Joint Crediting Mechanism Approved Methodology ID_AM008

"Installation of a separate type fridge-freezer showcase by using natural refrigerant for grocery store to reduce air conditioning load inside the store"

A. Title of the methodology

Installation of a separate type fridge-freezer showcase by using natural refrigerant for grocery store to reduce air conditioning load inside the store, version 32.0

B. Terms and definitions

| Terms | Definitions | |
|------------------------------|---|--|
| Separate type fridge-freezer | Refrigeration or freezer system with natural refrigerant of | |
| showcase | which condensing unit and showcase unit are separated and | |
| | the condensing unit is located outside the store. The system | |
| | includes the following: | |
| | Reach-in type fridge showcase or freezer showcase (a | |
| | structure to interrupt display room from outside air by | |
| | glass type door) | |
| | Open type fridge showcase (a structure to interrupt | |
| | display room from outside air by air curtain) | |
| | Walk in type fridge showcase (a structure which people | |
| | can go in and fill groceries from behind the display | |
| | shelves) | |
| Natural refrigerant | Natural refrigerant refers to naturally occurring substances | |
| | with refrigeration capacity and with zero ozone depletion | |
| | potential (ODP) (e.g., CO ₂ and NH ₃). | |
| Built-in type showcase | Refrigeration or freezer system of which condensing unit and | |
| | showcase unit are built in one unit. | |
| Coefficient of Performance | Coefficient of Performance (COP) is the cooling capacity per | |
| (COP) | rated power consumption of the air conditioning system. The | |
| | values of cooling capacity and rated power consumption are | |
| | defined under specific temperature stated in ISO 5151:2010. | |
| Energy efficiency | For the purpose of this methodology, energy efficiency of the | |
| | fridge-freezer showcase is defined as the rated volume (L) | |

| divided by the rated electricity consumption (W) or the rated |
|---|
| cooling capacity (W) divided by the rated electricity |
| consumption (W). |

C. Summary of the methodology

| Items | Summary |
|--------------------------|--|
| GHG emission reduction | This methodology applies to the project that aims for saving total |
| measures | energy of in-store showcase and air conditioning system by |
| | introducing a separate type natural refrigerant fridge-freezer |
| | showcase for grocery store in Indonesia, which leads to GHG |
| | emission reductions, through the reduction of air conditioning |
| | electricity load demand by not releasing waste heat inside the |
| | store. |
| Calculation of reference | Reference emissions are GHG emissions from both the reference |
| emissions | built-in type fridge-freezer showcase and the reference air |
| | conditioning system. |
| | [Built-in type fridge-freezer showcase] |
| | Reference emissions from the reference fridge-freezer showcase |
| | are calculated with: |
| | Electricity consumption of the project fridge-freezer |
| | showcase; |
| | Energy efficiency of the project fridge-freezer showcase; |
| | Energy efficiency of the reference fridge-freezer |
| | showcase; and |
| | CO ₂ emission factor for consumed electricity. |
| | [Air conditioning system] |
| | Reference emissions from the reference air conditioning system |
| | due to waste heat from the reference fridge-freezer showcase are |
| | calculated with: |
| | Electricity consumption of the project fridge-freezer |
| | showcase; |
| | Energy efficiency of the project fridge-freezer showcase |
| | in terms of the cooling capacity; |
| | Energy efficiency of the project fridge-freezer showcase |
| | in terms of the volume; |

| | Energy efficiency of the reference fridge-freezer | |
|------------------------|--|--|
| | showcase; | |
| | COP of the reference air conditioning system; and | |
| | CO₂ emission factor for consumed electricity. | |
| Calculation of project | [Separate type natural refrigerant fridge-freezer showcase] | |
| emissions | Project emissions are calculated with power consumption of | |
| | installed separate type natural refrigerant fridge-freezer showcase | |
| | and CO ₂ emission factor for consumed electricity. | |
| Monitoring parameters | Electricity consumption of the project fridge showcase | |
| | Electricity consumption of the project freezer showcase | |

D. Eligibility criteria

This methodology is applicable to projects that satisfy all of the following criteria.

| Criterion 1 | The project is to install a separate type fridge-freezer showcase by using natural |
|-------------|---|
| | refrigerant or replacing the existing at a grocery store which is equipped with wall |
| | mounted type and/or ceiling cassette type air conditioning system and whose |
| | selling area is less than 400 (four hundred) m ² . |
| Criterion 2 | In the case of replacing the existing fridge-freezer showcase with the project |
| | fridge-freezer showcase, the existing one is a built-in type showcase. |
| Criterion 3 | A plan for not releasing refrigerant used for project fridge-freezer showcase is |
| | prepared. In the case of replacing the existing fridge-freezer showcase with the |
| | project fridge-freezer showcase, a plan is prepared in which refrigerant used in the |
| | existing fridge-freezer showcase is not released to the air e.g. re-use of the |
| | refrigerant. Execution of the prevention plan is checked at the time of verification, |
| | in order to confirm that refrigerant used for the existing one replaced by the |
| | project is not released to the air. |

E. Emission Sources and GHG types

| Reference emissions | |
|---|-----------------|
| Emission sources GHG types | |
| Electricity consumption of the reference fridge showcase | |
| Electricity consumption of the reference freezer showcase CO ₂ | |
| Electricity consumption of the reference air conditioning system | CO ₂ |

| Project emissions | |
|---|-----------|
| Emission sources | GHG types |
| Electricity consumption of the project fridge showcase | CO_2 |
| Electricity consumption of the project freezer showcase | CO_2 |

F. Establishment and calculation of reference emissions

F.1. Establishment of reference emissions

Reference emissions are GHG emissions from electricity consumption by both the reference built-in type fridge-freezer showcase and the reference air conditioning system used for cooling the exhaust heat from the reference fridge showcase.

Net emission reductions in this methodology are achieved by setting default values of "COP of the reference air conditioning system" in a conservative manner, and also achieved by not including "leakage of HFCs from the reference fridge-freezer showcase" when calculating emission reductions.

[COP of the reference air conditioning system]

The default values of COP of the reference air conditioning system are set in line with the approved JCM methodology ID_AM004-Ver1.0.

If the air conditioning system equipped in the project store has higher COP values compared to the table below within the respective cooling capacity range, the COP value of the air conditioning system installed at the project store is used.

If multiple types of air conditioning system with different cooling capacity rage shown in the table below are found in the project site, the highest value of COP is selected and applied to calculate reference emissions in a conservative manner.

| Cooling Capacity[kW] | Reference COP |
|----------------------------------|---------------|
| <u>2.6< x≤5.6</u> | <u>3.83</u> |
| <u>5.6<x≤6.8< u=""></x≤6.8<></u> | <u>3.61</u> |
| <u>6.8< x≤12.5</u> | <u>3.29</u> |
| <u>12.5≤x≤14.1</u> | <u>3.01</u> |

| Cooling Capacity [kW] | Reference COP |
|-----------------------|---------------|
| $2.5 < x \le 4.1$ | 4.00 |
| $4.1 < x \le 5.3$ | 3.59 |
| $5.3 < x \le 7.1$ | 2.96 |
| $7.1 < x \le 14.2$ | 2.85 |

The default COP values may be revised as to the revision of the approved JCM methodology ID_AM004 to maintain conservativeness.

[Energy efficiency of the reference fridge-freezer showcase]

The default values of rated electricity consumption of the reference fridge and freezer showcase are set *ex ante* in the table below.

The reference fridge showcase

-Reach-in showcase

| Range of volume (L) | Energy efficiency (L/W) |
|---------------------|-------------------------|
| z < 900 | <u>1.27</u> 1.18 |
| $900 \le z < 1,200$ | <u>1.94</u> 1.07 |
| 1,200 ≦ z | <u>2.43</u> 2.24 |

-Open showcase

| Range of volume (L) | Energy efficiency (L/W) |
|---------------------|-----------------------------|
| z < 900 | <u>0.54</u> 0.50 |
| $900 \le z < 1,200$ | <u>0.68</u> 0.65 |
| 1,200 ≦ z | <u>0.61</u> 0.73 |

The reference freezer showcase

-Reach-in showcase

| Range of volume (L) | Energy efficiency (L/W) |
|---------------------|-----------------------------|
| z < 900 | <u>0.54</u> 0.70 |
| $900 \le z < 1,200$ | <u>0.82</u> 0.70 |
| $1,200 \le z$ | <u>0.84</u> 1.01 |

Correspondence between project fridge-freezer showcase and reference fridge-freezer showcase:

| Pattern | Project fridge-freezer showcase | Reference fridge-freezer showcase |
|---------|---------------------------------|-----------------------------------|
| 1 | Reach-in type fridge showcase | Reach-in type fridge showcase |

| 2 | Open type fridge showcase | Open type fridge showcase |
|---|--------------------------------|--------------------------------|
| 3 | Walk-in type fridge showcase | Reach-in type fridge showcase |
| 4 | Reach-in type freezer showcase | Reach-in type freezer showcase |
| | | |

F.2. Calculation of reference emissions

 $RE_p = RE_{fridge,p} + RE_{freezer,p} + RE_{AC,add,fridge,p} + RE_{AC,add,freezer,p}$

 RE_p : Reference emissions during the period p [tCO₂/p]

