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

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Installation of a separate type fridge-freezer showcase by using natural refrigerant for grocery store to reduce air conditioning load inside the store, version $\underline{24.0}$

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	
	• CO ₂ 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. Eligibili	D. Eligibility criteria		
This method	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 to prevent release of		
	refrigerants used in into the atmosphere is prepared for the existing fridge-freezer		
	showcase is not released to the air e.g. re-use of the refrigerantreplaced by the		
	project. 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	CO ₂
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
2.5 < x 4.1	4.00
4.1 < x 5.3	3.59
5.3 < x 7.1	2.96
7.1 < x 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

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Range of volume (L)	Energy efficiency (L/W)
z < 900	1.18
900 z < 1,200	1.07
1,200 z	2.24

-Open showcase

Range of volume (L)	Energy efficiency (L/W)
z < 900	0.50
900 z < 1,200	0.65
1,200 z	0.73

The reference freezer showcase

-Reach-in showcase

Range of volume (L)	Energy efficiency (L/W)
z < 900	0.70
900 z < 1,200	0.70
1,200 z	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

$\mathbf{RE}_{\mathbf{p}} =$	$RE_{fridge,p} + RE_{freezer,p} + RE_{AC,add,fridge,p} + RE_{AC,add,freezer,p}$
RE_{p}	: Reference emissions during the period $p [tCO_2/p]$
RE _{fridge,p}	: Reference emissions of the fridge showcase during the period p [tCO ₂ /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 [tCO ₂ /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 [tCO ₂ /p]
	$\mathbf{RE}_{\mathbf{fridge},\mathbf{p}} = \sum_{\mathbf{i}} \left(\mathbf{EC}_{\mathbf{PJ},\mathbf{fridge},\mathbf{i},\mathbf{p}} \times \frac{\eta_{\mathbf{PJ},\mathbf{fridge},\mathbf{i}}}{\eta_{\mathbf{RE},\mathbf{fridge},\mathbf{i}}} \right) \times \mathbf{EF}_{\mathbf{elec}}$
RE _{fridge,p}	: Reference emissions of the fridge showcase during the period p [tCO ₂ /p]
EC _{PJ,fridge,i,p}	: Electricity consumption of the project fridge showcase <i>i</i> during the period
	<i>p</i> [MWh/p]
$\eta_{ m PJ,fridge,i}$: Energy efficiency of the project fridge showcase <i>i</i> in terms of the volume
	[L/W]
$\eta_{ m RE, fridge, i}$: Energy efficiency of the reference fridge showcase <i>i</i> in terms of the
	volume [L/W]
EF _{elec}	: CO ₂ emission factor for consumed electricity [tCO ₂ /MWh]
i	: Identification number of the fridge showcase [-]
	$\mathbf{RE_{freezer,p}} = \sum_{j} \left(\mathbf{EC_{PJ,freezer,j,p}} \times \frac{\eta_{PJ,freezer,j}}{\eta_{RE,freezer,j}} \right) \times \mathbf{EF_{elec}}$
RE _{freezer,p}	: Reference emissions of the freezer showcase during the period p [tCO ₂ /p]
EC _{PJ,freezer,j,p}	: Electricity consumption of the project freezer showcase <i>j</i> during the period
	<i>p</i> [MWh/p]
$\eta_{\mathrm{PJ,freezer,j}}$: Energy efficiency of the project freezer showcase <i>j</i> in terms of the volume
	[L/W]
$\eta_{ ext{RE,freezer,j}}$: Energy efficiency of the reference freezer showcase j in terms of the
	volume [L/W]
EF _{elec}	: CO ₂ emission factor for consumed electricity [tCO ₂ /MWh]
j	: Identification number of the freezer showcase [-]

