Bulacan (BL)

Baseline and project emissions calculations

Baseline

The baseline is based on the average 2002,2003 and 2004 data prior the tests and trials and therefore prior to the starting date of the project activity.

Clinker Production 2002-2004	(t)	4 169 839
Clinker production average 2002-2004	(t)	1 389 946

Fuel	Unit	Bituminous coal	Heavy oil	Light oil/diesel	Anthracite	Industrial waste originating from fossil source	Total
Emission factor (EE_{FFi})	tCO_2/TJ	94,60	73,3	74,1	98,3	143,0	
Lower heating value (HV_{FFi})	TJ/t	0,025	0,040	0,038	0,027	0,016	
Quantity of fossil fuel used (Q_{FF_BAI})	tonnes	145 644	1 021	72	30 745	2 255	
Specific emissions	tCO_2	339 553	2 971	204	82 545	5 069	430 342
Specific heating consumption	TJ	3 589	41	3	840	35	4 508
Percentage heat consumption	%	79,6	0,9	0,1	18,6	0,8	100,0
Weight average emission factor EE_{FF} (excluding industrial waste)	tCO_2/TJ						95,09
Specific fuel consumption in the baseline (HC_{FF})	TJ/tclinker						0,00324

Percentage of heat consumption for the clinker production in the project activity

Year	Bituminous coal	Heavy oil	Light oil	Anthracite	Industrial waste originating from fossil source	Agricultural waste/rice husk (AF-biomass)	sorted MSW (AF-non biomass)	Total
2007	*74,6*	*0,9*	*0,1*	*18,6*	*0,8*	*5,0*	*0,0*	*100,0*
2008*	70,1	0,9	0,1	18,6	0,8	7,5	2,0	100,0
2009	66,6	0,9	0,1	18,6	0,8	10,0	3,0	100,0
2010	59,6	0,9	0,1	18,6	0,8	15,0	5,0	100,0
2011	59,6	0,9	0,1	18,6	0,8	15,0	5,0	100,0
2012	59,6	0,9	0,1	18,6	0,8	15,0	5,0	100,0
2013	59,6	0,9	0,1	18,6	0,8	15,0	5,0	100,0
2014	59,6	0,9	0,1	18,6	0,8	15,0	5,0	100,0
2015	59,6	0,9	0,1	18,6	0,8	15,0	5,0	100,0
2016	59,6	0,9	0,1	18,6	0,8	15,0	5,0	100,0

2017	59,6	0,9	0,1	18,6	0,8	15,0	5,0	100,0
2018	59,6	0,9	0,1	18,6	0,8	15,0	5,0	100,0

* starting date of the crediting period

Monitoring project heat input from alternative fuel (agricultural waste-rice husk and sorted MSW)

Since waste fuel and industrial waste originating from fossil fuel are not part of the project activity and are calculated with the fossil fuel in the baseline, the heat input is calculated with the fossil fuel.

		2007	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	
clinker production	tonnes	1 682 000	1 682 000	1 682 000	1 682 000	1 682 000	1 682 000	1 682 000	1 682 000	1 682 000	1 682 000	1 682 000	1 682 000	
Global specific heat consumption (see modelisation regarding moisture)	TJ/tclinker	0,00326	0,00326	0,00328	0,00329	0,00329	0,00329	0,00329	0,00329	0,00329	0,00329	0,00329	0,00329	
Specific heating consumption	TJ	5 478	5 490	5 510	5 534	5 534	5 534	5 534	5 534	5 534	5 534	5 534	5 534	
Agricultural waste														
Quantity ($Q_{AF\_biomass}$)	tonnes	22 634	34 024	45 532	68 589	68 589	68 589	68 589	68 589	68 589	68 589	68 589	68 589	62 827
Lower Heating value ($HV_{AF\_biomass}$)	TJ/t	0,012	0,012	0,012	0,012	0,012	0,012	0,012	0,012	0,012	0,012	0,012	0,012	
Heat Input ($HI_{AF\_biomass}$)	TJ/y	273,914	411,754	551,023	830,067	830,067	830,067	830,067	830,067	830,067	830,067	830,067	830,067	
Sorted MSW														
Quantity ($Q_{AF\_sorted\ MSW}$)	tonnes	0	6 239	9 392	15 721	15 721	15 721	15 721	15 721	15 721	15 721	15 721	15 721	14 140
Lower Heating value ($HV_{AF\_sorted\ MSW}$)	TJ/t	0,02	0,02	0,02	0,02	0,02	0,02	0,02	0,02	0,02	0,02	0,02	0,02	
Heat Input ($HI_{AF\_sorted\ MSW}$)	TJ/y	0,000	109,801	165,307	276,689	276,689	276,689	276,689	276,689	276,689	276,689	276,689	276,689	
Heat input from alternatives fuels (HI_{AF})	TJ/year	273,914	521,555	716,330	1106,756	1106,756	1106,756	1106,756	1106,756	1106,756	1106,756	1106,756	1106,756	

Monitoring project heat input from fossil fuel

		2007	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**
Coal													
Quantity (Q_{FF})	tonnes	165 885	156 217	148 965	133 884	133 884	133 884	133 884	133 884	133 884	133 884	133 884	133 884
Lower Heating value (HV_{FF})	TJ/t	0,025	0,025	0,025	0,025	0,025	0,025	0,025	0,025	0,025	0,025	0,025	0,025
Heat Input (HI_{FF_coal})	TJ/y	4088,171	3849,906	3671,202	3299,526	3299,526	3299,526	3299,526	3299,526	3299,526	3299,526	3299,526	3299,526
Heavy oil													
Quantity ($Q_{FF\_heavy\ oil}$)	tonnes	1 240	1 243	1 247	1 253	1 253	1 253	1 253	1 253	1 253	1 253	1 253	1 253
Lower Heating value ($HV_{FF\_heavy\ oil}$)	TJ/t	0,040	0,040	0,040	0,040	0,040	0,040	0,040	0,040	0,040	0,040	0,040	0,040

Heat Input ($HI_{FF\_heavy\ oil}$)	TJ/y	49,260	49,366	49,547	49,759	49,759	49,759	49,759	49,759	49,759	49,759	49,759	49,759
Light oil/Diesel													
Quantity ($Q_{FF\_light\ oil/diesel}$)	tonnes	88	88	88	89	89	89	89	89	89	89	89	89
Lower Heating value ($HV_{FF\_light\ oil/diesel}$)	TJ/t	0,038	0,038	0,038	0,038	0,038	0,038	0,038	0,038	0,038	0,038	0,038	0,038
Heat Input ($HI_{FF\_light/oil\ diesel}$)	TJ/y	3,352	3,359	3,371	3,386	3,386	3,386	3,386	3,386	3,386	3,386	3,386	3,386
Anthracite													
Quantity ($Q_{FF\_used\ oil}$)	tonnes	37 363	37 444	37 581	37 742	37 742	37 742	37 742	37 742	37 742	37 742	37 742	37 742
Lower Heating value ($HV_{FF\_used\ oil}$)	TJ/t	0,027	0,027	0,027	0,027	0,027	0,027	0,027	0,027	0,027	0,027	0,027	0,027
Heat Input $HI_{FF\_used\ oil}$	TJ/y	1020,498	1022,691	1026,451	1030,838	1030,838	1030,838	1030,838	1030,838	1030,838	1030,838	1030,838	1030,838
Industrial waste originating from fossil fuels													
Quantity ($Q_{AF\_industrial\ waste\ originating\ from\ fossil\ fuel}$)	tonnes	2 741	2 747	2 757	2 769	2 769	2 769	2 769	2 769	2 769	2 769	2 769	2 769
Lower Heating value ($HV_{AF\_industrial\ waste\ originating\ from\ fossil\ fuel}$)	TJ/t	0,016	0,016	0,016	0,016	0,016	0,016	0,016	0,016	0,016	0,016	0,016	0,016
Heat Input ($HIAF_{industrial\ waste\ originating\ from\ fossil\ fuel}$)	TJ/y	43,079	43,172	43,330	43,516	43,516	43,516	43,516	43,516	43,516	43,516	43,516	43,516
Heat input from fossil fuel used (HI_{FF})	TJ/y	5 204,360	4 968,493	4 793,902	4 427,024	4 427,024	4 427,024	4 427,024	4 427,024	4 427,024	4 427,024	4 427,024	4 427,024
Monitoring moisture penalty													
Specific fuel consumuption on project case ($HC_{AF,y}$)	TJ/tclinker	0,00326	0,00326	0,00328	0,00329	0,00329	0,00329	0,00329	0,00329	0,00329	0,00329	0,00329	0,00329
Moisture penalty per tonne of clinker (HC_{AF}-HC_{FF})	TJ/tclinker	0,00001	0,00002	0,00003	0,00005	0,00005	0,00005	0,00005	0,00005	0,00005	0,00005	0,00005	0,00005
Moisture penalty (MP_y)	TJ/y	23,278	35,052	55,236	78,784	78,784	78,784	78,784	78,784	78,784	78,784	78,784	78,784

Monitoring GHG emission from the alternative fuels

The industrial waste originating from fossil fuel and waste oil have been integrated in the emission from fossil fuel as they are included in the baseline.
Since the quantity remains the same in the project activity and since the agricultural by-product and the sorted MSW are CO2 neutral emission, alternative fuel is zero

		2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
GHG emissions from alternative fuels	**tCO_2e/y**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**

Monitoring baseline GHG emissions from the fossil fuels displaced

		2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Total heat provided by all alternative fuel (Q_{AF}*HV_{AF})	TJ/y	273,914	521,555	716,330	1106,756	1106,756	1106,756	1106,756	1106,756	1106,756	1106,756	1106,756	1106,756
Total moisture penalty (MP)	TJ/y	23,278	35,052	55,236	78,784	78,784	78,784	78,784	78,784	78,784	78,784	78,784	78,784
Emission factor for fosssil fuel displaced (EE_{FF})	tCO_2/TJ	95,09	95,09	95,09	95,09	95,09	95,09	95,09	95,09	95,09	95,09	95,09	95,09
GHG emissions from fossil fuel displaced by alternatives (FF_{GHG})	**tCO_2/y**	**23 833**	**46 261**	**62 863**	**97 749**	**97 749**	**97 749**	**97 749**	**97 749**	**97 749**	**97 749**	**97 749**	**97 749**

Monitoring GHG emissions due to on site transportation and drying of alternative fuels

Agricultural wastes are handling with a bobcat.
Estimation of electricity consumption is calculated on a provisory facilities in Bulacan.

