

**Response to Request for Review  
BHL Palia Kalan Project; Project activity 1184**

*1. Further demonstration of the additionality of the project activity is required.*

**Response:** The additionality of the project activity may be demonstrated using either investment analysis or barrier analysis or a combination of both. We have used barrier analysis as the project activity faces significant barriers relating to the electricity regulatory framework specific to the state of Uttar Pradesh and barriers due to the selling of electricity to the state electricity boards. These have been detailed in the PDD. It can be seen from the common practice analysis that no similar project activity has been proposed without considering the benefits from CDM. BHL in its initial analysis of the power sector categorically stated to investors that the returns were not commensurate with the risks<sup>1</sup>, however in view of the developments in the CDM market the PP has embarked on investment for the supply of electricity to the grid.

Whilst the barrier analysis is limited to the regulatory framework and tariff we feel that this clearly demonstrates the most significant barrier as this determines the entire revenues from the project. Other barriers to the development of the project do exist – similar to those discussed in the case of the most recently registered large scale bagasse based project, No 1139 (which also focused solely on barriers)<sup>2</sup>. However our view was that given the strength of the barriers presented in the case of the project activity these would be sufficient to demonstrate additionality, especially since this barrier persists throughout the life of the project.

*2. 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 expected tariff.*

**Response:** A financial analysis has now been undertaken for the project activity. This has been carried out comparing the project IRR with the cost of funds, the WACC.

The WACC has been calculated at 20.3% as shown in the attached spreadsheets using data from the Sensex and the Reserve Bank of India 10 year bond rate. The beta has been taken from Bloomberg, a provider of financial information and the following is the reference:

<sup>1</sup> BHL presentation to investors, January 2005, Page 73-76 provided to the DOE at the time of validation.

<sup>2</sup> This can be further seen from the delays in the commissioning of the project and for the same reason there were no exports in the 2006-2007 season.



Actual export	MWh	18,248	25,364	25,364	25,364	25,364	25,364	25,364	25,364	25,364	25,364
<b>Revenue, Rs 1000</b>											
Electricity		52,188	73,303	74,317	75,332	76,600	76,600	76,600	76,600	76,600	76,600
<b>Costs, Rs 1000</b>											
O&M		11,002	11,442	11,900	12,376	12,871	13,386	13,921	14,478	15,057	15,659
Admin		4,000	4,160	4,326	4,499	4,679	4,867	5,061	5,264	5,474	5,693
UPEB maintenance		3,076	3,199	3,327	3,460	3,599	3,743	3,893	4,048	4,210	4,379
<b>PBIDT</b>											
Project flows		-220,039	34,110	54,501	54,764	54,996	55,451	54,605	53,725	52,810	51,859
Project IRR		<b>18.79%</b>									
		<b>2006</b>	<b>2007</b>	<b>2008</b>	<b>2009</b>	<b>2010</b>	<b>2011</b>	<b>2012</b>	<b>2013</b>	<b>2014</b>	<b>2015</b>
		1	2	3	4	5	6	7	8	9	10
PBIDT		34,110	54,501	54,764	54,996	55,451	54,605	53,725	52,810	51,859	50,869
CER revenues		9,812	13,639	13,639	13,639	13,639	13,639	13,639	13,639	13,639	13,639
PBIDT with CERs		43,922	68,140	68,403	68,635	69,090	68,244	67,364	66,449	65,498	64,508
Project flows		-220,039	43,922	68,140	68,403	68,635	69,090	68,244	67,364	66,449	65,498
Project IRR		<b>25.48%</b>									

## Approach II

Tariff from the PPA as signed with UPPCL (with escalation):

Year 1	Rs/kWh	2.8600
Year 2	Rs/kWh	2.8900
Year 3	Rs/kWh	2.9300
Year 4	Rs/kWh	2.9700
Year 5	Rs/kWh	3.0200
Year 6	Rs/kWh	3.0614
Year 7	Rs/kWh	3.1033
Year 8	Rs/kWh	3.1459
Year 9	Rs/kWh	3.1890
Year 10	Rs/kWh	3.2327

The table above yields the following cash flows for the project activity:

		2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
		1	2	3	4	5	6	7	8	9	10
Electricity	MWh	20,736	28,823	28,823	28,823	28,823	28,823	28,823	28,823	28,823	28,823
Deduction for billable	2%	415	576	576	576	576	576	576	576	576	576
Tripping	10%	2,074	2,882	2,882	2,882	2,882	2,882	2,882	2,882	2,882	2,882
Actual export	MWh	18,248	25,364	25,364	25,364	25,364	25,364	25,364	25,364	25,364	25,364
<b>Revenue, Rs 1000</b>											
Electricity		52,188	73,303	74,317	75,332	76,600	77,650	78,714	79,793	80,886	81,995
<b>Costs, Rs 1000</b>											
O&M		11,002	11,442	11,900	12,376	12,871	13,386	13,921	14,478	15,057	15,659
Admin		4,000	4,160	4,326	4,499	4,679	4,867	5,061	5,264	5,474	5,693
UPEB maintenance		3,076	3,199	3,327	3,460	3,599	3,743	3,893	4,048	4,210	4,379
<b>PBIDT</b>											
Project flows		-220,039	34,110	54,501	54,764	54,996	55,451	55,655	55,839	56,003	56,145

