

 <b>CDM: FORM FOR SUBMISSION OF A “LETTER TO THE BOARD” (Version 01.2)</b>	
<p>This form should be used only by project participants and other stakeholders for submitting a “Letter to the Board” in accordance with the latest version of the <i>Modalities and procedures for direct communication with stakeholders</i></p>	
Name of the stakeholder <sup>1</sup> submitting this form (individual/organization):	Chhattisgarh Hydro Power LLP
Address and contact details of the individual submitting this form:	Mr. G. K. Chhanghani, Panchsheel Nagar, JMG House, Raipur, Chhattisgarh – 492001 e-mail: <a href="mailto:gkc@seml.co.in">gkc@seml.co.in</a> Direct Tel: +91-771-2214103 / 2214100
Title/Subject (give a short title or specify the subject of your submission)	<a href="#">Guidance on calculation of Beta in CAPM model</a>
Please mention whether the submitter of the form is:	<input checked="" type="checkbox"/> Project participant <input type="checkbox"/> Other stakeholder, please specify
Specify whether you want the letter to be treated as confidential <sup>2</sup> :	<input type="checkbox"/> To be treated as confidential <input checked="" type="checkbox"/> To be publicly available (UNFCCC CDM web site)
Please choose any of the type(s) below <sup>3</sup> to describe the purpose of this submission.	
<input checked="" type="checkbox"/> <b>Type I:</b> <div style="display: flex; justify-content: space-around;"> <div style="text-align: center;"> <input checked="" type="checkbox"/> <b>Request for clarification</b>  <input type="checkbox"/> Standards. Please specify reference  <input type="checkbox"/> Procedures. Please specify reference  <input checked="" type="checkbox"/> Guidance. Please specify reference Guidelines on the assessment of investment analysis, Version 05.0, EB 62, Annex 5  <input type="checkbox"/> Forms. Please specify reference  <input type="checkbox"/> Others. Please specify reference         </div> <div style="text-align: center;"> <input type="checkbox"/> <b>Revision of existing rules</b> </div> </div> <input type="checkbox"/> <b>Type II: Request for Introduction of new rules</b> <input type="checkbox"/> <b>Type III: Provision of information and suggestions on policy issues</b>	
Please describe in detail the issue on which you request a response from the Board, including the exact reference source and version (if applicable).	
<p>&gt;&gt; The Capital Asset Pricing Model or CAPM has been one of the most widely used methods for calculating the benchmark for CDM projects. Through this model, a WACC is calculated to establish an appropriate required return on an investment, given the balance of financing between debt and equity. The WACC is calculated using the following formula : <math>WACC = (Rd \times (1-t) \times D/(D+E)) + (Re \times E/(D+E))</math></p> <p>Where: Re = Cost of equity  Rd = Cost of debt  T = Marginal Tax rate</p>	

<sup>1</sup> DNAs and DOEs shall use the respective DNA/DOE forms for communication with the Board.

<sup>2</sup> As per the applicable modalities and procedures, the Board may make its response publicly available.

<sup>3</sup> Latest CDM regulatory documents and information are available at: <http://cdm.unfccc.int/Reference/index.html> .

E = Market value of the firm's equity

D = Market value of the firm's debt

Following the CAPM, the Cost of Equity is calculated as:

$$r_e = r_f + \beta * (r_m - r_f)$$

Where:

$r_e$	Required return on equity for such investment
$r_f$	Risk free rate of return
$r_m$	Equity market return
$\beta$	beta, a measure of the volatility, of a security or a portfolio in comparison to the market as a whole. It reflects systematic or market risk, as opposed to company-specific risk

Through this request for clarification, **we seek specific guidance on the calculation of Beta** which is an important element of CAPM.

The CAPM is a method of calculating the firm's cost of equity, based on an assessment of its risk. The CAPM can be used to calculate a discount rate that reflects the business risk of an investment.

#### Proxy Companies And Proxy Betas

The first step in using the CAPM to calculate a discount rate is to obtain information on companies with business operations similar to those of the proposed investment project. For example, if a food processing company was looking at an investment in coal mining, it would need to obtain information on some coal mining companies; these companies are referred to as 'proxy companies'. Since their equity betas represent the business risk of the proxy companies' business operations, they are referred to as 'proxy equity betas' or 'proxy betas'.