		2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Quantity (QAF_biomass)	tonne	22 634	34 024	45 532	68 589	68 589	68 589	68 589	68 589	68 589	68 589	68 589	68 589
Capacity of the transportation (bobcat)	tonne	0,15	0,15	0,15	0,15	0,15	0,15	0,15	0,15	0,15	0,15	0,15	0,15
Distance	km	0,05	0,05	0,05	0,05	0,05	0,05	0,05	0,05	0,05	0,05	0,05	0,05
Distance per year transportation	km/y	7 545	11 341	15 177	22 863	22 863	22 863	22 863	22 863	22 863	22 863	22 863	22 863
(Bobcat) fuel consumption	liter/tonne	1,05	1,05	1,05	1,05	1,05	1,05	1,05	1,05	1,05	1,05	1,05	1,05
Transportation fuel used for alternative fuel on site ($OF_{AF\_agricultural\ waste\text{-}rice\ husk}$)	t/y	23,77	35,72	47,81	72,02	72,02	72,02	72,02	72,02	72,02	72,02	72,02	72,02
CO_2 emission factor for transportation fuel (VEF_CO_2)	tCO_2/tonne fuel	3,17	3,17	3,17	3,17	3,17	3,17	3,17	3,17	3,17	3,17	3,17	3,17

CH_4 emission factor for transportation fuel (VEF_CH_4)	kg CH_4/ tonne	0,18	0,18	0,18	0,18	0,18	0,18	0,18	0,18	0,18	0,18	0,18	0,18
N_2O emission factor for transportation fuel (VEF_N_2O)	kg N_2O/ tonne	0,09	0,09	0,09	0,09	0,09	0,09	0,09	0,09	0,09	0,09	0,09	0,09
Global warming potential for CH_4		21	21	21	21	21	21	21	21	21	21	21	21
Global warming potential for N_2O		310	310	310	310	310	310	310	310	310	310	310	310
Fuel used for drying alternative fuels (FD)	t/y	0	0	0	0	0	0	0	0	0	0	0	0
Heating value of the fuel used for drying (FD_HV)	TJ/t fuel	na	na	na	na	na	na	na	na	na	na	na	na
Emission factor of the fuel used for drying (VEF_D)	tCO_2/TJ	na	na	na	na	na	na	na	na	na	na	na	na
GHG emission from on site transportation ($OT_{GHG\_transportation}$)	tCO_2/y	76	114	153	231	231	231	231	231	231	231	231	231
Quantity of all alternative fuels (QAF)	tonne	22 634	40 262	54 924	84 310	84 310	84 310	84 310	84 310	84 310	84 310	84 310	84 310
Electricity used for transportation of alternative fuel	MWh/tonne	0,009	0,009	0,009	0,009	0,009	0,009	0,009	0,009	0,009	0,009	0,009	0,009
Power consumption for on site transportation of alternative fuel (OP_{AF})	MWh	194,919	346,733	472,998	726,067	726,067	726,067	726,067	726,067	726,067	726,067	726,067	726,067
Emission factor of electricity used (EF_P)	tCO_2/MWh	0,531	0,531	0,531	0,531	0,531	0,531	0,531	0,531	0,531	0,531	0,531	0,531
GHG emission from electricity (OT GHG_conveyors)	tCO_2/y	104	184	251	386	386	386	386	386	386	386	386	386
GHG emission from on site transportation (OT_{GHG})	**tCO_2/y**	**180**	**299**	**404**	**616**	**616**	**616**	**616**	**616**	**616**	**616**	**616**	**616**

Monitoring emission saving from reduction of on site transport of fossil fuel

For conservativeness the saving from reduction of on site transportation aren't taking into account.

		2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Emissions from reduction of on site trasnport of fossil fuel ($OT\text{-}GHG_{FF}$)	**tCO_2e**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**

Leakage

Monitoring CH_4 emissions due to biomass residues that would be burned in the absence of the project activity

For conservativeness and in regard to the ecological solid waste management act of 2000, the CH4 emissions due to biomass residues are not taken into account.

		2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Amount of biomass residues that would have been burned in the open field in the absence of the project activity (QAF-B)	t/y	0	0	0	0	0	0	0	0	0	0	0	0
Carbon fraction of the biomass residues (BCF)	tC/t biomass	0,30	0,30	0,30	0,30	0,30	0,30	0,30	0,30	0,30	0,30	0,30	0,30
carbon released as CH4 in open air burning (CH_4F)	fraction	0,005	0,005	0,005	0,005	0,005	0,005	0,005	0,005	0,005	0,005	0,005	0,005
Mass conversion factor for carbon to methane (CH_4/C)	tCH_4/tC	1,33	1,33	1,33	1,33	1,33	1,33	1,33	1,33	1,33	1,33	1,33	1,33
Global warming potential of methane (GWP_CH4)		21	21	21	21	21	21	21	21	21	21	21	21
GHG emissions due to burning of biomass residue that is used as alternative fuel (BB_{CH4})	**tCO_2e/y**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
For conservativeness: GHG emissions due to burning of biomass residue that is used as alternative fuel (BB_{CH4})	**tCO_2e/y**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**

Monitoring CH_4 emissions due to anaerobic decomposition of biomass residues at landfill

A survey shows that 90,8% of the biomass residues would have been lanfilled in an uncontrolled manner in the absence of the project. For conservativeness as it is difficult to insure that the decomposition will be anaerobic, the CH4 are not taken into account.

		2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Amount of biomass residues that would be landfilled ($QAFL_{l\_x}$)	t/y	0	0	0	0	0	0	0	0	0	0	0	0
Model correction factor (φ)		0,9	0,9	0,9	0,9	0,9	0,9	0,9	0,9	0,9	0,9	0,9	0,9
Fraction of methane in the lanfill gas (F)		0,5	0,5	0,5	0,5	0,5	0,5	0,5	0,5	0,5	0,5	0,5	0,5
Per cent of degradable organic carbon in the biomass (DOC_j)		30	30	30	30	30	30	30	30	30	30	30	30
Fraction of DOC dissimilated to landfill gas (DOC_f)		0,77	0,77	0,77	0,77	0,77	0,77	0,77	0,77	0,77	0,77	0,77	0,77
Methane correction factor (MCF)		0,4	0,4	0,4	0,4	0,4	0,4	0,4	0,4	0,4	0,4	0,4	0,4
Decay rate for the biomass resifues stream type j (k_j)		0,023	0,023	0,023	0,023	0,023	0,023	0,023	0,023	0,023	0,023	0,023	0,023
Methane global warming potential (QWP_{CH4})		21	21	21	21	21	21	21	21	21	21	21	21
y-x		9	8	7	6	5	4	3	2	1	0	0	0
Baseline GHG emissions due to anaerobic decomposition of biomass residues in landfills ($LW_{CH4,y}$)		**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**

Monitoring emissions from off site transport of alternative and fossil fuels

For conservativeness the leakage from fossil fuel is not included.

		2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Quantity of alternative fuel ($Q_{AF\_biomass\text{-}rice\ husk}$)	tonnes	22 634	34 024	45 532	68 589	68 589	68 589	68 589	68 589	68 589	68 589	68 589	68 589
Average truck capacity ($CT_{AF\_biomass\text{-}rice\ husk}$)	tonnes/truck	10	10	10	10	10	10	10	10	10	10	10	10

Average round trip distance between the supply site and the plant ($D_{AF\_biomass\text{-}rice\ husk}$)	km/truck	80	80	80	80	80	80	80	80	80	80	80	80
Emission factor of CO_2 in transport	kg CO2/km	1,097	1,097	1,097	1,097	1,097	1,097	1,097	1,097	1,097	1,097	1,097	1,097
Emission factor of CH_4 in transport	kg CH_4/km	0,00006	0,00006	0,00006	0,00006	0,00006	0,00006	0,00006	0,00006	0,00006	0,00006	0,00006	0,00006
Emission factor of N_2O in transport	kg N_2O/km	0,000031	0,000031	0,000031	0,000031	0,000031	0,000031	0,000031	0,000031	0,000031	0,000031	0,000031	0,000031
Emission factor from fuel due to transportation	kg CO_2e/km	1,10787	1,10787	1,10787	1,10787	1,10787	1,10787	1,10787	1,10787	1,10787	1,10787	1,10787	1,10787
Leakage resulting from transport of the agricultural waste ($LK_{AF\_agricultural\ waste\text{-}rice\ husk}$)	tCO_2e/y	201	302	404	608	608	608	608	608	608	608	608	608
Quantity of alternative fuel ($Q_{AF\_sorted\ MSW}$)	tonnes	0	6 239	9 392	15 721	15 721	15 721	15 721	15 721	15 721	15 721	15 721	15 721
Average truck capacity ($CT_{AF\_sorted\ MSW}$)	tonnes/truck	5	5	5	5	5	5	5	5	5	5	5	5
Average round trip distance between the supply site and the plant ($D_{AF\_sorted\ MSW}$)	km/truck (max)	80	80	80	80	80	80	80	80	80	80	80	80
Leakage resulting from transport of the sorted MSW ($LK_{AF\_sorted\ MSW}$)	tCO_2e/y	0,00	110,59	166,49	278,67	278,67	278,67	278,67	278,67	278,67	278,67	278,67	278,67
Leakage resulting from transport of the all alternative fuels (LK_{AF})	tCO_2e/y	201	412	570	887	887	887	887	887	887	887	887	887
Quantity of fossil fuel which is reduced due to the consumption of alternative fuel (RQ_{FF})	tonnes	11 115	21 163	29 066	44 909	44 909	44 909	44 909	44 909	44 909	44 909	44 909	44 909
Average truck capacity (CT_{FF_truck})	tonnes/truck	29	29	29	29	29	29	29	29	29	29	29	29

Average round trip distance between the port and the plant (D_{FF_truck})	km/truck	120	120	120	120	120	120	120	120	120	120	120	120
Average ship capacity (CT_{FF_ship})	tonnes/ship	8000	8000	8000	8000	8000	8000	8000	8000	8000	8000	8000	8000
Average round trip distance between supply port and local port (D_{FF_ship})	nautical miles	1 000	1 000	1 000	1 000	1 000	1 000	1 000	1 000	1 000	1 000	1 000	1 000
Heating value of the fuel ship (HV_{ship})	GJ/t	42	42	42	42	42	42	42	42	42	42	42	42
Emission factor of the fuel ship ($EE_{fuel\ ship}$)	$kgCO_2/GJ$	77,40	77,40	77,40	77,40	77,40	77,40	77,40	77,40	77,40	77,40	77,40	77,40
Ship consumption	t fuel/nautical mile	0,07	0,07	0,07	0,07	0,07	0,07	0,07	0,07	0,07	0,07	0,07	0,07
Leakage due to reduced transport of fossil fuel (LK_{FF_truck})	tCO_2e/y	51	97	133	206	206	206	206	206	206	206	206	206
Leakage due to reduced transport of fossil fuel (LK_{FF_ship})	tCO_2e/y	324	617	848	1 310	1 310	1 310	1 310	1 310	1 310	1 310	1 310	1 310
Leakage due to reduced transport of fossil fuel (LK_{FF})	tCO_2e/y	375	714	981	1 516	1 516	1 516	1 516	1 516	1 516	1 516	1 516	1 516
Leakage from transport of alternative fuels less leakage due to reduced transport of fossil fuel (LK_{trans})	**tCO_2e/y**	**-175**	**-302**	**-411**	**-629**	**-629**	**-629**	**-629**	**-629**	**-629**	**-629**	**-629**	**-629**
For conservativeness: Leakage from transport (LK_{trans})	**tCO_2e/y**	**201**	**412**	**570**	**887**	**887**	**887**	**887**	**887**	**887**	**887**	**887**	**887**

