

CALCULATION OF BASELINE EMISSION FACTORS AND EMISSION REDUCTIONS DUE TO 12 MW BIOMASS BASED POWER PROJECT

Methodology Used: The weighted average emissions of current generation mix

<u>Year of offer</u>	<u>1999</u>		<u>2000</u>		<u>2001</u>		<u>2002-03</u>		<u>2003-04</u>		<u>2004-05</u>	
Capacity addition and Installed capacity, MW												
Sector	Cap.Addn.	Instl. Cap.	Cap.Addn.	Instl. Cap.	Cap.Addn.	Instl. Cap.	Cap.Addn.	Instl. Cap.	Cap.Addn.	Instl. Cap.	Cap.Addn.	Instl. Cap.
Coal /LigniteBased, (APTRANSCO)								2947		2947		2947
Coal / Lignite Based, (share from central plants)		770	58	828		857	400	1257		1257		1257
Gas / Naptha Based, (state)		272		272		272	210	482		482		482
Hydro (APTRANSCO)		2657	15	2672		2672		2672	300	2972	221	3193
Private /IPP(gas/naptha)		564	97	661	355	1016	230	1246		1246		1246
Private /IPP(coal/lignite)											260	260
Nuclear (central)		115		115		115		115		115		115
Renewables- wind/biomas cogen/mini hydel etc.		57	44	101	44	145	44	189	117	306	117	423
Others including captive projects		60	0	60	0	60	0	475	0	475	0	475
Total, MW		4495	214	4709	399	5137	884	9383	417	9800	598	10398
Capacity addition, %			4,76		8,47		17,21		4,44		6,10	
Generation Mix, MWh												
Sector	mU	%	mU	%	mU	%	mU	%	mU	%	mU	%
Coal /LigniteBased, (APTRANSCO)							19019,60	48,31	19019,60	47,42	19019,60	45,40
Coal / Lignite Based, (share from central plants)							5505,66	13,98	5505,66	13,73	5505,66	13,14
Gas Based, (state)					1672,82	100,00	2964,34	7,53	2964,34	7,39	2964,34	7,08
Hydro, MW (APTRANSCO)							2923,00	7,42	3251,18	8,11	3492,94	8,34
Private /IPP(gas/naptha)							5457,48	13,86	5457,48	13,61	5457,48	13,03
Private /IPP(coal/lignite)							0,00	0,00	0,00	0,00	1138,80	2,72
Nuclear, MW(central)							755,55	1,92	755,55	1,88	755,55	1,80
Renewables- wind/biomas cogen/mini hydel etc.							662,26	1,68	1072,22	2,67	1482,19	3,54
Others captive projects incl. Industrial cogen							2080,50	5,28	2080,50	5,19	2080,50	4,97
Total					1672,82	100,00	39368,38	100,00	40106,53	100,00	41897,06	100,00
Total generation					1672,82	100,00	39368,38	100,00	40106,53	100,00	41897,06	100,00
% of generation by coal out of total gen.								62,30		61,15		61,26
% of generation by gas out of total gen								21,39		21,00		20,10

Year of offer	1999		2000		2001		2002-03		2003-04		2004-05	
Baseline Emissions (kgCO ₂ /kWh)												
Actual emission factor for coal	1,015		1,015		1,015		1,015		1,015		1,015	
Actual emission factor for Gas	0,547		0,547		0,547		0,547		0,547		0,547	
Net emission factor for thermal (Coal)		0,000		0,000		0,000		0,632		0,621		0,622
Net emission factor for thermal (Gas)		0,000		0,000		0,000		0,117		0,115		0,110
Total net emission factor		0,000		0,000		0,000		0,749		0,736		0,732
On-Site Project Emission Reductions												
Generation capacity , KW										12000		12000
Plant load factor, %										80		80
No. of hours of plant operation per annum										0		8160
No. of units generated in a year, millions										0		78,336
Auxilliary consumption per annum										0,000		7,050
No. of units exported to grid, millions										0,00		71,29
T&D losses considered on exportable power										0		0
No. of units replaced in the grid, millions units				495,87						0,00		71,29
Baseline emission factor considered, kgCO ₂ /kWh										0,736		0,732
Baseline emissions, tones										0,00		52159,24
Generation by coal as supplimentry fuel (30%)				164,506						0,000		23,501
Emission factor considered for coal, kgCO ₂ /kWh										1,079		1,079
Project emissions, tones										0,00		25357,36
Actual green power to grid, millions units				331,36128						0,00		47,78
Carbon emission reductions in a year										0,00		26801,88
Commitment period				2003 - 2009								
No. of years of delivery of CERs			7 years									
Total number of CERs				184090								
Year		2004	2005	2006	2007	2008	2009	2010	Total			
Baseline emissions		52159	53229	52592	51975	51638	50164	49835	361592			
Project emissions		25357	25357	25357	25357	25357	25357	25357	177502			
Emission reductions		26802	27872	27235	26617	26280	24806	24477	184090			

