Monitoring Report Sheet (Input Sheet) [For Verification]

Table 1: Parameters monitored *ex post*

(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)	(k)
Monitoring period	**Monitoring point No.**	**Parameters**	**Description of data**	**Monitored Values**	**Units**	**Monitoring option**	**Source of data**	**Measurement methods and procedures**	**Monitoring frequency**	**Other comments**
2016/4/1-2016/12/31	1	$FC_{PJ1,i,p}$	Fossil fuel consumed during the period *p* by the high efficiency equipment *i* introduced in the project categorized as measure 1	182,949	L/p	Option C	Monitored data	Fossil fuel consumption is monitored by a volumetric meter subject to maintenance/calibration/replacement in line with manufacturer's or meter suppliers' specifications	Monitored continuously and recorded monthly	
2016/4/1-2016/12/31	2	$EC_{PJ2,i,p}$	Electricity consumed during the period *p* by the high efficiency equipment *i* introduced in the project categorized as measure 2	136,014	kWh/p	Option C	Monitored data	Electricity consumption is measured by an electricity meter. The meter is calibrated or replaced in line with relevant national/international standards, or manufacturer's specifications.	Monitored continuously and recorded monthly	
2016/4/1-2016/12/31	3	t_p	Operating hours of auxiliary electric equipment during the period *p*	6,600	hr/p	Option C	Monitored data	Operating hours are checked against an operation record taken by the project participant	monitored and recorded monthly	Conservative assumption of continuous operation
2016/4/1-2016/12/31	4	$t_{i,p}$	Operating hours of the high efficiency equipment *i* introduced in the project during the period *p* categorized as measure 3	5,850	hr/p	Option C	Monitored data	Operating hours are checked against an operation schedule prepared by the project participant.	monitored and recorded monthly	

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

(a)	(b)	(c)	(d)	(e)	(f)
Parameters	**Description of data**	**Estimated Values**	**Units**	**Source of data**	**Other comments**
$\eta_{PJ1,i}$	Energy efficiency of the equipment *i* introduced in the project	0.93	dimensionless	Rated/provided by the technology supplier	
$\eta_{REF1,i}$	Energy efficiency of the reference equipment replaced/substituted by the equipment *i* introduced in the project	0.90	dimensionless	Default values are applied - New natural gas fired boiler (w/o condenser): 92% - New oil fired boiler: 90% - New coal fired boiler: 85% The latest version of CDM Tool to determine the baseline efficiency of thermal or electric energy generation systems	
ECR_i	Rated electricity consumption of the high efficiency equipment *i* introduced in the project	19	kW	Rated/provided by the technology supplier	
H_i	Rated heating capacity of the high efficiency equipment *i* introduced in the project	83	kW	Rated/provided by the technology supplier	
DC_i	Unit fuel consumption rate of the reference equipment replaced/substituted by the equipment *i* introduced in the project	0	L/kWh	Rated/provided by the technology supplier	
CH_i	Rated cooling capacity of the high efficiency equipment *i* introduced in the project	0	kW	Rated/provided by the technology supplier	
COP_i	Efficiency of the reference equipment replaced/substituted by the equipment *i* introduced in the project	5.71	dimensionless	Default values are applied Cooling Capacity/unit (USRT) - x ≤ 250 USRT: COP 5.71 - 250 USRT < x ≤ 300 USRT: COP 5.75 - 300 USRT<x ≤ 500 USRT: COP 5.91	
$ECR_{REF3,i}$	Rated electricity consumption of the reference equipment *i* replaced by the high efficiency equipment *i* in the project categorized as measure 3	14	kW	Rated/provided by the technology supplier	
ECA_i	Capacity of auxiliary electric equipment that is installed due to the implementation of the high efficiency equipment *i*	1	kW	Rated/provided by the technology supplier	
$EC_{PJ3,i}$	Rated electricity consumption of the high efficiency lighting *i* in the project categorized as measure 3	4	kW	Rated/provided by the technology supplier	
$EF_{CO2,ELEC}$	CO_2 emission factor of the electricity consumed When captive power generation is not available at the project site, then the most recent Vietnamese national grid emission factor [EF_{grid}] available at the time of validation is applied as [$EF_{CO2,ELEC}$] and fixed for the monitoring period thereafter. When captive power generation is available at the project site, then [$EF_{CO2,ELEC}$] is conservatively selected as below and fixed for the monitoring period thereafter: $EF_{CO2,ELEC}$ = min (EF_{grid}, $EF_{captive}$) $EF_{captive}$ = 0.8 tCO_2/MWh* *The most recent emission factor available from CDM approved small scale methodology AMS-I.A at the time of validation is applied.	0.566	tCO_2/MWh	[EFgrid] Ministry of Natural Resources and Environment (MONRE), Vietnamese DNA for CDM unless otherwise instructed by the Joint Committee. [EFcaptive] CDM approved small scale methodology: AMS-I.A	
EF_{CO2}	CO_2 emission factor of fossil fuel	0.002720	tCO_2/L	Country specific data or IPCC default value from “2006 IPCC Guidelines for National Greenhouse Gas Inventories”. Lower limit values of the default net calorific value and CO2 emission factor are applied.	