$RE_{AC,add,fridge,p} = EC_{RE,AC,add,fridge,p} \times EF_{elec}$							
	$EC_{RE,AC,add,fridge,p} = \sum_{i} EH_{RE,fridge,i,p} \times \frac{1}{\eta_{RE,AC}}$						
	$EH_{RE,fridge,i,p} = HG_{RE,fridge,i,p} + EC_{RE,fridge,i,p}$						
$HG_{RE,fridge,i,p} = HG_{PJ,fridge,i,p}$							
$\mathbf{HG}_{\mathbf{PJ,fridge,i,p}} = \mathbf{EC}_{\mathbf{PJ,fridge,i,p}} \times \eta_{\mathbf{PJ,fridge,cap,i}}$							
	$\mathbf{EC}_{\mathbf{RE,fridge,i,p}} = \mathbf{EC}_{\mathbf{PJ,fridge,i,p}} \times \frac{\eta_{\mathbf{PJ,fridge,i}}}{\eta_{\mathbf{RE,fridge,i}}}$						
$RE_{AC,add,fridge,p}$: 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 [tCO ₂ /p]						
$\mathrm{EC}_{\mathrm{RE},\mathrm{AC},\mathrm{add},\mathrm{fridge},\mathrm{p}}$: 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}	: CO ₂ emission factor for consumed electricity [tCO ₂ /MWh]						
EH _{RE,fridge,i,p}	: Amount of exhaust heat from the reference fridge showcase <i>i</i> during						
	the period <i>p</i> [MWh/p]						
$\eta_{ m RE,AC}$: COP of the reference air conditioning system [-]						
HG _{RE,fridge,i,p}	: Amount of cooling energy generated by the reference fridge showcase						
	<i>i</i> during the period <i>p</i> [MWh/p]						
HG _{PJ,fridge,i,p}	: Amount of cooling energy generated by the project fridge showcase <i>i</i>						
	during the period <i>p</i> [MWh/p]						
EC _{RE,fridge,i,p}	: Electricity consumption of the reference fridge showcase <i>i</i> during the						
	period p [MWh/p]						
EC _{PJ,fridge,i,p}	: Electricity consumption of the project fridge showcase <i>i</i> during the						
	period p [MWh/p]						
$\eta_{ m PJ,fridge,cap,i}$: Energy efficiency of the project fridge showcase <i>i</i> in terms of the						
	cooling capacity [W/W]						
$\eta_{ m PJ,fridge,i}$: Energy efficiency of the project fridge showcase <i>i</i> in terms of the						
	volume [L/W]						
$\eta_{\mathrm{RE,fridge,i}}$: Energy efficiency of the reference fridge showcase i in terms of the						
	volume [L/W]						
i	: Identification number of the fridge showcase [-]						
	$RE_{AC,add,freezer,p} = EC_{RE,AC,add,freezer,p} \times EF_{elec}$						

$EC_{RE,AC,add,freezer,p} = \sum_{j} EH_{RE,freezer,j,p} \times \frac{1}{\eta_{RE,AC}}$					
	$EH_{RE,freezer,j,p} = HG_{RE,freezer,j,p} + EC_{REfreezer,j,p}$				
	$HG_{RE,freezer,j,p} = HG_{PJ,freezer,j,p}$				
	$\mathbf{HG}_{\mathbf{PJ,freezer,j,p}} = \mathbf{EC}_{\mathbf{PJ,freezer,j,p}} \times \eta_{\mathbf{PJ,freezer,cap,j}}$				
	$\mathbf{EC}_{\mathbf{RE, freezer, j, p}} = \mathbf{EC}_{\mathbf{PJ, freezer, j, p}} \times \frac{\eta_{\mathbf{PJ, freezer, j}}}{\eta_{\mathbf{RE, freezer, j}}}$				
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 [tCO ₂ /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}	: CO ₂ emission factor for consumed electricity [tCO ₂ /MWh]				
EH _{RE,freezer,j,p}	: Amount of exhaust heat from the reference freezer showcase <i>j</i> during				
	the period p [MWh/p]				
$\eta_{ m RE,AC}$: COP of the reference air conditioning system [-]				
HG _{RE,freezer,j,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 <i>p</i> [MWh/p]				
EC _{RE,freezer,j,p}	: Electricity consumption of the reference freezer showcase <i>j</i> during the				
	period p [MWh/p]				
EC _{PJ,freezer,j,p}	: Electricity consumption of the project freezer showcase <i>j</i> during the				
	period p [MWh/p]				
$\eta_{ m PJ,freezer,cap,j}$: Energy efficiency of the project freezer showcase j in terms of the				
	cooling capacity [W/W]				
$\eta_{\mathrm{PJ,freezer,j}}$: Energy efficiency of the project freezer showcase <i>j</i> in terms of the				
	volume [L/W]				
$\eta_{\mathrm{RE,freezer,j}}$: 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