Project IRR	19.24%									
	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
	1	2	3	4	5	6	7	8	9	10
PBIDT	34,110	54,501	54,764	54,996	55,451	55,655	55,839	56,003	56,145	56,264
CER revenues	9,812	13,639	13,639	13,639	13,639	13,639	13,639	13,639	13,639	13,639
PBIDT with CERs	43,922	68,140	68,403	68,635	69,090	69,294	69,478	69,642	69,784	69,903
Project flows	-220,039	43,922	68,140	68,403	68,635	69,090	69,294	69,478	69,642	69,784
Project IRR	25.80%									

It is clear from the above data that the project activity does not yield sufficient revenues without the consideration of the CDM and is therefore additional. As mentioned in the PDD, we would like to point out that the additionality of the project activity was demonstrated on the basis of the barrier faced by the project activity in particular those related to the regulatory framework in the state which are real and this is clear from the fact that all the projects in the sector have taken CDM into consideration when undertaking the investment to permit exports of power to the grid. It is further shown below how any decrease in the tariff may affect the returns associated with the project activity. We have assumed a decrease of 1.5% annually from year 5 onwards, when the tariff is not defined:

Year 1	Rs/kWh	2.8600
Year 2	Rs/kWh	2.8900
Year 3	Rs/kWh	2.9300
Year 4	Rs/kWh	2.9700
Year 5	Rs/kWh	2.9255
Year 6	Rs/kWh	2.8816
Year 7	Rs/kWh	2.8383
Year 8	Rs/kWh	2.7958
Year 9	Rs/kWh	2.7538
Year 10	Rs/kWh	2.7125

The cash flows associated with the project activity under this assumption of a decreasing tariff are shown in the table below:

		2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
		1	2	3	4	5	6	7	8	9	10
Electricity	MWh	20,736	28,823	28,823	28,823	28,823	28,823	28,823	28,823	28,823	28,823
Deduction for billable	2%	415	576	576	576	576	576	576	576	576	576
Tripping	10%	2,074	2,882	2,882	2,882	2,882	2,882	2,882	2,882	2,882	2,882
Actual export	MWh	18,248	25,364	25,364	25,364	25,364	25,364	25,364	25,364	25,364	25,364
<b>Revenue, Rs 1000</b>											
Electricity		52,188	73,303	74,317	75,332	74,202	73,089	71,992	70,913	69,849	68,801
<b>Costs, Rs 1000</b>											
O&M		11,002	11,442	11,900	12,376	12,871	13,386	13,921	14,478	15,057	15,659
Admin		4,000	4,160	4,326	4,499	4,679	4,867	5,061	5,264	5,474	5,693
UPEB maintenance		3,076	3,199	3,327	3,460	3,599	3,743	3,893	4,048	4,210	4,379
<b>PBIDT</b>											
Project flows		-220,039	34,110	54,501	54,764	54,996	53,053	51,094	49,118	47,123	45,108
Project IRR		17.77%									
		2006	2007	2008	2009	2010	2011	2012	2013	2014	2015

		1	2	3	4	5	6	7	8	9	10
PBIDT		34,110	54,501	54,764	54,996	53,053	51,094	49,118	47,123	45,108	43,070
CER revenues		9,812	13,639	13,639	13,639	13,639	13,639	13,639	13,639	13,639	13,639
PBIDT with CERs		43,922	68,140	68,403	68,635	66,692	64,733	62,757	60,762	58,747	56,709
Project flows	-220,039	43,922	68,140	68,403	68,635	66,692	64,733	62,757	60,762	58,747	56,709
Project IRR	24.71%										

3. Further justification is required regarding why data from the period 2005/2006 has not been used in the calculation of the baseline emission factor.

**Response:** In line with the approved consolidated methodology ACM0002 "Consolidated baseline methodology for grid-connected electricity generation from renewable sources" version 6, the baseline emission factor is calculated in the case of the simple OM is "calculated using either of the two following data vintages for years(s) y:

- (ex-ante) the full generation-weighted average for the most recent 3 years for which data are available at the time of PDD submission, if or,
- the year in which project generation occurs, if  $EF_{OM,y}$  is updated based on ex-post monitoring."<sup>3</sup>

Since we have chosen ex ante estimation of combined margin for the BHL Palia Kalan project, we have used the data that was publicly available for the 3 most recent years which was 2002/03, 2003/04 and 2004/05. Whilst coal consumption data is available for 2005/06 the CEA General Review 2006, which was the most up to date publication, contains data for gas based power plants only for the period 2004/05. We are willing to calculate the Simple OM based on 2005/06 generation data and fuel consumption for coal and use the emission factor for gas based on 2004/05 data in this calculation if it is felt that this would be a more suitable approach by the EB.