Table3: *Ex-post* calculation of CO_2 emission reductions

Monitoring Period	CO_2 emission reductions	Units
2016/4/1-2016/12/31	155	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 Report Sheet (Calculation Process Sheet) [For Verification]

1. Calculations for emission reductions	Fuel type	Value	Units	Parameter
Emission reductions during the period *p*	N/A	155.7	tCO_2/p	ER_p
2. Selected default values, etc.				
Efficiency of reference boiler		0.90	-	$\eta_{REF1,i}$
Efficiency of project boiler		0.93	-	$\eta_{PJ1,i}$
COP of reference chiller		5.71	-	COP_i
3. Calculations for reference emissions				
Reference emissions during the period *p*	N/A	747.5	tCO_2/p	RE_p
Reference emissions (Fuel consumption)		700.2	tCO_2/p	-
Fossil fuel consumed during the period *p* by reference equipment (measures 1 and 2)		257,381	L/p	$\Sigma FC_{REF,i,p}$
Fossil fuel consumed during the period *p* by the reference equipment (measure 1)		189,047	L/p	$FC_{REF,1,p}$
Energy efficiency of the high efficiency equipment (measure 1)		0.93	-	$\eta_{PJ1,i}$
Energy efficiency of the reference equipment (measure 1)		0.90	-	$\eta_{REF1,i}$
Fossil fuel consumed during the period *p* by the high efficiency equipment (measure 1)		182,949	L/p	$FC_{PJ1,i,p}$
Fossil fuel consumed during the period *p* by reference equipment (measure 2)		68,334	L/p	$FC_{REF,2,p}$
Rated electricity consumption of the high efficiency equipment (measure 2)	Electricity	19	kW	ECR_i
Rated heating capacity of the high efficiency equipment (measure 2)		83	kW	H_i
Unit fuel consumption rate of the reference equipment (measure 2)		0	L/kWh	DC_i
CO_2 emission factor of fossil fuel		0.002720	tCO_2/L	EF_{CO2}
Reference emissions (Power consumption)		47.3	tCO_2/p	-
Electricity consumed during the period *p* by the reference equipment (measures 2 and 3)	Electricity	83,693	kWh/p	$\Sigma EC_{REF,i,p}$
Electricity consumed during the period *p* by the reference equipment (measure 2)	Electricity	0	kWh/p	$EC_{REF,2,p}$
Rated electricity consumption of the high efficiency equipment (measure 2)		19	kW	ECR_i
Rated cooling capacity of the high efficiency equipment (measure 2)		0	kW	CH_i
Efficiency of reference cooling equipment (measure 2)		5.71	--	COP_i
Electricity consumed during the period *p* by the high efficiency equipment (measure 2)	Electricity	136,014	kWh/p	$EC_{PJ2,i,p}$
Electricity consumed during the period *p* by the reference equipment (measure 3)	Electricity	83,693	kWh/p	$EC_{REF,3,p}$
Rated electricity consumption of the reference equipment (measure 3)	Electricity	14	kW	$ECR_{REF3,i}$
Operating hours of the high efficiency equipment during the period *p* (measure 3)		5,850	hr/p	$t_{i,p}$
CO_2 emission factor of electricity consumed		0.566	tCO_2/MWh	$EF_{CO2,ELEC}$

4. Calculations of the project emissions				
Project emissions during the period of *p*	N/A	591.9	tCO_2/p	PE_p
Project emissions (Fuel consumption)		497.7	tCO_2/p	-
Fossil fuel consumed during the period *p* by the high efficiency equipment (measure 1)		182,949	L/p	$FC_{PJ1,i,p}$
CO_2 emission factor of fossil fuel		0.00272	tCO_2/L	EF_{CO2}
Project emissions (Power consumption)		94.1	tCO_2/p	-
Total electricity consumed during the period *p* by the high efficiency equipment (measure 2 and 3)	Electricity	166,431	kWh/p	$\Sigma EC_{PJ,i,p}$
Total electricity consumed during the period *p* by the high efficiency equipment (measure 2)	Electricity	140,502	kWh/p	$EC_{PJ,2,p}$
Capacity of auxiliary electric equipment		1	kW	ECA_i
Operating hours of auxiliary electric equipment during the period *p*		6,600	hr/p	t_p
Electricity consumed during the period *p* by the high efficiency equipment (measure 3)	Electricity	25,929	kWh/p	$EC_{PJ,3,p}$
Rated electricity consumption of the high efficiency equipment (measure 3)	Electricity	4	kW	$EC_{PJ3,i}$
Operating hours of the high efficiency equipment during the period *p* (measure 3)		5,850	hr/p	$t_{i,p}$
CO_2 emission factor of electricity consumed		0.566	tCO_2/MWh	$EF_{CO2,ELEC}$

[List of Default Values]

Boiler efficiency (new natural gas fired boiler w/o condenser)	0.92	--
Boiler efficiency (new oil fired boiler)	0.90	--
Boiler efficiency (new coal fired boiler)	0.85	--
Chiller COP (x ≤ 250USRT)	5.71	--
Chiller COP (250< x ≤300USRT)	5.75	--
Chiller COP (300 < x ≤500USRT)	5.91	--

