IGES Experience of developing Excel-based worksheets

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IGES CDM ERs Calculation Sheet Series

- ACM0010 Version 5 (Consolidated methodology for GHG emission reductions from manure management systems)
- ACM0012 Version 3.2 (Consolidated baseline methodology for GHG emission reductions from waste energy recovery projects)
- ACM0014 Version 4 (Mitigation of greenhouse gas emissions from treatment of industrial wastewater)
- AMS-III.H. Version 15 (Methane recovery in wastewater treatment)
- AMS-III.D. Version 16 (Methane recovery in animal manure management systems)

IGES CDM ERs Calculation Sheet Series

- Providing a simplified spreadsheet for demonstrating emission reductions based on the approved methodologies
- Providing estimated emission reductions by entering only several key parameters
- Providing detailed calculating formulas in the spreadsheet so that you will be able to modify any conditions or assumptions based on your own interests
- Using for training materials of IGES CDM Capacity Building Activities in the Asia region

How to use ERs calculation sheet (1)

AMS-III.D./Version 16: Methane recovery in animal manure management systems

1. Input selected values on the "Data" sheet of an excel file

<table>
<thead>
<tr>
<th>Data</th>
<th>Parameter</th>
<th>Unit</th>
<th>Data Input</th>
</tr>
</thead>
<tbody>
<tr>
<td>Region</td>
<td>-</td>
<td>-</td>
<td>Asia</td>
</tr>
<tr>
<td>Annual average number of breeding swine</td>
<td>N_L_breed</td>
<td>n</td>
<td>2,000</td>
</tr>
<tr>
<td>Average weight of breeding swine</td>
<td>W_L_breed</td>
<td>kg</td>
<td>150</td>
</tr>
<tr>
<td>Annual average number of market swine</td>
<td>N_L_market</td>
<td>n</td>
<td>15,000</td>
</tr>
<tr>
<td>Average animal weight of market swine</td>
<td>W_L_market</td>
<td>kg</td>
<td>70</td>
</tr>
</tbody>
</table>

ER Result                  | tCO₂eq/yr          | 9,104

9,104 t-CO₂e
Estimated emission reductions based on the assumption
How to use ERs calculation sheet (2)

AMS-III.D./Version 16: Methane recovery in animal manure management systems

2. Change the value of data input in the “Data” sheet if the assumption and condition are different from a proposed project.

### Structure of ERs calculation sheet

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Data Input</th>
<th>Assumption</th>
</tr>
</thead>
<tbody>
<tr>
<td>Annual methane conversion factor (MCF) for current manure management system</td>
<td>0.78</td>
<td>Current manure management system is uncovered anaerobic digester with annual average temperature (30°C) below 2°C.</td>
</tr>
<tr>
<td>Number of days in year where the treatment was operational</td>
<td>365</td>
<td>The treatment plant would be operated throughout the year.</td>
</tr>
<tr>
<td>Fraction of manure handled in the system</td>
<td>100%</td>
<td>Assume that all manure is collected and treated at the system.</td>
</tr>
<tr>
<td>Flammability and thermal energy content in the absence of the project and in the project</td>
<td>0</td>
<td>No energy consumption at current management and in the project.</td>
</tr>
<tr>
<td>Heat efficiency</td>
<td>0.9</td>
<td>Flaring system is enclosed.</td>
</tr>
<tr>
<td>Volumetric flow rate of the residual gas in dry basis at normal conditions</td>
<td>100</td>
<td>Assumption.</td>
</tr>
<tr>
<td>Concentration of methane in the biogas</td>
<td>0.43008</td>
<td>Applied an expected fraction of methane in biogas of 0.60 m³/GJ/m³ multiplied to the density of methane at normal conditions of 0.7188.</td>
</tr>
<tr>
<td>Dry matter content of the manure when removed from the animal barn</td>
<td>10%</td>
<td>Assumption.</td>
</tr>
<tr>
<td>Annual average interval between manure collection and delivery for treatment</td>
<td>20</td>
<td>Assumption.</td>
</tr>
<tr>
<td>Annual methane conversion factor (MCF) for storage of manure</td>
<td>0.42</td>
<td>Type of storage of manure before being fed into anaerobic digester is liquid manure without natural cover.</td>
</tr>
</tbody>
</table>

**Data sheet**

**Ref sheet (regional information)**

**ERs sheet**

**BEs sheet**

**PEs sheet**
Grid Emission Factor Calculation Sheet

Providing a simplified spreadsheet for calculating grid emission factor from the power system based on the approved methodological tool.

The share of using the tool in registered projects

- Using the tool: 2,276 (75%)
- Not using the tool: 755 (25%)

Source: IGES CDM project database, May 2011

The calculation procedure in the tool

1. Identify the relevant electricity systems
2. Choose whether to include off-grid power plants in the project electricity system (optional)
3. Select the method to determine the operating margin (OM) Quotation
4. Calculate the operating margin emission factor according to the selected method
5. Identify the group of power units to be included in the build margin (BM)
6. Calculate the build margin emission factor
7. Calculate the combined margin (CM) emissions factor

Structure of GEFs Calculation Sheet

Combined Margin (CM)

Operating Margin (OM)

Build Margin (BM)

Simple adjusted OM
Dispatch data analysis OM
Simple OM
Average OM
Sample group (a)
Sample group (b)

Option I
Option II including off-grid power plant

Option 1
Option 2
Option 3

Option A
Option A1
Option A2
Option A3

Coverage area of the sheet

Automation
- Identification of low cost / must run resources
- Calculation with IPCC’s default values
- BM sample group selection

Required data for use of the sheet
- Data from each of power plants connected to the grid
- Net Electricity Generation
- Type of Fuel
- Commission year
- Fuel consumption (if available)
- Data vintage:
  - Ex-ante (3 years)