4. The additionality of the project should be demonstrated using version 3 of the "Tool for the demonstration and assessment of additionality".

**Response:** The PDD was webhosted between 23<sup>rd</sup> September 2006 to 22<sup>nd</sup> October 2006 using version 3 of ACM0006. On 2<sup>nd</sup> November ACM0006 was revised to version 4, the PDD was updated at this time to reflect version 4 but did not require re-webhosting. At the time of writing the PDD we used the latest version of the additionality tool, version 2. As pointed in the request for the review the additionality tool was revised whilst version 4 of ACM0006 was still applicable. The additionality tool was revised in February 2007 and version 4 of ACM0006 was applicable from November 2006 to May 2007.

We have now updated the PDD using version 3 of the additionality tool but feel that there needs to be some clarification from the EB on this as there would seem to be a conflict with the idea of permitting the use of methodologies that have subsequently been revised, as if all the latest tools available have to be updated. The re-writing and re-validating of projects may continue every time there is a revision.

5. In the PDD it is not quite clear the project design engineering. The PDD (page 10) declares that "project activity only installs a turbine generator (no additional boilers will be installed...)". It is unclear specifically which boiler(s) will be coupled with the turbine generator while in PDD

<sup>3</sup> Page 6 of ACM0006, version 2

(page 2) the capacities and operating pressures and temperatures for five boilers are given in details. It must be explained more clearly how the capacity of the new turbine - 12 MW was chosen.

**Response:** As mentioned in the PDD, the project activity does not involve the installation of any new boiler. It is further clarified in this response that the boiler of 80 TPH<sup>4</sup> capacity manufactured by Thermax with a operating pressure and temperature of 45kg/cm<sup>2</sup> and 450° C respectively will be connected to the new 12 MW turbine generator. Earlier the steam from the boiler was passed through a PRDS (pressure reducing station). The boiler generates sufficient steam to run the turbine of 12 MW and the use of PRDS is discontinued.

Further, the actual steam generation from the boiler is about 72 TPH and the specific steam consumption for power generation is about 6.05 tonnes/MWh for the condensing cum extraction type turbine generator installed in the project activity. The approximate power generation potential can therefore be arrived from the ratio of steam generation in the boiler and the specific consumption of steam in the turbine which gives us:  $(72/6.05) \sim 12$  MW.

6. The PP/DOE shall further substantiate the appropriateness of the emission factor they propose to apply to this project activity.

**Response:** The emission factor has been calculated in line with ACM0002 version 6. An alternative to calculating the emission factor ourselves is to use the CEA emission factor. However this issue has been the subject of a request for review on two other CDM projects and this issue was discussed at EB34. The response was accepted by the EB as this issue was not raised in the subsequent terms of review for these projects therefore we feel that the appropriateness has been dealt with through this process. In terms of the appropriateness of the emission factor we believe that the only possible alternative is the CEA

We have attached below the response to the request for review provided earlier.

**Question 3 – The baseline emission factor (0.914 tCO<sub>2</sub>/MWh) is higher than the factor published by the Central Electricity Authority of India (0.75 tCO<sub>2</sub>/MWh).**

The validation report outlined the main reasons why the CEA CEF was not followed<sup>5</sup>, 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 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 2004/05<sup>6</sup>).

<sup>4</sup> Paragraph 2 of section A.2 in the PDD

<sup>5</sup> <http://www.cea.nic.in/planning/c%20and%20e/Government%20of%20India%20website.htm>

<sup>6</sup> 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.

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, tCO <sub>2</sub> /MWh	Our, tCO <sub>2</sub> /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)<sup>4</sup> 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 fuels<sup>7</sup>. 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 arise<sup>8</sup>. 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 CEA
NCV	Individual power plants or default values	Indian National Communication
EF	Indian National Communication	Indian National Communication
Oxidation factor	Coal and lignite from tests conducted, others from IPCC 2006	IPCC 1996 <sup>9</sup>

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](http://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.

• West: The build margin 2004-05 decreased slightly due to some changes in the composition.”

Source: CO<sub>2</sub> Baseline Database for the Indian Power Sector, User guide, version 2, June 2007

<sup>7</sup> The CEA CEF actually uses GCVs and converts these to NCVs.

<sup>8</sup> 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: CO<sub>2</sub> Baseline Database for the Indian Power Sector, User guide, version 1.1, December 2006

<sup>9</sup> At the time of submission the 2006 IPCC data was not published.