	$PE_p = PE_{fridge,p} + PE_{freezer,p}$
PEp	: Project emissions during the period p [tCO ₂ /p]
PE _{fridge,p}	: Project emissions of the fridge showcase during the period p [tCO ₂ /p]
PE _{freezer,p}	: Project emissions of the freezer showcase during the period p [tCO ₂ /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 _{PJ,fridge,i,p}	: Electricity consumption of the project fridge showcase <i>i</i> during the period <i>p</i> [MWh/p]
EF _{elec}	: CO ₂ emission factor for consumed electricity [tCO ₂ /MWh]
i	: Identification number of the fridge showcase [-]
	$PE_{freezer,p} = \sum_{j} (EC_{PJ,freezer,j,p}) \times EF_{elec}$
PE _{freezer,p}	: Project emissions of the project freezer showcase during the period p [tCO ₂ /p]
EC _{PJ,freezer,j,p}	: Electricity consumption of the project freezer showcase <i>j</i> during the period <i>p</i> [MWh/p]
EF _{elec}	: CO ₂ emission factor for consumed electricity [tCO ₂ /MWh]
j	: Identification number of the freezer showcase [-]

H. Calculation of emissions reductions

$\mathbf{ER}_{\mathbf{p}} = \mathbf{RE}_{\mathbf{p}} - \mathbf{PE}_{\mathbf{p}}$					
ER _p	: Emissions reductions during the period p [tCO ₂ /p]				
REp	: Reference emissions during the period p [tCO ₂ /p]				
PEp	: Project emissions during the period p [tCO ₂ /p]				

I. Data and parameters fixed *ex ante*

l

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

Parameter	Descript	Source					
	Energy efficiency of the r in terms of the volume.	Nominal value available on product catalogs, specification					
	-Reach-in showcase		documents or				
	Range of volume (L)	Energy efficiency (L/W)	websites.				
	z < 900	1.18					
	900 z < 1,200	1.07	The default values are				
	1,200 z	2.24	derived from the resul				
	-Open showcase		of survey on energy efficiency of fridge				
$\eta_{ m RE, fridge, i}$	Range of volume (L)	Energy efficiency (L/W)	showcase from				
nte,n luge,i	z < 900	0.50	manufacturers well				
	900 z < 1,200	0.65	known in the market.				
	1,200 z	0.73	The default values				
	1,200 2	0110	should be revised if				
	When multiple types of sl	necessary from survey result which is					
	and Walk-in) are connected	and Walk-in) are connected to a condensing unit, the					
	energy efficiency of Reac	h-in showcase above is	conducted by JC or project participants				
	selected according to the	selected according to the total sum of rated cooling					
	capacity (watt) of all show	every three years.					
	corresponding to the "Ran						
	Energy efficiency of the r	reference freezer showcase j	Nominal value				
	in terms of the volume.	in terms of the volume.					
			catalogs, specification				
	-Reach-in showcase		documents or				
	Range of volume (L)	Energy efficiency (L/W)	websites.				
20	z < 900	0.70					
$\eta_{ ext{RE,freezer,j}}$	900 z < 1,200	0.70	The default values are				
	1,200 z	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.
	Energy efficiency of the project fridge showcase <i>i</i> in	The specifications of
	terms of the cooling capacity.	the project fridge
	The value of rated cooling capacity (watt) and rated	showcase and
	electricity consumption (watt) used in calculation of	condensing unit for
	energy efficiency prepared by manufacturer is	quotation or the
	applied.	factory acceptance test
$\eta_{ m PJ,fridge,cap,i}$		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 cooling capacity	
	(watt) of all showcases connected and the rated	
	electricity consumption (watt) of condensing unit.	
	Energy efficiency of the project fridge showcase <i>i</i> in	The specifications of
	terms of the volume.	the project fridge
	The value of rated volume (liter) and rated electricity	showcase and
	consumption (watt) used in calculation of energy	condensing unit for
	efficiency prepared by manufacturer is applied.	quotation or the
$\eta_{ m PJ, fridge, i}$		factory acceptance test
	When multiple showcases are connected to a	data by manufacturer.
	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.	
	Energy efficiency of the project freezer showcase j in	The specifications of
	terms of the cooling capacity.	the project fridge
nore	The value of rated cooling capacity (watt) and rated	showcase for quotation
$\eta_{ m PJ, freezer, cap, i}$	electricity consumption (watt) used in calculation of	or the factory
	energy efficiency prepared by manufacturer is	acceptance test data by
	applied.	manufacturer.

