

Enclosure-1												
CCN calculation for preheater upgradation line 1												
	Baseline	2002-03	2003-04	2004-05	2005-06	2006-07	2007-08	2008-09	2009-10	2010-11	2011-12	
CO ₂ emission per ton of Peltsake	CCO ₂ /ton	3.18	3.18	3.18	3.18	3.18	3.18	3.18	3.18	3.18	3.18	3.18
CO ₂ emission per ton of Coal	CCO ₂ /ton	2.44	2.44	2.44	2.44	2.44	2.44	2.44	2.44	2.44	2.44	2.44
Quantity of the coal consumed	ton/yr	8.88	10.41	9.61	10.75	10.75	10.75	10.75	10.75	10.75	10.75	10.75
Percentage heat contribution by Peltsake in the kiln	%	40.25	69.00	78.71	95.00	95.00	95.00	95.00	95.00	95.00	95.00	95.00
Percentage heat contribution by Coal in the kiln	%	59.75	31.94	21.29	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00
Average caloric value of fuel used	Calorific kJ/kg	7222.00	7496.00	7683.00	7796.00	7796.00	7796.00	7796.00	7796.00	7796.00	7796.00	7796.00
Total heat consumption by the kiln	million kcal/yr	64.10	78.07	73.81	83.80	83.80	83.80	83.80	83.80	83.80	83.80	83.80
Average emission factor of fuel used	ton CO ₂ /ton	2.74	2.84	3.02	3.14	3.14	3.14	3.14	3.14	3.14	3.14	3.14
Total clinker produced in the kiln	ton/yr	87.66	110.32	104.49	120.17	120.17	120.17	120.17	120.17	120.17	120.17	120.17
Efficiency calculation (Ref: 0 deg C)												
Heat input												
Heat temperature of the cooling air in system	C	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00
Flow rate of cooling air in system	Nm ³ /hr	19267.34	23820.07	22576.31	25961.09	25961.09	25961.09	25961.09	25961.09	25961.09	25961.09	25961.09
Specific heat of cooling air	kcal/Nm ³ C	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31
Heat temperature of the feed in system	C	69.00	69.00	69.00	69.00	69.00	69.00	69.00	69.00	69.00	69.00	69.00
Flow rate of feed in system	Nm ³ /hr	130383.25	135629.44	169144.19	191065.80	191065.80	191065.80	191065.80	191065.80	191065.80	191065.80	191065.80
Specific heat of raw feed	kcal/Nm ³ C	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21
Heat temperature of conveying air	C	45.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Flow rate of conveying air in system	Nm ³ /hr	7889.62	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Specific heat of conveying air	kcal/Nm ³ C	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31
Heat temperature of fine coal in system	C	65.00	67.00	67.00	67.00	67.00	67.00	67.00	67.00	67.00	67.00	67.00
Flow rate of fine coal	Nm ³ /hr	12009.75	14171.01	13375.13	15381.40	15381.40	15381.40	15381.40	15381.40	15381.40	15381.40	15381.40
Specific heat of the coal	kcal/Nm ³ C	0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.27
Heat temperature of coal conveying air	C	45.00	45.00	45.00	45.00	45.00	45.00	45.00	45.00	45.00	45.00	45.00
Flow rate of coal conveying air	Nm ³ /hr	1753.25	3199.25	3030.30	3484.85	3484.85	3484.85	3484.85	3484.85	3484.85	3484.85	3484.85
Specific heat of coal conveying air	kcal/Nm ³ C	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31
Heat temperature of primary air	C	45.00	45.00	45.00	45.00	45.00	45.00	45.00	45.00	45.00	45.00	45.00
Flow rate of primary air	Nm ³ /hr	3594.16	4633.46	4388.71	5047.02	5047.02	5047.02	5047.02	5047.02	5047.02	5047.02	5047.02
Specific heat of primary air	kcal/Nm ³ C	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31
Temperature of seal air-excess air	C	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00
Flow rate of seal air-excess air	Nm ³ /hr	21915.61	11032.04	10449.31	12076.72	12076.72	12076.72	12076.72	12076.72	12076.72	12076.72	12076.72
Specific heat of seal air-excess air	kcal/Nm ³ C	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31
Temperature of water spray in cooler	C	0.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00
Flow rate of water spray in cooler	Nm ³ /hr	0.00	4743.78	4493.21	5167.19	5167.19	5167.19	5167.19	5167.19	5167.19	5167.19	5167.19
Specific heat of water	kcal/Nm ³ C	0.00	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36
Heat from coal burning	kcal/yr	64104780.16	78956936.22	73834147.61	83804138.05	83804138.05	83804138.05	83804138.05	83804138.05	83804138.05	83804138.05	83804138.05
Total heat input	kcal/yr	68456334.85	83865302.22	78797394.94	89511768.07	89511768.07	89511768.07	89511768.07	89511768.07	89511768.07	89511768.07	89511768.07
Useful Heat output												
Heat of reaction	kcal/yr	35503282.46	44679763.55	42318746.43	48667704.55	48667704.55	48667704.55	48667704.55	48667704.55	48667704.55	48667704.55	48667704.55
Efficiency of system	%	51.88	53.63	53.71	54.37	54.37	54.37	54.37	54.37	54.37	54.37	54.37
% Increase in efficiency	%	0.00	1.77	1.84	2.51	2.51	2.51	2.51	2.51	2.51	2.51	2.51
Saving in heat output due to energy efficiency of system	kcal/yr	0.00	14746502.02	1452764.10	2243834.26	2243834.26	2243834.26	2243834.26	2243834.26	2243834.26	2243834.26	2243834.26
Saving in input heat	kcal/yr	0.00	2748415.48	2704675.50	4126957.99	4126957.99	4126957.99	4126957.99	4126957.99	4126957.99	4126957.99	4126957.99
Saving in fuel	kg/yr	0.00	386.49	362.07	529.75	529.75	529.75	529.75	529.75	529.75	529.75	529.75
Annual saving in fuel	kg/annum	0.00	300696.47	2730029.42	4195828.92	4195828.92	4195828.92	4195828.92	4195828.92	4195828.92	4195828.92	4195828.92
Emissions reduced	ton/annum	0.00	8835.84	8251.39	13187.48	13187.48	13187.48	13187.48	13187.48	13187.48	13187.48	13187.48

The average values taken for calorific values.

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