Monitoring emissions from off site preparation (drying, etc) of alternative and fossil fuels

The alternative fuels used are not dried or prepared

		2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Quantity of alternative fuels prepared ($QAF_{\_prepared\ off\ site}$)	tonne	0	0	0	0	0	0	0	0	0	0	0	0

Electricity used for preparation of alternative fuel	MWh/tonne	0	0	0	0	0	0	0	0	0	0	0	0
Power consumption in preparing alternative fuel (PD_{AFO})	MWh/y	0	0	0	0	0	0	0	0	0	0	0	0
Emission factor of electricity used (EFpO)	tCO_2/MWh	0,531	0,531	0,531	0,531	0,531	0,531	0,531	0,531	0,531	0,531	0,531	0,531
GHG emission that could be generated during preparation of alternative fuels (GHG_{PAFO})	**tCO_2/y**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**

Emission Reductions

		2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	Total	Average
GHG emission from fossil fuels displaced by the alternative fuels (FF_{GHG})	tCO_2/y	23 833	46 261	62 863	97 749	97 749	97 749	97 749	97 749	97 749	97 749	97 749	97 749		
GHG emission from alternative fuels (AF_{GHG})	tCO_2e/y	0	0	0	0	0	0	0	0	0	0	0	0		
GHG emission from on site transport (and drying) of alternative fuels (OT_{GHG})	tCO2e/y	180	299	404	616	616	616	616	616	616	616	616	616		
Leakage from transport (LKtrans) (conservative)	tCO_2e/y	201	412	570	887	887	887	887	887	887	887	887	887		
Emissions from reduction of on site trasnport of fossil fuel (OT-GHG_{FF}) (conservative)	tCO_2e/y	0	0	0	0	0	0	0	0	0	0	0	0		
GHG emissions due to burning of biomass residue that is used as alternative fuel (BB_{CH4}) (conservative)	tCO_2e/y	0	0	0	0	0	0	0	0	0	0	0	0		

Baseline GHG emissions due to anaerobic decomposition of biomass residues in landfills ($LW_{CH4,y}$)	tCO_2e/y	0	0	0	0	0	0	0	0	0	0	0	0		
GHG emission that could be generated during preparation of alternative fuels (GHG_{PAFO})	tCO_2/y	0	0	0	0	0	0	0	0	0	0	0	0		
Total emission reductions (AF_{ER})	**tCO_2e/y**	**23 452**	**45 550**	**61 888**	**96 246**	**96 246**	**96 246**	**96 246**	**96 246**	**96 246**	**96 246**	**96 246**	**96 246**	**877 407**	**87 741**
		2007	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**		

	Emission reductions
June 08-May 09	52 358
June 09-May 10	76 204
June 10-May 11	96 246
June 11-May 12	96 246
June 12-May 13	96 246
June 13-May 14	96 246
June 14-May 15	96 246
June 15-May 16	96 246
June 16-May 17	96 246
June 17-May 18	96 246
June 08-May 18	898 530

Lugait (LG))

Baseline and project emissions calculations

Baseline

The baseline is based on the average 2002,2003 and 2004 data prior the tests and trials and therefore prior to the starting date of the project activity.

Clinker Production 2002-2004	(t)	4 956 307
Clinker production average 2002-2004	(t)	1 652 102

Fuel	Unit	Bituminous coal	Anthracite	Petcoke	Heavy oil	Used / waste oils	Industrial waste originating from fossil source	Total	
Emission factor (EE_{FFi})	tCO_2/TJ	94,60	98,3	97,5	73,3	73,3	143,00		
Lower heating value (HV_{FFi})	TJ/t	0,026	0,027	0,034	0,038	0,035			
Quantity of fossil fuel used (Q_{FF_BAI})	tonnes	201 438	3 407	0	2 232	82			
Specific emissions	tCO_2	504 476	9 146	0	6 183	212	.	520 017	
Specific heating consumption	TJ	5 333	93	0	84	3		5 513	5 513
Percentage heat consumption	%	96,7	1,7	0,0	1,5	0,1		100,0	
Weight average emission factor (EE_{FF}) (excluding industrial waste)	tCO_2/TJ							94,33	
Specific fuel consumption in the baseline (HC_{FF})	TJ/tclinker							0,003337	

Percentage of heat consumption for the clinker production in the project activity

Year	Bituminous coal	Anthracite	Petcoke	Heavy oil	Used / waste oils	Industrial waste originating from fossil source	Agricultural waste/rice husk (AF-biomass)	sorted MSW (AF-non biomass)	Total
2007	94,7	1,7	0,0	1,6	0,1	0,0	2,0	0,0	100,0
2008*	89,7	1,7	0,0	1,6	0,1	0,0	5,0	2,0	100,0
2009	83,7	1,7	0,0	1,5	0,1	0,0	10,0	3,0	100,0
2010	78,7	1,7	0,0	1,5	0,1	0,0	15,0	3,0	100,0
2011	78,7	1,7	0,0	1,5	0,1	0,0	15,0	3,0	100,0
2012	78,7	1,7	0,0	1,5	0,1	0,0	15,0	3,0	100,0
2013	78,7	1,7	0,0	1,5	0,1	0,0	15,0	3,0	100,0
2014	78,7	1,7	0,0	1,5	0,1	0,0	15,0	3,0	100,0
2015	78,7	1,7	0,0	1,5	0,1	0,0	15,0	3,0	100,0
2016	78,7	1,7	0,0	1,5	0,1	0,0	15,0	3,0	100,0
2017	78,7	1,7	0,0	1,5	0,1	0,0	15,0	3,0	100,0

2018	78,7	1,7	0,0	1,5	0,1	0,0	15,0	3,0	100,0

* starting date of the crediting period

Monitoring project heat input from alternative fuel (agricultural waste-rice husk and sorted MSW)

Since waste fuel and industrial waste originating from fossil fuel are not part of the project activity and are calculated with the fossil fuel in the baseline, the heat input is calculated with the fossil fuel.

		2007	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	
clinker production	tonnes	1 343 303	1 343 303	1 343 303	1 343 303	1 343 303	1 343 303	1 343 303	1 343 303	1 343 303	1 343 303	1 343 303	1 343 303	
Global specific heat consumption (see modelisation regarding moisture)	TJ/tclinker	0,00334	0,00335	0,00337	0,00339	0,00339	0,00339	0,00339	0,00339	0,00339	0,00339	0,00339	0,00339	
Specific heating consumption	TJ	4 493	4 506	4 529	4 554	4 554	4 554	4 554	4 554	4 554	4 554	4 554	4 554	
Agricultural waste														
Quantity ($Q_{AF\_biomass}$)	tonnes	7 425	18 617	37 424	56 449	56 449	56 449	56 449	56 449	56 449	56 449	56 449	56 449	50 763
Lower Heating value ($HV_{AF\_biomass}$)	TJ/t	0,012	0,012	0,012	0,012	0,012	0,012	0,012	0,012	0,012	0,012	0,012	0,012	
Heat Input ($HI_{AF\_biomass}$)	TJ/y	89,863	225,304	452,905	683,148	683,148	683,148	683,148	683,148	683,148	683,148	683,148	683,148	
Sorted MSW														
Quantity ($Q_{AF\_sorted\ MSW}$)	tonnes	0	5 121	7 720	7 763	7 763	7 763	7 763	7 763	7 763	7 763	7 763	7 763	7 494
Lower Heating value ($HV_{AF\_sorted\ MSW}$)	TJ/t	0,02	0,02	0,02	0,02	0,02	0,02	0,02	0,02	0,02	0,02	0,02	0,02	
Heat Input ($HI_{AF\_sorted\ MSW}$)	TJ/y	0,000	90,122	135,872	136,630	136,630	136,630	136,630	136,630	136,630	136,630	136,630	136,630	
Heat input from alternatives fuels ($HI\ A_F$)	TJ/year	89,863	315,426	588,777	819,778	819,778	819,778	819,778	819,778	819,778	819,778	819,778	819,778	

Monitoring project heat input from fossil fuel

		2007	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**
Coal													
Quantity (Q_{FF})	tonnes	160 678	152 664	143 211	135 443	135 443	135 443	135 443	135 443	135 443	135 443	135 443	135 443
Lower Heating value (HV_{FF})	TJ/t	0,026	0,026	0,026	0,026	0,026	0,026	0,026	0,026	0,026	0,026	0,026	0,026
Heat Input ($HI_{FF\_coal)}$	TJ/y	4 253,674	4 041,503	3 791,270	3 585,617	3 585,617	3 585,617	3 585,617	3 585,617	3 585,617	3 585,617	3 585,617	3 585,617
Anthracite													
Quantity ($Q_{FF\_anthracite}$)	tonnes	2 830	2 821	2 819	2 818	2 818	2 818	2 818	2 818	2 818	2 818	2 818	2 818
Lower Heating value ($HV_{FF\_anthracite}$)	TJ/t	0,027	0,027	0,027	0,027	0,027	0,027	0,027	0,027	0,027	0,027	0,027	0,027

Heat Input ($HI_{FF\_anthracite}$)	TJ/y	77,282	77,054	76,994	76,968	76,968	76,968	76,968	76,968	76,968	76,968	76,968	76,968
Petcoke													
Quantity ($Q_{FF\_petcoke}$)	tonnes	0	0	0	0	0	0	0	0	0	0	0	0
Lower Heating value ($HV_{FF\_petcoke}$)	TJ/t	0,034	0,034	0,034	0,034	0,034	0,034	0,034	0,034	0,034	0,034	0,034	0,034
Heat Input ($HI_{FF\_petcoke}$)	TJ/y	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000
Heavy oil													
Quantity ($Q_{FF\_heavy\ oil}$)	tonnes	1 855	1 848	1 845	1 844	1 844	1 844	1 844	1 844	1 844	1 844	1 844	1 844
Lower Heating value ($HV_{FF\_heavy\ oil}$)	TJ/t	0,038	0,038	0,038	0,038	0,038	0,038	0,038	0,038	0,038	0,038	0,038	0,038
Heat Input ($HI_{FF\_heavy\ oil}$)	TJ/y	70,093	69,844	69,747	69,681	69,681	69,681	69,681	69,681	69,681	69,681	69,681	69,681
Used oil													
Quantity ($Q_{FF\_used\ oil}$)	tonnes	64	64	65	65	65	65	65	65	65	65	65	65
Lower Heating value ($HV_{FF\_used\ oil}$)	TJ/t	0,035	0,035	0,035	0,035	0,035	0,035	0,035	0,035	0,035	0,035	0,035	0,035
Heat Input $HI_{FF\_used\ oil}$	TJ/y	2,247	2,253	2,265	2,277	2,277	2,277	2,277	2,277	2,277	2,277	2,277	2,277
Industrial waste originating from fossil fuels													
Quantity ($Q_{AF\_industrial\ waste\ originating\ from\ fossil\ fuel}$)	tonnes	0	0	0	0	0	0	0	0	0	0	0	0
Lower Heating value ($HV_{AF\_industrial\ waste\ originating\ from\ fossil\ fuel}$)	TJ/t	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000
Heat Input ($HIAF_{\_industrial\ waste\ originating\ from\ fossil\ fuel}$)	TJ/y	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000
Heat input from fossil fuel used (HI_{FF})	TJ/y	4 403,296	4 190,654	3 940,275	3 734,543	3 734,543	3 734,543	3 734,543	3 734,543	3 734,543	3 734,543	3 734,543	3 734,543
Monitoring moisture penalty													
Specific fuel consumuption on project case ($HC_{AF,y}$)	TJ/tclinker	0,00334	0,00335	0,00337	0,00339	0,00339	0,00339	0,00339	0,00339	0,00339	0,00339	0,00339	0,00339
Moisture penalty per tonne of clinker (HC_{AF}-HC_{FF})	TJ/tclinker	0,00001	0,00002	0,00003	0,00005	0,00005	0,00005	0,00005	0,00005	0,00005	0,00005	0,00005	0,00005