Monitoring Report Sheet (Input Sheet) [For Verification]

Table 1: Parameters monitored *ex post*

(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)	(k)
Monitoring period	**Monitoring point No.**	**Parameters**	**Description of data**	**Monitored Values**	**Units**	**Monitoring option**	**Source of data**	**Measurement methods and procedures**	**Monitoring frequency**	**Other comments**
2016/4/1-2016/12/31	1	$FC_{PJ1,i,p}$	Fossil fuel consumed during the period *p* by the high efficiency equipment *i* introduced in the project categorized as measure 1	185,031	L/p	Option C	Monitored data	Fossil fuel consumption is monitored by a volumetric meter subject to maintenance/calibration/replacement in line with manufacturer's or meter suppliers' specifications	Monitored continuously and recorded monthly	
2016/4/1-2016/12/31	2	$EC_{PJ2,i,p}$	Electricity consumed during the period *p* by the high efficiency equipment *i* introduced in the project categorized as measure 2	0	kWh/p	Option C	Monitored data	Electricity consumption is measured by an electricity meter. The meter is calibrated or replaced in line with relevant national/international standards, or manufacturer's specifications.	Monitored continuously and recorded monthly	not applicable to the project
2016/4/1-2016/12/31	3	t_p	Operating hours of auxiliary electric equipment during the period *p*	6,600	hr/p	Option C	Monitored data	Operating hours are checked against an operation record taken by the project participant	monitored and recorded monthly	Conservative assumption of continuous operation
2016/4/1-2016/12/31	4	$t_{i,p}$	Operating hours of the high efficiency equipment *i* introduced in the project during the period *p* categorized as measure 3	0	hr/p	Option C	Monitored data	Operating hours are checked against an operation schedule prepared by the project participant.	monitored and recorded monthly	not applicable to the project

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

(a)	(b)	(c)	(d)	(e)	(f)
Parameters	**Description of data**	**Estimated Values**	**Units**	**Source of data**	**Other comments**
$\eta_{PJ1,i}$	Energy efficiency of the equipment *i* introduced in the project	0.93	dimensionless	Rated/provided by the technology supplier	
$\eta_{REF1,i}$	Energy efficiency of the reference equipment replaced/substituted by the equipment *i* introduced in the project	0.90	dimensionless	Default values are applied - New natural gas fired boiler (w/o condenser): 92% - New oil fired boiler: 90% - New coal fired boiler: 85% The latest version of CDM Tool to determine the baseline efficiency of thermal or electric energy generation systems	
ECR_i	Rated electricity consumption of the high efficiency equipment *i* introduced in the project	0	kW	Rated/provided by the technology supplier	
H_i	Rated heating capacity of the high efficiency equipment *i* introduced in the project	0	kW	Rated/provided by the technology supplier	
DC_i	Unit fuel consumption rate of the reference equipment replaced/substituted by the equipment *i* introduced in the project	0	L/kWh	Rated/provided by the technology supplier	
CH_i	Rated cooling capacity of the high efficiency equipment *i* introduced in the project	0	kW	Rated/provided by the technology supplier	
COP_i	Efficiency of the reference equipment replaced/substituted by the equipment *i* introduced in the project	5.71	dimensionless	Default values are applied Cooling Capacity/unit (USRT) - x ≤ 250 USRT: COP 5.71 - 250 USRT < x ≤ 300 USRT: COP 5.75 - 300 USRT<x ≤ 500 USRT: COP 5.91	
$ECR_{REF3,i}$	Rated electricity consumption of the reference equipment *i* replaced by the high efficiency equipment *i* in the project categorized as measure 3	0	kW	Rated/provided by the technology supplier	
ECA_i	Capacity of auxiliary electric equipment that is installed due to the implementation of the high efficiency equipment *i*	0	kW	Rated/provided by the technology supplier	
$EC_{PJ3,i}$	Rated electricity consumption of the high efficiency lighting *i* in the project categorized as measure 3	0	kW	Rated/provided by the technology supplier	
$EF_{CO2,ELEC}$	CO_2 emission factor of the electricity consumed When captive power generation is not available at the project site, then the most recent Vietnamese national grid emission factor [EF_{grid}] available at the time of validation is applied as [$EF_{CO2,ELEC}$] and fixed for the monitoring period thereafter. When captive power generation is available at the project site, then [$EF_{CO2,ELEC}$] is conservatively selected as below and fixed for the monitoring period thereafter: $EF_{CO2,ELEC}$ = min (EF_{grid}, $EF_{captive}$) $EF_{captive}$ = 0.8 tCO_2/MWh* *The most recent emission factor available from CDM approved small scale methodology AMS-I.A at the time of validation is applied.	0.566	tCO_2/MWh	[EFgrid] Ministry of Natural Resources and Environment (MONRE), Vietnamese DNA for CDM unless otherwise instructed by the Joint Committee. [EFcaptive] CDM approved small scale methodology: AMS-I.A	
EF_{CO2}	CO_2 emission factor of fossil fuel	0.002720	tCO_2/L	Country specific data or IPCC default value from “2006 IPCC Guidelines for National Greenhouse Gas Inventories”. Lower limit values of the default net calorific value and CO2 emission factor are applied.	

