

REVIEW
BHL Bilai Project
Project 1086

The review has been requested to seek further clarification on the following two points -

1. As the main barrier presented to support the additionality of the project activity is the low tariff paid in the state, it should be demonstrated that this project activity is not economically attractive at the current or expect tariff
2. The baseline emission factor (0.914 tCO₂/MWh) is higher than the factor published by the Central Electricity Authority of India (0.75 tCO₂/MWh). This discrepancy should be explained

Response -

1. The additionality for the project activity has been demonstrated by using barrier analysis. In the case of BHL Bilai Project the main barrier is the PPA (power purchase agreement) tariff on the export of electricity to the grid. It has been argued that expansion in the power generation capacity does not make commercial sense without the inclusion of the benefits from the CDM. The following financial analysis demonstrate that at the current and expected tariff rates set out in the PPA the project is not financially viable and hence additional.

The current tariff rates are taken from the project PPA and are in line with the UPERC Tariff Order for bagasse based power plants. As the tariff is only defined for the first four years it is assumed to remain constant thereafter.

Year	Tarrif Rs/kWh
2007	2.98
2008	3.02
2009	3.06
2010	3.10

The financial analysis is set out below but is based on the following data, evidence of which has been provided to the DOE.

Investment cost	Rs m
Turbine Generator	95.5
Boiler – no new boiler	0
Steam Piping	9.4
Civil cost	3.6
Switchyard and transmission line	66
Contingency and preoperative	11.3
Total	185.8

Project costs	Annual
Operation and maintenance cost	5% of Investment cost
Admin ¹	Rs 4m
UPEB maintenance	5% of cost of line
Grid Tripping	10% of export
Net Billable	2% of export

¹ 13 people will be employed in the new power plant, taking the average salary as Rs 0.3m per person per year gives a total of Rs 4m.

Based on the above and taking into account the revenues from the annual net export of 13,230 MWh of electricity we arrive at the project IRR of 4.98% without the inclusion of revenues from the emission reductions. These returns are compared to the cost of financing in India (the benchmark) which has been conservatively taken from the Prime Lending Rate (PLR) in India (the rate at which banks are willing to lend at). This was reported as 11% at the time the project was implemented. PLRs are published in India in the financial press and the range quoted on 28th June 2006 was 11% to 12% from 5 major banks². The PLR is taken as this is below the weighted cost of capital and is hence a conservative benchmark.

The financial calculations based on the above figures are as shown below.

Rs 1,000		2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
		1	2	3	4	5	6	7	8	9	10
Electricity for export	MWh	15,034	15,034	15,034	15,034	15,034	15,034	15,034	15,034	15,034	15,034
Deduction for billable	2%	301	301	301	301	301	301	301	301	301	301
Tripping	10%	1,503	1,503	1,503	1,503	1,503	1,503	1,503	1,503	1,503	1,503
Actual export	MWh	13,230	13,230	13,230	13,230	13,230	13,230	13,230	13,230	13,230	13,230
Revenue, Rs 1000											
Electricity		39,424	39,953	40,482	41,012	41,012	41,012	41,012	41,012	41,012	41,012
Costs, Rs 1000											
O&M		9,292	9,292	9,292	9,292	9,292	9,292	9,292	9,292	9,292	9,292
Admin		4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000
UPEB maintenance		3,300	3,300	3,300	3,300	3,300	3,300	3,300	3,300	3,300	3,300
PBIDT³											
Project flows	-185,830	22,833	23,362	23,891	24,420	24,420	24,420	24,420	24,420	24,420	24,420
Project IRR	4.98%										

The following table shows the analysis of the project IRR with the inclusion of CERs, based on a US\$10/tCO₂e price and a INR/US\$ equal to 40.

Rs 1,000		2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
		1	2	3	4	5	6	7	8	9	10
PBIDT		22,833	23,362	23,891	24,420	24,420	24,420	24,420	24,420	24,420	24,420
CER revenues		11,856	11,856	11,856	11,856	11,856	11,856	11,856	11,856	11,856	11,856
PBIDT with CERs		34,689	35,218	35,748	36,277	36,277	36,277	36,277	36,277	36,277	36,277
Project flows	-185,830	34,689	35,218	35,748	36,277	36,277	36,277	36,277	36,277	36,277	36,277
Project IRR	14.11%										

2. The validation report page 42 CAR 6 outlined the main reasons why the CEA CEF was not followed⁴, this was mainly due to issues of transparency relating to the calculations and the ability to replicate the results. We have provided more explanation on these issues which we believe supports our own independent calculation of the CEF. There has been some pressure in India to achieve a common CEF across project activities, however the CEA CEF is not calculated nor mandated by the Indian DNA and we therefore feel given the justifications outlined below our determination should be acceptable.

