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To
The Secretary
CDM Executive Board
UNFCCC, Bonn
Germany

Ref: BH-II/CDM/6272
Date: January 19, 2009

Subject: *Project Proponent's Response on request for review 'Modification and retrofitting of the existing 34 MW hydropower plant at Bhandardara -2 (project activity) in Maharashtra state in India by Dodson – Lindblom Hydro Power Private Limited (DLHPPL)" UNFCCC reference No 2173*

Clarification 1,2,3

The DOE is requested to clarify how it has validated the calculation of the benchmark, in particular the use of 25.91% as market risk premium.

Response:

The project proponent has used post tax project IRR as a financial indicator for financial analysis and additionality justification.

The benchmark for the project activity is calculated based on para 6 b of the additionality tool.
(b) Estimates of the cost of financing and required return on capital (e.g. commercial lending rates and guarantees required for the country and the type of project activity concerned), based on bankers views and private equity investors/funds' required return on comparable projects;

The project activity involves both equity and debt component. Hence the cost of financing has been derived based upon weighted average of the cost of debt and equity component as determined for the project activity.

1. Cost of Equity:
The cost of equity has been determined based upon the Capital Asset Pricing Model (CAPM).

<u>1.1 CAPM:</u> The Capital Asset Pricing Model (CAPM) is used to determine a theoretically appropriate required rate of return of an asset. The model takes into account the asset's sensitivity

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to non-diversifiable risk (also known as market risk), often represented by the quantity beta (β) in the financial industry, as well as the expected return of the market and the expected return of a theoretical risk-free asset.

The underlying algorithm of CAPM is as follows

$$r = R_f + Beta\ (R_m - R_f)$$

Where,

r = Expected return from a security
R_f = Rate of a risk free investment
R_m = Expected market return
Beta = Indicator towards measuring the volatility of the security, relative to the asset class.

It is apparent from the above equation that the expected return from a security is the return of a risk-free investment plus Beta times the difference between the expected market return and the return from the risk-free investment (termed as market risk premium). Hence CAPM justifies that the expected return of an investor should be commensurate with the higher expected risk of the investment.

In words, the algorithm says

Expected Return from a security = Risk free return + Market risk Premium * Beta

Thus, in order to apply CAPM, the following estimates are required
- Risk Free rate
- Market Risk Premium
- Beta

1.2 Risk Free Rate

The risk free rate is the return on a security (or a portfolio of securities) that is free from default risk. Typically, the rate of long term government bonds are used to determine the risk free rate

In the context of the present project activity YTM[1] (Yield to Maturity) at primary issues over a period of 10 years has been considered to represent the risk free rate.

The value is 7.34%.

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[1] Reserve Bank of India - Annual Report, 2004. Page no.172 of the report
(http://rbidocs.rbi.org.in/rdocs/AnnualReport/PDFs/56232.pdf)

1.3 Market Risk Premium

The market risk premium is the difference between the expected market rate of return and risk free rate and is usually measured by looking at the average of the historical returns on a market portfolio.

In the context of the present project activity, the period of 2002 to 2004 has been selected to calculate the expected market return. Towards calculating the average of the historical returns on a market portfolio, the project participants had the following stock market indices[2] to select from:

BSE SENSEX

BSE Sensex stands for Bombay Stock Exchange Sensitive Index. It is an index composed of the 30 largest and the most actively traded stocks in the market. These companies hold around one fifth of the market capitalization of the BSE. It is regarded as the pulse of share market, the dips and rise of the Indian share market can be identified through the Sensex.

BSE 100

BSE 100 index is called as BSE National Index as it works as a broad-based index reflecting the stock market at national level. Launched in 1989 this index was compiled of 100 companies from "Specified" and the "Non-Specified" list of the five major stock exchanges, viz. Mumbai, Calcutta, Delhi, Ahmedabad and Madras

BSE 200

Launched in 1994, BSE 200 index comprises of the 200 selected companies and their equity shares from the specified and non specified lists of the major exchanges. Companies are short listed on the basis of their current market capitalization and certain fundamental factors like the market performance of the company, volumes of the company turnover etc.

Jaiprakash Hydro Power Ltd. (the only listed IPP having its presence exclusively in hydro sector) forms a part of this index. (**Annexure -4**)

BSE 500

Due to the changing pattern of the economy, Bombay Stock Exchange coined a new index as, BSE 500 comprising 500 scripts. The index represents about 93% of the total market capitalizations, ideally said to represent the total market.

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[2] Project proponent is headquartered in Mumbai and the operating stock exchange from Mumbai is Bombay Stock Exchange.