Table3: *Ex-post* calculation of CO_2 emission reductions

Monitoring Period	CO_2 emission reductions	Units
2016/4/1-2016/12/31	16	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 Report Sheet (Calculation Process Sheet) [For Verification]

1. Calculations for emission reductions	Fuel type	Value	Units	Parameter
Emission reductions during the period *p*	N/A	16.8	tCO_2/p	ER_p
2. Selected default values, etc.				
Efficiency of reference boiler		0.90	-	$\eta_{REF1,i}$
Efficiency of project boiler		0.93	-	$\eta_{PJ1,i}$
COP of reference chiller		5.71	-	COP_i
3. Calculations for reference emissions				
Reference emissions during the period *p*	N/A	520.1	tCO_2/p	RE_p
Reference emissions (Fuel consumption)		520.1	tCO_2/p	-
Fossil fuel consumed during the period *p* by reference equipment (measures 1 and 2)		191,199	L/p	$\Sigma FC_{REF,i,p}$
Fossil fuel consumed during the period *p* by the reference equipment (measure 1)		191,199	L/p	$FC_{REF,1,p}$
Energy efficiency of the high efficiency equipment (measure 1)		0.93	-	$\eta_{PJ1,i}$
Energy efficiency of the reference equipment (measure 1)		0.90	-	$\eta_{REF1,i}$
Fossil fuel consumed during the period *p* by the high efficiency equipment (measure 1)		185,031	L/p	$FC_{PJ1,i,p}$
Fossil fuel consumed during the period *p* by reference equipment (measure 2)		0	L/p	$FC_{REF,2,p}$
Rated electricity consumption of the high efficiency equipment (measure 2)	Electricity	0	kW	ECR_i
Rated heating capacity of the high efficiency equipment (measure 2)		0	kW	H_i
Unit fuel consumption rate of the reference equipment (measure 2)		0	L/kWh	DC_i
CO_2 emission factor of fossil fuel		0.002720	tCO_2/L	EF_{CO2}
Reference emissions (Power consumption)		0.0	tCO_2/p	-
Electricity consumed during the period *p* by the reference equipment (measures 2 and 3)	Electricity	0	kWh/p	$\Sigma EC_{REF,i,p}$
Electricity consumed during the period *p* by the reference equipment (measure 2)	Electricity	0	kWh/p	$EC_{REF,2,p}$
Rated electricity consumption of the high efficiency equipment (measure 2)		0	kW	ECR_i
Rated cooling capacity of the high efficiency equipment (measure 2)		0	kW	CH_i
Efficiency of reference cooling equipment (measure 2)		5.71	--	COP_i
Electricity consumed during the period *p* by the high efficiency equipment (measure 2)	Electricity	0	kWh/p	$EC_{PJ2,i,p}$
Electricity consumed during the period *p* by the reference equipment (measure 3)	Electricity	0	kWh/p	$EC_{REF,3,p}$
Rated electricity consumption of the reference equipment (measure 3)	Electricity	0	kW	$ECR_{REF3,i}$
Operating hours of the high efficiency equipment during the period *p* (measure 3)		0	hr/p	$t_{i,p}$
CO_2 emission factor of electricity consumed		0.566	tCO_2/MWh	$EF_{CO2,ELEC}$

4. Calculations of the project emissions				
Project emissions during the period of *p*	N/A	503.4	tCO_2/p	PE_p
Project emissions (Fuel consumption)		503.4	tCO_2/p	-
Fossil fuel consumed during the period *p* by the high efficiency equipment (measure 1)		185,031	L/p	$FC_{PJ1,i,p}$
CO_2 emission factor of fossil fuel		0.00272	tCO_2/L	EF_{CO2}
Project emissions (Power consumption)		0.0	tCO_2/p	-
Total electricity consumed during the period *p* by the high efficiency equipment (measure 2 and 3)	Electricity	0	kWh/p	$\Sigma EC_{PJ,i,p}$
Total electricity consumed during the period *p* by the high efficiency equipment (measure 2)	Electricity	0	kWh/p	$EC_{PJ,2,p}$
Capacity of auxiliary electric equipment		0	kW	ECA_i
Operating hours of auxiliary electric equipment during the period *p*		6,600	hr/p	t_p
Electricity consumed during the period *p* by the high efficiency equipment (measure 3)	Electricity	0	kWh/p	$EC_{PJ,3,p}$
Rated electricity consumption of the high efficiency equipment (measure 3)	Electricity	0	kW	$EC_{PJ3,i}$
Operating hours of the high efficiency equipment during the period *p* (measure 3)		0	hr/p	$t_{i,p}$
CO_2 emission factor of electricity consumed		0.566	tCO_2/MWh	$EF_{CO2,ELEC}$

[List of Default Values]

Boiler efficiency (new natural gas fired boiler w/o condenser)	0.92	--
Boiler efficiency (new oil fired boiler)	0.90	--
Boiler efficiency (new coal fired boiler)	0.85	--
Chiller COP (x ≤ 250USRT)	5.71	--
Chiller COP (250< x ≤300USRT)	5.75	--
Chiller COP (300 < x ≤500USRT)	5.91	--