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	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.	
	Energy efficiency of the project freezer showcase <i>j</i> 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
$\eta_{ m PJ, freezer, j}$		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.	
	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
$EF_{ m elec}$		(Indonesian DNA for
<i>LI</i> elec	[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* [tCO ₂ /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
	Default COP values of the refer	ence air conditioning	The latest version of
	system.		approved JCM
	If multiple types of air condition	ning system with	methodology
	different cooling capacity, whic	h means different	ID_AM004
	COP values, are found in the pr	oject site, the highest	
	value of COP is selected.		
	When an air conditioning system	m with higher COP	
	value than that of the reference	COP with	
	corresponding cooling capacity	set in the table is	
	installed at the project site, $\eta_{\rm RE}$	_{E,AC} is revised to the	
	COP value of installed one.		
$\eta_{ m RE,AC}$			
	Default COP ¹ of F	Reference	
	Air Conditioning Sys	tem ($\eta_{\rm RE,AC}$)	
	Cooling Capacity [kW]	Reference COP	
	2.5 < x 4.1	4.00	
	4.1 < x 5.3	3.59	
	5.3 < x 7.1	2.96	
	7.1 < x 14.2	2.85	
	¹ The default COP values may be r	evised as to the revision	
	of the approved JCM methodology	r ID_AM004.	

History of the document

Version	Date	Contents revised
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.

		put Sheet) [Attachment to Project Design Document]								
	ge showcase] Parameters to be m	ionitored ex post	Table	2: Project-spec	ific parameters to be fixed ex an	te				Та
	Monitoring point No.								1	_
(b)	Parameters	EC _{PJ,fridge,i,p}	(a)	Parameters	η _{PJ,fridge,i}	n _{RE,fridge,i} Energy efficiency of the volume of	η _{PJ,fridge,cap,i} Energy efficiency of the cooling	EFelec	η _{RE,AC}	(2
(c)	Description of data	Electricity consumption of the project fridge showcase <i>i</i> during the period <i>p</i>	(b)	Description of data	the project fridge showcase i	the reference fridge showcase i		CO ₂ emission factor for consumed electricity	COP of the reference air conditioning system	
(e)	Units	MWh/p	(d)	Units	L/W	L/W	showcase i W/W	tCO ₂ /MWh	-	1 1
(f)	Monitoring option	Option C								1
(g)	Source of data	Monitored data								
		Measuring equipment is installed to measure power consumption of in each fridge showcase. Data accumulated from the equipment is recorded by greecry store calf and double checked by another staff on a monthly basis, to prevent missing data. Measurement is conducted with any of the following methods:						[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	The latest version of approved JCM methodology ID_AM004: Cooling Capacity [kW] Reference COP	
		[Method 1: Automated monitoring system] - Measured data is automatically transmitted through internet to the	(e)	Source of data	The specifications of the project fridge showcase and condensing unit for quotation or the factory	The default values set in this methodology corresponding to the		Interconnection Systems", National Committee on Clean Development Mechanism (Indonesian DNA for CDM), based	$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	(E
(h)	Measurement methods and	remote server for recording. - Data recorded in the remote server is reported and double-checked	(e)	Source of uata	acceptance test data by	type and rated volume of the project fridge showcase	the factory acceptance test data by manufacturer.	on data obtained by Directorate General of Electricity, Ministry of Energy and Mineral Resources, Indonesia, unless otherwise	$5.3 < x 7.1 \qquad 2.96$ $7.1 < x 14.2 \qquad 2.85$	
	procedures	by a responsible staff on a monthly basis to prevent missing data. [Method 2: Manual monitoring]			manufacturer.		-,	instructed by the Joint Committee."		
		 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. 						[For captive electricity] CDM approved small scale methodology AMS-I.A	* The default COP values may be revised as to the revision of the approved JCM methodology ID_AM004.	
		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.								
(i) I	Ionitoring frequency	Monthly	(f)	Other						(c
(j) (d) E	Other comments stimated Value of the	e fridge showcase i	(c) I	comments Estimated Value	of the fridge showcase i					
	i=1		(-/	i=1						- 1
	i=2 i=3		-	i=2 i=3						- 1
	i=4 i=5			i=4 i=5						
	i=6			i=6						- 1
	i=7 i=8		-	i=7 i=8						- 1
	i=9			i=9						- 1
	i=10 i=11		-	i=10 i=11						- 7
	i=12			i=12						
	i=13 i=14			i=13 i=14						- 7
	i=15 i=16			i=15 i=16						
	i=17			i=17						
	i=18 i=19		-	i=18 i=19						- 1
	i=20			i=20						
	i=21 i=22		-	i=21 i=22						-
	i=23			i=23						-
	i=24 i=25		-	i=24 i=25						-
	i=26 i=27			i=26 i=27						-
	i=28			i=28						
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						ll-1(1)		·		

