VALIDATION REPORT

Energy Development Company Limited

2 X 3.5 MW Ullunkal Hydro Power Project in Kerala, India

SGS Climate Change Programme
SGS United Kingdom Ltd
SGS House
217-221 London Road
Camberley Surrey
GU15 3EY
United Kingdom

Date of Issue:	**Project Number:**
12-01-2010	CDM.VAL1824
Project Title:	
2 X 3.5 MW Ullunkal Hydro Power Project in Kerala, India.	
Organisation:	**Client:**
SGS United Kingdom Limited	Energy Development Company Limited
Publication of PDD for Stakeholders Consultation	
Commenting Period:	20/05/2008 – 18/06/2008
First PDD Version and Date:	01, dated 12/05/2008
Final PDD Version and Date:	04, dated 04/08/2009

Summary:

Energy Development Company Limited has commissioned SGS to perform the validation of the project: 2 X 3.5 MW Ullunkal Hydro Power Project in Kerala, India.

Methodology Used: AMS-I.D

Version and Date: 13, dated 14/12/2007

The scope of the validation is defined as an independent and objective review of the project design document, the project's baseline study and monitoring plan and other relevant documents. The information in these documents is reviewed against Kyoto Protocol requirements, UNFCCC rules and applicable CDM requirements.

The report is based on the assessment of the project design document undertaken through stakeholder consultations, application of standard auditing techniques including but not limited to document reviews, follow up actions (e.g. site visit, telephone or e-mail interviews) and also the review of the applicable simplified methodology and underlying formulae and calculations.

The report and the annexed validation describes a total of six findings which include:

- Four Corrective Action Requests (CARs);
- Two Clarification Requests (CLs);
- No Forward Action Requests (FARs); and

All findings have been *closed satisfactorily* and the project:

– ☒Will be recommended to the CDM Executive Board with a request for registration OR

Subject:			**Document Distribution**
CDM Validation			
Validation Team:			
Ajoy Gupta – Lead Assessor Kaushik Pal – Assessor Abhishek Mahawar – Expert (Financial)			☒ No Distribution (without permission from the Client or responsible organisational unit)
Technical Review:	**Trainee Technical Reviewer:**		
Date: 24/08/2009 Name: Kaviraj Singh	Name: NA		☐ Limited Distribution
Authorised Signatory:			
Name: Siddharth Yadav Date: 2nd February 2010			☐ Unrestricted Distribution
Revision Number:	**Date:**	**Number of Pages:**	
0	28-07-2009	80	
1	19-08-2009	79	
2	22-08-2009	79	
3	12-01-2010	81	

Abbreviations

CAR	Corrective Action Request
CAPEX	Capital Expenditure
CDM	Clean Development Mechanism
CDM	EB CDM Executive Board
CER	Certified Emission Reduction
CL	Clarification Request
CPP	Captive Power Project
DPR	Detail Project Report
DOE	Designated Operational Entity
DNA	Designated National Authority
EDCL	Energy Development Company Limited
FAR	Forward Action Request
GHG	Greenhouse Gas(es)
IA	Implementation Agreement
IDC	Interest During Construction
IPP	Independent Power Project
IPCC	Intergovernmental Panel on Climate Change
PDD	Project Design Document
UNFCCC	United Nations Framework Convention on Climate Change

Table of Content

Annexes:

1. Validation Opinion

SGS United Kingdom Ltd has been contracted by Energy Development Company Limited to perform a validation of the project: 2 X 3.5 MW Ullunkal Hydro Power Project in Kerala, India in India.

The Validation was performed in accordance with the UNFCCC criteria for the Clean Development Mechanism (CDM), Validation and Verification Manual version 1 and host country criteria, as well as criteria given to provide for consistent project operations, monitoring and reporting.

The proposed CDM project activity is implementation of a small hydro power project set up of two turbines each of 3.5MW capacity and cumulatively 7 MW of installed capacity. The renewable power generated by the project activity will be thereafter evacuated to the nearest 11 kV grid substation of Kerala State Electricity Board, a part of the Southern Regional Electricity Grid of India. The project activity will result in reductions of greenhouse gas (GHG) emissions that are real, measurable and give long-term benefits to the mitigation of climate change.

In our opinion, the project meets all relevant UNFCCC, CDM criteria and all relevant host country criteria. The project correctly applies methodology AMS-I.D version 13. It is demonstrated that the project is not a likely baseline scenario. Emission reductions attributable to the project are hence additional to any that would occur in the absence of the project activity.

The total emission reductions from the project are estimated to be 219,490 tCO2e over a ten year crediting period, averaging 21,949 tCO2e annually. The emission reduction forecast has been checked and it is deemed likely that the stated amount is achieved given the underlying assumptions do not change.

The project will hence be recommended by SGS for registration with the UNFCCC.