Monitoring Report Sheet (Input Sheet) [For Verification]

Table 1: Parameters monitored *ex post*

(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)	(k)
Monitoring period	**Monitoring point No.**	**Parameters**	**Description of data**	**Monitored Values**	**Units**	**Monitoring option**	**Source of data**	**Measurement methods and procedures**	**Monitoring frequency**	**Other comments**
2017/1/1-2017/5/31	1	$FC_{PJ1,i,p}$	Fossil fuel consumed during the period *p* by the high efficiency equipment *i* introduced in the project categorized as measure 1	116,116	L/p	Option C	Monitored data	Fossil fuel consumption is monitored by a volumetric meter subject to maintenance/calibration/replacement in line with manufacturer's or meter suppliers' specifications	Monitored continuously and recorded monthly	
2017/1/1-2017/5/31	2	$EC_{PJ2,i,p}$	Electricity consumed during the period *p* by the high efficiency equipment *i* introduced in the project categorized as measure 2	70,974	kWh/p	Option C	Monitored data	Electricity consumption is measured by an electricity meter. The meter is calibrated or replaced in line with relevant national/international standards, or manufacturer's specifications.	Monitored continuously and recorded monthly	
2017/1/1-2017/5/31	3	t_p	Operating hours of auxiliary electric equipment during the period *p*	3,624	hr/p	Option C	Monitored data	Operating hours are checked against an operation record taken by the project participant	monitored and recorded monthly	Conservative assumption of continuous operation
2017/1/1-2017/5/31	4	$t_{i,p}$	Operating hours of the high efficiency equipment *i* introduced in the project during the period *p* categorized as measure 3	3,212	hr/p	Option C	Monitored data	Operating hours are checked against an operation schedule prepared by the project participant.	monitored and recorded monthly	

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

(a)	(b)	(c)	(d)	(e)	(f)
Parameters	**Description of data**	**Estimated Values**	**Units**	**Source of data**	**Other comments**
$\eta_{PJ1,i}$	Energy efficiency of the equipment *i* introduced in the project	0.93	dimensionless	Rated/provided by the technology supplier	
$\eta_{REF1,i}$	Energy efficiency of the reference equipment replaced/substituted by the equipment *i* introduced in the project	0.90	dimensionless	Default values are applied - New natural gas fired boiler (w/o condenser): 92% - New oil fired boiler: 90% - New coal fired boiler: 85% The latest version of CDM Tool to determine the baseline efficiency of thermal or electric energy generation systems	
ECR_i	Rated electricity consumption of the high efficiency equipment *i* introduced in the project	19	kW	Rated/provided by the technology supplier	
H_i	Rated heating capacity of the high efficiency equipment *i* introduced in the project	83	kW	Rated/provided by the technology supplier	
DC_i	Unit fuel consumption rate of the reference equipment replaced/substituted by the equipment *i* introduced in the project	0	L/kWh	Rated/provided by the technology supplier	
CH_i	Rated cooling capacity of the high efficiency equipment *i* introduced in the project	0	kW	Rated/provided by the technology supplier	
COP_i	Efficiency of the reference equipment replaced/substituted by the equipment *i* introduced in the project	5.71	dimensionless	Default values are applied Cooling Capacity/unit (USRT) - x ≤ 250 USRT: COP 5.71 - 250 USRT < x ≤ 300 USRT: COP 5.75 - 300 USRT<x ≤ 500 USRT: COP 5.91	
$ECR_{REF3,i}$	Rated electricity consumption of the reference equipment *i* replaced by the high efficiency equipment *i* in the project categorized as measure 3	14	kW	Rated/provided by the technology supplier	
ECA_i	Capacity of auxiliary electric equipment that is installed due to the implementation of the high efficiency equipment *i*	1	kW	Rated/provided by the technology supplier	
$EC_{PJ3,i}$	Rated electricity consumption of the high efficiency lighting *i* in the project categorized as measure 3	4	kW	Rated/provided by the technology supplier	
$EF_{CO2,ELEC}$	CO_2 emission factor of the electricity consumed When captive power generation is not available at the project site, then the most recent Vietnamese national grid emission factor [EF_{grid}] available at the time of validation is applied as [$EF_{CO2,ELEC}$] and fixed for the monitoring period thereafter. When captive power generation is available at the project site, then [$EF_{CO2,ELEC}$] is conservatively selected as below and fixed for the monitoring period thereafter: $EF_{CO2,ELEC}$ = min (EF_{grid}, $EF_{captive}$) $EF_{captive}$ = 0.8 tCO_2/MWh* *The most recent emission factor available from CDM approved small scale methodology AMS-I.A at the time of validation is applied.	0.566	tCO_2/MWh	[EFgrid] Ministry of Natural Resources and Environment (MONRE), Vietnamese DNA for CDM unless otherwise instructed by the Joint Committee. [EFcaptive] CDM approved small scale methodology: AMS-I.A	
EF_{CO2}	CO_2 emission factor of fossil fuel	0.002720	tCO_2/L	Country specific data or IPCC default value from “2006 IPCC Guidelines for National Greenhouse Gas Inventories”. Lower limit values of the default net calorific value and CO2 emission factor are applied.	

