park waste					
Glass, plastic, metal, other inert waste 4) Combustion officiency Type of waste (.) Enter the planned data before the project starts or input the monitoring data after the project starts . Wood Paper Organic, garbage, beverage (exclude sludge) Fabric Yard Waste, park waste Glass, plastic, metal, other inert waste Moount of waste type i fed into the RDF (ty) Enter the planned data. Parameter Entry Unit N ₂ O emission from the combustion pf RDF after the project starts 1) Amount of waste type i fed into the RDF (ty) Enter the planned data before the project starts or input the monitoring data after the project starts.					
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Type of waste i Combustion efficiency Unit : Paper	(4) 0011		or input the mor	itoring data	a after the project starts
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Fabric					-
Yard waste, park waste Glass, plastic, metal, other inert waste 5) Amount of waste gastified (Vy) Enter the planned data. Parameter Entry Juit Amount of waste Parameter Entry Uvi 6) Emission factor for N ₂ O emissions from combustion (kg-N ₂ O/t) Enter the planned data. Parameter Entry Value Unit N ₂ O emission factor for CH ₄ emissions from combustion (kg-CH ₄ /t) Enter the planned data. Parameter Entry CH ₄ emission factor 0.2 Parameter Entry Unit CH ₄ emission factor CH ₄ emission factor 0.2 Fry GHG emission from the combustion pf RDF after the project starts 1) Amount of waste type i fed into the RDF (t/y) Enter the planned data before the project starts or input the monitoring data Type of waste i Weight Wood Unit: t/y Paper Organic, garbage, beverage (exclude sludge) Fabric Fraction of carbon content in waste type i(-) Enter the planned data before the project starts or input the mon					_
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Type of waste i Fraction of fossil carbon Unit: — Wood	PEr,y (1) Amo (2) Frac	 ssion factor for CH₄ emissions from combustio Enter the planned data. Parameter CH₄ emission factor GHG emission from the combustion pf RDI unt of waste type i fed into the RDF (t/y) Enter the planned data before the project starts Type of waste i Wood Paper Organic, garbage, beverage (exclude sludge) Fabric Yard waste, park waste Glass, plastic, metal, other inert waste tion of carbon content in waste type i (-) Enter the planned data before the project starts Type of waste i Wood Paper Organic, garbage, beverage (exclude sludge) Fabric Type of waste i Wood Paper Organic, garbage, beverage (exclude sludge) Fabric Yard waste, park waste Glass, plastic, metal, other inert waste 	47 n (kg-CH4/t) Entry 0.2 after the proje or input the mor Weigh Weigh Grinput the mor Fraction of cark	t-CH₄/t ct starts	a after the project starts . Unit : t/y a after the project starts .
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Glass, plastic, metal, other inert waste

(4) Combustion efficiency for waste (-)

Enter the planned data before the project starts or input the monitoring data after the project starts .
Type of waste i
Combustion efficiency
Unit : -

	Type of waste i	Compusiion	enciency		
	Wood				
	Paper			1	
	Organic, garbage, beverage (exclude sludge)				
	Fabric			1	
	Yard waste, park waste				
	Glass, plastic, metal, other inert waste				
(5) Am	ount of waste type i fed into the RDF (t/y)			-	
	Enter the planned data.				
	Parameter	Entry	Unit]	
	Amount of waste		t/y		
(6)Emi	ission factor for N ₂ O emissions from combustion	on (kg-N ₂ O/t)		-	
	Enter the planned data.				
	Parameter	Entry	U	nit	
	N ₂ O emission factor		t-N ₂ O/t		
(7)Emi	ission factor for CH ₄ emissions from combustic	n (ka-CH./t)	-		
(,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	Enter the planned data.				
		Entry	1 1	nit	
	Parameter				
	Parameter CH, emission factor	Linuy		int	
	Parameter CH ₄ emission factor	Litty	t-CH₄/t		
	CH ₄ emission factor : GHG emissions from waste incineration af	ter the project s	t-CH₄/t		
	CH ₄ emission factor : GHG emissions from waste incineration aff ount of waste type i fed into the incineration (t/)	ter the project s	t-CH₄/t		is state to
	 CH₄ emission factor GHG emissions from waste incineration afform out of waste type i fed into the incineration (t/g Enter the planned data before the project starts 	ter the project s /)	t-CH₄/t starts	after the pro	ject starts .
	 CH₄ emission factor GHG emissions from waste incineration afform out of waste type i fed into the incineration (t/y Enter the planned data before the project starts Type of waste i 	ter the project s	t-CH₄/t starts		oject starts .
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	CH ₄ emission factor GHG emissions from waste incineration aff ount of waste type i fed into the incineration (t/y Enter the planned data before the project starts Type of waste i Wood Paper Organic, garbage, beverage (exclude sludge) Fabric	ter the project s /)	t-CH₄/t starts	after the pro	oject starts .
PEi,y (1) Amo	 CH₄ emission factor GHG emissions from waste incineration aff ount of waste type i fed into the incineration (t/y Enter the planned data before the project starts Type of waste i Wood Paper Organic, garbage, beverage (exclude sludge) Fabric Yard waste, park waste 	ter the project s /)	t-CH₄/t starts	after the pro	oject starts .
(1)Ăm	 CH₄ emission factor GHG emissions from waste incineration aff ount of waste type i fed into the incineration (t/y Enter the planned data before the project starts Type of waste i Wood Paper Organic, garbage, beverage (exclude sludge) Fabric Yard waste, park waste Glass, plastic, metal, other inert waste 	ter the project s /)	t-CH₄/t starts	after the pro	oject starts .
(1)Ăm	CH ₄ emission factor GHG emissions from waste incineration aff ount of waste type i fed into the incineration (t/y Enter the planned data before the project starts Type of waste i Wood Paper Organic, garbage, beverage (exclude sludge) Fabric Yard waste, park waste Glass, plastic, metal, other inert waste ction of carbon content in waste type i (-)	ter the project s) or input the mo Weic	t-CH ₄ /t	after the pro Unit:t/y	
(1)Ăm	CH ₄ emission factor GHG emissions from waste incineration aff ount of waste type i fed into the incineration (t/y Enter the planned data before the project starts Type of waste i Wood Paper Organic, garbage, beverage (exclude sludge) Fabric Yard waste, park waste Glass, plastic, metal, other inert waste ction of carbon content in waste type i (-) Enter the planned data before the project starts	er the project s	t-CH₄/t starts nitoring data ght nitoring data	after the pro Unit : t/y	
(1)Ăm	 CH₄ emission factor GHG emissions from waste incineration aff ount of waste type i fed into the incineration (t/y Enter the planned data before the project starts Type of waste i Wood Paper Organic, garbage, beverage (exclude sludge) Fabric Yard waste, park waste Glass, plastic, metal, other inert waste ction of carbon content in waste type i (-) Enter the planned data before the project starts 	ter the project s) or input the mo Weic	t-CH₄/t starts nitoring data ght nitoring data	after the pro Unit : t/y	
(1)Ăm	 CH₄ emission factor GHG emissions from waste incineration aff ount of waste type i fed into the incineration (t/y Enter the planned data before the project starts Type of waste i Wood Paper Organic, garbage, beverage (exclude sludge) Fabric Yard waste, park waste Glass, plastic, metal, other inert waste ction of carbon content in waste type i (-) Enter the planned data before the project starts Type of waste i Wood 	er the project s	t-CH₄/t starts nitoring data ght nitoring data	after the pro Unit : t/y	
(1)Ăm	CH₄ emission factor : GHG emissions from waste incineration aff ount of waste type i fed into the incineration (t/y) Enter the planned data before the project starts Type of waste i Wood Paper Organic, garbage, beverage (exclude sludge) Fabric Yard waste, park waste Glass, plastic, metal, other inert waste ction of carbon content in waste type i (-) Enter the planned data before the project starts Type of waste i Wood	er the project s	t-CH₄/t starts nitoring data ght nitoring data	after the pro Unit : t/y	
(1)Ăm	CH₄ emission factor : GHG emissions from waste incineration aff ount of waste type i fed into the incineration (t/y) Enter the planned data before the project starts Type of waste i Wood Paper Organic, garbage, beverage (exclude sludge) Fabric Yard waste, park waste Glass, plastic, metal, other inert waste ction of carbon content in waste type i (-) Enter the planned data before the project starts Type of waste i Wood Paper Organic, garbage, beverage (exclude sludge)	er the project s	t-CH₄/t starts nitoring data ght nitoring data	after the pro Unit : t/y	
(1)Ăm	CH₄ emission factor : GHG emissions from waste incineration aff ount of waste type i fed into the incineration (t/y) Enter the planned data before the project starts Type of waste i Wood Paper Organic, garbage, beverage (exclude sludge) Fabric Yard waste, park waste Glass, plastic, metal, other inert waste ction of carbon content in waste type i (-) Enter the planned data before the project starts Type of waste i Wood Paper Organic, garbage, beverage (exclude sludge) Fabric	er the project s	t-CH₄/t starts nitoring data ght nitoring data	after the pro Unit : t/y	
(1)Ăm	CH₄ emission factor : GHG emissions from waste incineration aff ount of waste type i fed into the incineration (t/y) Enter the planned data before the project starts Type of waste i Wood Paper Organic, garbage, beverage (exclude sludge) Fabric Yard waste, park waste Glass, plastic, metal, other inert waste ction of carbon content in waste type i (-) Enter the planned data before the project starts Type of waste i Wood Paper Organic, garbage, beverage (exclude sludge)	er the project s	t-CH₄/t starts nitoring data ght nitoring data	after the pro Unit : t/y	

Enter the planned data before the project starts or input the monitoring data after the project starts . Type of waste i Fraction of fossil carbon Unit : --

Wood	
Paper	
Organic, garbage, beverage (exclude sludge)	
Fabric	
Yard waste, park waste	

Glass, plastic, metal, other inert waste (4) Combustion efficiency for waste (-)

Enter the planned data before the project starts or input the monitoring data after the project starts . t: -

I ype of waste i	Compussion efficiency	Unit
Wood		
Paper		
Organic, garbage, beverage (exclude sludge)		
Fabric		
Yard waste, park waste		
Glass, plastic, metal, other inert waste		

(5) Amount of waste incinerated (t/y)

Enter the planned data.

Parameter Entry Unit t/y

Amount of waste (6) Emission factor for N_2O emissions from combustion (kg- N_2O/t)

Enter the planned data.