 $RE_{fridge,p}$: Reference emissions of the fridge showcase during the period p [tCO₂/p]

 $RE_{freezer,p}$: Reference emissions of the freezer showcase during the period p

 $[tCO_2/p]$

RE_{AC,add,fridge,p}: Reference emissions of the air conditioning system caused by the

electricity consumption due to exhaust heat from the reference fridge

showcase during the period p [tCO₂/p]

RE_{AC,add,freezer,p}: Reference emissions of the air conditioning system caused by the

electricity consumption due to exhaust heat from the reference freezer

showcase during the period p [tCO₂/p]

 $RE_{fridge,p} = \sum_{i} \left(EC_{PJ,fridge,i,p} \times \frac{\eta_{PJ,fridge,i}}{\eta_{RE,fridge,i}} \right) \times EF_{elec}$

 $RE_{fridge,p}$: Reference emissions of the fridge showcase during the period p [tCO₂/p]

 $EC_{PJ,fridge,i,p}$: Electricity consumption of the project fridge showcase i during the period

p [MWh/p]

 $\eta_{\text{PJ,fridge,i}}$: Energy efficiency of the project fridge showcase *i* in terms of the volume

[L/W]

 $\eta_{\text{RE,fridge,i}}$: Energy efficiency of the reference fridge showcase i in terms of the

volume [L/W]

EF_{elec} : CO₂ emission factor for consumed electricity [tCO₂/MWh]

i : Identification number of the fridge showcase [-]

 $RE_{freezer,p} = \sum_{i} \left(EC_{PJ,freezer,j,p} \times \frac{\eta_{PJ,freezer,j}}{\eta_{RE,freezer,j}} \right) \times EF_{elec}$

 $RE_{freezer,p}$: Reference emissions of the freezer showcase during the period p [tCO₂/p]

 $EC_{PI,freezer,i,p}$: Electricity consumption of the project freezer showcase j during the period

p [MWh/p]

 $\eta_{\text{Pl,freezer,j}}$: Energy efficiency of the project freezer showcase j in terms of the volume

[L/W]

 $\eta_{\text{RE,freezer,j}}$: Energy efficiency of the reference freezer showcase j in terms of the

volume [L/W]

EF_{elec} : CO₂ emission factor for consumed electricity [tCO₂/MWh]

i : Identification number of the freezer showcase [-]

 $RE_{AC,add,fridge,p} = EC_{RE,AC,add,fridge,p} \times EF_{elec}$

$$EC_{RE,AC,add,fridge,p} = \sum_{i} EH_{RE,fridge,i,p} \times \frac{1}{\eta_{RE,AC}}$$

 $EH_{RE,fridge,i,p} = HG_{RE,fridge,i,p} + EC_{RE,fridge,i,p}$

 $HG_{RE,fridge,i,p} = HG_{PJ,fridge,i,p}$

 $HG_{PJ,fridge,i,p} = EC_{PJ,fridge,i,p} \times \eta_{PJ,fridge,cap,i}$

 $EC_{RE,fridge,i,p} = EC_{PJ,fridge,i,p} \times \frac{\eta_{PJ,fridge,i}}{\eta_{RE,fridge,i}}$

RE_{AC,add,fridge,p}: Reference emissions of the air conditioning system caused by the

electricity consumption due to exhaust heat from the reference fridge

showcase during the period p [tCO₂/p]

EC_{RE,AC,add,fridge,p}: Electricity consumption of the reference air conditioning system due

to exhaust heat from the reference fridge showcase during the period p

[MWh/p]

EF_{elec} : CO₂ emission factor for consumed electricity [tCO₂/MWh]

 $EH_{RE,fridge,i,p}$: Amount of exhaust heat from the reference fridge showcase *i* during

the period p [MWh/p]

 $\eta_{\text{RE.AC}}$: COP of the reference air conditioning system [-]

 $HG_{RE,fridge,i,p}$: Amount of cooling energy generated by the reference fridge showcase

i during the period *p* [MWh/p]

 $HG_{PI,fridge,i,p}$: Amount of cooling energy generated by the project fridge showcase i

during the period p [MWh/p]

 $EC_{RE,fridge,i,p}$: Electricity consumption of the reference fridge showcase *i* during the

period *p* [MWh/p]

 $EC_{PJ,fridge,i,p}$: Electricity consumption of the project fridge showcase i during the

period p [MWh/p]

 $\eta_{\text{PJ,fridge,cap,i}}$: Energy efficiency of the project fridge showcase i in terms of the

cooling capacity [W/W]

 $\eta_{\text{Pl,fridge,i}}$: Energy efficiency of the project fridge showcase *i* in terms of the

| _ | |
|----------|---------|
| volume | FT /W/1 |
| VOIGILIC | 12 / 77 |

 $\eta_{\text{RE,fridge,i}}$: Energy efficiency of the reference fridge showcase i in terms of the

volume [L/W]

i : Identification number of the fridge showcase [-]

$$RE_{AC,add,freezer,p} = EC_{RE,AC,add,freezer,p} \times EF_{elec}$$

$$EC_{RE,AC,add,freezer,p} = \sum_{i} EH_{RE,freezer,j,p} \times \frac{1}{\eta_{RE,AC}}$$

$$EH_{RE,freezer,j,p} = HG_{RE,freezer,j,p} + EC_{REfreezer,j,p}$$

$$HG_{RE,freezer,j,p} = HG_{PI,freezer,j,p}$$

 $HG_{PJ,freezer,j,p} = EC_{PJ,freezer,j,p} \times \eta_{PJ,freezer,cap,j}$

$$EC_{RE,freezer,j,p} = EC_{PJ,freezer,j,p} \times \frac{\eta_{PJ,freezer,j}}{\eta_{RE,freezer,j}}$$

RE_{AC,add,freezer,p} : Reference emissions of the air conditioning system caused by the

electricity consumption due to exhaust heat from the reference freezer

showcase during the period p [tCO₂/p]

EC_{RE,AC,add,freezer,p}: Electricity consumption of the reference air conditioning system due

to exhaust heat from the reference freezer showcase during the period p

[MWh/p]

EF_{elec} : CO₂ emission factor for consumed electricity [tCO₂/MWh]

 $EH_{RE,freezer,i,p}$: Amount of exhaust heat from the reference freezer showcase j during

the period p [MWh/p]

 $\eta_{\text{RE,AC}}$: COP of the reference air conditioning system [-]

 $HG_{RE,freezer,i,p}$: Amount of cooling energy generated by the reference freezer

showcase j during the period p [MWh/p]

 $HG_{PJ,freezer,j,p}$: Amount of cooling energy generated by the project freezer showcase j

during the period *p* [MWh/p]

 $EC_{RE,freezer,j,p}$: Electricity consumption of the reference freezer showcase j during the

period p [MWh/p]

 $\mathrm{EC}_{\mathrm{PJ,freezer,j,p}}$: Electricity consumption of the project freezer showcase j during the

period p [MWh/p]

 $\eta_{\text{PJ,freezer,cap,j}}$: Energy efficiency of the project freezer showcase j in terms of the

cooling capacity [W/W]

 $\eta_{\text{Pl,freezer,j}}$: Energy efficiency of the project freezer showcase j in terms of the

volume [L/W]

 $\eta_{\text{RE,freezer,j}}$: Energy efficiency of the reference freezer showcase j in terms of the

volume [L/W]

j : Identification number of the freezer showcase [-]

G. Calculation of project emissions

 $PE_p = PE_{fridge,p} + PE_{freezer,p}$

 PE_p : Project emissions during the period p [tCO₂/p]

 $PE_{fridge,p}$: Project emissions of the fridge showcase during the period p [tCO₂/p] $PE_{freezer,p}$: Project emissions of the freezer showcase during the period p [tCO₂/p]

 $PE_{fridge,p} = \sum_{i} (EC_{PJ,fridge,i,p}) \times EF_{elec}$

 $PE_{fridge,p}$: Project emissions of the project fridge showcase during the period p

 $[tCO_2/p]$

 $EC_{PI,fridge,i,p}$: Electricity consumption of the project fridge showcase i during the period

p [MWh/p]

EF_{elec} : CO₂ emission factor for consumed electricity [tCO₂/MWh]

i : Identification number of the fridge showcase [-]

 $PE_{freezer,p} = \sum_{i} (EC_{PJ,freezer,j,p}) \times EF_{elec}$

 $PE_{freezer, D}$: Project emissions of the project freezer showcase during the period p

 $[tCO_2/p]$

 $EC_{Pl,freezer,j,p}$: Electricity consumption of the project freezer showcase j during the period

p [MWh/p]

EF_{elec} : CO₂ emission factor for consumed electricity [tCO₂/MWh]

i : Identification number of the freezer showcase [-]

H. Calculation of emissions reductions

 $ER_p = RE_p - PE_p$

 ER_p : Emissions reductions during the period p [tCO₂/p]

 RE_p : Reference emissions during the period p [tCO₂/p] PE_p : Project emissions during the period p [tCO₂/p]

I. Data and parameters fixed ex ante

The source of each data and parameter fixed ex ante is listed as below.