Table3: *Ex-post* calculation of CO_2 emission reductions

Monitoring Period	CO_2 emission reductions	Units
2017/1/1-2017/5/31	83	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 Report Sheet (Calculation Process Sheet) [For Verification]

1. Calculations for emission reductions	Fuel type	Value	Units	Parameter
Emission reductions during the period *p*	N/A	83.9	tCO_2/p	ER_p
2. Selected default values, etc.				
Efficiency of reference boiler		0.90	-	$\eta_{REF1,i}$
Efficiency of project boiler		0.93	-	$\eta_{PJ1,i}$
COP of reference chiller		5.71	-	COP_i
3. Calculations for reference emissions				
Reference emissions during the period *p*	N/A	449.4	tCO_2/p	RE_p
Reference emissions (Fuel consumption)		423.4	tCO_2/p	-
Fossil fuel consumed during the period *p* by reference equipment (measures 1 and 2)		155,644	L/p	$\Sigma FC_{REF,i,p}$
Fossil fuel consumed during the period *p* by the reference equipment (measure 1)		119,987	L/p	$FC_{REF,1,p}$
Energy efficiency of the high efficiency equipment (measure 1)		0.93	-	$\eta_{PJ1,i}$
Energy efficiency of the reference equipment (measure 1)		0.90	-	$\eta_{REF1,i}$
Fossil fuel consumed during the period *p* by the high efficiency equipment (measure 1)		116,116	L/p	$FC_{PJ1,i,p}$
Fossil fuel consumed during the period *p* by reference equipment (measure 2)		35,658	L/p	$FC_{REF,2,p}$
Rated electricity consumption of the high efficiency equipment (measure 2)	Electricity	19	kW	ECR_i
Rated heating capacity of the high efficiency equipment (measure 2)		83	kW	H_i
Unit fuel consumption rate of the reference equipment (measure 2)		0	L/kWh	DC_i
CO_2 emission factor of fossil fuel		0.002720	tCO_2/L	EF_{CO2}
Reference emissions (Power consumption)		26.0	tCO_2/p	-
Electricity consumed during the period *p* by the reference equipment (measures 2 and 3)	Electricity	45,955	kWh/p	$\Sigma EC_{REF,i,p}$
Electricity consumed during the period *p* by the reference equipment (measure 2)	Electricity	0	kWh/p	$EC_{REF,2,p}$
Rated electricity consumption of the high efficiency equipment (measure 2)		19	kW	ECR_i
Rated cooling capacity of the high efficiency equipment (measure 2)		0	kW	CH_i
Efficiency of reference cooling equipment (measure 2)		5.71	--	COP_i
Electricity consumed during the period *p* by the high efficiency equipment (measure 2)	Electricity	70,974	kWh/p	$EC_{PJ2,i,p}$
Electricity consumed during the period *p* by the reference equipment (measure 3)	Electricity	45,955	kWh/p	$EC_{REF,3,p}$
Rated electricity consumption of the reference equipment (measure 3)	Electricity	14	kW	$ECR_{REF3,i}$
Operating hours of the high efficiency equipment during the period *p* (measure 3)		3,212	hr/p	$t_{i,p}$
CO_2 emission factor of electricity consumed		0.566	tCO_2/MWh	$EF_{CO2,ELEC}$

4. Calculations of the project emissions				
Project emissions during the period of *p*	N/A	365.5	tCO_2/p	PE_p
Project emissions (Fuel consumption)		315.9	tCO_2/p	-
Fossil fuel consumed during the period *p* by the high efficiency equipment (measure 1)		116,116	L/p	$FC_{PJ1,i,p}$
CO_2 emission factor of fossil fuel		0.00272	tCO_2/L	EF_{CO2}
Project emissions (Power consumption)		49.6	tCO_2/p	-
Total electricity consumed during the period *p* by the high efficiency equipment (measure 2 and 3)	Electricity	87,676	kWh/p	$\Sigma EC_{PJ,i,p}$
Total electricity consumed during the period *p* by the high efficiency equipment (measure 2)	Electricity	73,439	kWh/p	$EC_{PJ,2,p}$
Capacity of auxiliary electric equipment		1	kW	ECA_i
Operating hours of auxiliary electric equipment during the period *p*		3,624	hr/p	t_p
Electricity consumed during the period *p* by the high efficiency equipment (measure 3)	Electricity	14,237	kWh/p	$EC_{PJ,3,p}$
Rated electricity consumption of the high efficiency equipment (measure 3)	Electricity	4	kW	$EC_{PJ3,i}$
Operating hours of the high efficiency equipment during the period *p* (measure 3)		3,212	hr/p	$t_{i,p}$
CO_2 emission factor of electricity consumed		0.566	tCO_2/MWh	$EF_{CO2,ELEC}$

[List of Default Values]

Boiler efficiency (new natural gas fired boiler w/o condenser)	0.92	--
Boiler efficiency (new oil fired boiler)	0.90	--
Boiler efficiency (new coal fired boiler)	0.85	--
Chiller COP (x ≤ 250USRT)	5.71	--
Chiller COP (250< x ≤300USRT)	5.75	--
Chiller COP (300 < x ≤500USRT)	5.91	--