Parameter	Entry	Unit
N ₂ O emission factor		t-N ₂ O/t

(7) Emission factor for CH_4 emissions from combustion (kg- CH_4/t)

Enter the planned data.		
Parameter	Entry	Unit
CH ₄ emission factor		t-CH₄/t

PEw,y (1)Amo	ount of wastewater treated anaerobically or rele	ased untreated	from the p	-	
	Enter the planned data before the project starts Parameter	or input the mon Entry	itoring data Unit	after the p	project starts .
	Amount of wastewater after project	70,000			
(2)Che	mical oxygen demand (COD) of wastewater aft			D/m^3)	
(2)0110	Enter the planned data before the project starts				proiect starts.
	Parameter	Entry		nit	
	COD of wastewater	0.00003	t-COD/m ³		
(3)Max	imum methane producing capacity (t-CH ₄ /t-CO	D)	-		•
	Use 0.265 as IPCC default value.				_
	Parameter	Entry	_	nit	
	Maximum CH ₄ producing capacity	0.265	t-CH₄/	t-COD	
(4)Metl	nane correction factor (-)				-
	Data/ information specific to the target country s	hould be prefera	bly used fo	r calculation	n. Data availability should
	i) National default				
	ii)IPCC Guideline default data		1	I	
	Parameter	Entry	Unit		
	CH ₄ correction factor	0.8	-		
	Source: 2006 IPCC Guidelines for Na	tional Greenhou	se Gas Inve	entories Vo	lume 5 Waste table6.3
A Othe	r conditions				

XX year after the project

<u>10</u>year y≦10

Entry Select from the list/input

Calculation Sheet : Before the Project starts

SAMPLE : Intermediate treatment of the waste

GHG emission reduction after project activity(t-CO₂/y) ERy = BEy - PEy (t-CO₂/y)

1. Baseline emission $BE_y = MB_y - MD_{reg,y} + BE_{EN,y}$

BE _y	Baseline emission: GHG emission from CH ₄ released into the atmosphere before the project starts which the waste treatment is installed	85 448	t-CO ₂ /y
MB _y	GHG emission from methane produced in landfill before the project starts	77,222	t-CO ₂ /y
MD _{reg,y}	GHG emission reduction of methane destroyed by national regulation before the project star This shall be "0" where developing countries have a very few regulation	0	t-CO₂/y
BE _{EN,y}	CO ₂ emissions from generation of energy displaced by the project activity	8,226	t-CO ₂ /y

2. Project emission $PE_y = PE_{EC,y} + PE_{FC,y} + PE_{e,y} + PE_{a,y} + PE_{g,y} + PE_{r,y} + PE_{i,y} + PE_{w,y}$

PE _y	Project emission: GHG emission after the project star	2,024	t-CO ₂ /y
РЕ _{ЕС,у}	GHG emission from electricity consumption after the project starts	448	t-CO ₂ /y
РЕ _{FC,y}	GHG emission from fossil fuel consumption after the project starts	1,462	t-CO ₂ /y
PEc,y	GHG emission during the composting process after the project star If CH ₄ produced in the composting process is recovered and destroyed by energy generation or flare after the project starts, this term shall be neglected.		t-CO₂/y
PEa,y	GHG emission from the anaerobic digestion process after the project starts If CH ₄ produced in the anaerobic digestion process is recovered and destroyed by energy generation or flare after the project starts, this term shall be neglected.	105	t-CO₂/y
PEg,y	GHG emission from the gasification process after the project starts	0	t-CO ₂ /y
PEr,y	GHG emission from the combustion of RDF after the project starts	0	t-CO ₂ /y
PEi,y	GHG emissions from waste incineration after the project starts	0	t-CO ₂ /y
PEw,y	GHG emissions from wastewater treatment after the project starts	9	t-CO ₂ /y

3. GHG emission reduction after project activity ERy = BEy - PEy (t-CO₂/y)

ER _y	GHG emission reduction after project activity	83,424	t-CO ₂ /y
BE _y	Baseline emission: GHG emission from CH ₄ released into the atmosphere before the project starts which the waste treatment is installed	85 448	t-CO₂/y
PE _y	Project emission: GHG emission after the project starts	2,024	t-CO ₂ /y

Input Sheet : After the Project starts

Project name

SAMPLE : Intermediate treatment of waste

1 Information of the aurout Diana				
1. Information of the current Biogas (1) Model correction factor to account Enter 0.9 as default value.	for model uncer	tainties	Defau	lt value in red
Parameter		Entry	Unit	1
Model correction factor to acco	ount for model			
uncertainties		0.9	MWh/y	
(2)Oxidation factor				
Enter the default value 0.1 (co	vered) or 0 (not c			1
Parameter Oxidation factor		Entry	Unit MWh/y	
(3) Fraction of methane in Biogas from	landfill	0.0	IVI V M/ Y	1
Enter 0.5 as default value.	inananini			
Parameter		Entry	Unit	
Fraction of methane in Biogas		0.5	-	
(4) Fraction of degradable organic car	bon (DOC) that c	an decompose		-
Enter 0.5 as default value.				
Parameter		Entry	Unit	
Fraction of degradable organic	c carbon (DOC)	0.5	_	
that can decompose		0.0		
(5) Methane correction factor in Bioga		ma (Defente A	n e n div	
Methane correction factor accorection factor accorection	ording to Biogas t	Vpe (Refer to Ap Entry	pendix). Unit	1
Methane correction factor in B	ionas	0.8	-	•
(6) Annual weight of waste prevented	from disposal at		the projec	l starts
Enter the planned data before				
Parameter		Entry	Unit	
Total weight of waste	1st year	182,500	t/y	
	2nd year			
	3rd year			
	4th year 5th year			
	6th year	182,500		
	7th year	182,500		
	8th year	182,500		
	9th year	182,500		
	10th year	182,500		
(7)Composition of solid waste			. teo da la Tarr	
Enter the planned data before Parameter	e the project starts	Entry	Unit	a anter the project startss .
Wood			%	
Paper			%	
Organic, garbage, beverage (e	exclude sludge)	44	%	
Fabric	~ /		%	
Yard waste, park waste		19		
Glass, plastic, metal, other ine		24		
(8) Fraction of degradable organic car				
should be validated in the follo				for calculation. Data availability
ii) National default			115.	
iii) IPCC Guideline default data	а			
Parameter	u	Entry	Unit	
Wood		43	%	
Paper			%	
Organic, garbage, beverage (e	exclude sludge)	15	%	
Fabric		24	%	
Yard waste, park waste	rt wooto	20	%	
Glass, plastic, metal, other ine	en waste	0	%	

(9) Decay rate of degradable organic carbon according to waste type

Data/ information specific to the target country should be preferably used for calculation. Data availability should be validated in the following order to enter data in the cells.

ii) National default

iii) IPCC Guideline default data

Parameter	Entry	Unit
Wood	0.035	-
Paper	0.070	-
Organic, garbage, beverage (exclude sludge)	0.400	-
Fabric	0.070	-
Yard waste, park waste	0.170	-

2. Information of electricity and thermal energy generation by using biogas

BE_{ENv} : CO2 emissions from generation of energy displaced by the project activity

(1) Amount of electricity and quantity of thermal energy using Biogas after the project starts(MWh/y)

Enter the planned data before the project starts or input the monitoring data after the project starts .

Parameter	Entry	Unit
Amount of electricity produced using Biogas	1,000	MWh/y
Amount of thermal energy produced	100	TJ/y

(2) Emission factor of the typical power plant (t-CO₂/MWh)

Data availability should be validated in the following order in selecting the typical power plant and obtaining CO2 emissions factor specific to the target.

i) Interview to the electric power management entity concerned

ii) Published values in the target country

		1.1.1.
Parameter	Entry	Unit
Emission factor of the typical power plant	0.896	t-CO ₂ /MWh
Source: Interview to XX company of		

(3)CO2 emission factor of heat generated (t-CO2/TJ)

	Parameter		Entry	Unit
	n factor per unit of energy of the boiler fuel	Fuel type	73.3	t-CO ₂ /TJ
consumption i	in the absence of project	Petroleum		
Boiler efficien	су		100	%
Rate of heat g	generation from boiler out of the heat generation	using	1	—
CO2 emission	n factor per heat generated		73.3	t-CO ₂ /TJ
Source:	2006 IPCC Guidelines for National Greenh	ouse Gas Inv	entories Vo	lume 2 Energy

2006 IPCC Guidelines for National Greenhouse Gas Inventories Volume 2 Energy table2.2

3. Project information

PE_{elec.v} : GHG emission from electricity consumption after the project starts

PE_{fuel,y} : GHG emission from fossil fuel consumption after the project starts

(1) The electricity and fuel consumption after the project starts in the Biogas recovery facilities (MWh/y)

Enter the planned data before the project starts or input the monitoring data after the project starts .

Parameter		Entry	Unit
Amount of electricity consump	otion after the	500	MWh/y
	Petroleum	500	kL/y
Amount of fuel consumption	Coal	50	t/y
after the project starts	Gas	100	m ³ /y
	Others		

(2) Emission factor of the typical power plant (t-CO₂/MWh)

Data availability should be validated in the following order in selecting the typical power plant and obtaining CO2 emissions factor specific to the target.

i) Interview to the electric power management entity concerned

ii) Published values in the target country

Parameter	Entry	Unit
Emission factor of the typical power plant	0.896	t-CO ₂ /MWh
Source: Interview to XX company of X	XX country	

(3) Net caloric value according to fuel type

Data/ information specific to the target country should be preferably used for calculation. Data availability should be validated in the following order to enter data in the cells.

i) Project-specific values obtained through interview to electricity management entity concerned

ii) National default

iii) IPCC Guideline default data

Parameter		Net calor	ific value	CO2 emiss	sion factor
Petroleum		36.3	GJ/kL	73.3	t-CO ₂ /TJ
Coal		26.7	GJ/t	98.3	t-CO ₂ /TJ
Gas		0.0384	GJ/m3	56.1	t-CO ₂ /TJ
Others					t-CO ₂ /TJ
Source:	Interview to	o XX			

2006 IPCC Guidelines for National Greenhouse Gas Inventories Volume 2 Energy table1.2,table2.2

./m[:]

PEc,y : GHG emission during the composting process after the project starts

(1) Quantity of organic waste composed (t/y)

Enter the planned data before the project starts or input the monitoring data after the project starts . Parameter Unit Entrv 0 t/y

Quantity of organic waste composed

(2) Emission factor for N₂O and CH₄ from the composting process (t-N₂O/t-compost)

Enter the IPCC default value.