| Parameter | Descript | Source | |
|-----------------------------|---|--|--|
| $\eta_{	ext{RE,fridge,i}}$ | Energy efficiency of the r in terms of the volume. | Nominal value available on product catalogs, specification | |
| | -Reach-in showcase Range of volume (L) | documents or websites. | |
| | $ \begin{array}{c c} z < 900 \\ \hline 900 \le z < 1,200 \\ \hline 1,200 \le z \end{array} $ | The default values are derived from the result | |
| | -Open showcase Range of volume (L) | Energy efficiency (L/W) | of survey on energy efficiency of fridge showcase from |
| | $z < 900$ $900 \le z < 1,200$ $1,200 \le z$ When multiple types of stand Walk-in) are connected energy efficiency of Reactions. | 0.540.50 0.680.65 0.610.73 howcases (Reach-in, Open, ed to a condensing unit, the h-in showcase above is total sum of rated cooling | manufacturers well known in the market. The default values should be revised if necessary from survey result which is conducted by JC or project participants-every three years. |
| | corresponding to the "Ran | | |
| $\eta_{	ext{RE,freezer,j}}$ | Energy efficiency of the r in terms of the volume. -Reach-in showcase | Nominal value available on product catalogs, specification documents or | |
| | Range of volume (L) z < 900 | websites. | |

| | $900 \le z < 1,200$ | <u>0.82</u> 0.70 | The default values are |
|--------------------------------|-----------------------------|---------------------------------|-------------------------|
| | 1,200 ≤ z | <u>0.84</u> 1.01 | derived from the result |
| | | | of survey on energy |
| | | | efficiency of fridge |
| | | | showcase from |
| | | | manufacturers well |
| | | | known in the market. |
| | | | The default values |
| | | | should be revised if |
| | | | necessary from survey |
| | | | result which is |
| | | | conducted by JC or |
| | | | project participants- |
| | | | every three years. |
| $\eta_{	ext{PJ,fridge,cap,i}}$ | Energy efficiency of the p | project fridge showcase i in | The specifications of |
| | terms of the cooling capac | city. | the project fridge |
| | The value of rated cooling | showcase and | |
| | electricity consumption (v | watt) used in calculation of | condensing unit for |
| | energy efficiency prepare | quotation or the | |
| | applied. | | factory acceptance test |
| | | | data by manufacturer. |
| | When multiple showcases | s are connected to a | |
| | condensing unit, the energ | gy efficiency is calculated as | |
| | a ratio between the total s | um of rated cooling capacity | |
| | (watt) of all showcases co | onnected and the rated | |
| | electricity consumption (v | watt) of condensing unit. | |
| $\eta_{	ext{PJ,fridge,i}}$ | Energy efficiency of the p | project fridge showcase i in | The specifications of |
| | terms of the volume. | | the project fridge |
| | The value of rated volume | e (liter) and rated electricity | showcase and |
| | consumption (watt) used | in calculation of energy | condensing unit for |
| | efficiency prepared by ma | anufacturer is applied. | quotation or the |
| | | | factory acceptance test |
| | When multiple showcases | | data by manufacturer. |
| | condensing unit, the energ | gy efficiency is calculated as | |
| | a ratio between the total s | um of rated volume (liter) | |
| | of all showcases connected | ed and the rated electricity | |
| | consumption (watt) of con- | ndensing unit. | |

| | | 1 |
|---------------------------------|--|--------------------------|
| $\eta_{	ext{PJ,freezer,cap,i}}$ | Energy efficiency of the project freezer showcase j in | The specifications of |
| | terms of the cooling capacity. | the project fridge |
| | The value of rated cooling capacity (watt) and rated | showcase for quotation |
| | electricity consumption (watt) used in calculation of | or the factory |
| | energy efficiency prepared by manufacturer is | acceptance test data by |
| | applied. | manufacturer. |
| | | |
| | When multiple showcases are connected to a | |
| | condensing unit, the energy efficiency is calculated as | |
| | a ratio between the total sum of rated cooling capacity | |
| | (watt) of all showcases connected and the rated | |
| | electricity consumption (watt) of condensing unit. | |
| $\eta_{	ext{PJ,freezer,j}}$ | Energy efficiency of the project freezer showcase j in | The specifications of |
| | terms of the volume. | the project fridge |
| | The value of rated volume (liter) and rated electricity | showcase for quotation |
| | consumption (watt) used in calculation of energy | or the factory |
| | efficiency prepared by manufacturer is applied. | acceptance test data by |
| | | manufacturer. |
| | When multiple showcases are connected to a | |
| | condensing unit, the energy efficiency is calculated as | |
| | a ratio between the total sum of rated volume (liter) | |
| | of all showcases connected and the rated electricity | |
| | consumption (watt) of condensing unit. | |
| $EF_{ m elec}$ | CO ₂ emission factor for consumed electricity. | [Grid electricity] |
| | When project air conditioning system consumes only | The data is sourced |
| | grid electricity or captive electricity, the project | from "Emission |
| | participant applies the CO ₂ emission factor | Factors of Electricity |
| | respectively. | Interconnection |
| | When project air conditioning system may consume | Systems", National |
| | both grid electricity and captive electricity, the project | Committee on Clean |
| | participant applies the CO ₂ emission factor with | Development |
| | lower value. | Mechanism |
| | | (Indonesian DNA for |
| | [CO ₂ emission factor] | CDM), based on data |
| | For grid electricity: The most recent value available | obtained by |
| | from the source stated in this table at the time of | Directorate General of |
| | validation | Electricity, Ministry of |
| | | |

For captive electricity: 0.8* [tCO₂/MWh] **Energy and Mineral** *The most recent value available from CDM Resources, Indonesia, approved small scale methodology AMS-I.A at the unless otherwise time of validation is applied. instructed by the Joint Committee. [Captive electricity] CDM approved small scale methodology AMS-I.A The latest version of Default COP values of the reference air conditioning $\eta_{\text{RE,AC}}$ approved JCM system. If multiple types of air conditioning system with methodology different cooling capacity, which means different ID_AM004 COP values, are found in the project site, the highest value of COP is selected. When an air conditioning system with higher COP value than that of the reference COP with corresponding cooling capacity set in the table is installed at the project site, $\eta_{RE,AC}$ is revised to the COP value of installed one. Default COP1 of Reference Air Conditioning System ($\eta_{RE,AC}$) Cooling Capacity [kW] **Reference COP** $2.5 < x \le 4.1$ 4.00 $4.1 < x \le 5.3$ 3.59 $5.3 < x \le 7.1$ 2.96 $7.1 < x \le 14.2$ 2.85 **Cooling Capacity[kW] Reference COP** $2.6 \le x \le 5.6$ 3.83 $\underline{5.6} \leq x \leq 6.8$ <u>3.61</u> $6.8 \le x \le 12.5$ 3.29 12.5 < x≤14.1 **3.01** ¹ The default COP values may be revised as to the revision of the approved JCM methodology ID_AM004.

History of the document

| Version | Date | Contents revised |
|---------|------------------|---|
| 03.0 | <u>TBD</u> | TBD |
| 02.0 | 10 November 2015 | Revisions to: Change the description of Criterion 3 in Section D; and Change the description of "Measurement methods and procedures" for the electricity consumption of the project fridge showcases and the project freezer showcases in the Monitoring Spreadsheet. |
| 01.0 | 18 May 2015 | JC4, Annex 3 Initial approval. |

Monitoring Plan Sheet (Input Sheet) [Attachment to Project Design Document] [For fridge showcase]

| Table | 1: Parameters to be me | onitored ex post | T | |
|-----------------------------------|--|--|---|--|
| (a) | Monitoring point No. | 1 | _ | |
| (b) | Parameters | EC _{PJ,fridge,i,p} | | |
| (c) | Description of data | Electricity consumption of the project fridge showcase <i>i</i> during the period <i>p</i> | (| |
| (e) | (e) Units MWh/p | | | |
| (f) | Monitoring option | Option C | (| |
| (g) Source of data Monitored data | | | | |
| (g) | Measurement methods and procedures | Measuring equipment is installed to measure power consumption of fridge showcase. Measurement is conducted with any of the following methods: [Method 1: Automated monitoring system] - Measured data is automatically transmitted through internet to the remote server for recording. - Data recorded in the remote server is reported and double-checked by a responsible staff on a monthly basis to prevent missing data. [Method 2: Manual monitoring] - Measured data on monitoring equipment are read and recorded manually by a grocery store staff member and double-checked by another member on a monthly basis, to prevent missing data. In case a calibration certificate issued by an entity accredited under national/international standards is not provided, such measuring equipment is required to be calibrated. | • | |
| | | | H | |
| (i) | Monitoring frequency | Montnly | | |
| (j) | Other comments | fridas showeres i | | |
| (d) | Estimated Value of the i=1 | rinage snowcase / | (| |
| | i=1 i=2 | | | |
| | i=3 | | | |
| | i=4 | | | |
| | i=5 | | | |
| | i=6 | | | |
| | i=7 | | | |
| | i=8 i=9 | | | |
| | i=10 | | | |
| | i=10 | | | |
| | i=12 | | | |
| | i=13 | | | |
| | i=14 | | | |
| | i=15 | | | |
| | i=16 i=17 | | | |
| | i=18 | | | |
| | i=19 | | | |
| | i=20 | | | |
| | i=21 | | | |
| | i=22 | | | |
| | i=23 i=24 | | | |
| | i=24 i=25 | | | |
| | i=26 | | | |
| | i=27 | | | |
| | i=28 | | | |
| | i=29 | | | |
| | i=30 | | | |
| | i=31 i=32 | | | |
| | i=33 | | | |
| | i=34 | | | |
| | i=35 | | | |
| | i=36 | | | |
| | i=37 | | | |
| | i=38 | | | |
| | i=39 i=40 | | | |
| | i=40 | | | |
| | i=42 | | | |
| | i=43 | | | |
| | i=44 | | | |
| | i=45 | | | |
| | i=46 | | | |
| | i=47 i=48 | | | |
| | i=48 i=49 | | | |
| | :-50 | | | |