From a CAPM point of view, these proxy betas can be used to represent the business risk of the proposed investment project. For example, the proxy betas from several power generation companies ought to represent the business risk of an investment in power generation. If you were to look at the equity betas of several power generation companies, however, it is very unlikely that they would all have the same value. The reason for this is that equity betas reflect not only the business risk of a company's operations, but also the financial risk of a company. The systematic risk represented by equity betas, therefore, includes both business risk and financial risk. To proceed further with calculating a project-specific discount rate, it is necessary to remove the effect of the financial risk or leverage from each of the proxy equity betas in order to find their asset betas, which are betas that reflect business risk alone. If a company has no leverage, and hence no financial risk, its equity beta and its asset beta are identical.

#### Unlevering Equity Betas

The asset beta may be calculated from the equity beta by the following formula:

$$\beta_a = \beta_e * [E / \{E + (1-T)*D\}]$$

Where,  $\beta_a$  = Asset beta

$\beta_e$  = Equity beta

E = Equity of the Company

D = Debt of the Company

T = Company profit tax rate

If the equity beta, the gearing, and the tax rate of the proxy company are known, this asset beta formula can be used to calculate the proxy company's asset beta. Since this calculation removes the effect of the financial risk or leveraging of the proxy company from the proxy beta, it is usually called 'unlevering the equity beta'.

Similarly, the amended asset beta formula is called the ‘unlevering formula’.

#### Averaging Asset Betas

After the equity betas of several proxy companies have been unlevered, it is usually found that the resulting asset betas have slightly different values. This is not surprising, since it is very unlikely that two proxy companies will have exactly the same business risk from a systematic risk point of view. Even two power generation companies will not be using the same power generation technology or getting the same tariff for the power sold. Renewable energy projects will have different asset betas as compared to conventional power generation companies.

In order to remove the effect of the slight differences in business operations and business risk that are reflected in the asset betas, a simple arithmetic average is calculated.

#### Relevering The Asset Beta

The average asset beta represents the business risk of the proposed investment project. Before a project-specific discount rate can be calculated, however, the financial risk of the investing company needs to be taken into consideration. In other words, having unlevered the proxy equity betas when calculating the asset betas, it is now necessary to ‘relever’ the average proxy asset beta to reflect the financial risk of the investing company. In order to represent the equity beta in terms of the asset beta, as follows:

$$\begin{aligned}\beta_e &= \beta_a * \{(E + D*(1 - T))/E\} \\ &= \beta_a * \{1 + (1 - T)*D/E\}\end{aligned}$$

Where,  $\beta_a$  = Asset beta  
 $\beta_e$  = Equity beta  
 E = Equity share of the proposed investment  
 D = Debt share of the proposed investment  
 T = company profit tax rate

The levering and the tax rate of the investing company, and the average proxy asset beta, are inserted into the relevering formula in order to calculate the relevered equity beta. In CDM parlance, Paragraph 18 of EB 62 Annex 5 states that, If the benchmark is based on parameters that are standard in the market, then the typical debt/equity finance structure observed in the sector of the country should be used.

Hence, for relevering the beta for CDM projects, the typical Debt: Equity Structure for new projects in the country should be used.

Thus, the following steps should be performed for obtaining the beta value to be used in the CAPM model:

- a) Select public listed companies that are similar in operations to the investment being evaluated and were listed in the stock market at the time of decision making.
- b) Select the broad market equity index based on which sensitivity of reference stock’s returns will be calculated, i.e the equity beta of proxy companies will be calculated.
- c) Using reference’s stock returns, and equity index’s return, calculate equity beta of reference stock. Since monthly betas over 5 years are considered appropriate, it is essential to select the reference stocks such that at least 5 years of historical data is available.
- d) Convert the reference stock’s equity beta to asset beta using the debt equity ratio and tax rates of the reference stock. Latest available data for a complete financial year can be used to compute debt equity ratio and tax rates
- e) Calculate average of the asset betas of reference stocks
- f) Convert the average asset beta to equity beta by re-levering it using the the typical debt/equity finance structure observed in the sector of the country

## g) Use this beta in CAPM equation

This is the correct step-by step approach for calculating beta and the approach may be verified from several reliable sources. The same approach was discussed as an appropriate approach in an investment analysis work-shop arranged by the PD-Forum and the conclusions of the workshop were acknowledged by Mr. Conor Barry, head of the CDM stakeholder interaction unit, and his team. The veracity of the approach may be verified from the following links:

[http://www.accaglobal.com/content/dam/acca/global/PDF-students/2012/sa\\_apr08\\_head.pdf](http://www.accaglobal.com/content/dam/acca/global/PDF-students/2012/sa_apr08_head.pdf)

<http://pages.stern.nyu.edu/~jgiddy/wacc.htm>

<http://www.regulationbodyofknowledge.org/documents/138.pdf>, pages 175-177

<http://macabacus.com/valuation/DCF/wacc>

<http://www.marciniak.waw.pl/NEW/311726/FM4.pdf>, pages 1-2

The same approach was also proposed in similar clarification request CLA\_TOOL\_0007. The PD-forum had also send an open letter to the CDM Executive Board on May 11, 2009 (<http://www.pd-forum.net/files/4734a436e4e07ce599bfa75b38f990ab.pdf>) wherein the same approach was proposed.