Moisture penalty (MP_y)	TJ/y	10,599	23,520	46,492	71,761	71,761	71,761	71,761	71,761	71,761	71,761	71,761	71,761

Monitoring GHG emission from the alternative fuels

The industrial waste originating from fossil fuel and waste oil have been integrated in the emission from fossil fuel as they are included in the baseline.
Since the quantity remains the same in the project activity and since the agricultural by-product and the sorted MSW are CO2 neutral emission, alternative fuel is zero

		2007	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**
GHG emissions from alternative fuels	**tCO_2e/y**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**

Monitoring baseline GHG emissions from the fossil fuels displaced

		2007	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**
Total heat provided by all alternative fuel (Q_{AF}*HV_{AF})	TJ/y	89,863	315,426	588,777	819,778	819,778	819,778	819,778	819,778	819,778	819,778	819,778	819,778
Total moisture penalty (MP)	TJ/y	10,599	23,520	46,492	71,761	71,761	71,761	71,761	71,761	71,761	71,761	71,761	71,761
Emission factor for fosssil fuel displaced (EE_{FF})	tCO_2/TJ	94,33	94,33	94,33	94,33	94,33	94,33	94,33	94,33	94,33	94,33	94,33	94,33
GHG emissions from fossil fuel displaced by alternatives (FF_{GHG})	**tCO_2/y**	**7 477**	**27 534**	**51 151**	**70 557**	**70 557**	**70 557**	**70 557**	**70 557**	**70 557**	**70 557**	**70 557**	**70 557**

Monitoring GHG emissions due to on site transportation and drying of alternative fuels

Agricultural wastes are handling with a bobcat.

		2007	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**
Quantity (QAF_biomass)	tonne	7 425	18 617	37 424	56 449	56 449	56 449	56 449	56 449	56 449	56 449	56 449	56 449
Capacity of the transportation (bobcat)	tonne	0,15	0,15	0,15	0,15	0,15	0,15	0,15	0,15	0,15	0,15	0,15	0,15
Distance	km	0,05	0,05	0,05	0,05	0,05	0,05	0,05	0,05	0,05	0,05	0,05	0,05
Distance per year transportation	km/y	2 475	6 206	12 475	18 816	18 816	18 816	18 816	18 816	18 816	18 816	18 816	18 816
(Bobcat) fuel consumption	liter/tonne	1,05	1,05	1,05	1,05	1,05	1,05	1,05	1,05	1,05	1,05	1,05	1,05

Transportation fuel used for alternative fuel on site ($OF_{AF\_agricultural\ waste\text{-}rice\ husk}$)	t/y	7,80	19,55	39,30	59,27	59,27	59,27	59,27	59,27	59,27	59,27	59,27	59,27
CO_2 emission factor for transportation fuel (VEF_CO_2)	tCO_2/tonne fuel	3,17	3,17	3,17	3,17	3,17	3,17	3,17	3,17	3,17	3,17	3,17	3,17
CH_4 emission factor for transportation fuel (VEF_CH_4)	kg CH_4/ tonne	0,18	0,18	0,18	0,18	0,18	0,18	0,18	0,18	0,18	0,18	0,18	0,18
N_2O emission factor for transportation fuel (VEF_N_2O)	kg N_2O/ tonne	0,09	0,09	0,09	0,09	0,09	0,09	0,09	0,09	0,09	0,09	0,09	0,09
Global warming potential for CH_4		21	21	21	21	21	21	21	21	21	21	21	21
Global warming potential for N_2O		310	310	310	310	310	310	310	310	310	310	310	310
Fuel used for drying alternative fuels (FD)	t/y	0	0	0	0	0	0	0	0	0	0	0	0
Heating value of the fuel used for drying (FD_HV)	TJ/t fuel	na	na	na	na	na	na	na	na	na	na	na	na
Emission factor of the fuel used for drying (VEF_D)	tCO_2/TJ	na	na	na	na	na	na	na	na	na	na	na	na
GHG emission from on site transportation ($OT_{GHG\_transportation}$)	tCO_2/y	25	63	126	190	190	190	190	190	190	190	190	190
Quantity of all alternative fuels (QAF)	tonne	7 425	23 738	45 144	64 212	64 212	64 212	64 212	64 212	64 212	64 212	64 212	64 212
Electricity used for transportation of alternative fuel	MWh/tonne	0,009	0,009	0,009	0,009	0,009	0,009	0,009	0,009	0,009	0,009	0,009	0,009
Power consumption for on site transportation of alternative fuel (OP_{AF})	MWh	63,947	204,425	388,773	552,986	552,986	552,986	552,986	552,986	552,986	552,986	552,986	552,986
Emission factor of electricity used (EF_P)	tCO_2/MWh	0,453	0,453	0,453	0,453	0,453	0,453	0,453	0,453	0,453	0,453	0,453	0,453

GHG emission from electricity (OT GHG_conveyors)	tCO_2/y	29	93	176	251	251	251	251	251	251	251	251	251
GHG emission from on site transportation (OT_{GHG})	**tCO_2/y**	**54**	**155**	**302**	**440**	**440**	**440**	**440**	**440**	**440**	**440**	**440**	**440**

Monitoring emission saving from reduction of on site transport of fossil fuel

For conservativeness the saving from reduction of on site transportation aren't taking into account.

		2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Emissions from reduction of on site trasnport of fossil fuel ($OT\text{-}GHG_{FF}$)	**tCO_2e**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**

Leakage

Monitoring CH_4 emissions due to biomass residues that would be burned in the absence of the project activity

For conservativeness and in regard to the ecological solid waste management act of 2000, the CH4 emissions due to biomass residues are not taken into account.

		2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Amount of biomass residues that would have been burned in the open field in the absence of the project activity (QAF-B)	t/y	0	0	0	0	0	0	0	0	0	0	0	0
Carbon fraction of the biomass residues (BCF)	tC/t biomass	0,30	0,30	0,30	0,30	0,30	0,30	0,30	0,30	0,30	0,30	0,30	0,30
carbon released as CH4 in open air burning (CH_4F)	fraction	0,005	0,005	0,005	0,005	0,005	0,005	0,005	0,005	0,005	0,005	0,005	0,005
Mass conversion factor for carbon to methane (CH_4/C)	tCH_4/tC	1,33	1,33	1,33	1,33	1,33	1,33	1,33	1,33	1,33	1,33	1,33	1,33
Global warming potential of methane (GWP_CH4)		21	21	21	21	21	21	21	21	21	21	21	21
GHG emissions due to burning of biomass residue that is used as alternative fuel (BB_{CH4})	**tCO_2e/y**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**

For conservativeness: GHG emissions due to burning of biomass residue that is used as alternative fuel (BB_{CH4})	**tCO_2e/y**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**

Monitoring CH_4 emissions due to anaerobic decomposition of biomass residues at landfill

A survey shows that 90,8% of the biomass residues would have been lanfilled in an uncontrolled manner in the absence of the project. For conservativeness as it is difficult to insure that the decomposition will be anaerobic, the CH4 are not taken into account.

		2007	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**
Amount of biomass residues that would be landfilled ($QAFL_{L\_x}$)	t/y	0	0	0	0	0	0	0	0	0	0	0	0
Model correction factor (φ)		0,9	0,9	0,9	0,9	0,9	0,9	0,9	0,9	0,9	0,9	0,9	0,9
Fraction of methane in the lanfill gas (F)		0,5	0,5	0,5	0,5	0,5	0,5	0,5	0,5	0,5	0,5	0,5	0,5
Per cent of degradable organic carbon in the biomass (DOC_j)		30	30	30	30	30	30	30	30	30	30	30	30
Fraction of DOC dissimilated to landfill gas (DOC_f)		0,77	0,77	0,77	0,77	0,77	0,77	0,77	0,77	0,77	0,77	0,77	0,77
Methane correction factor (MCF)		0,4	0,4	0,4	0,4	0,4	0,4	0,4	0,4	0,4	0,4	0,4	0,4
Decay rate for the biomass resifues stream type j (k_j)		0,023	0,023	0,023	0,023	0,023	0,023	0,023	0,023	0,023	0,023	0,023	0,023
Methane global warming potential (QWP_{CH4})		21	21	21	21	21	21	21	21	21	21	21	21
y-x		9	8	7	6	5	4	3	2	1	0	0	0
Baseline GHG emissions due to anaerobic decomposition of biomass residues in landfills ($LW_{CH4,y}$)		**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**

Monitoring emissions from off site transport of alternative and fossil fuels

For conservativeness the leakage from fossil fuel is not included.