Parameter	Entry	Unit
Emission factor for N_2O from the composting process	0.0003	t-N ₂ O/t-waste
Emission factor for \ensuremath{CH}_4 from the composting process	0.004	t-CH ₄ /t-waste

2006 IPCC Guidelines for National Greenhouse Gas Inventories Volume 5 Waste table4.1 Source

PEa,y : GHG emission from the anaerobic digestion process after the project starts

(1) Total volume of stack gas from anaerobic digestion (m³/y)

Enter the monitoring data		
Parameter	Entry	Unit
Total volume of stack gas	30,000	m ³ /y
 word constant of CLL in the steals was from one	anabia dinastia	- (+ CII /m 3)

(2) Monitored content of CH₄ in the stack gas from anaerobic digestion (t-CH₄/m²) Enter the monitoring data

Enter the monitoring data		
Parameter	Entry	Unit
Monitored content of CH ₄	0.001	t-CH

PEg,y : GHG emission from the gasification process after the project starts

(1) Amount of waste type i fed into the gasifier (t/y)

Enter the planned data before the project starts or input the monitoring data after the project starts . Jnit:t/y

Type of waste i	vveight
Wood	
Paper	
Organic, garbage, beverage (exclude sludge)	
Fabric	
Yard waste, park waste	
Glass, plastic, metal, other inert waste	
an of contain containt in words two i ()	

(2) Fraction of carbon content in waste type i (-)

Enter the planned data before the project starts or input the monitoring data after the project starts . Init : 🗕

Type of waste i	Fraction of carbon waste	ι
Wood		
Paper		
Organic, garbage, beverage (exclude sludge)		
Fabric		
Yard waste, park waste		
Glass, plastic, metal, other inert waste		

	Enter the planned data before the project starts	or input the mon	itoring data	
	Type of waste i	Fraction of fos	sil carbon	Unit: —
	Wood			
	Paper			
	Organic, garbage, beverage (exclude sludge)			
	Fabric			
	Yard waste, park waste			
	Glass, plastic, metal, other inert waste			l
Com	bustion efficiency for waste(-)			
	Enter the planned data before the project starts	or input the mon	itoring data	
	Type of waste i	Combustion e	efficiency	Unit: —
	Wood			
	Paper			
	Organic, garbage, beverage (exclude sludge)			
	Fabric			
	Yard waste, park waste			
	Glass, plastic, metal, other inert waste		<u>,</u>	
5)Tota	I volume of stack gas from gasification after t			
	Enter the planned data before the project starts			after the project starts .
	Parameter	Entry	Unit	
	Volume of stack gas		m ³ /y	
6)Mon	itored content of nitrous oxide in the stack gas	from gasification	on (t-N ₂ O/n	n ³)
	Enter the monitoring data			
	Parameter	Entry	U	nit
	Monitored content of N ₂ O	0.00001	$t-N_2O/m^3$	
7) Mon	itored content of methane in the stack gas from			
/////		in guointoution (t	0.14/11. /	
	Enter the monitoring data			
	Enter the monitoring data	Entry		nit
	Parameter	Entry	-	nit
		Entry 0.000001	-	nit
Er.v	Parameter Monitored content of CH ₄	0.000001	t-CH₄/m ³	nit
	Parameter Monitored content of CH ₄ : GHG emission from the combustion of RD	0.000001	t-CH₄/m ³	nit
	Parameter Monitored content of CH ₄ : GHG emission from the combustion of RDI punt of waste type i fed into the RDF (t/y)	0.000001 F after the projec	t-CH₄/m ³	
	Parameter Monitored content of CH ₄ : GHG emission from the combustion of RDI but of waste type i fed into the RDF (t/y) Enter the planned data before the project starts	0.000001 F after the project	t-CH₄/m ³ ct starts itoring data	after the project starts .
1 - C - C - C - C - C - C - C - C - C -	Parameter Monitored content of CH ₄ : GHG emission from the combustion of RDI but of waste type i fed into the RDF (t/y) Enter the planned data before the project starts Type of waste i	0.000001 F after the projec	t-CH₄/m ³ ct starts itoring data	
1 - C - C - C - C - C - C - C - C - C -	Parameter Monitored content of CH ₄ : GHG emission from the combustion of RDI but of waste type i fed into the RDF (t/y) Enter the planned data before the project starts Type of waste i Wood	0.000001 F after the project	t-CH₄/m ³ ct starts itoring data	after the project starts .
1 A A A A A A A A A A A A A A A A A A A	Parameter Monitored content of CH ₄ : GHG emission from the combustion of RDI bunt of waste type i fed into the RDF (t/y) Enter the planned data before the project starts Type of waste i Wood Paper	0.000001 F after the project	t-CH₄/m ³ ct starts itoring data	after the project starts .
	Parameter Monitored content of CH ₄ : GHG emission from the combustion of RDI bunt of waste type i fed into the RDF (t/y) Enter the planned data before the project starts Type of waste i Wood Paper Organic, garbage, beverage (exclude sludge)	0.000001 F after the project	t-CH₄/m ³ ct starts itoring data	after the project starts .
1 - C - C - C - C - C - C - C - C - C -	Parameter Monitored content of CH ₄ : GHG emission from the combustion of RDI bunt of waste type i fed into the RDF (t/y) Enter the planned data before the project starts Type of waste i Wood Paper Organic, garbage, beverage (exclude sludge) Fabric	0.000001 F after the project	t-CH₄/m ³ ct starts itoring data	after the project starts .
1 - C - C - C - C - C - C - C - C - C -	Parameter Monitored content of CH ₄ : GHG emission from the combustion of RDI bunt of waste type i fed into the RDF (t/y) Enter the planned data before the project starts Type of waste i Wood Paper Organic, garbage, beverage (exclude sludge) Fabric Yard waste, park waste	0.000001 F after the project	t-CH₄/m ³ ct starts itoring data	after the project starts .
1)Âmc	Parameter Monitored content of CH ₄ : GHG emission from the combustion of RDI bunt of waste type i fed into the RDF (t/y) Enter the planned data before the project starts Type of waste i Wood Paper Organic, garbage, beverage (exclude sludge) Fabric	0.000001 F after the project	t-CH₄/m ³ ct starts itoring data	after the project starts .
1)Âmc	Parameter Monitored content of CH ₄ : GHG emission from the combustion of RDI but of waste type i fed into the RDF (t/y) Enter the planned data before the project starts Type of waste i Wood Paper Organic, garbage, beverage (exclude sludge) Fabric Yard waste, park waste Glass, plastic, metal, other inert waste tion of carbon content in waste type i (-) Enter the planned data before the project starts	0.000001 F after the project or input the mon Weigh	t-CH₄/m ³ ct starts itoring data t itoring data	after the project starts . Unit : t/y after the project starts .
1)Ămc	Parameter Monitored content of CH ₄ : GHG emission from the combustion of RDI but of waste type i fed into the RDF (t/y) Enter the planned data before the project starts Type of waste i Wood Paper Organic, garbage, beverage (exclude sludge) Fabric Yard waste, park waste Glass, plastic, metal, other inert waste tion of carbon content in waste type i (-) Enter the planned data before the project starts	0.000001 F after the project or input the mon Weigh	t-CH₄/m ³ ct starts itoring data t itoring data	after the project starts . Unit : t/y after the project starts .
1)Ămc	Parameter Monitored content of CH ₄ : GHG emission from the combustion of RDI bunt of waste type i fed into the RDF (t/y) Enter the planned data before the project starts Type of waste i Wood Paper Organic, garbage, beverage (exclude sludge) Fabric Yard waste, park waste Glass, plastic, metal, other inert waste tion of carbon content in waste type i (-) Enter the planned data before the project starts Type of waste i	0.000001 F after the project or input the mon Weigh	t-CH₄/m ³ ct starts itoring data t itoring data	after the project starts . Unit : t/y after the project starts .
1)Ămc	Parameter Monitored content of CH ₄ : GHG emission from the combustion of RDI bunt of waste type i fed into the RDF (t/y) Enter the planned data before the project starts Type of waste i Wood Paper Organic, garbage, beverage (exclude sludge) Fabric Yard waste, park waste Glass, plastic, metal, other inert waste tion of carbon content in waste type i (-) Enter the planned data before the project starts Type of waste i Wood	0.000001 F after the project or input the mon Weigh	t-CH₄/m ³ ct starts itoring data t itoring data	after the project starts . Unit : t/y after the project starts .
1)Ămc	Parameter Monitored content of CH ₄ : GHG emission from the combustion of RDI bunt of waste type i fed into the RDF (t/y) Enter the planned data before the project starts Type of waste i Wood Paper Organic, garbage, beverage (exclude sludge) Fabric Yard waste, park waste Glass, plastic, metal, other inert waste tion of carbon content in waste type i (-) Enter the planned data before the project starts Type of waste i Wood Paper	0.000001 F after the project or input the mon Weigh	t-CH₄/m ³ ct starts itoring data t itoring data	after the project starts . Unit : t/y after the project starts .
1)Ămc	Parameter Monitored content of CH ₄ : GHG emission from the combustion of RDI bunt of waste type i fed into the RDF (t/y) Enter the planned data before the project starts Type of waste i Wood Paper Organic, garbage, beverage (exclude sludge) Fabric Yard waste, park waste Glass, plastic, metal, other inert waste tion of carbon content in waste type i (-) Enter the planned data before the project starts Type of waste i Wood Paper Organic, garbage, beverage (exclude sludge)	0.000001 F after the project or input the mon Weigh	t-CH₄/m ³ ct starts itoring data t itoring data	after the project starts . Unit : t/y after the project starts .
1)Ămc	Parameter Monitored content of CH ₄ : GHG emission from the combustion of RDI bunt of waste type i fed into the RDF (t/y) Enter the planned data before the project starts Type of waste i Wood Paper Organic, garbage, beverage (exclude sludge) Fabric Yard waste, park waste Glass, plastic, metal, other inert waste tion of carbon content in waste type i (-) Enter the planned data before the project starts Type of waste i Wood Paper Organic, garbage, beverage (exclude sludge) Fabric	0.000001 F after the project or input the mon Weigh	t-CH₄/m ³ ct starts itoring data t itoring data	after the project starts . Unit : t/y after the project starts .
I)Ămo	Parameter Monitored content of CH ₄ : GHG emission from the combustion of RDI bunt of waste type i fed into the RDF (t/y) Enter the planned data before the project starts Type of waste i Wood Paper Organic, garbage, beverage (exclude sludge) Fabric Yard waste, park waste Glass, plastic, metal, other inert waste tion of carbon content in waste type i (-) Enter the planned data before the project starts Type of waste i Wood Paper Organic, garbage, beverage (exclude sludge) Fabric Type of waste i Wood Paper Organic, garbage, beverage (exclude sludge) Fabric Yard waste, park waste	0.000001 F after the project or input the mon Weigh	t-CH₄/m ³ ct starts itoring data t itoring data	after the project starts . Unit : t/y after the project starts .
2)Frac	Parameter Monitored content of CH ₄ : GHG emission from the combustion of RDI bunt of waste type i fed into the RDF (t/y) Enter the planned data before the project starts Type of waste i Wood Paper Organic, garbage, beverage (exclude sludge) Fabric Yard waste, park waste Glass, plastic, metal, other inert waste tion of carbon content in waste type i (-) Enter the planned data before the project starts Type of waste i Wood Paper Organic, garbage, beverage (exclude sludge) Fabric Type of waste i Wood Paper Organic, garbage, beverage (exclude sludge) Fabric Yard waste, park waste Glass, plastic, metal, other inert waste	0.000001 F after the project or input the mon Weigh	t-CH₄/m ³ ct starts itoring data t	after the project starts . Unit : t/y after the project starts .
1) Âmc 2) Frac	Parameter Monitored content of CH4 : GHG emission from the combustion of RDI punt of waste type i fed into the RDF (t/y) Enter the planned data before the project starts Type of waste i Wood Paper Organic, garbage, beverage (exclude sludge) Fabric Yard waste, park waste Glass, plastic, metal, other inert waste tion of carbon content in waste type i (-) Enter the planned data before the project starts Type of waste i Wood Paper Organic, garbage, beverage (exclude sludge) Fabric Yard waste, park waste Organic, garbage, beverage (exclude sludge) Fabric Yard waste, park waste Glass, plastic, metal, other inert waste Glass, plastic, metal, other inert waste Glass, plastic, metal, other inert waste tion of fossil carbon in total carbon of waste type	0.000001 F after the project or input the mon Weigh or input the mon Fraction of carb	t-CH₄/m ³ ct starts itoring data t itoring data on content	after the project starts . Unit : t/y after the project starts . Unit : —
2)Frac	Parameter Monitored content of CH4 : GHG emission from the combustion of RDI punt of waste type i fed into the RDF (t/y) Enter the planned data before the project starts Type of waste i Wood Paper Organic, garbage, beverage (exclude sludge) Fabric Yard waste, park waste Glass, plastic, metal, other inert waste tion of carbon content in waste type i(-) Enter the planned data before the project starts Type of waste i Wood Paper Organic, garbage, beverage (exclude sludge) Fabric Type of waste i Wood Paper Organic, garbage, beverage (exclude sludge) Fabric Yard waste, park waste Glass, plastic, metal, other inert waste Glass, plastic, metal, other inert waste Glass, plastic, metal, other inert waste Top of fossil carbon in total carbon of waste ty Enter the planned data before the project starts	0.000001 F after the project or input the mon Weigh weigh weight	t-CH₄/m ³ ct starts itoring data it itoring data on content itoring data	after the project starts . Unit : t/y after the project starts . Unit : —
2)Frac	Parameter Monitored content of CH4 : GHG emission from the combustion of RDI bunt of waste type i fed into the RDF (t/y) Enter the planned data before the project starts Type of waste i Wood Paper Organic, garbage, beverage (exclude sludge) Fabric Yard waste, park waste Glass, plastic, metal, other inert waste tion of carbon content in waste type i(-) Enter the planned data before the project starts Type of waste i Wood Paper Organic, garbage, beverage (exclude sludge) Fabric Type of waste i Wood Paper Organic, garbage, beverage (exclude sludge) Fabric Yard waste, park waste Glass, plastic, metal, other inert waste Glass, plastic, metal, other inert waste Glass, plastic, metal, other inert waste Type of torsil carbon in total carbon of waste type Enter the planned data before the project starts Type of waste i	0.000001 F after the project or input the mon Weigh or input the mon Fraction of carb	t-CH₄/m ³ ct starts itoring data it itoring data on content itoring data	after the project starts . Unit : t/y after the project starts . Unit : —
1) Âmc 2) Frac	Parameter Monitored content of CH4 : GHG emission from the combustion of RDI bunt of waste type i fed into the RDF (t/y) Enter the planned data before the project starts Type of waste i Wood Paper Organic, garbage, beverage (exclude sludge) Fabric Yard waste, park waste Glass, plastic, metal, other inert waste tion of carbon content in waste type i(-) Enter the planned data before the project starts Type of waste i Wood Paper Organic, garbage, beverage (exclude sludge) Fabric Type of waste i Wood Paper Organic, garbage, beverage (exclude sludge) Fabric Yard waste, park waste Glass, plastic, metal, other inert waste Glass, plastic, metal, other inert waste Glass, plastic, metal, other inert waste Type of waste i Wood	0.000001 F after the project or input the mon Weigh weigh weight	t-CH₄/m ³ ct starts itoring data it itoring data on content itoring data	after the project starts . Unit : t/y after the project starts . Unit : —
1) Âmc	Parameter Monitored content of CH4 : GHG emission from the combustion of RDI punt of waste type i fed into the RDF (t/y) Enter the planned data before the project starts Type of waste i Wood Paper Organic, garbage, beverage (exclude sludge) Fabric Yard waste, park waste Glass, plastic, metal, other inert waste tion of carbon content in waste type i(-) Enter the planned data before the project starts Type of waste i Wood Paper Organic, garbage, beverage (exclude sludge) Fabric Type of waste i Wood Paper Organic, garbage, beverage (exclude sludge) Fabric Yard waste, park waste Glass, plastic, metal, other inert waste Glass, plastic, metal, other inert waste Glass, plastic, metal, other inert waste tion of fossil carbon in total carbon of waste ty Enter the planned data before the project starts Type of waste i Wood	0.000001 F after the project or input the mon Weigh weigh weight	t-CH₄/m ³ ct starts itoring data it itoring data on content itoring data	after the project starts . Unit : t/y after the project starts . Unit : —
1) Âmc	Parameter Monitored content of CH4 : GHG emission from the combustion of RDI punt of waste type i fed into the RDF (t/y) Enter the planned data before the project starts Type of waste i Wood Paper Organic, garbage, beverage (exclude sludge) Fabric Yard waste, park waste Glass, plastic, metal, other inert waste tion of carbon content in waste type i(-) Enter the planned data before the project starts Type of waste i Wood Paper Organic, garbage, beverage (exclude sludge) Fabric Type of waste i Wood Paper Organic, garbage, beverage (exclude sludge) Fabric Yard waste, park waste Glass, plastic, metal, other inert waste tion of fossil carbon in total carbon of waste ty Enter the planned data before the project starts Type of waste i Wood Paper Organic, garbage, beverage (exclude sludge)	0.000001 F after the project or input the mon Weigh weigh weight	t-CH₄/m ³ ct starts itoring data it itoring data on content itoring data	after the project starts . Unit : t/y after the project starts . Unit : —
1) Âmc 2) Frac	Parameter Monitored content of CH4 : GHG emission from the combustion of RDI punt of waste type i fed into the RDF (t/y) Enter the planned data before the project starts Type of waste i Wood Paper Organic, garbage, beverage (exclude sludge) Fabric Yard waste, park waste Glass, plastic, metal, other inert waste tion of carbon content in waste type i(-) Enter the planned data before the project starts Type of waste i Wood Paper Organic, garbage, beverage (exclude sludge) Fabric Type of waste i Wood Paper Organic, garbage, beverage (exclude sludge) Fabric Yard waste, park waste Glass, plastic, metal, other inert waste tion of fossil carbon in total carbon of waste ty Enter the planned data before the project starts Type of waste i Wood Paper Organic, garbage, beverage (exclude sludge) Fabric Type of waste i Wood	0.000001 F after the project or input the mon Weigh weigh weight	t-CH₄/m ³ ct starts itoring data it itoring data on content itoring data	after the project starts . Unit : t/y after the project starts . Unit : —
2)Frac	Parameter Monitored content of CH4 : GHG emission from the combustion of RDI punt of waste type i fed into the RDF (t/y) Enter the planned data before the project starts Type of waste i Wood Paper Organic, garbage, beverage (exclude sludge) Fabric Yard waste, park waste Glass, plastic, metal, other inert waste tion of carbon content in waste type i(-) Enter the planned data before the project starts Type of waste i Wood Paper Organic, garbage, beverage (exclude sludge) Fabric Type of waste i Wood Paper Organic, garbage, beverage (exclude sludge) Fabric Yard waste, park waste Glass, plastic, metal, other inert waste tion of fossil carbon in total carbon of waste ty Enter the planned data before the project starts Type of waste i Wood Paper Organic, garbage, beverage (exclude sludge)	0.000001 F after the project or input the mon Weigh weigh weight	t-CH₄/m ³ ct starts itoring data it itoring data on content itoring data	after the project starts . Unit : t/y after the project starts . Unit : —