The CEF used in the case of the project activity was determined through a calculation of a Combined margin for 2004/05 from publicly available data, since submission sources underlying our calculation have been updated and also the CEA CEF number have been updated for 2005/06, however we present

² Business Standard, Section II, 28th June 2006, page 5 – the rate when the investment decisions were taken.

³ PBIDT – Profit before interest depreciation and tax

⁴ <http://www.cea.nic.in/planning/c%20and%20e/Government%20of%20India%20website.htm>

below our CEF analysis for 2004/05 in comparison to the CEA CEF 2004/05 result. (Whilst there have been some updates to the earlier data sets in the June 2007 CEA CEF update this has not affected the earlier CEA CEF for the Northern region for 2004/05⁵).

The following table outlines the differences in the CEA CEF and our CEF for the determination of the 2004/05 Combined margin.

Northern region grid CM	CEA, tCO2/MWh	Our, tCO2/MWh
2004/05	0.75	0.914

The reason why we have not used the CEA CEF data is that we do not believe it can or has been validated by any DOE. The data in the tables provided by the CEA CEF are hard coded and there is no reference to supporting documents that make the information publicly available (see <http://www.cea.nic.in/planning/c%20and%20e/Government%20of%20India%20website.htm> and the data contained in the spreadsheets presented). Without transparency and sources we do not believe the CEA CEF should be used as the methodology specifically states:

“Calculations for this combined margin must be based on data from an official source (where available)⁴ and made publicly available.” Page 5, ACM0002, version 6

We had initially calculated the Indian CEF in 2004 and from there updated and refined our database drawing on publicly available information mainly, from CEA sources published their website. Whilst the review asks for an explanation of the discrepancy the main problem in providing this is the lack of transparency in the presentation of the underlying data the CEA CEF uses, the generation data is provided but there is no source to the information on the fossil fuel consumption of the stations/units nor the NCV of the fossil fuels⁶. The user manual refers to some default values but says in the majority of cases that station or unit level data has been used but it does not distinguish where these differences in sources arise⁷. In our determination of the Northern regional CEF we have adopted an approach that follows the guidance in the methodology explicitly and used data from official and publicly available sources which allows ready checking and validation by the DOE (the same cannot be said of the CEA CEF).

If we examine our sources of data against those of the CEA CEF it sheds some light on where the differences arise but without specific information on the actual data used in the CEA CEF or the source (be it the default data they provide in the user manual or the station/unit specific data) it is difficult to show how the final calculated figures differ.

Data item	CEA source	Our source
Generation of station/unit	Individual power plants or station heat rates	Monthly generation report, published on CEA website
Fuel consumption of station/unit	Individual power plants	Performance review of thermal power plants, published by CEA General review, published by

⁵ Whilst some of the historical data has changed in the CEA CEF database this does not affect the Northern grid, page 16

“5.3 Changes compared to Previous Database Versions

In comparison with the previous version of the Database (Version 1.1), this version includes some small changes, which affect the emission factors for the Fiscal Years 2000-01 to 2004-05. The most notable of these changes are summarized below.

- North-East: The operating margins and the build margin 2004-05 increased slightly in comparison with Version 1.1. The reason is that actual fuel consumption data became available for some stations.
- South: The operating margins and build margin decreased slightly for some years. Again the main reason is that actual fuel consumption became available for some stations.
- West: The build margin 2004-05 decreased slightly due to some changes in the composition.”

Source: CO₂ Baseline Database for the Indian Power Sector, User guide, version 2, June 2007

⁶ The CEA CEF actually uses GCVs and converts these to NCVs.

⁷ Page S1 The calculations are based on generation, fuel consumption and fuel quality data obtained from the power stations. Typical standard data were used wherever precise information was not available.

Source: CO₂ Baseline Database for the Indian Power Sector, User guide, version 1.1, December 2006

NCV	Individual power plants or default values	CEA Indian National Communication
EF	Indian National Communication	Indian National Communication
Oxidation factor	Coal and lignite from tests conducted, others from IPCC 2006	IPCC 1996 ⁸

Where we can provide a direct comparison is in the generation data used for the plants in the OM, our generation data was taken from the CEA website (where monthly generation for each plant in each region is listed). To arrive at yearly generation it is possible to use examine the data for March which lists year to date (the CEA year runs April – March). The data is on the CEA website (www.cea.nic.in) and the downloads of this have been attached, we have provided data for the last 3 years and shown the difference.