The market returns from these indices are as mentioned in the table below
(Detailed Computation attached as **Annexure-1**)

	Year	Geometric Mean of Opening Index (for the month of Jan)	CAGR ON AVERAGE
SENSEX	2002	3353.31[3]	33.64 %
	2004	5988.90	
BSE 100	2002	1601.63	40.55 %
	2004	3163.75	
BSE 200	2002	375.28	44.67 %
	2004	785.5	
BSE 500	2002	1035.07	52.80 %
	2004	2416.59	

It is evident from the above analysis that amongst the Bombay Stock Exchange (BSE) indices the returns were maximum for BSE 500 index and the least for SENSEX.In order to be conservative SENSEX was selected as the portfolio of securities that represents the expected market return.

It may be worthwhile to discuss that among the many factors that influence and determine the market risk premium, variance in the underlying economy and the market structure are the most significant. **Risk premiums for emerging markets like India are larger than developed countries owing to their high growth and high risk economies** .Further, if the companies listed on the market are mostly large, stable, and diversified, risk premium is smaller. On the other hand when the companies listed on the market are generally small and not diversified, the risk premium is larger.

Thus the market risk premium estimated is

Market risk premium (Rm – Rf) $= 33.64 - 7.34$

$= \mathbf{26.30\%}$

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[3] Geometric mean of opening Indices price for the respective moth (Jan 2002). The opening data is taken from the website http://www.bseindia.com/histdata/hindices.asp

The BSE Sensex values used in the calculation of the market risk premium were geometric means of opening Index for the month of Jan. The project proponent wishes to bring to the notice of the CDM EB that mean index value used for January 2004 in the previous calculation was inadvertently taken as 5954.15 instead of 5988.90. This incorrect value yielded a CAGR of 33.25% and a market risk premium of 25.91 % as shown in the calculation below.

Market risk premium (Rm – Rf)   = 33.25 % – 7.34 %

                                                            = 25.91%

The same has been corrected in the revised calculations.

However the market risk premium should not be viewed on a standalone basis.

The over all risk premium depends on market risk premium as well as on a parameter called Beta, which has been explained below. While computing the expected return on equity a very conservative value of beta has been taken.

1.4 Beta:

Equity Beta is the measure of the expected volatility of a particular stock relative to a well-diversified market portfolio. It measures the systematic risk of a stock, i.e. the risk that cannot be eliminated in a well-balanced, diversified portfolio. The beta of an equity is calculated as the covariance between its return and the return on a well-diversified market portfolio, divided by the variance of the return on a well-diversified market portfolio.

Equity Beta (βe) = Covariance (r, rm) / Variance (rm)

Where:

r is the return from the equity investment in a single stock

rm is the return from the equity investment in the well-diversified market portfolio

The measured equity beta for a particular firm relates to the unique capital structure of that firm and a change in the capital structure will change the degree of financial risk borne by the equity holders and hence the equity beta. A common practice to allow equity betas to be compared across firms with different capital structures is to adjust the estimated equity beta into the equivalent asset beta (which is the equity beta that would apply if the assets were financed wholly with equity) using the following formula:

$Beta_a = Beta_e / \{1 + (1 - T)^*(D/E)\}$

where:

$Beta_a$ is the Asset beta or unlevered beta of the firm

$Beta_e$ is the Equity beta or levered beta of the firm

T is the marginal tax-rate of the firm

D/E is the debt-equity ratio of the firm

As an asset, beta is purged of the financial risks associated with gearing and it can be compared with other asset betas derived from different capital structures. The asset beta can then be adjusted into an equity beta that is consistent with the target project's level of gearing and compared, say, to an equity beta that can be estimated directly from the market.

Towards determining the value of Equity Beta, listed companies which are also involved in the similar business domain have been compared.

Company	Beta Value[4]
Jaiprakash Hydro Power Ltd (JHPL)	1.078
GVK Power & Infrastructure Ltd (GPIL)	1.101
Tata Power Company Ltd (TPCL)	0.964

Amongst the above listed companies, JHPL is a hydro power based Independent Power Producer (IPP) and TPCL also has mix of hydro power plants in their portfolio. GPIL is involved in establishing only thermal power plants and hence the corresponding Beta value has not been taken into further consideration.

Using the Equity beta value of JHPL, the asset beta has been determined
(Detailed Computation attached as **Annexure-2**)

Company	Equity beta	debt to equity ratio (as per balance sheet of 31.03.2004)	Asset beta Or unlevered beta	Debt to equity ratio of the project	**Equity beta of project**
Jaiprakash hydro	1.078	1.94	0.39	2.33	**1.22**

Equity Beta applicable to the project has been determined by levering the asset beta determined above and using the same formula

$Beta_e = Beta_a * \{1 + (1 - T) * (D / E)\}$
Where

Where D/E is the actual debt-equity ratio of the project and T is the actual effective tax rate of the project (MAT). Thus the equity beta applicable to the project is significantly higher than the equity beta of JHPL.