Glass, plastic, metal, other inert waste

(4) Combustion efficiency for waste(-)

Enter the planned data before the project starts or input the monitoring data after the project starts .
Type of waste i
Combustion efficiency
Unit:-

Type of waster	Compustion eniciency
Wood	
Paper	
Organic, garbage, beverage (exclude sludge	
Fabric	
Yard waste, park waste	
Glass, plastic, metal, other inert waste	

(5) Total volume of stack gas from RDF after the project starts (m³/y)

Enter the planned data before the project starts or input the monitoring data after the project starts .

	Parameter		Entry	Unit	
	Volume of stack gas			m ³ /y	
(6) Monitored content of N_2O in the stack gas from RDF (t-N ₂ O/m ³)					

Enter the monitoring data

Parameter	Entry	Unit	
Monitored content of N ₂ O		t-N ₂ O/m ³	
rad content of methods in the stock and from PDF (t CH /m3)			

(7) Monitored content of methane in the stack gas from RDF (t-CH₄/m^{\circ})

Enter the monitoring data

Parameter	Entry	Unit
Monitored content of CH ₄		t-CH₄/m³

PEi,y : GHG emissions from waste incineration after the project starts

(1) Amount of waste type I fed into the incineration (t/y)

Enter the planned data before the project starts or input the monitoring data after the project starts . Type of waste i Weight Unit: t/y

I ype of waste i	Weight
Wood	
Paper	
Organic, garbage, beverage (exclude sludge)	
Fabric	
Yard waste, park waste	
Glass, plastic, metal, other inert waste	

(2) Fraction of carbon content in waste type i (-)

Enter the planned data before the project starts or input the monitoring data after the project starts .

Type of waste i	Fraction of carbon content	Unit: 🗕
Wood		
Paper		
Organic, garbage, beverage (exclude sludge)		
Fabric		
Yard waste, park waste		
Glass, plastic, metal, other inert waste		

(3) Fraction of fossil carbon in total carbon of waste type i (-))

Enter the planned data before the project starts or input the monitoring data after the project starts .

Unit : -

Type of waste i	Fraction of fossil carbon
Wood	
Paper	
Organic, garbage, beverage (exclude sludge)	
Fabric	
Yard waste, park waste	
Glass, plastic, metal, other inert waste	

(4) Combustion efficiency for waste(-)

Enter the planned data before the project starts or input the monitoring data after the project starts.

Type of waste i	Combustion efficiency	Unit:
Wood		
Paper		
Organic, garbage, beverage (exclude sludge)		
Fabric		
Yard waste, park waste		
Glass, plastic, metal, other inert waste		
,	<u>,</u>	

(5) Total volume of stack gas from incineration after the project starts (m³/y)

Enter the planned data before the project starts or input the monitoring data after the project starts .