⁸ At the time of submission the 2006 IPCC data was not published.

Comparison of Generation data

	2002/03			2003/04			2004/05		
	Generation data taken from CEA monthly report, GWh	CEA CEF database, GWh	Diff	Generation data taken from CEA monthly report, GWh	CEA CEF database, GWh	Diff	Generation data taken from CEA monthly report, GWh	CEA CEF database, GWh	Diff
Badarpur	5284	4811	473	5432	4943	489	5464	5463	1
I.P.Stn.(DVB)	619	547	72	771	669	102	921	920	0
Rajghat(DVB)	837	739	98	775	683	92	696	697	-1
Faridabad	973	850	123	795	850	-55	869	868	1
Panipat	4994	4486	508	5949	4486	1463	6008	5757	251
Bhatinda	2497	2266	231	2553	2308	245	1993	1992	1
Lehra Mohabbat	2907	2646	261	3379	3079	300	3308	3309	-1
Roper	8246	7565	682	8303	7612	691	9082	9083	0
Kota	6551	5915	636	6758	5792	966	7751	7431	320
Suratgarh	7289	6490	799	8303	7419	884	9363	9362	0
Anpara	11693	10690	1003	11982	10997	985	11511	11509	1
Harduaganj	769	652	117	733	615	118	632	631	1
Obra	6528	5786	742	6247	5509	738	5550	5553	-3
Panki Extn.	1016	937	79	1065	985	80	1043	1043	0
Paricha	961	765	196	655	523	132	966	967	-1
Tanda (NTPC)	2223	1921	302	2912	2650	262	3320	3317	3
Unchahar (NTPC)	6151	5626	525	6454	5868	586	6781	6781	0
Rihand STPS	7752	7128	624	7958	7347	611	7987	7988	-1
Singrauli(STPS)	16168	14769	1399	15644	14479	1165	15806	15803	3
NCTPP(Dadri)	6043	5555	488	6185	5683	502	6830	6831	-1
I.P. GT	935			957			1162		
I.P. WHP	280	1187	28	253	1189	21	378	1540	1
Pragata CCGT	825	813	12	2405	2345	60	2551	2552	-1
F'bad CCGT	2697	2645	52	2792	2727	65	3162	3162	0
Pampore GT	58	57	1	29	29	0	24	24	0
Ramgarh GT	161			241			343		0
Ramgarh ST	0	210	-49	0	206	35	17	360	0
Anta GT (NTPC)	2760	2679	81	2777	2702	75	2785	2785	0
Auraiya GT	4272	4140	132	4252	4122	130	4120	4118	2
Dadri GT	5212	5068	144	5062	4930	132	5458	5457	1

In terms of the build margin we have undertaken some analysis on the plants that arise in our data set and those that arise in the CEA CEF dataset. However we can only comment on our dataset as again sources are not provided in the CEA CEF dataset.

In the analysis of the 2004/05 build margin our list of plants includes Suratgarh as the first plant (i.e. the earliest in our list). We have taken the date of commissioning of the plant as 01/02/1999 which is its date of commencement of its commercial operation. The CEA CEF on the other hand considers the date of commissioning as 10/05/1998, which is its date of synchronization on oil. This can be verified from www.rajenergy.com/Genco.htm. Thus by omitting Suratgarh the CEA CEF includes two other power plants which come next in reverse chronological order the Unchachar power plant and GHTP (LEH. MOH). The date of commissioning of Tanda unit 4 is not publicly available (only the time period i.e. between 1998 and 1999) to be conservative we took this as 30/12/1998 as it is a thermal power plant, <http://cercind.gov.in/031105/8-05.pdf#search=%22UPSEB%20Tanda%22>.

As we only have power plant level data we have apportioned the total generation across the added generation capacities, whilst the CEA CEF has allocated the generation to the particular unit when it is known, which may lead to some differences in the generation data under the build margin. The data regarding the hydro power plant Sewa III (9 MW capacity), Jammu and Kashmir, was wrongly typed as Gumma (3MW). This error has now been rectified and the new value of BM has been calculated accordingly (this does not however significantly change our calculation of the BM).

We do not believe that we can provide any further information in addition to that outlined above given the lack of information contained with the CEA CEF numbers. If it is felt by the EB that our response is not sufficient we request you suggest the use of either the CEA CEF for this project activity or another source rather than place the project activity under review on this point.