		2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Quantity of alternative fuel ($Q_{AF\_biomass\text{-}rice\ husk}$)	tonnes	7 425	18 617	37 424	56 449	56 449	56 449	56 449	56 449	56 449	56 449	56 449	56 449
Average truck capacity ($CT_{AF\_biomass\text{-}rice\ husk}$)	tonnes/truck	10	10	10	10	10	10	10	10	10	10	10	10
Average round trip distance between the supply site and the plant ($D_{AF\_biomass\text{-}rice\ husk}$)	km/truck	318	318	318	318	318	318	318	318	318	318	318	318
Emission factor of CO_2 in transport	kg CO2/km	1,097	1,097	1,097	1,097	1,097	1,097	1,097	1,097	1,097	1,097	1,097	1,097
Emission factor of CH_4 in transport	kg CH_4/km	0,00006	0,00006	0,00006	0,00006	0,00006	0,00006	0,00006	0,00006	0,00006	0,00006	0,00006	0,00006
Emission factor of N_2O in transport	kg N_2O/km	0,000031	0,000031	0,000031	0,000031	0,000031	0,000031	0,000031	0,000031	0,000031	0,000031	0,000031	0,000031
Emission factor from fuel due to transportation	kg CO_2e/km	1,10787	1,10787	1,10787	1,10787	1,10787	1,10787	1,10787	1,10787	1,10787	1,10787	1,10787	1,10787
Leakage resulting from transport of the agricultural waste ($LK_{AF\_biomass\text{-}rice\ husk}$)	tCO_2e/y	262	656	1 318	1 989	1 989	1 989	1 989	1 989	1 989	1 989	1 989	1 989
Quantity of alternative fuel ($Q_{AF\_sorted\ MSW}$)	tonnes	0	5 121	7 720	7 763	7 763	7 763	7 763	7 763	7 763	7 763	7 763	7 763
Average truck capacity ($CT_{AF\_sorted\ MSW}$)	tonnes/truck	5	5	5	5	5	5	5	5	5	5	5	5
Average round trip distance between the supply site and the plant ($D_{AF\_sorted\ MSW}$)	km/truck (max)	160	160	160	160	160	160	160	160	160	160	160	160
Leakage resulting from transport of the sorted MSW ($LK_{AF\_sorted\ MSW}$)	tCO_2e/y	0,00	181,53	273,69	275,21	275,21	275,21	275,21	275,21	275,21	275,21	275,21	275,21
Leakage resulting from transport of the all alternative fuels (LK_{AF})	tCO_2e/y	262	837	1 592	2 264	2 264	2 264	2 264	2 264	2 264	2 264	2 264	2 264

Quantity of fossil fuel which is reduced due to the consumption of alternative fuel (RQ_{FF})	tonnes	3 394	11 915	22 240	30 966	30 966	30 966	30 966	30 966	30 966	30 966	30 966	30 966
Average truck capacity (CT_{FF_truck})	tonnes/truck	29	29	29	29	29	29	29	29	29	29	29	29
Average round trip distance between the port and the plant (D_{FF_truck})	km/truck	0	0	0	0	0	0	0	0	0	0	0	0
Average ship capacity (CT_{FF_ship})	tonnes/ship	8 000	8 000	8 000	8 000	8 000	8 000	8 000	8 000	8 000	8 000	8 000	8 000
Average round trip distance between supply port and local port (D_{FF_ship})	nautical miles	790	790	790	790	790	790	790	790	790	790	790	790
Heating value of the fuel ship (HV_{ship})	GJ/t	42	42	42	42	42	42	42	42	42	42	42	42
Emission factor of the fuel ship ($EE_{fuel\ ship}$)	$kgCO_2/GJ$	77,40	77,40	77,40	77,40	77,40	77,40	77,40	77,40	77,40	77,40	77,40	77,40
Ship consumption	t fuel/nautical mile	0,07	0,07	0,07	0,07	0,07	0,07	0,07	0,07	0,07	0,07	0,07	0,07
Leakage due to reduced transport of fossil fuel (LK_{FF_truck})	tCO_2e/y	0	0	0	0	0	0	0	0	0	0	0	0
Leakage due to reduced transport of fossil fuel (LK_{FF_ship})	tCO_2e/y	76	267	498	694	694	694	694	694	694	694	694	694
Leakage due to reduced transport of fossil fuel (LK_{FF})	tCO_2e/y	76	267	498	694	694	694	694	694	694	694	694	694
Leakage from transport of alternative fuels less leakage due to reduced transport of fossil fuel (LK_{trans})	**tCO_2e/y**	**186**	**571**	**1 094**	**1 570**	**1 570**	**1 570**	**1 570**	**1 570**	**1 570**	**1 570**	**1 570**	**1 570**
For conservativeness: Leakage from transport (LK_{trans})	**tCO_2e/y**	**262**	**837**	**1 592**	**2 264**	**2 264**	**2 264**	**2 264**	**2 264**	**2 264**	**2 264**	**2 264**	**2 264**

Monitoring emissions from off site preparation (drying, etc) of alternative and fossil fuels

The alternative fuels used are not dried.

Since 1 supplier (Lugait's region) is grinding the rice husk, the related electricity consumption is calculated.

		2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Quantity of alternative fuels prepared ($QAF_{\_prepared\ off\ site}$)	tonne	800	800	800	800	800	800	800	800	800	800	800	800
Electricity used for preparation of alternative fuel	MWh/tonne	0,00025	0,00025	0,00025	0,00025	0,00025	0,00025	0,00025	0,00025	0,00025	0,00025	0,00025	0,00025
Power consumption in preparing alternative fuel (PD_{AFO})	MWh/y	0,2	0,2	0,2	0,2	0,2	0,2	0,2	0,2	0,2	0,2	0,2	0,2
Emission factor of electricity used (EFpO)	tCO_2/MWh	0,453	0,453	0,453	0,453	0,453	0,453	0,453	0,453	0,453	0,453	0,453	0,453
GHG emission that could be generated during preparation of alternative fuels (GHG_{PAFO})	**tCO_2/y**	**0,0906**	**0,0906**	**0,0906**	**0,0906**	**0,0906**	**0,0906**	**0,0906**	**0,0906**	**0,0906**	**0,0906**	**0,0906**	**0,0906**

Emission Reductions

		2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	Total	Average
GHG emission from fossil fuels displaced by the alternative fuels (FF_{GHG})	tCO_2/y	7 477	27 534	51 151	70 557	70 557	70 557	70 557	70 557	70 557	70 557	70 557	70 557		
GHG emission from alternative fuels (AF_{GHG})	tCO_2e/y	0	0	0	0	0	0	0	0	0	0	0	0		
GHG emission from on site transport (and drying) of alternative fuels (OT_{GHG})	tCO2e/y	54	155	302	440	440	440	440	440	440	440	440	440		
Leakage from transport (LKtrans) (conservative)	tCO_2e/y	262	837	1 592	2 264	2 264	2 264	2 264	2 264	2 264	2 264	2 264	2 264		
Emissions from reduction of on site transport of fossil fuel (OT-GHG_{FF}) (conservative)	tCO_2e/y	0	0	0	0	0	0	0	0	0	0	0	0		

GHG emissions due to burning of biomass residue that is used as alternative fuel (BB_{CH4}) (conservative)	tCO_2e/y	0	0	0	0	0	0	0	0	0	0	0	0		
Baseline GHG emissions due to anaerobic decomposition of biomass residues in landfills ($LW_{CH4,y}$)	tCO_2e/y	0	0	0	0	0	0	0	0	0	0	0	0		
GHG emission that could be generated during preparation of alternative fuels (GHG_{PAFO})	tCO_2/y	0,0906	0,0906	0,0906	0,0906	0,0906	0,0906	0,0906	0,0906	0,0906	0,0906	0,0906	0,0906		
Total emission reductions (AF_{ER})	**tCO_2e/y**	**7 161**	**26 541**	**49 257**	**67 853**	**67 853**	**67 853**	**67 853**	**67 853**	**67 853**	**67 853**	**67 853**	**67 853**	**618 619**	**61 862**

	Emission reductions
June 08-May 09	36 006
June 09-May 10	57 005
June 10-May 11	67 853
June 11-May 12	67 853
June 12-May 13	67 853
June 13-May 14	67 853
June 14-May 15	67 853
June 15-May 16	67 853
June 16-May 17	67 853
June 17-May 18	67 853
June 08-May 18	635 832

Davao (DV)

Baseline and project emissions calculations

Baseline

The baseline is based on the average 2002,2003 and 2004 data prior the tests and trials and therefore prior to the starting date of the project activity.

Clinker Production 2002-2004	(t)	3 123 660
Clinker production average 2002-2004	(t)	1 041 220

Fuel	Unit	Bituminous coal	Anthracite	Petcoke	Heavy oil	Light oil	Used / waste oils	Industrial waste originating from fossil source	Total	
Emission factor (EE_{FFi})	tCO_2/TJ	94,60	98,3	97,5	73,3	74,1	73,3	143,00		
Lower heating value (HV_{FFi})	TJ/t	0,024	0,027	0,033	0,039	0,038	0,035	0,016		
Quantity of fossil fuel used (Q_{FF_BAI})	tonnes	117 617	20 080	0	480					
Specific emissions	tCO_2	272 094	53 985	0	1 360				327 439	
Specific heating consumption	TJ	2 876	549	0	19				3 444	3 444
Percentage heat consumption	%	88,5	11,0	0,0	0,5				100	
Weight average emission factor (EE_{FF}) (excluding industrial waste)	tCO_2/TJ								95,08	
Specific fuel consumption in the baseline (HC_{FF})	TJ/tclinker								0,00331	

Percentage of heat consumption for the clinker production in the project activity

Year	Bituminous coal	Anthracite	Light oil/Diesel	Heavy oil	Used / waste oils	Industrial waste originating from fossil source	Agricultural waste/rice husk (AF-biomass)	sorted MSW (AF-non biomass)	Total
2007	86,2	11,0	0,1	0,5	0,0	0,2	2,0	0,0	100,0
2008*	81,2	11,0	0,1	0,5	0,0	0,2	5,0	2,0	100,0
2009	75,2	11,0	0,1	0,5	0,0	0,2	10,0	3,0	100,0
2010	70,2	11,0	0,1	0,5	0,0	0,2	15,0	3,0	100,0
2011	70,2	11,0	0,1	0,5	0,0	0,2	15,0	3,0	100,0
2012	70,2	11,0	0,1	0,5	0,0	0,2	15,0	3,0	100,0
2013	70,2	11,0	0,1	0,5	0,0	0,2	15,0	3,0	100,0
2014	70,2	11,0	0,1	0,5	0,0	0,2	15,0	3,0	100,0
2015	70,2	11,0	0,1	0,5	0,0	0,2	15,0	3,0	100,0
2016	70,2	11,0	0,1	0,5	0,0	0,2	15,0	3,0	100,0
2017	70,2	11,0	0,1	0,5	0,0	0,2	15,0	3,0	100,0
2018	70,2	11,0	0,1	0,5	0,0	0,2	15,0	3,0	100,0

* starting date of the crediting period

Monitoring project heat input from alternative fuel (agricultural waste-rice husk and sorted MSW)

Since waste fuel and industrial waste originating from fossil fuel are not part of the project activity and are calculated with the fossil fuel in the baseline, the heat input is calculated with the fossil fuel.