Monitoring Report Sheet (Input Sheet) [For Verification]

Table 1: Parameters monitored *ex post*

(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)	(k)
Monitoring period	**Monitoring point No.**	**Parameters**	**Description of data**	**Monitored Values**	**Units**	**Monitoring option**	**Source of data**	**Measurement methods and procedures**	**Monitoring frequency**	**Other comments**
2017/1/1-2017/5/31	1	$FC_{PJ1,i,p}$	Fossil fuel consumed during the period *p* by the high efficiency equipment *i* introduced in the project categorized as measure 1	79,308	L/p	Option C	Monitored data	Fossil fuel consumption is monitored by a volumetric meter subject to maintenance/calibration/replacement in line with manufacturer's or meter suppliers' specifications	Monitored continuously and recorded monthly	
2017/1/1-2017/5/31	2	$EC_{PJ2,i,p}$	Electricity consumed during the period *p* by the high efficiency equipment *i* introduced in the project categorized as measure 2	0	kWh/p	Option C	Monitored data	Electricity consumption is measured by an electricity meter. The meter is calibrated or replaced in line with relevant national/international standards, or manufacturer's specifications.	Monitored continuously and recorded monthly	not applicable to the project
2017/1/1-2017/5/31	3	t_p	Operating hours of auxiliary electric equipment during the period *p*	3,624	hr/p	Option C	Monitored data	Operating hours are checked against an operation record taken by the project participant	monitored and recorded monthly	Conservative assumption of continuous operation
2017/1/1-2017/5/31	4	$t_{i,p}$	Operating hours of the high efficiency equipment *i* introduced in the project during the period *p* categorized as measure 3	0	hr/p	Option C	Monitored data	Operating hours are checked against an operation schedule prepared by the project participant.	monitored and recorded monthly	not applicable to the project

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

(a)	(b)	(c)	(d)	(e)	(f)
Parameters	**Description of data**	**Estimated Values**	**Units**	**Source of data**	**Other comments**
$\eta_{PJ1,i}$	Energy efficiency of the equipment *i* introduced in the project	0.93	dimensionless	Rated/provided by the technology supplier	
$\eta_{REF1,i}$	Energy efficiency of the reference equipment replaced/substituted by the equipment *i* introduced in the project	0.90	dimensionless	Default values are applied - New natural gas fired boiler (w/o condenser): 92% - New oil fired boiler: 90% - New coal fired boiler: 85% The latest version of CDM Tool to determine the baseline efficiency of thermal or electric energy generation systems	
ECR_i	Rated electricity consumption of the high efficiency equipment *i* introduced in the project	0	kW	Rated/provided by the technology supplier	
H_i	Rated heating capacity of the high efficiency equipment *i* introduced in the project	0	kW	Rated/provided by the technology supplier	
DC_i	Unit fuel consumption rate of the reference equipment replaced/substituted by the equipment *i* introduced in the project	0	L/kWh	Rated/provided by the technology supplier	
CH_i	Rated cooling capacity of the high efficiency equipment *i* introduced in the project	0	kW	Rated/provided by the technology supplier	
COP_i	Efficiency of the reference equipment replaced/substituted by the equipment *i* introduced in the project	5.71	dimensionless	Default values are applied Cooling Capacity/unit (USRT) - x ≤ 250 USRT: COP 5.71 - 250 USRT < x ≤ 300 USRT: COP 5.75 - 300 USRT<x ≤ 500 USRT: COP 5.91	
$ECR_{REF3,i}$	Rated electricity consumption of the reference equipment *i* replaced by the high efficiency equipment *i* in the project categorized as measure 3	0	kW	Rated/provided by the technology supplier	
ECA_i	Capacity of auxiliary electric equipment that is installed due to the implementation of the high efficiency equipment *i*	0	kW	Rated/provided by the technology supplier	
$EC_{PJ3,i}$	Rated electricity consumption of the high efficiency lighting *i* in the project categorized as measure 3	0	kW	Rated/provided by the technology supplier	
$EF_{CO2,ELEC}$	CO_2 emission factor of the electricity consumed When captive power generation is not available at the project site, then the most recent Vietnamese national grid emission factor [EF_{grid}] available at the time of validation is applied as [$EF_{CO2,ELEC}$] and fixed for the monitoring period thereafter. When captive power generation is available at the project site, then [$EF_{CO2,ELEC}$] is conservatively selected as below and fixed for the monitoring period thereafter: $EF_{CO2,ELEC}$ = min (EF_{grid}, $EF_{captive}$) $EF_{captive}$ = 0.8 tCO_2/MWh* *The most recent emission factor available from CDM approved small scale methodology AMS-I.A at the time of validation is applied.	0.566	tCO_2/MWh	[EFgrid] Ministry of Natural Resources and Environment (MONRE), Vietnamese DNA for CDM unless otherwise instructed by the Joint Committee. [EFcaptive] CDM approved small scale methodology: AMS-I.A	
EF_{CO2}	CO_2 emission factor of fossil fuel	0.002720	tCO_2/L	Country specific data or IPCC default value from “2006 IPCC Guidelines for National Greenhouse Gas Inventories”. Lower limit values of the default net calorific value and CO2 emission factor are applied.	