Table 2: Project-specific parameters to be fixed ex ante

| (| a) | Parameters | η _{PJ,fridge,i} | η _{RE,fridge,i} | η _{PJ,fridge,cap,i} | EF _{elec} | Ŋ _{RE,AC} |
|-----|----|---------------------|--|--|---|--|--|
| (1 | b) | Description of data | Energy efficiency of the volume of the project fridge showcase <i>i</i> | Energy efficiency of the volume of the reference fridge showcase <i>i</i> | Energy efficiency of the cooling capacity of the project fridge showcase <i>i</i> | CO ₂ emission factor for consumed electricity | COP of the reference air conditioning system |
| (| d) | Units | L/W | L/W | W/W | tCO ₂ /MWh | - |
| | | Source of data | The specifications of the project fridge showcase and condensing unit for quotation or the factory acceptance test data by manufacturer. | The default values set in this methodology corresponding to the type and rated volume of the project fridge showcase | project fridge showcase | [For grid electricity] The most recent value available at the time of validation is applied and fixed for the monitoring period thereafter. The data is sourced from "Emission Factors of Electricity Interconnection Systems", National Committee on Clean Development Mechanism (Indonesian DNA for CDM), based on data obtained by Directorate General of Electricity, Ministry of Energy and Mineral Resources, Indonesia, unless otherwise instructed by the Joint Committee." [For captive electricity] CDM approved small scale methodology AMS-IA | The latest version of approved JCM methodology ID_AM004: * The default COP values may be revised as to the revision of the approved JCM methodology ID_AM004. |
| - (| f) | Other comments | | | | | |
| | | | of the fridge showcase i | | | | |
| , | " | i=1 | or the mage showcase r | | | | |
| - 1 | | i=2 | | | | | |
| ┨ | | i=3 i=4 | | | | | |
| | | i=5 | | | | | |
| - 1 | | i=6 | | | | | |
| - | | i=7 i=8 | | | | | |
| | | i=9 | | | | | |
| - 1 | | i=10 | | | | | |
| - | | i=11 i=12 | | | | | |
| | | i=13 | | | | | |
| - | | i=14 i=15 | | | | | |
| 1 | | i=16 | | | | | |
| | | i=17 | | | | | |
| ┨ | | i=18 i=19 | | | | | |
| | | i=20 | | | | | |
| - | | i=21 | | | | | |
| 1 | | i=22 i=23 | | | | | |
| | | i=24 | | | | | |
| - | | i=25 i=26 | | | | | |
| | | i=27 | | | | | |
| | | i=28 | | | | | |
| | | i=29 i=30 | | | | | |
| | | i=31 | | | | | |
| | | i=32 i=33 | | | | | |
| | | i=33 | | | | | |
| | | i=35 | | | | | |
| | | i=36 i=37 | | | | | |
| | | i=38 | | | | | |
| | | i=39 | | | | | |
| | | i=40 i=41 | | | | | |
| | | i=42 | | | | | |
| | | i=43 i=44 | | | | | |
| | | i=44 i=45 | | | | | |
| | | i=46 | | | | | |
| | | i=47 | | | | | |
| | | i=48 i=49 | | | | | |
| | | i=50 | | | | | |

Table3: Ex-ante estimation of each CO₂ emission reduction

| (a) | Parameters | RE _{fridge,i,p} | RE _{AC,add,fridge,i,p} | PE _{fridge,i,p} |
|-----|------------------------|--|--|--|
| (b) | Description of data | Reference emissions of the fridge showcase <i>i</i> during the period <i>p</i> | Reference emissions of the air conditioning system caused by the additional electricity consumption due to additional load caused by exhaust heat from the reference fridge showcase <i>i</i> during the period <i>p</i> | Project emissions of the fridge showcase <i>i</i> during the period <i>p</i> |
| (d) | Units | tCO ₂ /p | tCO ₂ /p | tCO ₂ /p |
| (c) | Estimated Value of the | fridge showcase i | | |
| (0) | i=1 | 0.0 | 0.0 | 0.0 |
| | i=2 | 0.0 | 0.0 | 0.0 |
| | i=3 | 0.0 | 0.0 | 0.0 |
| | i=4 | 0.0 | 0.0 | 0.0 |
| | i=5 | 0.0 | 0.0 | 0.0 |
| | i=6 | 0.0 | 0.0 | 0.0 |
| | i=7 | 0.0 | 0.0 | 0.0 |
| | i=8 | 0.0 | 0.0 | 0.0 |
| | i=9 | 0.0 | 0.0 | 0.0 |
| | i=10 | 0.0 | 0.0 | 0.0 |
| | i=11 0.0 i=12 0.0 | | 0.0 | 0.0 |
| | | | 0.0 | 0.0 |
| | i=13 | 0.0 | 0.0 | 0.0 |
| | i=14 | 0.0 | 0.0 | 0.0 |
| | i=15 | 0.0 | 0.0 | 0.0 |
| | i=16 | 0.0 | 0.0 | 0.0 |
| | i=17 | 0.0 | 0.0 | 0.0 |
| | i=18 | 0.0 | 0.0 | 0.0 |
| | i=19 | 0.0 | 0.0 | 0.0 |
| | i=20 | 0.0 | 0.0 | 0.0 |
| | i=21 | 0.0 | 0.0 | 0.0 |
| | j=22 | 0.0 | 0.0 | 0.0 |
| | i=23 | 0.0 | 0.0 | 0.0 |
| | i=24 | 0.0 | 0.0 | 0.0 |
| | i=25 | 0.0 | 0.0 | 0.0 |
| | i=26 | 0.0 | 0.0 | 0.0 |
| | i=27 | 0.0 | 0.0 | 0.0 |
| | i=28 | 0.0 | 0.0 | 0.0 |
| | i=29 | 0.0 | 0.0 | 0.0 |
| | i=30 | 0.0 | 0.0 | 0.0 |
| | i=31 | 0.0 | 0.0 | 0.0 |
| | i=32 | 0.0 | 0.0 | 0.0 |
| | i=33 | 0.0 | 0.0 | 0.0 |
| | i=34 | 0.0 | 0.0 | 0.0 |
| | i=35 | 0.0 | 0.0 | 0.0 |
| | i=36 | 0.0 | 0.0 | 0.0 |
| | i=37 | 0.0 | 0.0 | 0.0 |
| | i=38 | 0.0 | 0.0 | 0.0 |
| | i=39 | 0.0 | 0.0 | 0.0 |
| | i=40 | 0.0 | 0.0 | 0.0 |
| | i=41 | 0.0 | 0.0 | 0.0 |
| | i=42 | 0.0 | 0.0 | 0.0 |
| | i=43 | 0.0 | 0.0 | 0.0 |
| | i=44 | 0.0 | 0.0 | 0.0 |
| | i=45 | 0.0 | 0.0 | 0.0 |
| | i=46 | 0.0 | 0.0 | 0.0 |
| | i=47 | 0.0 | 0.0 | 0.0 |
| | i=48 | 0.0 | 0.0 | 0.0 |
| | i=49 | 0.0 | 0.0 | 0.0 |
| | i=50 | 0.0 | 0.0 | 0.0 |

Table4: Ex-ante estimation of CO₂ emission reductions for fridge showcases

| CO ₂ emission reductions | Units |
|-------------------------------------|---------------------|
| 0 | tCO ₂ /p |

[Monitoring option]

| L | Option A | Based on public data which is measured by entities other than the project participants (Data used: publicly recognized data such as statistical data and specifications) |
|---|----------|--|
| ı | Option B | Based on the amount of transaction which is measured directly using measuring equipments (Data used: commercial evidence such as invoices) |
| | Option C | Based on the actual measurement using measuring equipments (Data used: measured values) |

Monitoring Plan Sheet (Input Sheet) [Attachment to Project Design Document]

[For freezer showcase]

| Table 1 | ŀ | Parameters | to | hο | monitored | ΔV | nnet |
|---------|---|-------------------|----|----|-----------|----|------|
| | | | | | | | |