		2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	
clinker production	tonnes	1 119 000	1 119 000	1 119 000	1 119 000	1 119 000	1 119 000	1 119 000	1 119 000	1 119 000	1 119 000	1 119 000	1 119 000	
Global specific heat consumption (see modelisation regarding moisture)	TJ/tclinker	0,00332	0,00333	0,00334	0,00336	0,00336	0,00336	0,00336	0,00336	0,00336	0,00336	0,00336	0,00336	
Specific heating consumption	TJ	3 711	3 721	3 740	3 760	3 760	3 760	3 760	3 760	3 760	3 760	3 760	3 760	
Agricultural waste														
Quantity ($Q_{AF\_biomass}$)	tonnes	6 133	15 373	30 907	46 598	46 598	46 598	46 598	46 598	46 598	46 598	46 598	46 598	41 906
Lower Heating value ($HV_{AF\_biomass}$)	TJ/t	0,012	0,012	0,012	0,012	0,012	0,012	0,012	0,012	0,012	0,012	0,012	0,012	
Heat Input ($HI_{AF\_biomass}$)	TJ/y	74,221	186,042	374,031	563,927	563,927	563,927	563,927	563,927	563,927	563,927	563,927	563,927	
Sorted MSW														
Quantity ($Q_{AF\_sorted\ MSW}$)	tonnes	0	4 228	6 376	6 408	6 408	6 408	6 408	6 408	6 408	6 408	6 408	6 408	6 187
Lower Heating value ($HV_{AF\_sorted\ MSW}$)	TJ/t	0,02	0,02	0,02	0,02	0,02	0,02	0,02	0,02	0,02	0,02	0,02	0,02	
Heat Input ($HI_{AF\_sorted\ MSW}$)	TJ/y	0,000	74,417	112,209	112,785	112,785	112,785	112,785	112,785	112,785	112,785	112,785	112,785	
Heat input from alternatives fuels ($HI\ A_F$)	TJ/year	74,221	260,459	486,240	676,712	676,712	676,712	676,712	676,712	676,712	676,712	676,712	676,712	

Monitoring project heat input from fossil fuel

		2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Coal													
Quantity ($Q_{FF\ coal}$)	tonnes	130 815	123 551	115 021	107 925	107 925	107 925	107 925	107 925	107 925	107 925	107 925	107 925
Lower Heating value (HV_{FF_coal})	TJ/t	0,024	0,024	0,024	0,024	0,024	0,024	0,024	0,024	0,024	0,024	0,024	0,024
Heat Input ($HI_{FF\_coal)}$	TJ/y	3198,999	3021,379	2812,772	2639,237	2639,237	2639,237	2639,237	2639,237	2639,237	2639,237	2639,237	2639,237
Anthracite													
Quantity ($Q_{FF\ anthracite}$)	tonnes	14 866	14 905	14 983	15 060	15 060	15 060	15 060	15 060	15 060	15 060	15 060	15 060
Lower Heating value ($HV_{FF\_anthracite}$)	TJ/t	0,027	0,027	0,027	0,027	0,027	0,027	0,027	0,027	0,027	0,027	0,027	0,027

Heat Input ($HI_{FF\_anthracite}$)	TJ/y	406,565	407,636	409,769	411,873	411,873	411,873	411,873	411,873	411,873	411,873	411,873	411,873
Light oil/Diesel													
Quantity ($Q_{FF\_light\ oil/diesel}$)	tonnes	97	98	98	99	99	99	99	99	99	99	99	99
Lower Heating value ($HV_{FF\_light\ oil/diesel}$)	TJ/t	0,038	0,038	0,038	0,038	0,038	0,038	0,038	0,038	0,038	0,038	0,038	0,038
Heat Input ($HI_{FF\_light\ oil/diesel}$)	TJ/y	3,711	3,721	3,740	3,760	3,760	3,760	3,760	3,760	3,760	3,760	3,760	3,760
Heavy oil													
Quantity ($Q_{FF\_heavy\ oil}$)	tonnes	521	522	525	528	528	528	528	528	528	528	528	528
Lower Heating value ($HV_{FF\_heavy\ oil}$)	TJ/t	0,039	0,039	0,039	0,039	0,039	0,039	0,039	0,039	0,039	0,039	0,039	0,039
Heat Input ($HI_{FF\_heavy\ oil}$)	TJ/y	20,149	20,202	20,307	20,412	20,412	20,412	20,412	20,412	20,412	20,412	20,412	20,412
Used oil													
Quantity ($Q_{FF\_used\ oil}$)	tonnes	0	0	0	0	0	0	0	0	0	0	0	0
Lower Heating value ($HV_{FF\_used\ oil}$)	TJ/t	0,035	0,035	0,035	0,035	0,035	0,035	0,035	0,035	0,035	0,035	0,035	0,035
Heat Input $HI_{FF\_used\ oil}$	TJ/y	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000
Industrial waste originating from fossil fuels													
Quantity ($Q_{AF\_industrial\ waste\ originating\ from\ fossil\ fuel}$)	tonnes	472	473	476	478	478	478	478	478	478	478	478	478
Lower Heating value ($HV_{AF\_industrial\ waste\ originating\ from\ fossil\ fuel}$)	TJ/t	0,016	0,016	0,016	0,016	0,016	0,016	0,016	0,016	0,016	0,016	0,016	0,016
Heat Input ($HIAF_{\_industrial\ waste\ originating\ from\ fossil\ fuel}$)	TJ/y	7,422	7,442	7,481	7,519	7,519	7,519	7,519	7,519	7,519	7,519	7,519	7,519
Heat input from fossil fuel used (HI_{FF})	TJ/y	3 636,846	3 460,379	3 254,070	3 082,800	3 082,800	3 082,800	3 082,800	3 082,800	3 082,800	3 082,800	3 082,800	3 082,800
Monitoring moisture penalty													
Specific fuel consumuption on project case ($HC_{AF,y}$)	TJ/tclinker	0,00332	0,00333	0,00334	0,00336	0,00336	0,00336	0,00336	0,00336	0,00336	0,00336	0,00336	0,00336

Moisture penalty per tonne of clinker (HC_{AF}-HC_{FF})	TJ/tclinker	0,00001	0,00002	0,00003	0,00005	0,00005	0,00005	0,00005	0,00005	0,00005	0,00005	0,00005	0,00005
Moisture penalty (MP_y)	TJ/y	9,798	19,568	39,041	58,243	58,243	58,243	58,243	58,243	58,243	58,243	58,243	58,243

Monitoring GHG emission from the alternative fuels

The industrial waste originating from fossil fuel and waste oil have been integrated in the emission from fossil fuel as they are included in the baseline.
Since the quantity remains the same in the project activity and since the agricultural by-product and the sorted MSW are CO2 neutral emission, alternative fuel is zero

		2007	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**
GHG emissions from alternative fuels	**tCO_2e/y**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**

Monitoring baseline GHG emissions from the fossil fuels displaced

		2007	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**
Total heat provided by all alternative fuel (Q_{AF}*HV_{AF})	TJ/y	74,221	260,459	486,240	676,712	676,712	676,712	676,712	676,712	676,712	676,712	676,712	676,712
Total moisture penalty (MP)	TJ/y	9,798	19,568	39,041	58,243	58,243	58,243	58,243	58,243	58,243	58,243	58,243	58,243
Emission factor for fosssil fuel displaced (EE_{FF})	tCO_2/TJ	95,08	95,08	95,08	95,08	95,08	95,08	95,08	95,08	95,08	95,08	95,08	95,08
GHG emissions from fossil fuel displaced by alternatives (FF_{GHG})	**tCO_2/y**	**6 125**	**22 903**	**42 518**	**58 801**	**58 801**	**58 801**	**58 801**	**58 801**	**58 801**	**58 801**	**58 801**	**58 801**

Monitoring GHG emissions due to on site transportation and drying of alternative fuels

Agricultural wastes are handling with a bobcat.
Estimation of electricity consumption is calculated on a provisory facilities in Bulacan.

		2007	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**
Quantity (QAF_biomass)	tonne	6 133	15 373	30 907	46 598	46 598	46 598	46 598	46 598	46 598	46 598	46 598	46 598
Capacity of the transportation (bobcat)	tonne	0,15	0,15	0,15	0,15	0,15	0,15	0,15	0,15	0,15	0,15	0,15	0,15
Distance	km	0,05	0,05	0,05	0,05	0,05	0,05	0,05	0,05	0,05	0,05	0,05	0,05
Distance per year transportation (Bobcat)	km/y	2 044	5 124	10 302	15 533	15 533	15 533	15 533	15 533	15 533	15 533	15 533	15 533
fuel consumption	liter/tonne	1,05	1,05	1,05	1,05	1,05	1,05	1,05	1,05	1,05	1,05	1,05	1,05

Transportation fuel used for alternative fuel on site ($OF_{AF\_biomass\text{-}rice\ husk}$)	t/y	6,44	16,14	32,45	48,93	48,93	48,93	48,93	48,93	48,93	48,93	48,93	48,93
CO_2 emission factor for transportation fuel (VEF_CO_2)	tCO_2/tonne fuel	3,17	3,17	3,17	3,17	3,17	3,17	3,17	3,17	3,17	3,17	3,17	3,17
CH_4 emission factor for transportation fuel (VEF_CH_4)	kg CH_4/ tonne	0,18	0,18	0,18	0,18	0,18	0,18	0,18	0,18	0,18	0,18	0,18	0,18
N_2O emission factor for transportation fuel (VEF_N_2O)	kg N_2O/ tonne	0,09	0,09	0,09	0,09	0,09	0,09	0,09	0,09	0,09	0,09	0,09	0,09
Global warming potential for CH_4		21	21	21	21	21	21	21	21	21	21	21	21
Global warming potential for N_2O		310	310	310	310	310	310	310	310	310	310	310	310
Fuel used for drying alternative fuels (FD)	t/y	0	0	0	0	0	0	0	0	0	0	0	0
Heating value of the fuel used for drying (FD_HV)	TJ/t fuel	na	na	na	na	na	na	na	na	na	na	na	na
Emission factor of the fuel used for drying (VEF_D)	tCO_2/TJ	na	na	na	na	na	na	na	na	na	na	na	na
GHG emission from on site transportation ($OT_{GHG\_transportation}$)	tCO_2/y	21	52	104	157	157	157	157	157	157	157	157	157
Quantity of all alternative fuels (QAF)	tonne	6 133	19 601	37 282	53 006	53 006	53 006	53 006	53 006	53 006	53 006	53 006	53 006
Electricity used for transportation of alternative fuel	MWh/tonne	0,009	0,009	0,009	0,009	0,009	0,009	0,009	0,009	0,009	0,009	0,009	0,009
Power consumption for on site transportation of alternative fuel (OP_{AF})	MWh	52,816	168,801	321,068	456,481	456,481	456,481	456,481	456,481	456,481	456,481	456,481	456,481
Emission factor of electricity usedc(EF_P)	tCO_2/MWh	0,453	0,453	0,453	0,453	0,453	0,453	0,453	0,453	0,453	0,453	0,453	0,453

GHG emission from electricity (OT GHG_conveyors)	tCO_2/y	24	76	145	207	207	207	207	207	207	207	207	207
GHG emission from on site transportation (OT_{GHG})	**tCO_2/y**	**45**	**128**	**249**	**364**	**364**	**364**	**364**	**364**	**364**	**364**	**364**	**364**

Monitoring emission saving from reduction of on site transport of fossil fuel

For conservativeness the saving from reduction of on site transportation aren't taking into account.

		2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Emissions from reduction of on site trasnport of fossil fuel ($OT\text{-}GHG_{FF}$)	**tCO_2e**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**

Leakage

Monitoring CH_4 emissions due to biomass residues that would be burned in the absence of the project activity

For conservativeness and in regard to the ecological solid waste management act of 2000, the CH4 emissions due to biomass residues are not taken into account.