3: Ex-ante estimation of each CO2 emission reductions RE_{fridge,i,p} PE_{fridge,i,p} RE_{AC,add,fridge,i,p} Parameters

CO2 emission reductions for fridge showcases 0 Units

[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)
 Option C Based on the actual measurement using measuring equipments (Data used: measured values)

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>
Units	tCO ₂ /p	tCO ₂ /p	tCO ₂ /p
Estimated Value of the i=1		0.0	0.0
i=1 i=2	0.0	0.0	0.0
i=2	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 i=27	0.0	0.0	0.0
i=28	0.0	0.0	0.0
i=20	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 i=41	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=47	0.0	0.0	0.0
i=48	0.0	0.0	0.0
i=49	0.0	0.0	0.0

0.0

i=50

0.0

0.0

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

[For freezer showcase] Table 1: Parameters to be monitored *ex post*

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

(b) Parameters EC_{P_JInexer/JD} Image: P_IInexer/JD Image: P_IIn	(a)	Monitoring point No.	1	1					
No Description of max Descripion of max Description of max				(a)	Parameters		NRE froazer i	NP I freezer can i	EFelec
D Description of a proper lange and a proper lang									
Image: section of the sectio	(c)		period p	(b)	data	the project freezer showcase j	the reference freezer showcase j	capacity of the project freezer showcase <i>i</i>	
Image: provide the second se	(e)			(d)	Units	L/W	L/W	W/W	tCO ₂ /MWh
 Normal field set set set set set set set set set set									
No Note: 1 Number of the standing of	<u>(g)</u>	Source of data	Measuring equipment is installed to measure power consumption of in each freezer showcase. Data accumulated from the equipment is recorded by grocery store staff and double checked by another staff						
Buildentifying of goods Control Contro Control <thcontrol< <="" th=""><th>(h)</th><th>methods and</th><th>[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.</th><th>(e)</th><th>Source of data</th><th>freezer showcase for quotation and condensing unit or the factory acceptance test data by</th><th>methodology corresponding to the type and rated volume of the</th><th>freezer showcase for quotation or the factory acceptance test data</th><th>applied and fixed for the monitoring period thereaft data is sourced from "Emission Factors of Electricit Interconnection Systems", National Committee on 0 Development Mechanism (Indonesian DNA for CDI on data obtained by Directorate General of Electric of Energy and Mineral Resources, Indonesia, unles otherwise instructed by the Joint Committee." [For captive electricity]</th></thcontrol<>	(h)	methods and	[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.	(e)	Source of data	freezer showcase for quotation and condensing unit or the factory acceptance test data by	methodology corresponding to the type and rated volume of the	freezer showcase for quotation or the factory acceptance test data	applied and fixed for the monitoring period thereaft data is sourced from "Emission Factors of Electricit Interconnection Systems", National Committee on 0 Development Mechanism (Indonesian DNA for CDI on data obtained by Directorate General of Electric of Energy and Mineral Resources, Indonesia, unles otherwise instructed by the Joint Committee." [For captive electricity]
(i) Observaments (ii) Observaments (iii) Observaments (iii) Observaments (i) Observaments (iii) Observaments (iii) Observaments (iii) Observaments (iiii) Observaments (iiii) Observaments (iii) Observaments (iiii) Observaments (iiiii) Observaments (iiii) Observaments (iiiii) Observaments (iiiii) Observaments (iiii) Observaments (iiiii) Observaments (iiiii) Observaments (iiii) Observaments (iiiiii) Observaments (iiiiii) Observaments (iiii) Observaments (iiiiiiii) Observaments (iiiiii) Observam			national/international standards is not provided, such measuring equipment is required to be calibrated.						
(a) Extended Value of the freezer showcale / 1 1 1 1 1			Monthly	(f)	Other comments				
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i7mmmj3mmmmj4mmmmj40mmmmj41mmmmj42mmmmj43mmmmj44mmmmj45mmmmj46mmmmj47mmmmj48mmmmj49mmmmj41mmmmj47mmmmj48mmmmj49mmmmj49mmmmj41mmmmj42mmmmj43mmmmj43mmmmj43mmmmj43mmmmj43mmmmj44mmmmj45mmmmj44mmmmj45mmmmj44mmmmj44mmmmj44mmmmj45mmmmj46mm <t< th=""><th></th><th></th><th></th><th></th><th></th><th></th><th></th><th></th><th></th></t<>									
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Table3: Ex-ante estimation of each CO2 emission reductions