Parameter Entry Unit

Volume of stack gas m³/y

(6) Monitored content of N_2O in the stack gas from incineration (t- N_2O/m^3)

Enter the monitoring data

Parameter	Entry	Unit
Monitored content of N ₂ O		t-N ₂ O/m ³

(7) Monitored content of methane in the stack gas from incineration (t-CH4/m3)

Enter the monitoring data		
Parameter	Entry	Unit
Monitored content of CH ₄		t-CH₄/m ³

Enter the planned data before the project starts or input the monitoring data after the project starts . Parameter Entry Unit					
	Parameter	Entry	_		
(0) Cha	Amount of wastewater after project		00 m ³ /y		
(2)Cne	emical oxygen demand (COD) of waster				n rais at atorta
	Enter the planned data before the proje Parameter	Entrv	nonitorin	Unit	
	COD of wastewater		003 t-CC		-
			003 t-CC	DD/m	J
(3) wax	kimum methane producing capacity (t-C	σΠ 4/(-COD)			
	Use 0.265 as IPCC default value.	F ata.		1 1 1 1 1 1	7
	Parameter	Entry	0.0.5		4
	Maximum CH ₄ producing capacity	0.	<mark>265</mark>	t-CH ₄ /t-COD]
(4)Met	hane correction factor (-)				
	Data/ information specific to the targe	· · · · · · · · · · · · · · · · · · ·		used for calculat	ion. Data availability
	should be validated in the following or	der to enter data in the	e cells.		
	I) National default				
	ii)IPCC Guideline default data		1.1.2		
	Parameter	Entry	Unit		
	CH ₄ correction factor		<mark>0.8</mark> -		
	Source: 2006 IPCC Guide	lines for National G	reenhou	<mark>ise Ga</mark> s Invento	ories Volume 5 Waste tab

(1) Computation period of the emission reduction effect XX year after the project 10 year

y≦10

E

Entry Select from the list/input

Calculation Sheet : After the Project starts

SAMPLE : Intermediate treatment of waste

GHG emission reduction after project activity(t- CO_2/y) ERy = BEy - PEy (t- CO_2/y)

1. Baseline emission BEy = MB_y - $MDreg_{,y}$ + $BE_{EN,y}$

BE _y	Baseline emission: GHG emission from CH_4 released into the atmosphere before the project starts which the waste treatment is installed	85 448	t-CO ₂ /y
MD _{PJ,y}	GHG emission from methane produced in landfill before the project starts	77,222	t-CO ₂ /y
MD _{reg,y}	GHG emission reduction of methane destroyed by national regulation before the project star This shall be "0" where developing countries have a very few regulation	0	t-CO ₂ /y
BE _{EN,y}	CO ₂ emissions from generation of energy displaced by the project activity	8,226	t-CO ₂ /y

2. Project emission $PE_y = PE_{EC,y} + PE_{FC,y} + PE_{c,y} + PE_{a,y} + PE_{g,y} + PE_{i,y} + PE_{i,y} + PE_{w,y}$

PE _y	Project emission: GHG emission after the project star	2,549	t-CO ₂ /y
РЕ _{ЕС,у}	GHG emission from electricity consumption after the project starts	448	t-CO ₂ /y
PE _{FC,y}	GHG emission from fossil fuel consumption after the project starts	1,462	t-CO ₂ /y
PEc,y	GHG emission during the composting process after the project star If CH_4 produced in the composting process is recovered and destroyed by energy generation or flare after the project starts, this term shall be neglected.		t-CO₂/y
PEa,y	GHG emission from the anaerobic digestion process after the project starts If CH_4 produced in the anaerobic digestion process is recovered and destroyed by energy generation or flare after the project starts, this term shall be neglected.	630	t-CO₂/y
PEg,y	GHG emission from the gasification process after the project starts	0	t-CO ₂ /y
PEr,y	GHG emission from the combustion of RDF after the project starts	0	t-CO ₂ /y
PEi,y	GHG emissions from waste incineration after the project starts	0	t-CO ₂ /y
PEw,y	GHG emissions from wastewater treatment after the project starts	9	t-CO₂/y

3. GHG emission reduction after project activity ERy = BEy - PEy (t-CO₂/y)

ER _y	GHG emission reduction after project activity	82,899	t-CO ₂ /y
BE _y	Baseline emission: GHG emission from CH ₄ released into the atmosphere before the project starts which the waste treatment is installed	85 448	t-CO₂/y
PE _y	Project emission: GHG emission after the project starts	2,549	t-CO ₂ /y

24. Wastewater Treatment

Input Sheet

Project name SAMPLE : Wastewater Treatment

Default value in red

1. Information before the project starts

BE_{EC.v} : GHG emissions from electricity consumption on site before the project starts BE_{FC.v} : GHG emissions from fuel consumption on site before the project starts (1) Amount of electricity consumption before the project starts (MWh/y)

Enter the monitoring data

Parameter		Entry	Unit		
Amount of electricity consumption before the project starts		500	MWh/y		
	Petroleum	500	kL/y		
Amount of fuel consumption before the project starts	Coal	50	t/y		
	Gas	100	m ³ /y		
	Others				

(2) Emission factor of the typical power plant (t-CO₂/MWh)

Data availability should be validated in the following order in selecting the typical power plant and obtaining CO₂ emissions factor specific to the target.

i) Interview to the electric power management entity concerned

ii) Published values in the target country

Parameter	Entry	Unit
Emission factor of the typical power plant	0.896	t-CO ₂ /MWh
	and the second	

Interview to XX company of

(3) Net calorific value according to fuel type (TJ/Gg)

Data/ information specific to the target country should be preferably used for calculation. Data availability i) Project-specific values obtained through interview to electric power management entity concerned ii) National default

iii) IPCC Guideline default data

Parameter	Net calorific value		CO ₂ emiss	sion factor
Petroleum	36.3	GJ/kL	73.3	t-CO ₂ /TJ
Coal	26.7	GJ/t	98.3	t-CO ₂ /TJ
Gas	0.0384	GJ/m3	56.1	t-CO ₂ /TJ
Others				t-CO ₂ /TJ

Source: Interview to XX

2006 IPCC Guidelines for National Greenhouse Gas Inventories Volume 2 Energy table1.2,table2.2

BEww,ty : GHG emissions of the wastewater treatment system before the project starts

(1) Volume of wastewater treated in wastewater treatment system before the project starts (m³)

Enter the monitoring data.

(4

Enter the memoring data.				
Parameter	Entry	Unit		
Volume of wastewater treated	200,000	m ³ /y		

(2) Chemical oxygen demand removed by the wastewater treatment before the project starts (t-COD/m³) Enter the monitoring data.

It shall be determined as the difference of the COD of wastewater before and after the processing.					
Parameter	Entry	Unit			
Chamical average demand removed	0.050000	100D/3	4 1/-3 4 000 000		

Chemical oxygen demand removed 0.050000 t-COD/m³ 1 t/m³=1,000,000 mg/L (3) CH₄ correction factor for the wastewater treatment system before the project starts (-)

	Enter the IPCC guideline default value (Refer to Appendix).					
	Parameter	Entry	Unit			
	CH4 correction factor	0.8	-			
4)CH₄ pr	DCH ₄ producing capacity of the wastewater (kg-CH ₄ /kg-COD)					
	Use 0.25 as IPCC default value.					
	Parameter	Entry	Un	it		
				-		

$BE_{s,t,y}$: GHG emissions from the baseline sludge treatment systems before the project starts (1) Amount of dry matter in the treated sludge before the project starts (t)

Enter the monitoring data.	ject starts (t)	,	
Parameter	Entry	Unit	
Amount of dry matter in the treated sludge	954	m ³ /y	
Enter values when sludge treatment is not done before	e the project s	starts (wher	n no sludge generated).
Parameter	Entry	U	nit
Sludge generation ratio of the wastewater treatment	0	t-sludge	
Sludge generation ratio of the wastewater treatment	0	t-sludge	
(2) CH4 correction factor of the sludge treatment system bef		ct starts (-)
Enter the IPCC guideline default value (Refer to Appen			l i i i i i i i i i i i i i i i i i i i
Parameter	Entry	Unit	
CH ₄ correction factor of the sluge treatment system	0.8	-	
 (3) Degradable organic content of the untreated sludge (dry line Data/ information specific to the target country should should be validated in the following order to enter data i) National default ii) IPCC Guideline default data 	ld be preferat	bly used for	calculation. Data availability
Parameter	Entry	Unit	
DOC in sludge	0.5	-	
(4) Fraction of degradable organic carbon (DOC) dissimilated Use 0.5 as IPCC default value.	d to biogas	(-)	
Parameter	Entry	Unit	
Fraction of DOC dissimilated	0.5	-	
(5) Fraction of CH_4 in biogas (-)			
Use 0.5 as IPCC default value.		11.2	l i i i i i i i i i i i i i i i i i i i
Parameter	Entry	Unit	
Fraction of CH₄ in biogas	0.5	-	
 BE_{www,d,y} : GHG emissions from degradable organic carbon into sea/river/lake before the project starts (1) Volume of treated or untreated wastewater discharged (m Enter the monitoring data. 		stewater d	lischarged
Parameter	Entry	Unit	
Volume of wastewater discharged	70,000	m ³ /y	
(2) Monitored COD in treated wastewater discharged into sea before the project starts starts (t/m ³) Enter the monitoring data.	a/river/lake		
Parameter	Entry	Unit	
Monitored content of COD	0.000500	t/m ³	1 t/m ³ =1,000,000 mg/L
(3) CH ₄ producing capacity of the wastewater (kg-CH ₄ /kg-CO Use 0.25 as IPCC default value.			
Parameter	Entry		nit
CH4 producing capacity of the wastewater	0.25		kg-COD
(4) CH ₄ correction factor based on discharge pathway before Enter the IPCC guideline default value (Refer to Appen		starts (-)	
Parameter	Entry	Unit	
CH4 correction factor based on discharge pathway	0.1	-	

BE_{s,f,y} : GHG emission from the final sludge decay before the project starts

(1) Amount of dry matter in the final sludge reclaimed before the project starts (t/y)

Enter the monitoring data.

DC

Enter the memoring data.				
Parameter	Entry	Unit		
Amount of sludge	10,000	t/y		

(2) Degradable organic content of the untreated sludge (dry basis) (-)

Data/ information specific to the target country should be preferably used for calculation. Data availability should be validated in the following order to enter data in the cells.

 National c 	lefault
	Statistical defendence

II) IPCC Guideline delault data		
Parameter	Entry	Unit
OC in sludge	0.5	-

(3) CH_4 correction factor of the disposal site that receives the sludge before the project starts (-)

	Enter the IPCC guideline default value (Refer to Appendix).				
	Parameter	Entry	Unit		
	CH4 correction factor of the disposal site	0.8	-		
(4) Fraction of degradable organic carbon (DOC) dissimilated to biogas (-)					
	Use 0.5 as IPCC default value.				
	Parameter	Entry	Unit		
1	Fraction of DOC dissimilated	0.5	-		
(5) Fractio	(5) Fraction of CH₄ in biogas				

Use 0.5 as IPCC default value.		
Parameter	Entry	Unit
Fraction of CH₄ in biogas	0.5	-

BE_{EN}: CO₂ emissions from electric power or thermal energy displaced by the Biogas recovery

(1) Amount of electric power and thermal energy in biogas after the project starts (MWh/y)

Enter the planned data before the project starts or input the monitoring data after the project starts.