Table3: *Ex-post* calculation of CO_2 emission reductions

Monitoring Period	CO_2 emission reductions	Units
2017/1/1-2017/5/31	7	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 Report Sheet (Calculation Process Sheet) [For Verification]

1. Calculations for emission reductions	Fuel type	Value	Units	Parameter
Emission reductions during the period *p*	N/A	7.2	tCO_2/p	ER_p
2. Selected default values, etc.				
Efficiency of reference boiler		0.90	-	$\eta_{REF1,i}$
Efficiency of project boiler		0.93	-	$\eta_{PJ1,i}$
COP of reference chiller		5.71	-	COP_i
3. Calculations for reference emissions				
Reference emissions during the period *p*	N/A	222.9	tCO_2/p	RE_p
Reference emissions (Fuel consumption)		222.9	tCO_2/p	-
Fossil fuel consumed during the period *p* by reference equipment (measures 1 and 2)		81,952	L/p	$\Sigma FC_{REF,i,p}$
Fossil fuel consumed during the period *p* by the reference equipment (measure 1)		81,952	L/p	$FC_{REF,1,p}$
Energy efficiency of the high efficiency equipment (measure 1)		0.93	-	$\eta_{PJ1,i}$
Energy efficiency of the reference equipment (measure 1)		0.90	-	$\eta_{REF1,i}$
Fossil fuel consumed during the period *p* by the high efficiency equipment (measure 1)		79,308	L/p	$FC_{PJ1,i,p}$
Fossil fuel consumed during the period *p* by reference equipment (measure 2)		0	L/p	$FC_{REF,2,p}$
Rated electricity consumption of the high efficiency equipment (measure 2)	Electricity	0	kW	ECR_i
Rated heating capacity of the high efficiency equipment (measure 2)		0	kW	H_i
Unit fuel consumption rate of the reference equipment (measure 2)		0	L/kWh	DC_i
CO_2 emission factor of fossil fuel		0.002720	tCO_2/L	EF_{CO2}
Reference emissions (Power consumption)		0.0	tCO_2/p	-
Electricity consumed during the period *p* by the reference equipment (measures 2 and 3)	Electricity	0	kWh/p	$\Sigma EC_{REF,i,p}$
Electricity consumed during the period *p* by the reference equipment (measure 2)	Electricity	0	kWh/p	$EC_{REF,2,p}$
Rated electricity consumption of the high efficiency equipment (measure 2)		0	kW	ECR_i
Rated cooling capacity of the high efficiency equipment (measure 2)		0	kW	CH_i
Efficiency of reference cooling equipment (measure 2)		5.71	--	COP_i
Electricity consumed during the period *p* by the high efficiency equipment (measure 2)	Electricity	0	kWh/p	$EC_{PJ2,i,p}$
Electricity consumed during the period *p* by the reference equipment (measure 3)	Electricity	0	kWh/p	$EC_{REF,3,p}$
Rated electricity consumption of the reference equipment (measure 3)	Electricity	0	kW	$ECR_{REF3,i}$
Operating hours of the high efficiency equipment during the period *p* (measure 3)		0	hr/p	$t_{i,p}$
CO_2 emission factor of electricity consumed		0.566	tCO_2/MWh	$EF_{CO2,ELEC}$

4. Calculations of the project emissions				
Project emissions during the period of *p*	N/A	215.8	tCO_2/p	PE_p
Project emissions (Fuel consumption)		215.8	tCO_2/p	-
Fossil fuel consumed during the period *p* by the high efficiency equipment (measure 1)		79,308	L/p	$FC_{PJ1,i,p}$
CO_2 emission factor of fossil fuel		0.00272	tCO_2/L	EF_{CO2}
Project emissions (Power consumption)		0.0	tCO_2/p	-
Total electricity consumed during the period *p* by the high efficiency equipment (measure 2 and 3)	Electricity	0	kWh/p	$\Sigma EC_{PJ,i,p}$
Total electricity consumed during the period *p* by the high efficiency equipment (measure 2)	Electricity	0	kWh/p	$EC_{PJ,2,p}$
Capacity of auxiliary electric equipment		0	kW	ECA_i
Operating hours of auxiliary electric equipment during the period *p*		3,624	hr/p	t_p
Electricity consumed during the period *p* by the high efficiency equipment (measure 3)	Electricity	0	kWh/p	$EC_{PJ,3,p}$
Rated electricity consumption of the high efficiency equipment (measure 3)	Electricity	0	kW	$EC_{PJ3,i}$
Operating hours of the high efficiency equipment during the period *p* (measure 3)		0	hr/p	$t_{i,p}$
CO_2 emission factor of electricity consumed		0.566	tCO_2/MWh	$EF_{CO2,ELEC}$

[List of Default Values]

Boiler efficiency (new natural gas fired boiler w/o condenser)	0.92	--
Boiler efficiency (new oil fired boiler)	0.90	--
Boiler efficiency (new coal fired boiler)	0.85	--
Chiller COP (x ≤ 250USRT)	5.71	--
Chiller COP (250< x ≤300USRT)	5.75	--
Chiller COP (300 < x ≤500USRT)	5.91	--