(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 <i>j</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 freezer showcase <i>j</i> during the period <i>p</i>	Project emissions of the freezer showcase <i>j</i> during the period <i>p</i>
(d)	Units	tCO ₂ /p	tCO ₂ /p	tCO ₂ /p
(c)	Estimated Value of the			
	j=1	0.0	0.0	0.0
	j=2	0.0	0.0	0.0
	j=3	0.0	0.0	0.0
	j=4	0.0	0.0	0.0
	j=5	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
	j=0 j=9	0.0	0.0	0.0
	j=3 j=10	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=10	0.0	0.0	0.0
	j=17	0.0	0.0	0.0
	j=18	0.0	0.0	0.0
	j=19 j=20	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
	j=20	0.0	0.0	0.0
	j=28	0.0	0.0	0.0
	j=20	0.0	0.0	0.0
	j=23 j=30	0.0	0.0	0.0
	j=00	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
		0.0	0.0	0.0
	j=41		0.0	0.0
	j=42	0.0		
	j=42 j=43	0.0 0.0	0.0	0.0
	j=42	0.0		0.0
	j=42 j=43	0.0 0.0	0.0 0.0 0.0	0.0 0.0
	j=42 j=43 j=44 j=45 j=46	0.0 0.0 0.0	0.0 0.0 0.0 0.0	0.0
	j=42 j=43 j=44 j=45 j=46 j=47	0.0 0.0 0.0 0.0 0.0 0.0 0.0	0.0 0.0 0.0 0.0 0.0 0.0	0.0 0.0 0.0 0.0
	j=42 j=43 j=44 j=45 j=46 j=47 j=48	0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	0.0 0.0 0.0 0.0 0.0 0.0 0.0	0.0 0.0 0.0 0.0 0.0 0.0
	j=42 j=43 j=44 j=45 j=46 j=47	0.0 0.0 0.0 0.0 0.0 0.0 0.0	0.0 0.0 0.0 0.0 0.0 0.0	0.0 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 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) Option C Based on the actual measurement using measuring equipments (Data used: measured values)

Monitoring Spreadsheet: JCM_ID_AM008_ver02.0 Sectoral scope: 03

Monitoring Spreadsheet: JCM_ID_AM008_ver02.0 Sectoral scope: 03

Monitoring Plan Sheet (Calculatio	· Duanana Chant) [Attachment to	Drainet Dealers Dealers anti
Imonitoring Plan Sheet (Calculatio	n Process Sneet) (Attachment to	Project Design Documenti

1. Calculations for emission reductions	Fuel type	Value	Units	Parameter
Emission reductions during the period p		0	tCO ₂ /p	ERp
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. Calculations for reference emissions				
Reference emissions during the period <i>p</i>		0.0	tCO ₂ /p	REp
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,j}
4. Calculations of the project emissions				
Project 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}

[List of Default Values]

Energy efficiency of the reference fridge showcase	Range of volume (L)	Energy efficiency
Type: Reach-in showcase	z < 900	1.1
	900 z < 1200	1.0

Energy efficiency of the reference fridge showcase Type: Open showcase

Range of volume (L)	Energy efficiency
z < 900	0.50
900 z	0.65
1200 z	0.73

1200

Range of volume (L)

z < 900

z

900

4000

z

1.18 1.07

2.24

0.70

0.70

4 04

Energy efficiency

Energy efficiency of the reference freezer showcase Type: Reach-in showcase

COP of the reference air conditioning system

1200 z	1.01
Cooling Capacity (kW)	Reference COP
2.5 < x 4.1	4.00
4.1 < x 5.3	3.59
5.3 < x 7.1	2.96
7.1 < x 14.2	2.85