Parameter	Entry	Unit
Amount of electric power in biogas	1,000	MWh/y
Quantity of thermal energy in biogas	100	TJ/y
the factor of the texterior language should be the state of the state		

(2) Emission factor of the typical power plant (t-CO₂/MWh)

Data availability should be validated in the following order in selecting the typical power plant and obtaining CO_2 emissions factor specific to the target.

i) Interview to the electric power management entity concerned

ii) Published values in the target country

Parameter	Entry	Unit
Emission factor of the typical power plant	0.896	t-CO ₂ /MWh

Source: Interview to XX company of XX country

(3) Net calorific value according to fuel type (t-CO₂/TJ)

	Parameter		Entry	Unit
CO ₂ emission	factor per unit of energy of the boiler fuel	Fuel type	73.3	t-CO ₂ /TJ
consumption	in the absence of project	Petroleum		
Boiler efficien	су		100	%
Rate of heat g	generation from boiler out of the heat generatior	n using biomass	1	—
CO ₂ emission	a factor per heat generated		73.3	t-CO ₂ /TJ

2.2

2. Information after the project starts

PE_{EC,y} : GHG emission from electric consumption after the project starts

PE_{FC,v} : GHG emission from fossil fuel consumption after the project starts

(1) The electricity and fuel consumption after the project starts in the biogas recovery facilities (MWh/y)

Enter the planned data before the project starts or input the monitoring data after the project starts.

Parameter		Entry	Unit
Amount of electricity consumption	500	MWh/y	
	Petroleum	500	kL/y
Amount of fuel consumption after	Coal	50	t/y
the project starts	Gas	100	m ³ /y
	Others		

(2) Emission factor of the typical power plant (t-CO₂/MWh)

Data availability should be validated in the following order in selecting the typical power plant and obtaining CO₂ emissions factor specific to the target.

Parameter	Entry	Unit
Emission factor of the typical power plant	0.896	t-CO ₂ /MWh
Source: Interview to XX company of	XX country	

(3) Net calorific value according to fuel type (TJ/Gg)

Data/ information specific to the target country should be preferably used for calculation. Data availability should be validated in the following order to enter data in the cells.

i) Project-specific values obtained through interview to electric power management entity concerned ii) National default

iii) IPCC Guideline default data

Parameter	Net calorific	value	CO ₂ emission facto		
Petroleum	36.3	GJ/kL	73.3	t-CO ₂ /TJ	
Coal	26.7	GJ/t	98.3	t-CO ₂ /TJ	
Gas	0.0384	GJ/m3	56.1	t-CO ₂ /TJ	
Others				t-CO ₂ /TJ	
Source: Interview to XX	X				

Interview to XX

2006 IPCC Guidelines for National Greenhouse Gas Inventories Volume 2 Energy table1.2,table2.2

PE_{ww,t,y} : GHG emissions of the wastewater treatment system after the project starts

(1) Volume of wastewater treated in wastewater treatment system after the project starts (m³)

Enter the planned data before the project starts or in	out the monito	oring data af	ter the proj	ect starts.
Parameter	Entry	Unit		
Volume of wastewater treated	70,000	m ³ /y		
(2) Chemical oxygen demand removed by the wastewater tre				
Enter the planned data before the project starts or in				
It shall be determined as the difference of the COD of	wastewater b	pefore and a	fter the pro	cessing.
Parameter	Entry	Unit		
Chemical oxygen demand removed	0.000450	t-COD/m ³	$1 t/m^3 = 1,0$)00,000 mg/L
(3) CH ₄ correction factor for the wastewater treatment system	m after the p	roject start	s (-)	
Enter the IPCC guideline default value (Refer to Appe	ndix).			
Parameter	Entry	Unit		
CH ₄ correction factor for the wastewater treatment	0.8	-		
(4) CH_4 producing capacity of the wastewater (kg-CH ₄ /kg-C	OD)			
Use 0.25 as IPCC default value.				_
Parameter	Entry	U	nit	
CH ₄ producing capacity of the wastewater	0.25	kg-CH₄/	kg-CÖD	