(a) Monitoring point No. EC_{PJ,freezer,j,p} Parameters (c) Description of data Electricity consumption of the project freezer showcase j during the period p MWh/p Units (f) Monitoring option Option C Source of data Monitored data Measuring equipment is installed to measure power consumption of freezer showcase. Measurement is conducted with any of the following methods: [Method 1: Automated monitoring system] Measured data is automatically transmitted through internet to the remote server for recording. Measurement - Data recorded in the remote server is reported and double-checked by a responsible staff on a methods and monthly basis to prevent missing data. [Method 2: Manual monitoring] procedures - Measured data on monitoring equipment are read and recorded manually by a grocery store staff member and double-checked by another member on a monthly basis, to prevent missing data. In case a calibration certificate issued by an entity accredited under national/international standards is not provided, such measuring equipment is required to be calibrated. Monitoring frequency Monthly Other comments (d) Estimated Value of the freezer showcase j j=2 j=3 j=5 j=6 j=7 j=8 j=9 j=10 j=11 j=12 j=13 j=14 j=15 j=16 j=17 j=18 j=19 j=20 j=21 j=22 j=23 j=24 j=25 i=26 j=27 j=28 j=29 j=30 j=31 j=32 j=33 j=34 j=35 j=36 j=37 j=38 j=39 j=40 j=41 j=42 j=43 j=44 j=45 j=46 j=47 j=48 j=49

Table 2: Project-specific parameters to be fixed ex ante

| | (a) | Parameters | η _{PJ,freezer,j} | η _{RE,freezer,j} | η _{PJ,freezer,cap,j} | EF _{elec} | η _{RE,AC} |
|-------------|-----|----------------|--|---|--|---|--|
| ш | | Description of | Energy efficiency of the | Energy efficiency of the | Energy efficiency of the | | |
| ш | (b) | data | volume of the project | volume of the reference | cooling capacity of the | CO ₂ emission factor for consumed electricity | COP of the reference air conditioning system |
| | | | freezer showcase j | freezer showcase j | project freezer showcase j | 100 (14)(14) | |
| 4 | (d) | Units | L/W | L/W | W/W | tCO ₂ /MWh | - |
| - - - | (e) | Source of data | The specifications of the project freezer showcase for quotation and condensing unit or the factory acceptance test data by manufacturer | The default values set in this methodology corresponding to the type and rated volume of the project freezer showcase | The specifications of the project freezer showcase for quotation or the factory acceptance test data by manufacturer | [For grid electricity] The most recent value available at the time of validation is applied and fixed for the monitoring period thereafter. The data is sourced from "Emission Factors of Electricity Interconnection Systems", National Committee on Clean Development Mechanism (Indonesian DNA for CDM), based on data obtained by Directorate General of Electricity, Ministry of Energy and Mineral Resources, Indonesia, unless otherwise instructed by the Joint Committee." [For captive electricity] CDM approved small scale methodology AMS-I.A | The latest version of approved JCM methodology ID_AM004: * The default COP values may be revised as to the revision of the approved JCM methodology ID_AM004. |
| 1 | (f) | comments | | | | | |
| 4 | (c) | | of the freezer showcase | | | | |
| H | | j=1 j=2 | | | | | |
| 11 | | j=3 | | | | | |
| 11 | | j=4 | | | | | |
| H | | j=5 | | | | | |
| 11 | | i=6 i=7 | | | | | |
| 11 | | j=8 | | | | | |
| 41 | | j=9 | | | | | |
| 11 | | j=10 j=11 | | | | | |
| | | j=12 | | | | | |
| 41 | | j=13 | | | | | |
| H | | j=14 j=15 | | | | | |
| 11 | | j=16 | | | | | |
| 41 | | j=17 | | | | | |
| - 1 | | j=18 j=19 | | | | | |
| | | j=20 | | | | | |
| 41 | | j=21 | | | | | |
| - 1 | | j=22 j=23 | | | | | |
| 11 | | j=24 | | | | | |
| 31 | | j=25 | | | | | |
| - 1 | | j=26 j=27 | | | | | |
| 11 | | j=28 | | | | | |
| 11 | | j=29 | | | | | |
| - 1 | | j=30 j=31 | | | | | |
| 11 | | i=32 | | | | | |
| 11 | | j=33 | | | | | |
| H | | j=34 j=35 | | | | | |
| 11 | | j=36 | | | | | |
|] [| | j=37 | | | | | |
| - 1 | | j=38 j=39 | | | | | |
| 11 | | j=39 j=40 | | | | | |
|]] | | j=41 | | | | | |
| 4 🏻 | | j=42 | | | | | |
| +1 | | j=43 j=44 | | | | | |
| 11 | | j=45 | | | | | |
| 41 | | j=46 | | | | | |
| ┨╟ | | j=47 j=48 | | | | | |
| 11 | | j=46 j=49 | | | | | |
|] [| | j=50 | | | | | |

Table3: Ex-ante estimation of each CO₂ emission reduction

| (a) | Parameters | Parameters RE _{freezer,j,p} RE _{AC,add,freezer,j,p} | | PE _{freezer,j,p} | | |
|-----|------------------------|--|---|---|--|--|
| (b) | Description of data | Reference emissions of the freezer showcase j during the period ρ | Reference emissions of the air conditioning system caused by the additional electricity consumption due to additional load caused by exhaust heat from the reference freezer showcase <i>j</i> during the period <i>p</i> | Project emissions of the freezer showcase j during the period p | | |
| (d) | Units | tCO₂/p | tCO ₂ /p | tCO ₂ /p | | |
| (c) | Estimated Value of the | freezer showcase i | | | | |
| (0) | j=1 | 0.0 | 0.0 | 0.0 | | |
| | j=1 j=2 | 0.0 | 0.0 | 0.0 | | |
| | j=3 | 0.0 | 0.0 | 0.0 | | |
| | j=4 | 0.0 | 0.0 | 0.0 | | |
| | | 0.0 | 0.0 | 0.0 | | |
| | j=5 | 0.0 | 0.0 | 0.0 | | |
| | i=6 | | | | | |
| | j=7 | 0.0 | 0.0 | 0.0 | | |
| | j=8 | 0.0 | 0.0 | 0.0 | | |
| | j=9 | 0.0 | 0.0 | 0.0 | | |
| | j=10 | 0.0 | 0.0 | 0.0 | | |
| | j=11 | 0.0 | 0.0 | 0.0 | | |
| | j=12 | 0.0 | 0.0 | 0.0 | | |
| | j=13 | 0.0 | 0.0 | 0.0 | | |
| | | | | | | |
| | j=14 | 0.0 | 0.0 | 0.0 | | |
| | j=15 | 0.0 | 0.0 | 0.0 | | |
| | j=16 | 0.0 | 0.0 | 0.0 | | |
| | j=17 | 0.0 | 0.0 | 0.0 | | |
| | j=18 | 0.0 | 0.0 | 0.0 | | |
| | j=19 | 0.0 | 0.0 | 0.0 | | |
| | j=20 | 0.0 | 0.0 | 0.0 | | |
| | j=21 | 0.0 | 0.0 | 0.0 | | |
| | j=22 | 0.0 | 0.0 | 0.0 | | |
| | j=23 | 0.0 | 0.0 | 0.0 | | |
| | j=24 | 0.0 | 0.0 | 0.0 | | |
| | j=25 | 0.0 | 0.0 | 0.0 | | |
| | | 0.0 | 0.0 | 0.0 | | |
| | j=26 | | | | | |
| | j=27 | 0.0 | 0.0 | 0.0 | | |
| | j=28 | 0.0 | 0.0 | 0.0 | | |
| | j=29 | 0.0 | 0.0 | 0.0 | | |
| | j=30 | 0.0 | 0.0 | 0.0 | | |
| | j=31 | 0.0 | 0.0 | 0.0 | | |
| | j=32 | 0.0 | 0.0 | 0.0 | | |
| | j=33 | 0.0 | 0.0 | 0.0 | | |
| | j=34 | 0.0 | 0.0 | 0.0 | | |
| | j=35 | 0.0 | 0.0 | 0.0 | | |
| | j=36 | 0.0 | 0.0 | 0.0 | | |
| | j=37 | 0.0 | 0.0 | 0.0 | | |
| | j=38 | 0.0 | 0.0 | 0.0 | | |
| | j=39 | 0.0 | 0.0 | 0.0 | | |
| | j=39 j=40 | 0.0 | 0.0 | 0.0 | | |
| | j=40 j=41 | 0.0 | 0.0 | 0.0 | | |
| | j=41 j=42 | 0.0 | 0.0 | 0.0 | | |
| | | | | | | |
| | j=43 | 0.0 | 0.0 | 0.0 | | |
| | j=44 | 0.0 | 0.0 | 0.0 | | |
| | j=45 | 0.0 | 0.0 | 0.0 | | |
| | j=46 | 0.0 | 0.0 | 0.0 | | |
| | j=47 | 0.0 | 0.0 | 0.0 | | |
| | i=48 | 0.0 | 0.0 | 0.0 | | |
| | j=49 | 0.0 | 0.0 | 0.0 | | |
| | | | | | | |
| | j=50 | 0.0 | 0.0 | 0.0 | | |

Table4: Ex-ante estimation of CO₂ emission reductions for freezer showcases

| CO ₂ emission reductions | Units |
|-------------------------------------|---------------------|
| 0 | tCO ₂ /p |

[Monitoring option]

| Option A | A Based on public data which is measured by entities other than the project participants (Data used: publicly recognized data such as statistical data and specifications) | |
|----------|--|---|
| Option B | n B Based on the amount of transaction which is measured directly using measuring equipments (Data used: commercial evidence such as invoices) | |
| Option C | Based on the actual measurement using measuring equipments (Data used: measured values) | ı |

Monitoring Spreadsheet: JCM_ID_AM008_ver03.0

Reference Number:

Monitoring Plan Sheet (Calculation Process Sheet) [Attachment to Project Design Document]

| 1. (| alc | ulations for emission reductions | Fuel type | Value | Units | Parameter |
|------|-----|--|-----------|-------|---------------------|--------------------------------|
| | Em | ission reductions during the period <i>p</i> | • | 0.0 | tCO ₂ /p | ER _p |
| | | Emission reductions of the fridge showcase | | 0 | tCO ₂ /p | - |
| | | Emission reductions of the freezer showcase | | 0 | tCO ₂ /p | - |
| 2. § | ele | cted default values, etc. | | | | |
| | | | | | | |
| 3. (| alc | ulations for reference emissions | | | | |
| | Ref | erence emissions during the period p | | 0.0 | tCO ₂ /p | RE _p |
| | | Reference emissions of the fridge showcase | | 0.0 | tCO ₂ /p | RE _{fridge,p} |
| | | Reference emissions of the freezer showcase | | 0.0 | tCO ₂ /p | RE _{freezer,p} |
| | | Reference emissions of the air conditioning system caused by the additional electricity consumption due to additional load caused by exhaust heat from the reference fridge showcase | | 0.0 | tCO ₂ /p | RE _{AC,add,fridge,p} |
| | | Reference emissions of the air conditioning system caused by the additional electricity consumption due to additional load caused by exhaust heat from the reference freezer showcase | | 0.0 | tCO ₂ /p | RE _{AC,add,freezer,p} |
| 4. (| alc | ulations of the project emissions | | | | |
| | Pro | ject emissions during the period p | | 0.0 | tCO ₂ /p | PEp |
| | | Project emissions of the project fridge showcase | | 0.0 | tCO ₂ /p | PE _{fridge,p} |
| | | Project emissions of the project freezer showcase | | 0.0 | tCO ₂ /p | PE _{freezer,p} |

Energy efficiency of the reference fridge showcase

Type: Reach-in showcase

| Range of volume (L) | Energy efficiency |
|---------------------|-------------------|
| z < 900 | 1.27 |
| 900 ≤ z < 1200 | 1.94 |
| 1200 ≤ z | 2.43 |

Energy efficiency of the reference fridge showcase

Type: Open showcase

| Range of volume (L) | Energy efficiency |
|---------------------|-------------------|
| z < 900 | 0.54 |
| 900 ≤ z < 1200 | 0.68 |
| 1200 ≤ z | 0.61 |

Energy efficiency of the reference freezer showcase

Type: Reach-in showcase

| Range of volume (L) | Energy efficiency |
|---------------------|-------------------|
| z < 900 | 0.54 |
| 900 ≤ z < 1200 | 0.82 |
| 1200 ≤ z | 0.84 |

COP of the reference air conditioning system

| Cooling Capacity (kW) | Reference COP |
|-----------------------|---------------|
| 2.6 < x ≤ 5.6 | 3.83 |
| $5.6 < x \le 6.8$ | 3.61 |
| $6.8 < x \le 12.5$ | 3.29 |
| $12.5 < x \le 14.1$ | 3.01 |

Reference Number:

Monitoring Structure Sheet [Attachment to Project Design Document]

| Responsible personnel | Role |
|-----------------------|------|
| | |
| | |
| | |
| | |
| | |
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| | |
| | |
| | |
| | |
| | |
| | |

Monitoring Report Sheet (Input Sheet) [For Verification]

[For fridge showcase]

| a) b) | Monitoring period Monitoring point No. | 1 |
|----------|---|---|
| | | · · · · · · · · · · · · · · · · · · · |
|) | Parameters | EC _{PJ,fridge,i,p} |
|) | Description of data | Electricity consumption of the project fridge showcase i during the period p |
|) | Units | MWh/p |
|) | Monitoring option | Option C |
|) | Source of data | Monitored data |
| | | Measuring equipment is installed to measure power consumption of fridge showcase. |
|) | Measurement methods and procedures | Measurement is conducted with any of the following methods: [Method 1: Automated monitoring system] - Measured data is automatically transmitted through internet to the remote server for recording Data recorded in the remote server is reported and double-checked by a responsible staff on a monthly basis to prevent missing data. [Method 2: Manual monitoring] - Measured data on monitoring equipment are read and recorded manually by a grocery store staff member and double-checked by another member on a monthly basis, to prevent missing data. In case a calibration certificate issued by an entity accredited under national/international |
| | | standards is not provided, such measuring equipment is required to be calibrated. |
|) | Monitoring frequency | Monthly |
|) | Other comments | |
| 'n | Monitored Value of the | e fridge showcase i |
| | i=1 | |
| | i=2 | |
| | i=3 | |
| | i=4 | |
| | i=5 | |
| | i=6 | |
| | i=7 | |
| | i=8 | |
| | i=9 | |
| | i=10 | |
| | i=11 | |
| | i=12 | |
| | i=13 | |
| | i=14 | |
| | i=15 | |
| | i=16 | |
| | i=17 | |
| | i=18 | |
| | i=19 | |
| | i=20 | |
| | i=21 | |
| | i=22 | |
| | i=23 | |
| | i=24 | |
| | i=25 | |
| | i=26 | |
| | i=27 | |
| | i=28 | |
| | i=29 | |
| | i=30 | |
| | i=31 | |
| | i=32 | |
| | i=33 | |
| | i=34 | |
| | i=35 | |
| | i=36 | |
| | i=37 | |
| | i=38 | |
| | i=39 | |
| | i=40 | |
| | i=41 | |
| | i=42 | |
| | i=43 | |
| | i=44 | |
| | i=45 | |
| | i=46 | |
| | i=47 | |
| | i=48 | |
| | i=49 | |
| | i=50 | |

Table 2: Project-specific parameters fixed ex ante

| - 1 | (a) | Barametera | n | n | n | EF _{elec} | n |
|------|-----|----------------|--|--|--|--|--|
| - 1 | (a) | Parameters | η _{PJ,fridge,i} Energy efficiency of the | η _{RE,fridge,i} Energy efficiency of the | η _{PJ,fridge,cap,i} Energy efficiency of the | Li elec | η _{RE,AC} |
| | (b) | Description of | volume of the project | volume of the reference | cooling capacity of the | CO ₂ emission factor for consumed electricity | COP of the reference air conditioning system |
| Ш | (0) | data | fridge showcase i | fridge showcase i | project fridge showcase i | CO2 chilosoff factor for consumed electricity | COT of the reference all conditioning system |
| 11 | (d) | Units | L/W | L/W | W/W | tCO ₂ /MWh | |
| 7 | (4) | | | | | - | |
| f | (e) | Source of data | The specifications of the project fridge showcase and condensing unit for quotation or the factory acceptance test data by manufacturer. | The default values set in this methodology corresponding to the type and rated volume of the project fridge showcase | The specifications of the project fridge showcase for quotation or the factory acceptance test data by manufacturer. | [For grid electricity] The most recent value available at the time of validation is applied and fixed for the monitoring period thereafter. The data is sourced from "Emission Factors of Electricity Interconnection Systems", National Committee on Clean Development Mechanism (Indonesian DNA for CDM), based on data obtained by Directorate General of Electricity, Ministry of Energy and Mineral Resources, Indonesia, unless otherwise instructed by the Joint Committee." [For captive electricity] CDM approved small scale methodology AMS-IA | The latest version of approved JCM methodology ID_AM004: * The default COP values may be revised as to the revision of the approved JCM methodology ID_AM004. |
| 41 | (f) | Other | | | | | |
| | | comments | of the fridge showcase i | | | | |
| - 11 | (C) | i=1 | of the mage showcase r | | | | |
| 11 | | i=2 | | | | | |
|] | | i=3 | | | | | |
| 41 | | i=4 | | | | | |
| - 11 | | i=5 | | | | | |
| 11 | | i=6 i=7 | | | | | |
| 11 | | i=8 | | | | | |
|] | | i=9 | | | | | |
| 41 | | i=10 | | | | | |
| - 11 | | i=11 i=12 | | | | | |
| 11 | | i=12 | | | | | |
| J | | i=14 | | | | | |
|] | | i=15 | | | | | |
| 41 | | i=16 | | | | | |
| 11 | | i=17 i=18 | | | | | |
| 11 | | i=19 | | | | | |
|] | | i=20 | | | | | |
| 41 | | i=21 | | | | | |
| +1 | | i=22 i=23 | | | | | |
| 11 | | i=24 | | | | | |
| J | | i=25 | | | | | |
|] [| | i=26 | | | | | |
| 41 | | i=27 | | | | | |
| +1 | | i=28 i=29 | | | | | |
| 11 | | i=30 | | | | | |
|] | | i=31 | | | | | |
| 41 | | i=32 | | | | | |
| 41 | | i=33 i=34 | | | | | |
| 11 | | i=34 | | | | | |
|] | | i=36 | | | | | |
| 41 | | i=37 | | | | | |
| +1 | | i=38 | | | | | |
| + | | i=39 i=40 | | | | | |
| 11 | | i=41 | | | | | |
|] | | i=42 | | | | | |
| 41 | | i=43 | | | | | |
| 41 | | i=44 | | | | | |
| + | | i=45 i=46 | | | | | |
| 11 | | i=46 | | | | | |
|] | | i=48 | | | | | |
|] [| | i=49 | | | | | |
| _ | | i=50 | II-1(1) | | | | |
| | | | 11-1(1) | | | | |