		2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Amount of biomass residues that would have been burned in the open field in the absence of the project activity (QAF-B)	t/y	0	0	0	0	0	0	0	0	0	0	0	0
Carbon fraction of the biomass residues (BCF)	tC/t biomass	0,30	0,30	0,30	0,30	0,30	0,30	0,30	0,30	0,30	0,30	0,30	0,30
carbon released as CH4 in open air burning (CH_4F)	fraction	0,005	0,005	0,005	0,005	0,005	0,005	0,005	0,005	0,005	0,005	0,005	0,005
Mass conversion factor for carbon to methane (CH_4/C)	tCH_4/tC	1,33	1,33	1,33	1,33	1,33	1,33	1,33	1,33	1,33	1,33	1,33	1,33
Global warming potential of methane (GWP_CH4)		21	21	21	21	21	21	21	21	21	21	21	21
GHG emissions due to burning of biomass residue that is used as alternative fuel (BB_{CH4})	**tCO_2e/y**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**

For conservativeness: GHG emissions due to burning of biomass residue that is used as alternative fuel (BB_{CH4})	**tCO_2e/y**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**

Monitoring CH_4 emissions due to anaerobic decomposition of biomass residues at landfill

A survey shows that 90,8% of the biomass residues would have been lanfilled in an uncontrolled manner in the absence of the project. For conservativeness as it is difficult to insure that the decomposition will be anaerobic, the CH4 are not taken into account.

		2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Amount of biomass residues that would be landfilled ($QAFL_{L\_x}$)	t/y	0	0	0	0	0	0	0	0	0	0	0	0
Model correction factor (φ)		0,9	0,9	0,9	0,9	0,9	0,9	0,9	0,9	0,9	0,9	0,9	0,9
Fraction of methane in the lanfill gas (F)		0,5	0,5	0,5	0,5	0,5	0,5	0,5	0,5	0,5	0,5	0,5	0,5
Per cent of degradable organic carbon in the biomass (DOC_j)		30	30	30	30	30	30	30	30	30	30	30	30
Fraction of DOC dissimilated to landfill gas (DOC_f)		0,77	0,77	0,77	0,77	0,77	0,77	0,77	0,77	0,77	0,77	0,77	0,77
Methane correction factor (MCF)		0,4	0,4	0,4	0,4	0,4	0,4	0,4	0,4	0,4	0,4	0,4	0,4
Decay rate for the biomass resifues stream type j (k_j)		0,023	0,023	0,023	0,023	0,023	0,023	0,023	0,023	0,023	0,023	0,023	0,023
Methane global warming potential (QWP_{CH4})		21	21	21	21	21	21	21	21	21	21	21	21
y-x		9	8	7	6	5	4	3	2	1	0	0	0
Baseline GHG emissions due to anaerobic decomposition of biomass residues in landfills ($LW_{CH4,y}$)		**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**

Monitoring emissions from off site transport of alternative and fossil fuels

For conservativeness the leakage from fossil fuel is not included.

		2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Quantity of alternative fuel ($Q_{AF\_biomass\text{-}rice\ husk}$)	tonnes	6 133	15 373	30 907	46 598	46 598	46 598	46 598	46 598	46 598	46 598	46 598	46 598
Average truck capacity ($CT_{AF\_biomass\text{-}rice\ husk}$)	tonnes/truck	10	10	10	10	10	10	10	10	10	10	10	10
Average round trip distance between the supply site and the plant ($D_{AF\_biomass\text{-}rice\ husk}$)	km/truck	400	400	400	400	400	400	400	400	400	400	400	400
Emission factor of CO_2 in transport	kg CO2/km	1,097	1,097	1,097	1,097	1,097	1,097	1,097	1,097	1,097	1,097	1,097	1,097
Emission factor of CH_4 in transport	kg CH_4/km	0,00006	0,00006	0,00006	0,00006	0,00006	0,00006	0,00006	0,00006	0,00006	0,00006	0,00006	0,00006
Emission factor of N_2O in transport	kg N_2O/km	0,000031	0,000031	0,000031	0,000031	0,000031	0,000031	0,000031	0,000031	0,000031	0,000031	0,000031	0,000031
Emission factor from fuel due to transportation	kg CO_2e/km	1,10787	1,10787	1,10787	1,10787	1,10787	1,10787	1,10787	1,10787	1,10787	1,10787	1,10787	1,10787
Leakage resulting from transport of the agricultural waste ($LK_{AF\_biomass\text{-}rice\ husk}$)	tCO_2e/y	272	681	1 370	2 065	2 065	2 065	2 065	2 065	2 065	2 065	2 065	2 065
Quantity of alternative fuel ($Q_{AF\_sorted\ MSW}$)	tonnes	0	4 228	6 376	6 408	6 408	6 408	6 408	6 408	6 408	6 408	6 408	6 408
Average truck capacity ($CT_{AF\_sorted\ MSW}$)	tonnes/truck	5	5	5	5	5	5	5	5	5	5	5	5
Average round trip distance between the supply site and the plant ($D_{AF\_sorted\ MSW}$)	km/truck (max)	40	40	40	40	40	40	40	40	40	40	40	40
Leakage resulting from transport of the sorted MSW ($LK_{AF\_sorted\ MSW}$)	tCO_2e/y	0,00	37,47	56,51	56,80	56,80	56,80	56,80	56,80	56,80	56,80	56,80	56,80
Leakage resulting from transport of the all alternative fuels (LK_{AF})	tCO_2e/y	272	719	1 426	2 122	2 122	2 122	2 122	2 122	2 122	2 122	2 122	2 122

Quantity of fossil fuel which is reduced due to the consumption of alternative fuel (RQ_{FF})	tonnes	3 035	10 651	19 883	27 672	27 672	27 672	27 672	27 672	27 672	27 672	27 672	27 672
Average truck capacity (CT_{FF_truck})	tonnes/truck	29	29	29	29	29	29	29	29	29	29	29	29
Average round trip distance between the port and the plant (DF_{F_truck})	km/truck	0	0	0	0	0	0	0	0	0	0	0	0
Average ship capacity (CT_{FF_ship})	tonnes/ship	8 000	8 000	8 000	8 000	8 000	8 000	8 000	8 000	8 000	8 000	8 000	8 000
Average round trip distance between supply port and local port (D_{FF_ship})	nautical miles	730	730	730	730	730	730	730	730	730	730	730	730
Heating value of the fuel ship (HV_{ship})	GJ/t	42	42	42	42	42	42	42	42	42	42	42	42
Emission factor of the fuel ship ($EE_{fuel\ ship}$)	$kgCO_2/GJ$	77,40	77,40	77,40	77,40	77,40	77,40	77,40	77,40	77,40	77,40	77,40	77,40
Ship consumption	t fuel/nautical miles	0,07	0,07	0,07	0,07	0,07	0,07	0,07	0,07	0,07	0,07	0,07	0,07
Leakage due to reduced transport of fossil fuel (LK_{FF_truck})	tCO_2e/y	0	0	0	0	0	0	0	0	0	0	0	0
Leakage due to reduced transport of fossil fuel (LK_{FF_ship})	tCO_2e/y	63	220	412	573	573	573	573	573	573	573	573	573
Leakage due to reduced transport of fossil fuel (LK_{FF})	tCO_2e/y	63	220	412	573	573	573	573	573	573	573	573	573
Leakage from transport of alternative fuels less leakage due to reduced transport of fossil fuel (LK_{trans})	**tCO_2e/y**	**209**	**498**	**1 015**	**1 549**	**1 549**	**1 549**	**1 549**	**1 549**	**1 549**	**1 549**	**1 549**	**1 549**
For conservativeness: Leakage from transport (LK_{trans})	**tCO_2e/y**	**272**	**719**	**1 426**	**2 122**	**2 122**	**2 122**	**2 122**	**2 122**	**2 122**	**2 122**	**2 122**	**2 122**

Monitoring emissions from off site preparation (drying, etc) of alternative and fossil fuels

The alternative fuels used are not dried or prepared

		2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Quantity of alternative fuels prepared ($QAF_{\_prepared\ off\ site}$)	tonne	0	0	0	0	0	0	0	0	0	0	0	0
Electricity used for preparation of alternative fuel	MWh/tonne	0	0	0	0	0	0	0	0	0	0	0	0
Power consumption in preparing alternative fuel (PD_{AFO})	MWh/y	0	0	0	0	0	0	0	0	0	0	0	0
Emission factor of electricity used (EFpO)	tCO_2/MWh	0,453	0,453	0,453	0,453	0,453	0,453	0,453	0,453	0,453	0,453	0,453	0,453
GHG emission that could be generated during preparation of alternative fuels (GHG_{PAFO})	**tCO_2/y**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**

Emission Reductions

		2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	Total	Average
GHG emission from fossil fuels displaced by the alternative fuels (FF_{GHG})	tCO_2/y	6 125	22 903	42 518	58 801	58 801	58 801	58 801	58 801	58 801	58 801	58 801	58 801		
GHG emission from alternative fuels (AF_{GHG})	tCO_2e/y	0	0	0	0	0	0	0	0	0	0	0	0		
GHG emission from on site transport (and drying) of alternative fuels (OT_{GHG})	tCO2e/y	45	128	249	364	364	364	364	364	364	364	364	364		
Leakage from transport (LKtrans) (conservative)	tCO_2e/y	272	719	1 426	2 122	2 122	2 122	2 122	2 122	2 122	2 122	2 122	2 122		
Emissions from reduction of on site transport of fossil fuel ($OT\text{-}GHG_{FF}$) (conservative)	tCO_2e/y	0	0	0	0	0	0	0	0	0	0	0	0		

due to burning of biomass residue that is used as alternative fuel (BB_{CH4}) (conservative)	tCO_2e/y	0	0	0	0	0	0	0	0	0	0	0	0		
Baseline GHG emissions due to anaerobic decomposition of biomass residues in landfills ($LW_{CH4,y}$)	tCO_2e/y	0	0	0	0	0	0	0	0	0	0	0	0		
GHG emission that could be generated during preparation of alternative fuels (GHG_{PAFO})	tCO_2/y	0	0	0	0	0	0	0	0	0	0	0	0		
Total emission reductions (AF_{ER})	**tCO_2e/y**	**5 809**	**22 056**	**40 842**	**56 316**	**56 316**	**56 316**	**56 316**	**56 316**	**56 316**	**56 316**	**56 316**	**56 316**	**513 424**	**51 342**

	Emission reductions
June 08-May 09	29 883
June 09-May 10	47 289
June 10-May 11	56 316
June 11-May 12	56 316
June 12-May 13	56 316
June 13-May 14	56 316
June 14-May 15	56 316
June 15-May 16	56 316
June 16-May 17	56 316
June 17-May 18	56 316
June 08-May 18	527 699

Global HPHI (4 plants)