PE _{sty} : GHG em	nissions from the sludge treatment systems	(excluding)	composting	g)	
(1) Amount of dry	/ matter in the sludge treated by the sludge	treatment s	/stem after	the project	t starts (t)
	he planned data before the project starts or in				
	Parameter	Entry	Unit		
Amount	t of dry matter in the treated sludge	70,000	m ³ /y		
	n factor of the sludge treatment system after			l	
			i Starts (-)		
Enter tr	ne IPCC guideline default value (Refer to Appe	· · ·			
	Parameter	Entry	Unit		
	rrection factor of the sludge treatment system	0.0	-		
(3) Degradable or	ganic content of the untreated sludge (dry	basis))(-)			
Data	/ information specific to the target country shou	Ild be prefera	bly used for	calculation.	Data availability
should	be validated in the following order to enter data	a in the cells.			
i) Nat	tional default				
ii) IP(CC Guideline default data				
, in the second s	Parameter	Entry	Unit		
DOC in	sludge	0.5	-		
	gradable organic carbon (DOC) dissimilate	d to biogas (-)		
	5 as IPCC default value.		•		
	Parameter	Entry	Unit	l	
Fraction	n of DOC dissimilated to biogas	0.5	-		
(5) Fraction of CH		0.0		I	
	5 as IPCC default value.				
030 0.0	Parameter	Entry	Unit	1	
Fraction	n of CH_4 in biogas	0.5	Unit		
		0.0	-		
	nissions of the sludge treatment system aft				
	/ matter in the treated sludge by compostin				
Entert	he planned data before the project starts or inp			ter the proje	ect starts.
A	Parameter t of dry matter in the treated sludge	Entry	Unit		
Amoun	t of dry matter in the treated sludde		t/y		
		il an a N	a y		
(2)CH ₄ emission	factor by composting of sludge (t-CH4/t-slu				
(2)CH ₄ emission Emissio	factor by composting of sludge (t-CH ₄ /t-slu on factor of the general power facilities shall be	used as CO	2 emission		
(2)CH ₄ emission Emissio	factor by composting of sludge (t-CH4/t-slu	used as CO	2 emission		
(2)CH₄ emission Emissic connec	factor by composting of sludge (t-CH ₄ /t-slu on factor of the general power facilities shall be	used as CO	2 emission		
(2)CH₄ emission Emissic connec facilities i)Nati	factor by composting of sludge (t-CH ₄ /t-slu on factor of the general power facilities shall be ts to the grid. Data availability is validated in th s and its emission factor. ional default	used as CO	2 emission		
(2)CH₄ emission Emissic connec facilities i)Nati	factor by composting of sludge (t-CH ₄ /t-slu on factor of the general power facilities shall be ts to the grid. Data availability is validated in th s and its emission factor.	used as CO	2 emission		
(2) CH₄ emission Emissic connec facilities i)Nati ii)IPC	factor by composting of sludge (t-CH ₄ /t-slu on factor of the general power facilities shall be ts to the grid. Data availability is validated in th s and its emission factor. ional default	used as CO	2 emission		
(2) CH₄ emission Emissic connec facilities i)Nati ii)IPC	factor by composting of sludge (t-CH ₄ /t-slu on factor of the general power facilities shall be ts to the grid. Data availability is validated in th s and its emission factor. ional default CC Guideline default data (0.01)	used as CO	₂ emission f der in rega		
(2) CH₄ emission Emissic connec facilities i)Nati ii)IPC Use t	factor by composting of sludge (t-CH₄/t-slu on factor of the general power facilities shall be ts to the grid. Data availability is validated in th s and its emission factor. ional default CC Guideline default data (0.01) the planned data after the project starts. Parameter	e used as CO e following or	2 emission f der in rega	ds of the se	
(2) CH₄ emission Emissic connec facilities i)Nati ii)IPC Use t	factor by composting of sludge (t-CH ₄ /t-slu on factor of the general power facilities shall be ts to the grid. Data availability is validated in th s and its emission factor. ional default CC Guideline default data (0.01) the planned data after the project starts.	e used as CO e following or Entry	2 emission f der in rega	ds of the se	
(2) CH₄ emission Emissic connec facilities i)Nati ii)IPC Use t Emissic	factor by composting of sludge (t-CH₄/t-slu on factor of the general power facilities shall be ts to the grid. Data availability is validated in th s and its emission factor. ional default CC Guideline default data (0.01) the planned data after the project starts. Parameter on factor by composting	e used as CO e following or Entry 0.01	₂ emission t der in regat U t-CH₄/t	rds of the se nit -sludge	lection of general
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(2) CH₄ emission Emissio connec facilities i)Nati ii)IPC Use t Emissio PE _{ww,d.y} : GHG en after	factor by composting of sludge (t-CH₄/t-slu on factor of the general power facilities shall be ts to the grid. Data availability is validated in th s and its emission factor. ional default CC Guideline default data (0.01) the planned data after the project starts. Parameter on factor by composting nissions from degradable organic carbon in the project starts	Entry 0.01	₂ emission t der in regat U t-CH₄/t	rds of the se nit -sludge	lection of general
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(2) CH₄ emission Emissio connec facilities i)Nati ii)IPC Use t Emissio PE _{ww,d,y} : GHG en after (1) Volume of trea Enter t	factor by composting of sludge (t-CH₄/t-slu on factor of the general power facilities shall be ts to the grid. Data availability is validated in th s and its emission factor. ional default CC Guideline default data (0.01) the planned data after the project starts. Parameter on factor by composting nissions from degradable organic carbon in the project starts ated or untreated wastewater discharged (r he planned data before the project starts or inp Parameter	Entry Entry 0.01 Treated was n ³) Dut the monito Entry	2 emission f der in regat t-CH₄/t stewater di pring data at Unit	nit -sludge scharged ir	election of general
(2) CH₄ emission Emissio connec facilities i)Nati ii)IPC Use t Emissio PE _{ww.d.y} : GHG en after (1) Volume of trea Enter t Volume	factor by composting of sludge (t-CH₄/t-slu on factor of the general power facilities shall be ts to the grid. Data availability is validated in the s and its emission factor. ional default CC Guideline default data (0.01) the planned data after the project starts. Parameter on factor by composting nissions from degradable organic carbon in the project starts ated or untreated wastewater discharged (r he planned data before the project starts or inp Parameter e of wastewater discharged	Entry 0.01 0 treated was n ³) 0 ut the monito Entry 70,000	2 emission f der in regat t-CH₄/t stewater di bring data a Unit m ³ /y	nit -sludge scharged in	nto sea/river/lake
(2) CH₄ emission Emissio connec facilities i)Nati ii)IPC Use t Emissio PE _{ww.d.y} : GHG en after (1) Volume of trea Enter t Volume (2) COD of the trea	factor by composting of sludge (t-CH₄/t-slu on factor of the general power facilities shall be ts to the grid. Data availability is validated in the s and its emission factor. ional default CC Guideline default data (0.01) the planned data after the project starts. Parameter on factor by composting nissions from degradable organic carbon in the project starts ated or untreated wastewater discharged (r he planned data before the project starts or in Parameter e of wastewater discharged eated wastewater discharged into sea, river	Entry Entry 0.01 1 treated was n ³) Dut the monitor Entry 70,000 or lake after	2 emission f der in regat t-CH₄/t stewater di bring data a Unit m ³ /y the projec	nit -sludge scharged in fter the proje t starts (t/r	nto sea/river/lake ect starts. n ³)
(2) CH₄ emission Emissio connec facilities i)Nati ii)IPC Use t Emissio PE _{ww.d.y} : GHG en after (1) Volume of trea Enter t Volume (2) COD of the trea	factor by composting of sludge (t-CH₄/t-slu on factor of the general power facilities shall be ts to the grid. Data availability is validated in the s and its emission factor. ional default CC Guideline default data (0.01) the planned data after the project starts. Parameter on factor by composting nissions from degradable organic carbon in the project starts ated or untreated wastewater discharged (r he planned data before the project starts or inj Parameter e of wastewater discharged eated wastewater discharged into sea, river he planned data before the project starts or inj	Entry 0.01 Entry 0.01 Entry 0.01 Entry 70,000 or lake after put the monito	2 emission f der in regar t-CH₄/t stewater dia pring data a Unit m ³ /y the projec pring data a	nit -sludge scharged in fter the proje t starts (t/r	nto sea/river/lake ect starts. n ³)
(2) CH₄ emission Emissio connec facilities i)Nati ii)IPC Use t Emissio PEwww.dy : GHG en after (1) Volume of trea Enter t Volume (2) COD of the trea Enter t	factor by composting of sludge (t-CH₄/t-slu on factor of the general power facilities shall be ts to the grid. Data availability is validated in the s and its emission factor. ional default CC Guideline default data (0.01) the planned data after the project starts. Parameter on factor by composting nissions from degradable organic carbon in the project starts ated or untreated wastewater discharged (r he planned data before the project starts or inp Parameter of wastewater discharged eated wastewater discharged into sea, river he planned data before the project starts or inp Parameter e of wastewater discharged eated wastewater discharged into sea, river he planned data before the project starts or inp Parameter	Entry Entry 0.01 1 treated was n ³) Dut the monitor Entry 70,000 or lake after	2 emission f der in regat t-CH₄/t stewater dia oring data a Unit m ³ /y the projec oring data a Unit	nit -sludge scharged in fter the proje t starts (t/r fter the proje	nto sea/river/lake ect starts. n ³) ect starts.
(2) CH₄ emission Emissio connec facilities i)Nati ii)IPC Use t Emissio PEwww.dy : GHG en after (1) Volume of trea Enter t Volume (2) COD of the trea Enter t	factor by composting of sludge (t-CH₄/t-slu on factor of the general power facilities shall be ts to the grid. Data availability is validated in the s and its emission factor. ional default CC Guideline default data (0.01) the planned data after the project starts. Parameter on factor by composting nissions from degradable organic carbon in the project starts ated or untreated wastewater discharged (r he planned data before the project starts or inj Parameter e of wastewater discharged eated wastewater discharged into sea, river he planned data before the project starts or inj Parameter e of wastewater discharged eated wastewater discharged into sea, river he planned data before the project starts or inj Parameter e of content of COD	Entry Entry 0.01 Treated was 0.01 0.0000 0.000 0.000 0.0000 0.0000 0.00000 0.0000 0.0000 0.00000 0.0000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.000000 0.00000000	2 emission f der in regar t-CH₄/t stewater dia pring data a Unit m ³ /y the projec pring data a	nit -sludge scharged in fter the proje t starts (t/r fter the proje	nto sea/river/lake ect starts. n ³)
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(2) CH₄ emission Emissio connec facilities i)Nati ii)IPC Use t Emissio PE _{ww.dy} : GHG en after (1) Volume of trea Enter t Volume (2) COD of the trea Enter t Monitor (3) CH₄ producing	factor by composting of sludge (t-CH₄/t-slu on factor of the general power facilities shall be ts to the grid. Data availability is validated in the s and its emission factor. ional default CC Guideline default data (0.01) the planned data after the project starts. Parameter on factor by composting nissions from degradable organic carbon in the project starts ated or untreated wastewater discharged (r he planned data before the project starts or inp Parameter e of wastewater discharged bated wastewater discharged into sea, river he planned data before the project starts or inp Parameter e of wastewater discharged bated wastewater discharged into sea, river he planned data before the project starts or inp Parameter e of content of COD g capacity of the wastewater (kg-CH₄/kg-CC	Entry Entry 0.01 Treated was 0.01 0.0000 0.000 0.000 0.0000 0.0000 0.00000 0.0000 0.0000 0.00000 0.0000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.000000 0.00000000	2 emission f der in regat t-CH₄/t stewater dia oring data a Unit m ³ /y the projec oring data a Unit	nit -sludge scharged in fter the proje t starts (t/r fter the proje	nto sea/river/lake ect starts. n ³) ect starts.
(2) CH₄ emission Emissio connec facilities i)Nati ii)IPC Use t Emissio PE _{ww.dy} : GHG en after (1) Volume of trea Enter t Volume (2) COD of the trea Enter t Monitor (3) CH₄ producing	factor by composting of sludge (t-CH₄/t-slu on factor of the general power facilities shall be ts to the grid. Data availability is validated in the s and its emission factor. ional default CC Guideline default data (0.01) the planned data after the project starts. Parameter on factor by composting nissions from degradable organic carbon in the project starts ated or untreated wastewater discharged (r he planned data before the project starts or inj Parameter e of wastewater discharged eated wastewater discharged into sea, river he planned data before the project starts or inj Parameter e of wastewater discharged eated wastewater discharged into sea, river he planned data before the project starts or inj Parameter e of content of COD	Entry Entry 0.01 Treated was 0.01 0.0000 0.000 0.000 0.0000 0.0000 0.00000 0.0000 0.0000 0.00000 0.0000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.000000 0.00000000	2 emission f der in regar t-CH₄/t stewater dia pring data a Unit m ³ /y the projec pring data a Unit t/m ³	nit -sludge scharged in fter the proje t starts (t/r fter the proje	nto sea/river/lake ect starts. n ³) ect starts.
(2) CH₄ emission Emissio connec facilities i)Nati ii)IPC Use t Emissio PEwww.dy : GHG en after (1) Volume of trea Enter t Volume (2) COD of the trea Enter t (3) CH₄ producing Use 0.2	factor by composting of sludge (t-CH₄/t-slu on factor of the general power facilities shall be ts to the grid. Data availability is validated in the s and its emission factor. ional default CC Guideline default data (0.01) the planned data after the project starts. Parameter on factor by composting nissions from degradable organic carbon in the project starts ated or untreated wastewater discharged (r he planned data before the project starts or in Parameter e of wastewater discharged eated wastewater discharged into sea, river he planned data before the project starts or in Parameter e of content of COD g capacity of the wastewater (kg-CH₄/kg-CC 25 as IPCC default value.	Entry 0.01 Entry 0.01 Entry 0.000 or lake after Dut the monito Entry 0.000050 D	2 emission f der in regar t-CH₄/t stewater dia pring data a Unit m ³ /y the projec pring data a Unit t/m ³	nit -sludge scharged in fter the proje t starts (t/n fter the proje 1 t/m ³ =1,0	nto sea/river/lake ect starts. n ³) ect starts.
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(2) CH ₄ emission Emissio connect facilities i)Nati ii)IPC Use t Emissio PE _{ww,dy} : GHG en after (1) Volume of treat Enter t Volume (2) COD of the treat Enter t (3) CH ₄ producing Use 0.2 (4) CH ₄ correction	factor by composting of sludge (t-CH₄/t-slu on factor of the general power facilities shall be ts to the grid. Data availability is validated in the s and its emission factor. ional default CC Guideline default data (0.01) the planned data after the project starts. Parameter on factor by composting nissions from degradable organic carbon in the project starts ated or untreated wastewater discharged (r he planned data before the project starts or in Parameter e of wastewater discharged eated wastewater discharged into sea, river he planned data before the project starts or in Parameter e of content of COD g capacity of the wastewater (kg-CH₄/kg-CC 25 as IPCC default value. Parameter oducing capacity of the wastewater n factor based on discharge pathway after the parameter to Appe	Entry Entry 0.01 Entry 0.01 1 treated was n ³) put the monitor Entry 0.000050 D Entry 0.000050 D Entry 0.25 he project st ndix).	2 emission f der in regar t-CH₄/t stewater di pring data a Unit m ³ /y the projec pring data a Unit t/m ³ Unit t/m ³	nit -sludge scharged in fter the proje t starts (t/n fter the proje 1 t/m ³ =1,0	nto sea/river/lake ect starts. n ³) ect starts.
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$\ensuremath{\mathsf{PE}_{\mathsf{s},\mathsf{f},\mathsf{y}}}$: GHG emissions from anaerobic decay of the final sludge after the project starts

(1) Amount of dry matter in the final sludge reclaimed after the project starts (t/y)

Enter the planned data before the project starts or inp	ut the monito	oring data af	ter the project starts.
Parameter	Entry	Unit	
Amount of dry matter in the final sludge	0	t/v	

(2) Degradable organic content of the untreated sludge (dry basis)) (-)

Data/ information specific to the target country should be preferably used for calculation. Data availability should be validated in the following order to enter data in the cells.

i) ivai	ionai	derault		
ii) ID(C C1	uideline	dofau	lt data

Parameter	Entry	Unit
DOC is sludge	0.5	-

(3) CH₄ correction factor of the disposal site that receives the final sludge after the project starts (-) Enter the IPCC guideline default value (Refer to Appendix).

	Parameter	Entry	Unit			
	CH_4 correction factor of the disposal site	0.8	-			
(4)Fractio	(4) Fraction of degradable organic carbon (DOC) dissimilated to biogas (-)					
	Use 0.5 as IPCC default value.					
	Parameter	Entry	Unit			
	Fraction of DOC dissimilated	0.5	-			
(5) Fraction of CH ₄ in biogas						
	Use 0.5 as IPCC default value.					

Parameter	Entry	Unit
Fraction of CH ₄ in biogas	0.5	-

3. Other conditions

(1) Model correction factor to account for model uncertainties (before the project starts) (-)

Parameter	Entry	Unit			
Model correction factor (default value)	0.94	-			
(2) Model correction factor to account for model uncertainties (after the project starts) (-)					
Use 1.06 as default value.					
Parameter	Entry	Unit			
Model correction factor (default value)	1.06	-			
	Model correction factor (default value) (2) Model correction factor to account for model uncertain Use 1.06 as default value. Parameter	Parameter Entry Model correction factor (default value) 0.94 (2) Model correction factor to account for model uncertainties (after to Use 1.06 as default value. 0.94 Parameter Entry	Parameter Entry Unit Model correction factor (default value) 0.94 - (2) Model correction factor to account for model uncertainties (after the project Use 1.06 as default value. 0.94 - Parameter Entry Unit		

Entry

Entry of source, etc.