Table3: Ex-post calculation of each CO₂ emission reduction

| (a) | Parameters | RE _{fridge,i,p} | RE _{AC,add,fridge,i,p} | PE _{fridge,i,p} |
|-----|------------------------|--|--|--|
| (b) | Description of data | Reference emissions of the fridge showcase <i>i</i> during the period <i>p</i> | Reference emissions of the air conditioning system caused by the additional electricity consumption due to additional load caused by exhaust heat from the reference fridge showcase <i>i</i> during the period <i>p</i> | Project emissions of the fridge showcase <i>i</i> during the period <i>p</i> |
| (d) | Units | tCO ₂ /p | tCO ₂ /p | tCO ₂ /p |
| (c) | Estimated Value of the | fridge showcase i | | |
| (C) | i=1 | 0.0 | 0.0 | 0.0 |
| | j=2 | 0.0 | 0.0 | 0.0 |
| | i=3 | 0.0 | 0.0 | 0.0 |
| | i=4 | 0.0 | 0.0 | 0.0 |
| | i=5 | 0.0 | 0.0 | 0.0 |
| | i=6 | 0.0 | 0.0 | 0.0 |
| | i=7 | 0.0 | 0.0 | 0.0 |
| | i=8 | 0.0 | 0.0 | 0.0 |
| | i=9 | 0.0 | 0.0 | 0.0 |
| | i=10 | 0.0 | 0.0 | 0.0 |
| | i=11 | 0.0 | 0.0 | 0.0 |
| | i=12 | 0.0 | 0.0 | 0.0 |
| | i=13 | 0.0 | 0.0 | 0.0 |
| | i=14 | 0.0 | 0.0 | 0.0 |
| | i=15 | 0.0 | 0.0 | 0.0 |
| | i=16 | 0.0 | 0.0 | 0.0 |
| | i=17 | 0.0 | 0.0 | 0.0 |
| | i=18 | 0.0 | 0.0 | 0.0 |
| | i=19 | 0.0 | 0.0 | 0.0 |
| | i=20 | 0.0 | 0.0 | 0.0 |
| | i=21 | 0.0 | 0.0 | 0.0 |
| | i=22 | 0.0 | 0.0 | 0.0 |
| | i=23 | 0.0 | 0.0 | 0.0 |
| | i=24 | 0.0 | 0.0 | 0.0 |
| | i=25 | 0.0 | 0.0 | 0.0 |
| | i=26 | 0.0 | 0.0 | 0.0 |
| | i=27 i=28 | 0.0 | 0.0 | 0.0 |
| | i=28 i=29 | 0.0 | 0.0 | 0.0 |
| | i=29 | 0.0 | 0.0 | 0.0 |
| | i=30 | 0.0 | 0.0 | 0.0 |
| | i=32 | 0.0 | 0.0 | 0.0 |
| | i=32 | 0.0 | 0.0 | 0.0 |
| | i=34 | 0.0 | 0.0 | 0.0 |
| | i=35 | 0.0 | 0.0 | 0.0 |
| | i=36 | 0.0 | 0.0 | 0.0 |
| | i=37 | 0.0 | 0.0 | 0.0 |
| | i=38 | 0.0 | 0.0 | 0.0 |
| | i=39 | 0.0 | 0.0 | 0.0 |
| | i=40 | 0.0 | 0.0 | 0.0 |
| | i=41 | 0.0 | 0.0 | 0.0 |
| | i=42 | 0.0 | 0.0 | 0.0 |
| | i=43 | 0.0 | 0.0 | 0.0 |
| | i=44 | 0.0 | 0.0 | 0.0 |
| | i=45 | 0.0 | 0.0 | 0.0 |
| | i=46 | 0.0 | 0.0 | 0.0 |
| | i=47 | 0.0 | 0.0 | 0.0 |
| | i=48 | 0.0 | 0.0 | 0.0 |
| | i=49 | 0.0 | 0.0 | 0.0 |
| | i=50 | 0.0 | 0.0 | 0.0 |
| _ | | | | |

| Table4: Ex-post calculation of CO ₂ emission | n reductions for fridge showcases |
|---|-----------------------------------|
| | |

| 0 tCO ₂ /p | Monitoring Period | CO ₂ emission reductions | Units |
|-----------------------|-------------------|-------------------------------------|---------------------|
| | | 0 | tCO ₂ /p |

[Monitoring option]

| | Option A | Based on public data which is measured by entities other than the project participants (Data used: publicly recognized data such as statistical data and specifications) | | |
|---|----------|--|--|--|
| Option B Based on the amount of transaction which is measured directly using measuring equipments (Data used: commercial evidence such as invoices) | | | | |
| - [| Ontion C | Based on the actual measurement using measuring equipments (Data used: measured values) | | |

| - | | | | - | | | |
|---|------|----|-------------------|-----------|----|------|--|
| I | able | 1: | Parameters | monitored | ex | post | |
| | | | | | | | |

| | 1: Parameters monitor | |
|-----|--|---|
| (a) | | , |
| (b) | Monitoring point No. | 1 |
| (c) | Parameters | EC _{PJ,freezer,j,p} |
| (d) | Description of data | Electricity consumption of the project freezer showcase j during the period p |
| (f) | Units | MWh/p |
| (g) | Monitoring option | Option C |
| (h) | Source of data | Monitored data |
| | | Measuring equipment is installed to measure power consumption of freezer showcase. Measurement is conducted with any of the following methods: |
| (i) | Measurement methods and procedures | [Method 1: Automated monitoring system] - Measured data is automatically transmitted through internet to the remote server for recording. - Data recorded in the remote server is reported and double-checked by a responsible staff on a monthly basis to prevent missing data. [Method 2: Manual monitoring] - Measured data on monitoring equipment are read and recorded manually by a grocery store staff member and double-checked by another member on a monthly basis, to prevent missing data. |
| | | In case a calibration certificate issued by an entity accredited under national/international standards is not provided, such measuring equipment is required to be calibrated. |
| (j) | Monitoring frequency | Monthly |
| (k) | Other comments | |
| (e) | Monitored Value of the | e freezer showcase j |
| | j=1 | |
| | j=2 | |
| | j=3 | |
| | j=4 | |
| | j=5 | |
| | j=6 | |
| | j=7 | |
| | j=8 | |
| | j=9 | |
| | j=10 | |
| | j=11 | |
| | j=12 | |
| | j=13 | |
| | j=14 | |
| | j=15 | |
| | j=16 | |
| | j=17 | |
| | j=18 | |
| | j=19 | |
| | j=20 | |
| | j=21 | |
| | j=22 j=23 | |
| | j=23 j=24 | |
| | j=24 j=25 | |
| | j=25 j=26 | |
| | j=26 j=27 | |
| | j=28 | |
| | i=29 | |
| | j=30 | |
| | j=31 | |
| | j=32 | |
| | j=33 | |
| | j=34 | |
| | j=35 | |
| | j=36 | |
| | j=37 | |
| | j=38 | |
| | j=39 | |
| | j=40 | |
| | j=41 | |
| | j=42 | |
| | j=43 | |
| | j=44 | |
| | j=45 | |
| | j=46 | |
| | j=47 | |
| | j=48 | |
| | j=49 | |
| | j=50 | |
| | | · |

Table 2: Project-specific parameters fixed ex ante

| (a) | Parameters | $\eta_{PJ,freezer,j}$ | η _{RE,freezer.j} | η _{PJ,freezer,cap,j} | EF _{elec} | η _{RE,AC} |
|-----|-----------------|--|---|--|---|--|
| (b) | Description of | Energy efficiency of the volume of the project freezer showcase j | Energy efficiency of the volume of the reference freezer showcase <i>j</i> | Energy efficiency of the cooling capacity of the project freezer showcase <i>j</i> | CO ₂ emission factor for consumed electricity | COP of the reference air conditioning system |
| (d) | | L/W | L/W | W/W | tCO ₂ /MWh | - |
| (e) | Source of data | The specifications of the project freezer showcase for quotation and condensing unit or the factory acceptance test data by manufacturer | The default values set in this methodology corresponding to the type and rated volume of the project freezer showcase | The specifications of the project freezer showcase for quotation or the factory acceptance test data by manufacturer | [For grid electricity] The most recent value available at the time of validation is applied and fixed for the monitoring period thereafter. The data is sourced from "Emission Factors of Electricity Interconnection Systems", National Committee on Clean Development Mechanism (Indonesian DNA for CDM), based on data obtained by Directorate General of Electricity, Ministry of Energy and Mineral Resources, Indonesia, unless otherwise instructed by the Joint Committee." [For captive electricity] CDM approved small scale methodology AMS-I.A | The latest version of approved JCM methodology ID_AM004: * The default COP values may be revised as to the revision of the approved JCM methodology ID_AM004. |
| (f) | Other comments | | | | | |
| (c) | Estimated Value | of the freezer showcase | j | | | |
| | j=1 | | | | | |
| | j=2 | | | | | |
| | j=3 j=4 | | | | | |
| | j=5 | | | | | |
| | j=6 | | | | | |
| | j=7 i=8 | | | | | |
| | j=8 j=9 | | | | | |
| | j=10 | | | | | |
| | j=11 | | | | | |
| | j=12 j=13 | | | | | |
| | j=14 | | | | | |
| | j=15 | | | | | |
| | j=16 j=17 | | | | | |
| | j=17 | | | | | |
| | j=19 | | | | | |
| | j=20 | | | | | |
| | j=21 j=22 | | | | | |
| | j=23 | | | | | |
| | j=24 | | | | | |
| | j=25 j=26 | | | | | |
| | j=27 | | | | | |
| | j=28 | | | | | |
| | j=29 j=30 | | | | | |
| | j=31 | | | | | |
| | j=32 | | | | | |
| | j=33 j=34 | | | | | |
| | j=34 j=35 | | | | | |
| | j=36 | | | | | |
| | j=37 | | | | | |
| | j=38 j=39 | | | | | |
| | j=39 j=40 | | | | | |
| | j=41 | | | | | |
| | j=42 | | | | | |
| | j=43 j=44 | | | | | |
| | j=45 | | | | | |
| | j=46 | | | | | |
| | j=47 j=48 | | | | | |
| | j=46 j=49 | | | | | |
| | j=50 | II-1(1) | | | | |
| | | 11-1(1) | | | | · |