A. Percentage of the heat consumption for the clinker production (2002-2005)

Year	TJ	Coal	Anthracite	Petcoke	Heavy oil	Light oil/Diesel	Waste/ Used fuel	Activated carbon	Industrial waste/ scrap/ tyres	Trial materials	
Bulacan (BL)											Total
2002	4 530	74,2	24,1	0,0	0,9	0,1	0,0	0,0	0,8	0,0	100,0
2003	4 266	75,7	22,7	0,0	1,0	0,1	0,0	0,0	0,4	0,0	100,0
2004	4 731	88,3	9,7	0,0	0,8	0,0	0,0	0,0	1,1	0,0	100,0
Bulacan scenario average 2002-2004	**4 509**	**79,6**	**18,6**	**0,0**	**0,9**	**0,1**	**0,0**	**0,0**	**0,8**	**0,0**	**100,0**
Quantity (t)		**145 644**	**30 745**		**1 021**	**72**			**2 255**		
Heating value (TJ/t)		**0,025**	**0,027**		**0,040**	**0,038**			**0,016**		
2005 (trials)	4 203	95,9	0,0	0,0	0,8	0,1	0,0	0,0	2,5	0,7	100,0
Lugait (LG) (2 kilns)											
2002	5 934	65,1	0,0	33,7	1,3	0,0	0,0	0,0	0,0	0,0	100,0
2003	4 982	98,0	0,0	0,0	2,0	0,0	0,0	0,0	0,0	0,0	100,0
2004	5 637	92,0	5,2	1,3	1,4	0,0	0,2	0,0	0,0	0,0	100,0
Lugait scenario average 2002-2004	**5 518**	**84,1**	**1,8**	**12,5**	**1,5**	**0,0**	**0,1**	**0,0**	**0,0**	**0,0**	100,0
Quantity (t)		**175 366**	**3 407**	**20 442**	**2 232**		**82**				
Heating value (TJ/t)		**0,026**	**0,027**	**0,034**	**0,038**		**0,035**				
2005	5 763	83,9	0,3	9,5	6,0	0,0	0,2	0,0	0,0	0,0	100,0
Davao (DV)											
2002	**3 637**	88,3	0,0	11,1	0,5	0,1	0,0	0,0	0,0	0,0	100,0
2003	**3 148**	70,8	24,3	4,0	0,8	0,0	0,0	0,0	0,0	0,0	100,0
2004	**3 468**	89,3	10,3	0,0	0,4	0,0	0,0	0,0	0,0	0,0	100,0
Davao scenario average 2002-2004	**3 417**	**83,3**	**11,0**	**5,2**	**0,5**	**0,0**	**0,0**	**0,0**	**0,0**	**0,0**	100,0
Quantity (t)		**110 391**	**20 080**	**5 283**	**480**						
Heating value (TJ/t)		**0,024**	**0,027**	**0,033**	**0,039**						
2005 (trials)	3 244	92,1	0,0	0,0	0,8	0,0	0,0	7,0	0,1	0,0	100,0
Baseline 1 (2002-2004) TOTAL											
2002	14 101	74,0	7,7	17,0	0,9	0,1	0,0	0,0	0,3	0,0	100,0
2003	12 395	83,4	14,0	1,0	1,4	0,0	0,0	0,0	0,1	0,0	100,0
2004	13 836	90,0	8,0	0,5	0,9	0,0	0,1	0,0	0,4	0,0	100,0
Global average 2002-2004	13 444	**82,4**	**9,8**	**6,4**	**1,1**	**0,0**	**0,0**	**0,0**	**0,3**	**0,0**	100,0
Emission factor (tCO2/TJ)	95,04	**94,6**	**98,3**	**97,5**	**73,3**	**74,1**	**73,3**	**0,0**	**143,0**	**0,0**	

Average 2002-2004 (detail)

	Coal quantity (t)	Coal lower heating value (TJ/t)	Anthracite quantity (t)	Anthracite lower heating value (TJ/t)	Petcoke quantity (t)	Petcoke lower heating value (TJ/t)	Heavy oil quantity (t)	Heavy oil lower heating value (TJ/t)	Light oil/Diesel quantity (t)	Light oil/Diesel lower heating value (TJ/t)	Waste/used fuel quantity (t)	Waste/used fuel lower heating value (TJ/t)	Industrial waste/ scrap/ tyres quantity (t)	Industrial waste/ scrap/ tyres lower heating value (TJ/t)
Bulacan (BL)														
2002	133 691	0,025	39 675	0,027			965	0,040	82	0,043			2 303	0,015
2003	126 500	0,026	35 199	0,028			1 137	0,038	69	0,035			937	0,019
2004	176 743	0,024	17 360	0,026			959	0,041	66	0,035			3 526	0,015
BL	145 644	0,025	30 745	0,027			1 021	0,040	72	0,038			2 255	0,016
Lugait (LG)														
2002	142 174	0,027	0	0,000	59 190	0,034	1 996	0,038			0	0,000		
2003	182 867	0,027	0	0,000	0	0,000	2 631	0,038			0	0,000		
2004	201 056	0,026	10 220	0,029	2 135	0,034	2 069	0,038			247	0,035		
LG (2 kilns)	175 366	0,026	3 407	0,029	20 442	0,034	2 232	0,038			82	0,035		
Davao (DV)														
2002	109 694	0,025	19 120	0,027	12 066	0,033	436	0,039						
2003	92 223	0,024	28 150	0,027	3783,0	0,033	662	0,038						
2004	129 256	0,025	12 971	0,028	0	0,000	341	0,038						
DV	110 391	0,024	20 080	0,027	5 283	0,033	480	0,039						

B. Percentage of the heat consumption for the clinker production in the project activity

Year	TJ	Coal	Anthracite	Petcoke	Heavy oil	Light oil/Diesel	Waste/ Used fuel	Industrial waste/scrap/ tyres	**Agricultural waste (rice husk, coconut, tobacco leave etc)**	**sorted MSW**	
Baseline	13 444	88,8	9,8	0,0	1,1	0,0	0,0	0,3	0,0	0,0	100
2007	13 683	84,3	11,0	0,0	1,0	0,1	0,0	0,4	3,2	0,0	100
2008*	13 717	79,6	11,0	0,0	1,0	0,1	0,0	0,4	6,0	2,0	100
2009	13 780	74,6	10,9	0,0	1,0	0,1	0,0	0,4	10,0	3,0	100
2010	13 848	68,8	10,9	0,0	1,0	0,1	0,0	0,4	15,0	3,8	100
2011	13 848	68,8	10,9	0,0	1,0	0,1	0,0	0,4	15,0	3,8	100
2012	13 848	68,8	10,9	0,0	1,0	0,1	0,0	0,4	15,0	3,8	100
2013	13 848	68,8	10,9	0,0	1,0	0,1	0,0	0,4	15,0	3,8	100
2014	13 848	68,8	10,9	0,0	1,0	0,1	0,0	0,4	15,0	3,8	100
2015	13 848	68,8	10,9	0,0	1,0	0,1	0,0	0,4	15,0	3,8	100
2016	13 848	68,8	10,9	0,0	1,0	0,1	0,0	0,4	15,0	3,8	100
2017	13 848	68,8	10,9	0,0	1,0	0,1	0,0	0,4	15,0	3,8	100
2018	13 848	68,8	10,9	0,0	1,0	0,1	0,0	0,4	15,0	3,8	100

* starting date of the crediting period

Emissions reductions

	Total emission reductions	Project emissions	Baseline emissions	Leakage	Emission reductions		Project emissions	Baseline emissions	Leakage	Emission reductions	
2007	36 422	278	37 434	-734	36 422						
2008	94 148	582	96 698	-1 968	94 148	year A June 08-May 09	738	121 629	-2 643	118 248	
2009	151 987	956	156 532	-3 588	151 987	year B June 09-May 10	1 149	185 938	-4 290	180 499	
2010	220 414	1 420	227 107	-5 272	220 414	year C June 10-May 11	1 420	227 107	-5 272	220 414	
2011	220 414	1 420	227 107	-5 272	220 414	year D June 11-May 12	1 420	227 107	-5 272	220 414	
2012	220 414	1 420	227 107	-5 272	220 414	year E June 12-May 13	1 420	227 107	-5 272	220 414	
2013	220 414	1 420	227 107	-5 272	220 414	year F June 13-May 14	1 420	227 107	-5 272	220 414	
2014	220 414	1 420	227 107	-5 272	220 414	year G June 14-May 15	1 420	227 107	-5 272	220 414	
2015	220 414	1 420	227 107	-5 272	220 414	year H June 15-May 16	1 420	227 107	-5 272	220 414	
2016	220 414	1 420	227 107	-5 272	220 414	year I June 16-May 17	1 420	227 107	-5 272	220 414	
2017	220 414	1 420	227 107	-5 272	220 414	year J June 17-May 18	1 420	227 107	-5 272	220 414	
2018	220 414	1 420	227 107	-5 272	220 414						
total(2008-2017)	2 009 450	12 900	2 070 085	-47 736	2 009 450	June 08-May 18	13 249	2 124 422	-49 112	2 062 061	2 062 061
average	200 945				200 945		1 325	212 442	-4 911	206 206	

Clinker production (t)

year	DV	*LG1*	*LG2*	LG	BL	Total
2002	1 113 532	*581 463*	1 195 128	*1 776 591*	1 404 814	4 294 937
2003	956 207	*423 195*	1 070 100	*1 493 295*	1 307 036	3 756 538
2004	1 053 921	*486 640*	1 199 781	*1 686 421*	1 457 989	4 198 331
2005	982 488	*502 182*	1 231 672	*1 733 854*	1 275 687	3 992 030
2006	1 119 000	*522 697*	1 343 303	*1 866 000*	1 682 000	4 667 000
2007	1 119 000	*522 697*	1 343 303	*1 866 000*	1 682 000	4 667 000
2008	1 119 000	*522 697*	1 343 303	*1 866 000*	1 682 000	4 667 000
2009	1 119 000	*522 697*	1 343 303	*1 866 000*	1 682 000	4 667 000
2010	1 119 000	*522 697*	1 343 303	*1 866 000*	1 682 000	4 667 000
2011	1 119 000	*522 697*	1 343 303	*1 866 000*	1 682 000	4 667 000
2012	1 119 000	*522 697*	1 343 303	*1 866 000*	1 682 000	4 667 000
2013	1 119 000	*522 697*	1 343 303	*1 866 000*	1 682 000	4 667 000
2014	1 119 000	*522 697*	1 343 303	*1 866 000*	1 682 000	4 667 000
2015	1 119 000	*522 697*	1 343 303	*1 866 000*	1 682 000	4 667 000
2016	1 119 000	*522 697*	1 343 303	*1 866 000*	1 682 000	4 667 000
2017	1 119 000	*522 697*	1 343 303	*1 866 000*	1 682 000	4 667 000
2018	1 119 000	*522 697*	1 343 303	*1 866 000*	1 682 000	4 667 000
Installed capacity (t/d)	3 500	*1 500*	4 000	*5 500*	5 500	14 500