Calculation Sheet

SAMPLE : Wastewater Treatment

GHG emission reduction after project activity (t-CO₂/y) ERy = BEy - PEy (t-CO₂/y)

1. Baseline emission $BEy = BE_{EC,y} + BE_{FC,y} + BE_{ww,t,y} + BE_{s,t,y} + BE_{ww,d,y} + BE_{s,f,y} + BE_{EN,y}$

BE _y	Baseline emission : GHG emission from methane released into the atmosphere before the project starts	70,237	t-CO ₂ /y
BE _{EC,y}	GHG emissions from electricity consumption on site before the project	448	t-CO ₂ /y
BE _{FC,y}	GHG emissions from fuel consumption on site before the project	1,462	t-CO ₂ /y
BE www,t,y	GHG emissions of the wastewater treatment system before the project	39,480	t-CO ₂ /y
BE _{s,t,y}	GHG emissions from the baseline sludge treatment	2,510	t-CO ₂ /y
BE _{ww,d,y}	GHG emissions on pathway of wastewater discharged into sea/river/lake before the project	17	t-CO ₂ /y
BE _{s,f,y}	GHG emissions from anaerobic decay of the final sludge before the project If the sludge is controlled combusted, disposed in a landfill with biogas recovery, or used for soil application before the project, this term shall be neglected.		t-CO ₂ /y
BE _{EN,y}	Baseline emissions from generation of energy displaced by the project activity	8,226	t-CO ₂ /y

2. Project emission $PE_y = PE_{EC,y} + PE_{FC,y} + PE_{ww,t,y} + PE_{s,t,y} + PE_{ww,d,y} + PE_{s,t,y}$

PE _y	Project emission: GHG emission with wastewater or sludge treatment systems is installed or revised after the project starts		t-CO ₂ /y
PE _{EC,y}	GHG emission from electric consumption after the project starts	448	t-CO ₂ /y
PE _{FC,y}	GHG emission from fossil fuel consumption after the project starts	1,462	t-CO ₂ /y
PE _{ww,t,y}	GHG emissions of the wastewater treatment system after the project If the CH ₄ generated during the process is recovered and destroyed, this term shall be neglected.	140	t-CO ₂ /y
<i>PE_{s,t,y}</i>	GHG emissions from the sludge treatment systems If the CH ₄ generated during the process is recovered and destroyed, this term shall be neglected.	0	t-CO ₂ /y
PE _{ww,d,y}	GHG emissions on pathway of wastewater discharged into sea/river/lake after the project	2	t-CO ₂ /y
PE _{s,f,y}	GHG emissions from anaerobic decay of the final sludge in wastewater treatment after the project . If the sludge is controlled combusted, disposed in a landfill with biogas recovery, or used for soil application after the project, this term shall be neglected.	0	t-CO₂/y

3. GHG emission reduction after project activity ERy = BEy - PEy (t-CO₂/y)

ER _y	GHG emissions reduction in year y achieved by the project	68,185 <mark>t-CO₂/y</mark>
BE _y	Baseline emission: GHG emission from methane released into the atmosphere before the project starts	70,237 <mark>t-CO₂/y</mark>
PEy	Project emission: GHG emission with composting the sewage sludge decay in year y	2,052 <mark>t-CO₂/y</mark>

Input Sheet

Project name SAMPLE : Sewerage

. Information before the project	Default value	e in red		
E _{CH4.S.v} : GHG emissions from anaerobic decay of t	he final slud	lao in waste	water treat	ment before the proje
1) Amount of dry matter in the final sludge gene				
Use 0.5 as IPCC guidline default value (d				r treatment system (-
Parameter	Entry	Unit	ige).	
Amount of DOC in sludge	0.5	-		
2)CH₄ correction factor of the disposal site that	receives the	e sludae be	fore the n	oject (-)
Enter the IPCC guidline default value (Re		-		
Parameter	Entry	Unit		
CH ₄ correction factor of the disposal site	1.0	01111		
•		-	\sim	
3) Fraction of degradable organic carbon (DOC)	aissimilatee	d to blogas	(-)	
Use 0.5 as IPCC guideline default data. Parameter	Entry	Unit		
Fraction of DOC dissimilated	Entry 0.5	-		
4) Fraction of CH ₄ in biogas	0.5			
Use 0.5 as IPCC guideline default data.				
Parameter	Entry	Unit		
Fraction of CH_4 in biogas	0.5	-		
Traction of Ort ₄ in biogas	0.5	-		
Parameter	Entry	Unit		
Amount of electricity produced using		MWh/y		
Amount of thermal energy produced	100	TJ/y		
using biogas	100	т Ј/ у		
2) Emission factor of the typical power plant (t-	CO ₂ /MWh)			
Data availability should be validated in the	e following or	der in selec	ting the typ	pical power plant and o
CO ₂ emissions factor specific to the targe	t.			
i) Interview to the electric power managen	nent entity co	oncerned		
ii) Published values in the target country				
,				
Parameter	Entry	U	nit]
Emission factor of the typical power plant	0.896	t-CO ₂ /MWh	າ	
Source: Interview to XX compa	any of XX cou	untry		
3)CO2 emission factor of heat generated (t-CO2		-		
-				
Parameter			Entry	Unit
CO ₂ emission factor per unit of energy of	the boiler		73.3	t-CO ₂ /TJ
fuel consumption in the absence of project		Fuel type		
Boiler efficiency	t	Puel type Petroleum		
	et		100	%
		Petroleum	100	%
Rate of heat generation from boiler out of		Petroleum	<u>100</u> 1	%
, , , , , , , , , , , , , , , , , , ,		Petroleum	1	% t-CO ₂ /TJ

 Source:
 2006 IPCC Guidelines for National Greenhouse Gas Inventories Volume 2 Energy table2.2

2. Information after the project starts

- PE_{EC.v} : GHG emission from electric consumption after the project starts
- PE_{FC,y} : GHG emission from fossil fuel consumption after the project starts

(1) The electricity and fuel consumption after the project starts in the biogas recovery facilities (MWh/y) Enter the planned data before the project starts or input the monitoring data after the project starts.

Parameter	Entry	Unit	
Amount of electricity consum	500	MWh/y	
	Petroleum	500	kL/y
Amount of fuel consumption after the project starts	Coal	50	t/y
	Gas	100	m ³ /y
	Others		

(2) Emission factor of the typical power plant (t-CO₂/MWh)

Data availability should be validated in the following order in selecting the typical power plant and obtaining CO₂ emissions factor specific to the target.

i) Interview to the electric power management entity concerned

ii) Published values in the target country

Parameter	Entry	Unit	
CO2 emission factor of electricity which connects to grid	0.896	t-CO ₂ /MWh	
Source: Interview to XX company of XX country			

(3) Net calorific value according to fuel type(TJ/Gg)

Data/ information specific to the target country should be preferably used for calculation. Data availability should be validated in the following order to enter data in the cells.

i) Project-specific values obtained through interview to electricity management entity concerned ii) National default

iii) IPCC Guideline default data

Parameter		Net calorific value		CO ₂ emission factor	
Petroleum		36.3	GJ/kL	73.3	t-CO ₂ /TJ
Coal		26.7	GJ/t	98.3	t-CO ₂ /TJ
Gas		0.0384	GJ/m3	56.1	t-CO ₂ /TJ
Others					t-CO ₂ /TJ
Source:	Interview to	o XX			

2006 IPCC Guidelines for National Greenhouse Gas Inventories Volume 2 Energy table1.2,table2.2

PE_{C.v} : GHG emission during the composting process after the project starts

(1) Amount of dry matter in the sludge composed (t/y)

Enter the planned data before the project starts or input the monitoring data after the project starts.

Parameter	Entry	Unit		
Amount of dry matter composed	30,000	t/y		

(2) Emission factor for CH₄ from the composting process(t-CH₄/t-sludge)

Data/ information specific to the target country should be preferably used for calculation. Data availability should be validated in the following order to enter data in the cells.

i)National default

ii)IPCC Guideline default data(0.01)

Enter the monitoring data after the project starts.			
Parameter	Entry	Unit	
Emission factor during composting process	0.01	t-CH₄/t-sludge	

4. Other conditions

(1) Fraction of methane destroyed by national regulation before the project starts (t-CH₄/y)

It shall be "0" where developing countries	have a very	few regulati	ion
Parameter	Entry	Unit	
Fraction of CH ₄ destroyed	0.00	-	

(2) Model correction factor to account for model uncertainties (before the project starts) (-)

Enter 0.94 as default value

Parameter	Entry	Unit
Model correction factor (default value)	0.94	-

Entry

Entry of source, etc.

Calculation Sheet

SAMPLE : Sewerage

GHG emission reduction after project activity(t-CO₂/y)

 $ERY - DEY - FEY (I-CO_{a}/v)$

1. Baseline emission BEy = $BE_{CH4,S,y} \times (1-AF) + BE_{EN}$

ВЕ _у	Baseline emission: GHG emission from CH_4 released into the atmosphere before the project starts which the sludge is composted	106,926	t-CO ₂ /y
ВЕ _{СН4,S,} у	GHG emissions from anaerobic decay of the final sludge in sludge treatment before the project	98,700	t-CO ₂ /y
AF	GHG emission reduction of methane destroyed by national regulation before the project starts This shall be "0" where developing countries have a very few regulation.	0	-
BE _{EN,y}	GHG emission from electricity and thermal energy genaration displaced by the project activity	8,226	t-CO ₂ /y

2. Project emission $PE_y = PE_{EC,y} + PE_{FC,y} + PE_{C,y}$

PE _y	Project emission: GHG emission from CH_4 released into the atmosphere after the project starts which the sludge is composted	8,210	t-CO ₂ /y
PE _{EC,y}	GHG emission from electric consumption after the project star	448	t-CO ₂ /y
PE _{FC,y}	GHG emission from fossil fuel consumption after the project starts	1,462	t-CO ₂ /y
РЕ _{С,у}	GHG emission during the composting process after the project starts	6,300	t-CO ₂ /y

3. GHG emission reduction after project activity ERy = BEy - PEy (t-CO₂/y)

ER _y	GHG emissions reduction in year y achieved by the proje	98,716	t-CO ₂ /y
BE _y	Baseline emission: GHG emission from CH ₄ released into the atmosphere before the project starts which the sludge is composted	106,926	t-CO₂/y
PE _y	Project emission: GHG emission from CH4 released into the atmosphere after the project starts	8,210	t-CO₂/y