However, in India, activities in the electricity sector such as generation, distribution, transmission and trading of power come under the purview of a comprehensive legislation called the Electricity Act 2003 (EA 2003)[1]. As per the EA 2003, the power to determine the tariff relating to generation, transmission and distribution of electricity is vested with the Electricity Regulatory Commissions. In compliance with EA 2003, the government of India issued the National electricity policy in the year 2005. The policy required offering investors **a rate of return** on investment based on a clear understanding and evaluation of the risks and opportunities involved in the sector in order to attract investment in the sector (refer section 5.8.4 of the policy). At the same time, the policy also requires maintenance of an appropriate balance between the interests of the consumers and the need for investment while choosing the appropriate return on investment (section 5.8.4). The National Tariff policy, issued subsequently in the year 2006, also stated similar requirements for consideration while calculating tariffs. Accordingly, the Central Electricity Regulatory Commission (CERC) had fixed this appropriate return on investment as 16%.

However during executive board meeting no 40, EB has decided not to accept this benchmark. The exact extract is mentioned below:

"The Board noted that many proposed CDM project activities in the energy sector in India seek to demonstrate additionality by means of investment analysis applying a benchmark of 16%, which is based on tariff orders published in accordance with the Central Electricity Regulation Commission. The Board is concerned with the use of this value as a benchmark for proposed CDM project activities, as this value is used in tariff determination for CDM projects and for non-CDM projects. Therefore the Board is of the view that this value is not a suitable benchmark."

Thus taking due consideration of the above mentioned facts and figures, the conservative beta value taken in the calculation is only 0.60. The conservatism adopted in the computation of expected return on equity should thus be evident.

The table below and the explanation further on justify the conservativeness

Sources	Value	Benchmark return on equity
Equity Beta of JHPL	1.078	35.69 %
Equity Beta of TPCL	0.964	32.69 %

Equity beta applicable to the project	1.22	39.43%
Assumed Beta	0.6	23.12%

Return on equity (pre tax)   = 7.34 + 0.6 * 26.30
= 7.34 + 15.54
= **23.12%**

Impact of variation of Beta

JHPL is the only hydropower company which is listed and has a Beta value of 1.078

Using this value of Beta:

Return on equity   = *7.34 + (1.078 * 26.30)*
= 7.34 + 28.35
= **35.69%**

Therefore the values used by the project proponent in computation of Return on equity in CAPM model are conservative.

Clarification regarding the market risk premium: Thus it is evident that the project proponent has computed market risk premium based on the given guidance from UNFCCC and local financial system. The over all risk premium depends both on beta value and the market risk premium.

2. Cost of Debt:

The cost of debt has been ascertained from the interest rate charged by different Financial Institutions (FIs) who have taken term loan exposure in the present project activity. The project proponent has taken loan from three financial institutions with the varying interest rates. The weighted average interest cost adjusted for minimum alternative tax is considered as cost of debt.

Lenders	Loan (INR'0000000)	Interest rate	Interest
SBI	10.0000	8.750%	0.88
IFC	36.7860	10.945%	4.03
DEG	28.4131	6.478%	1.84
Tot/Avg	**75.1991**	**8.965%**	**6.74**

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The project proponent wishes to bring to the notice of the CDM EB that the post tax cost of debt was inadvertently calculated by dividing the pre-tax cost of debt by (1 – effective tax rate) instead of multiplying with (1- effective tax rate).Thus the value of 9.71 % was used in the calculation of benchmark instead of 8.28 %.

We have appropriately made the correction in the benchmark calculation sheet.

3. **Calculation of Revised Benchmark** (Detailed calculation attached as **Annexure -3**)

Return on equity post tax: Considering the dividend distribution tax of 12.83[5]% and transfer to reserve of 10%, the return on equity is estimated to be 29.46%.

Sources	Weight age	Cost %	Rate
Share Capital (Million INR)	30%	**29.46%**	8.84%
Term loan (Million INR)	70%	**8.28 %**	5.79%
Total	100%		
Weighted average cost of capital		**14.63%**	

The revised benchmark has no impact on the additionality because the Project IRR still does not exceed the benchmark as evident from the table below

Post Tax Project IRRs without CDM Benefits		
Base Case	10% increase in generation	10% decrease in generation
11.78	14.45	8.85

The above response shows the calculation procedure of benchmark. It is clear that during project decision making the market risk premium was high in India market which is reflected in all the Indecies (Shown in Annexure 1). It is clear that the project proponent has calculated benchmark in most conservative manner.

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[5] http://www.personalfn.com/detailb.asp?date=7/10/04&story=6 (12.5%+surcharge)

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In the light of the above justifications, project proponent requests the Executive Board to register the project at the earliest to promote sustainable development in the host country.

With Warm Regards,

For Dodson Lindblom Hydro Power Private Limited

Prem Paunikar
Director (Maharashtra Projects)
Project Proponent