CALCULATION OF BASELINE EMISSIONS												
Methodology Used: The weighted average												
Year of offer	2005-06		2006-07		2007-08		2008-09		2009-10		2010-11	
Capacity addition and Installed capacity												
Sector	Cap.Addn.	Instl. Cap.	Cap.Addn.	Instl. Cap.	Cap.Addn.	Instl. Cap.	Cap.Addn.	Instl. Cap.	Cap.Addn.	Instl. Cap.	Cap.Addn.	Instl. Cap.
Coal /LigniteBased, (APTRANSCO)	710	3657	210	3867		3867		3867		3867		3867
Coal / Lignite Based, (share from central plant)	500	1757		1757		1757		1757		1757		1757
Gas / Naptha Based, (state)		482		482		482		482		482		482
Hydro (APTRANSCO)	300	3493		3493	300	3793		3793		3793		3793
Private /IPP(gas/naptha)	492	1738	464	2202		2202		2202		2202		2202
Private /IPP(coal/lignite)	520	780	520	1300		1300		1300		1300		1300
Nuclear (central)		115		115		115		115		115		115
Renewables- wind/biomass cogen/mini hydro	117	540	117	657	117	774	117	891	122	1013	120	1133
Others including captive projects	250	725	250	975	0	975	0	975	0	975	0	975
Total, MW	2639	13287	1311	14848	417	15265	117	15382	122	15504	120	15624
Capacity addition, %	25,38		9,87		2,81		0,77		0,79		0,78	11129
Generation Mix, MWh												
Sector												
Coal /LigniteBased, (APTRANSCO)	23601,86	42,96	24957,17	40,19	24957,17	39,71	24957,17	39,46	24957,17	39,19	24957,17	38,93
Coal / Lignite Based, (share from central plant)	7695,66	14,01	7695,66	12,39	7695,66	12,25	7695,66	12,17	7695,66	12,08	7695,66	12,01
Gas Based, (state)	2964,34	5,40	2964,34	4,77	2964,34	4,72	2964,34	4,69	2964,34	4,65	2964,34	4,62
Hydro, MW (APTRANSCO)	3821,12	6,96	3821,12	6,15	4149,30	6,60	4149,30	6,56	4149,30	6,52	4149,30	6,47
Private /IPP(gas/naptha)	7612,44	13,86	9644,76	15,53	9644,76	15,35	9644,76	15,25	9644,76	15,15	9644,76	15,05
Private /IPP(coal/lignite)	3416,40	6,22	5694,00	9,17	5694,00	9,06	5694,00	9,00	5694,00	8,94	5694,00	8,88
Nuclear, MW(central)	755,55	1,38	755,55	1,22	755,55	1,20	755,55	1,19	755,55	1,19	755,55	1,18
Renewables- wind/biomass cogen/mini hydro	1892,16	3,44	2302,13	3,71	2712,10	4,32	3122,06	4,94	3549,55	5,57	3970,03	6,19
Others captive projects incl. Industrial cogeneration	3175,50	5,78	4270,50	6,88	4270,50	6,80	4270,50	6,75	4270,50	6,71	4270,50	6,66
Total	54935,03	100,00	62105,23	100,00	62843,38	100,00	63253,35	100,00	63680,84	100,00	64101,32	100,00
Total generation	54935,03	100,00	62105,23	100,00	62843,38	100,00	63253,35	100,00	63680,84	100,00	64101,32	100,00
% of generation by coal out of total gen.		63,19		61,74		61,02		60,62		60,22		59,82
% of generation by gas out of total gen		19,25		20,30		20,06		19,93		19,80		19,67

Year of offer	2005-06	2006-07	2007-08	2008-09	2009-10	2010-11
Baseline Emissions (kgCO ₂ /kWh)						
Actual emission factor for coal	1,015	1,015	1,015	1,015	1,015	1,015
Actual emission factor for Gas	0,547	0,547	0,547	0,547	0,547	0,547
Net emission factor for thermal (Coal)	0,641	0,627	0,619	0,615	0,611	0,607
Net emission factor for thermal (Gas)	0,105	0,111	0,110	0,109	0,108	0,108
Total net emission factor	0,747	0,738	0,729	0,724	0,720	0,715
On-Site Project Emission Reductions						
Generation capacity , KW	12000	12000	12000	12000	12000	12000
Plant load factor, %	80	80	80	80	80	80
No. of hours of plant operation per annum	8160	8160	8160	8160	8160	8160
No. of units generated in a year, millions	78,336	78,336	78,336	78,336	78,336	78,336
Auxilliary consumption per annum	7,050	7,050	7,050	7,050	8,617	8,617
No. of units exported to grid, millions	71,29	71,29	71,29	71,29	69,72	69,72
T&D losses considered on exportable power, %	0	0	0	0	0	0
No. of units replaced in the grid, millions units	71,29	71,29	71,29	71,29	69,72	69,72
Baseline emission factor considered, kgCO ₂ /kWh	0,747	0,738	0,729	0,724	0,720	0,715
Baseline emissions, tones	53229,26	52592,31	51974,57	51637,70	50163,78	49834,73
Generation by coal as supplimentry fuel (30%)	23,501	23,501	23,501	23,501	23,501	23,501
Emission factor considered for coal, kgCO ₂ /kWh	1,079	1,079	1,079	1,079	1,079	1,079
Project emissions, tones	25357,36	25357,36	25357,36	25357,36	25357,36	25357,36
Actual green power to grid, millions units	47,78	47,78	47,78	47,78	46,22	46,22
Carbon emission reductions in a year	27871,89	27234,94	26617,20	26280,34	24806,42	24477,36
Commitment period						
No. of years of delivery of CERs						
Total number of CERs						
Year						
Baseline emissions						
Project emissions						
Emission reductions						

Calculation CO2 emission factor of coal		
For emissions with coal		
Standard IPCC emission factor for coal	96,1	t CO2/TJ
Calorific value coal (Avg.)	3400	kcal/kg
Plant heat rate	2688	kcal/kWh
Coal Req	0,790	kg/kWh
CO2 Emission factor	1,079	kg/kWh