Further, the following registered projects are provided as examples that have also used this approach:

<http://cdm.unfccc.int/Projects/DB/SGS-UKL1232378419.68/view>

<http://cdm.unfccc.int/Projects/DB/RWTUV1310469763.6/view>

<http://cdm.unfccc.int/Projects/DB/BVQI1318836942.28/view>

<http://cdm.unfccc.int/Projects/DB/RWTUV1296641989.51/view>

<http://cdm.unfccc.int/Projects/DB/SGS-UKL1268728393.62/view>

<http://cdm.unfccc.int/Projects/DB/CEC1314779963.83/view>

<http://cdm.unfccc.int/Projects/DB/DNV-CUK1310024518.29/view>

However, in spite of all these evidences and supportives towards the approach; for Indian Projects, Validators have insisted on using the average equity betas only from proxy companies to determine the benchmark on the ground of conservativeness. This approach is inherently wrong since it does not allow for the financial leverages of the proxy companies and heavily undermines the financial and leverage risk of a new company investing in a project in the particular sector. It is our view that the guiding principle in determine the benchmarks should be “correct and conservative”, i.e. the calculation approach should be first correct and then conservative, instead of conservativeness overriding correctness.

This correct approach was further vilified by the rejection of the CDM EB of project no. 2163 where the EB had, in our opinion, incorrectly rejected the project for the beta being too high though it had followed the correct calculation procedure. The Board is requested to note that the beta value is not pre-selected by the PP. It is the outcome of the calculation following the CAPM. The PP has to calculate the average asset beta for all the power companies which were publicly listed in the stock market as “proxy”. The average asset beta represents the business risk of the proposed investment project. Before a project-specific discount rate can be calculated, however, the financial risk for a new company investing in the sector needs to be taken into consideration. In other words, having unlevered the proxy equity betas when calculating the asset betas, it is now necessary to re-lever the average proxy asset beta to reflect the financial risk of a new company who is willing to invest in the sector. Following EB guidelines, the beta has to be re-levered using the standard D:E ratio of 70:30 for power projects in India in line with paragraph 18 of Annex 5, EB 62. This ensures that the re-levered beta correctly reflects the risk of any new company investing in the sector as compared to applying a project specific D:E which would have made the beta project specific. The resultant equity beta value is the outcome of a calculation which is not controlled by the PP. Hence if the approach is correct, then the value of beta which is the outcome of the calculation, is also deemed to be correct immaterial of the value itself. However, the rejection of this project by the EB resulted in DOEs insisting on and PPs obliged to follow an incorrect approach to calculate the beta for Indian projects which has thereby set a precedence which is unfair and unjust and leads to incorrect and overly conservative benchmark values wherein conservativeness overrides correctness.

<p>We hence request the EB to kindly provide specific confirmation that the approach of calculating beta as described above is acceptable or suggest alternate methods of calculating the beta to be used in the CAPM model. We note that in response to AM_CLA_0007 and AM_CLA_0008 the EB has referred to an upcoming guidance on the CAPM. However, in view of such a guidance is yet to be made available, we request the Board to kindly provide us with a working solution for the present time.</p>	
<p><i>Please provide any specific suggestions or further information which would address the issue raised in the previous section, including the exact reference source and version (if applicable).</i></p>	
<p>&gt;&gt;</p>	
<p><i>If necessary, list attached files containing relevant information (if any)</i></p>	<ul style="list-style-type: none"> <li>[replace this bracket with text, the field will expand automatically with size of text]</li> </ul>
<p><b>Section below to be filled in by UNFCCC secretariat</b></p>	
Date when the form was received at UNFCCC secretariat	20 June 2013
Reference number	2013-271-S

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#### History of document

Version	Date	Nature of revision
01.2	08 February 2012	Editorial revision.
01.1	09 August 2011	Editorial revision.
01	04 August 2011	Initial publication date.
<p><b>Decision Class:</b> Regulatory  <b>Document Type:</b> Form  <b>Business Function:</b> Governance</p>		