Table3: Ex-post calculation of each CO₂ emission reduction

| (a) | Parameters | RE _{freezer,j,p} | RE _{AC,add,freezer,j,p} | PE _{freezer,j,p} |
|-----|------------------------|--|---|---|
| (b) | Description of data | Reference emissions of the freezer showcase j during the period ρ | Reference emissions of the air conditioning system caused by the additional electricity consumption due to additional load caused by exhaust heat from the reference freezer showcase <i>j</i> during the period <i>p</i> | Project emissions of the freezer showcase j during the period p |
| (d) | Units | tCO ₂ /p | tCO ₂ /p | tCO ₂ /p |
| (0) | Estimated Value of the | franzar abayyana i | | |
| (c) | | 0.0 | 0.0 | 0.0 |
| | j=1 j=2 | 0.0 | 0.0 | 0.0 |
| | j=2 j=3 | 0.0 | 0.0 | 0.0 |
| | j=3 j=4 | 0.0 | 0.0 | 0.0 |
| | j=4 j=5 | 0.0 | 0.0 | 0.0 |
| | j=5 j=6 | 0.0 | 0.0 | 0.0 |
| | j=6 j=7 | 0.0 | 0.0 | 0.0 |
| | j=7 j=8 | 0.0 | 0.0 | 0.0 |
| | | | | 0.0 |
| | j=9 | 0.0 | 0.0 | 0.0 |
| | j=10 | | 0.0 | |
| | j=11 | 0.0 | 0.0 | 0.0 |
| | j=12 | 0.0 | 0.0 | 0.0 |
| | j=13 | 0.0 | 0.0 | 0.0 |
| | j=14 | 0.0 | 0.0 | 0.0 |
| | j=15 | 0.0 | 0.0 | 0.0 |
| | j=16 | 0.0 | 0.0 | 0.0 |
| | j=17 | 0.0 | 0.0 | 0.0 |
| | j=18 | 0.0 | 0.0 | 0.0 |
| | j=19 | 0.0 | 0.0 | 0.0 |
| | j=20 | 0.0 | 0.0 | 0.0 |
| | j=21 | 0.0 | 0.0 | 0.0 |
| | j=22 | 0.0 | 0.0 | 0.0 |
| | j=23 | 0.0 | 0.0 | 0.0 |
| | j=24 j=25 | 0.0 | 0.0 | 0.0 |
| | j=25 j=26 | 0.0 | 0.0 | 0.0 |
| | j=26 j=27 | 0.0 | 0.0 | 0.0 |
| | j=27 i=28 | 0.0 | 0.0 | 0.0 |
| | j=26 j=29 | 0.0 | 0.0 | 0.0 |
| | j=29 j=30 | 0.0 | 0.0 | 0.0 |
| | j=30 j=31 | 0.0 | 0.0 | 0.0 |
| | j=32 | 0.0 | 0.0 | 0.0 |
| | j=33 | 0.0 | 0.0 | 0.0 |
| | j=34 | 0.0 | 0.0 | 0.0 |
| | j=35 | 0.0 | 0.0 | 0.0 |
| | j=36 | 0.0 | 0.0 | 0.0 |
| | j=37 | 0.0 | 0.0 | 0.0 |
| | j=38 | 0.0 | 0.0 | 0.0 |
| | j=39 | 0.0 | 0.0 | 0.0 |
| | j=40 | 0.0 | 0.0 | 0.0 |
| | j=41 | 0.0 | 0.0 | 0.0 |
| | j=42 | 0.0 | 0.0 | 0.0 |
| | j=43 | 0.0 | 0.0 | 0.0 |
| | j=44 | 0.0 | 0.0 | 0.0 |
| | j=45 | 0.0 | 0.0 | 0.0 |
| | j=46 | 0.0 | 0.0 | 0.0 |
| | i=47 | 0.0 | 0.0 | 0.0 |
| | j=48 | 0.0 | 0.0 | 0.0 |
| | j=49 | 0.0 | 0.0 | 0.0 |
| | i=50 | 0.0 | 0.0 | 0.0 |
| | 1-30 | 0.0 | 0.0 | 5.0 |

| Table4: Ex-post | calculation of | CO ₂ emission | reductions for | freezer show | cases |
|-----------------|----------------|--------------------------|----------------|--------------|-------|
| | | | | | |

| Monitoring Period | CO ₂ emission reductions | Units |
|-------------------|-------------------------------------|---------------------|
| | 0 | tCO ₂ /p |

[Monitoring option]

| Option A | Based on public data which is measured by entities other than the project participants (Data used: publicly recognized data such as statistical data and specifications) | | |
|----------|--|--|--|
| Option B | Option B Based on the amount of transaction which is measured directly using measuring equipments (Data used: commercial evidence such as invoices) | | |
| Ontion C | Based on the actual measurement using measuring equipments (Data used: measured values) | | |

Monitoring Spreadsheet: JCM_ID_AM008_ver03.0

Reference Number:

Monitoring Report Sheet (Calculation Process Sheet) [For Verification]

| | | | Fuel type | | | 1 |
|--|---|--|-----------|-------|---------------------|--------------------------------|
| 1. (| 1. Calculations for emission reductions | | | Value | Units | Parameter |
| | Em | ission reductions during the period p | | 0.0 | tCO ₂ /p | ER _p |
| | | Emission reductions of the fridge showcase | | 0 | tCO ₂ /p | - |
| | | Emission reductions of the freezer showcase | | 0 | tCO ₂ /p | - |
| 2. Selected default values, etc. | | | | | | |
| | | | | | | |
| 3. (| Calc | ulations for reference emissions | | | | |
| | Ref | ference emissions during the period p | | 0.0 | tCO ₂ /p | RE _p |
| | | Reference emissions of the fridge showcase | | 0.0 | tCO ₂ /p | RE _{fridge,p} |
| | | Reference emissions of the freezer showcase | | 0.0 | tCO ₂ /p | RE _{freezer,p} |
| | | Reference emissions of the air conditioning system caused by the additional electricity consumption due to additional load caused by exhaust heat from the reference fridge showcase | | 0.0 | tCO ₂ /p | RE _{AC,add,fridge,p} |
| | | Reference emissions of the air conditioning system caused by the additional electricity consumption due to additional load caused by exhaust heat from the reference freezer showcase | | 0.0 | tCO ₂ /p | RE _{AC,add,freezer,p} |
| 4. Calculations of the project emissions | | | | | | |
| | Pro | ject emissions during the period p | | 0.0 | tCO ₂ /p | PEp |
| | | Project emissions of the project fridge showcase | | 0.0 | tCO ₂ /p | PE _{fridge,p} |
| | | Project emissions of the project freezer showcase | | 0.0 | tCO ₂ /p | PE _{freezer,p} |

| | ſL | ist | of | Default | Va | lues |
|--|----|-----|----|---------|----|------|
|--|----|-----|----|---------|----|------|

Energy efficiency of the reference fridge showcase

Type: Reach-in showcase

| Range of volume (L) | Energy efficiency |
|---------------------|-------------------|
| z < 900 | 1.27 |
| 900 ≤ z < 1200 | 1.94 |
| 1200 ≤ z | 2.43 |

Energy efficiency of the reference fridge showcase

Type: Open showcase

| Range of volume (L) | Energy efficiency |
|---------------------|-------------------|
| z < 900 | 0.54 |
| 900 ≤ z < 1200 | 0.68 |
| 1200 ≤ z | 0.61 |

Energy efficiency of the reference freezer showcase

Type: Reach-in showcase

| Range of volume (L) | Energy efficiency |
|---------------------|-------------------|
| z < 900 | 0.54 |
| 900 ≤ z < 1200 | 0.82 |
| 1200 ≤ z | 0.84 |

COP of the reference air conditioning system

| Cooling Capacity (kW) | Reference COP |
|-----------------------|------------------------|
| 2.6 < x ≤ 5.6 | 3.83 |
| $5.6 < x \le 6.8$ | 3.61 |
| $6.8 < x \le 12.5$ | 3.29 |
| 12. 5 < x ≤ 14. 1 | ∄. ₫ (1 |