Signed on Behalf of the Validation Body by Authorized Signatory

Signature: 

Name: Siddharth Yadav

Date: 2nd February 2010

2. Introduction

2.1 Objective

Energy Development Company Limited has commissioned SGS to perform the validation of the project: 2 X 3.5 MW Ullunkal Hydro Power Project in Kerala, India with regard to the relevant requirements for Clean Development Mechanism (CDM) project activities. The purpose of a validation is to have an independent third party assess the project design. In particular, the project's baseline, the monitoring plan (MP) and the project's compliance with relevant UNFCCC and host country criteria are validated in order to confirm that the project design as documented is sound and reasonable and meets the stated requirements and identified criteria. Validation is seen as necessary to provide assurance to stakeholders of the quality of the project and its intended generation of certified emission reduction (CER). UNFCCC criteria refer to the Kyoto Protocol criteria and the CDM rules and modalities and related decisions by the COP/MOP and the CDM Executive Board.

2.2 Scope

The scope of the validation is defined as an independent and objective review of the project design document, the project's baseline study and monitoring plan and other relevant documents. The information in these documents is reviewed against Kyoto Protocol requirements, UNFCCC rules and associated interpretations. SGS has employed a risk-based approach in the validation, focusing on the identification of significant risks for project implementation and the generation of CERs.

The validation is not meant to provide any consulting towards the Client. However, stated requests for clarifications and/or corrective actions may provide input for improvement of the project design.

2.3 GHG Project Description

The proposed project activity is a small hydro based renewable energy generation project set up across the run of the river which will harness the potential of the water resource abundantly available, to generate 7MW electricity to be supplied to the Kerala State Electricity Board which is the part of the southern regional grid of India. The project activity involves the implementation of two turbines 3.5 MW capacity each.

2.4 The Names and Roles of the Validation Team Members

Name	Role	Affiliate
Ajoy Gupta	Lead Assessor	SGS INDIA
Kaushik Pal	Assessor	SGS INDIA
Abhishek Mahawar	Expert (Financial)	SGS INDIA

3. Methodology

3.1 Review of CDM-PDD and Additional Documentation

The validation is performed primarily as a document review of the publicly available project document version 01dated 12/05/2008 and the subsequent versions 02, dated 02/02/2009 and version 03 dated 21/07/2009 (final version). The assessment is performed by trained assessors using a validation protocol attached as Annex 2 Table 2

The site visit was performed on 08/07/2008. The execution team on the site visit checked the methodological applicability, baseline, project additionality; PDD related documents and the results are summarized in Annex I: Local Assessment checklist.

3.2 Use of the Validation Protocol

The validation protocol used for the assessment is designed in accordance with the Validation and Verification Manual, Version 1 dated 28 November 2008. It serves the following purposes:

- it organises, details and clarifies the requirements the project is expected to meet; and
- it documents both how a particular requirement has been validated and the result of the validation (reporting).

The validation protocol consists of several tables. The different columns in these tables are described below.

Checklist Question	Ref ID	Means of Verification (MoV)	Comment	Conclusion/ CARs/CLs
The various requirements are linked to checklist questions the project should meet.	Lists any references and sources used in the validation process. Full details are provided in the table at the bottom of the checklist.	Explains how conformance with the checklist question is investigated. Examples of means of verification are document review (DR) or interview (I). N/A means not applicable.	The section is used to elaborate and discuss the checklist question and/or the conformance to the question. It is further used to explain the conclusions reached.	This is either acceptable based on evidence provided (Y), or a Corrective Action Request (CAR) due to non-compliance with the checklist question (See below). Clarification Request (CL) is used when the validation team has identified a need for further clarification.

The completed validation protocol for this project is attached as Annex 2 to this report

3.3 Findings

As an outcome of the validation process, the team can raise different types of findings

A Clarification Request (CL) is raised if information is insufficient or not clear enough to determine whether the applicable CDM requirements have been met

Where a non-conformance arises the Assessor shall raise a **Corrective Action Request (CAR).** A CAR

is issued, where:

I. The project participants have made mistakes that will influence the ability of the project activity to achieve real, measurable additional emission reductions;
II. The CDM requirements have not been met;
III. There is a risk that emission reductions cannot be monitored or calculated.

The validation process may be halted until this information has been made available to the assessors' satisfaction. Failure to address a CL may result in a CAR. Information or clarifications provided as a result of a CL may also lead to a CAR.

A Forward Action Request (FAR) is raised during validation to highlight issues related to project implementation that require review during the first verification of the project activity. FARs shall not relate to the CDM requirements for registration.

Corrective Action Requests and Clarification Requests are raised in the draft validation protocol and detailed in a separate form (Annex A.3). In this form, the Project Developer is given the opportunity to "close" outstanding CARs and respond to CLs and FARs.

3.4 Internal Quality Control

Following the completion of the assessment process and a recommendation by the Assessment team, all documentation will be forwarded to a Technical Reviewer. The task of the Technical Reviewer is to check that all procedures have been followed and all conclusions are justified. The Technical Reviewer will either accept or reject the recommendation made by the assessment team. Findings can be raised at this stage and client must address them within agreed timeline.

4. Validation Findings

4.1 Approval

The Host Party for the proposed project activity is India. India ratified the Kyoto protocol on 26th August 2002. The Letter of Approval (LoA) No. 4/15/2008-CCC has been issued by the Host Country DNA on 12th March 2009[/4/] and the same document was received by SGS on 17th April 2009 from the Project Participant's (PP) directly. The LoA is clear, transparent and confirms the ratification year of the Host Party, voluntary participation of the proposed CDM project activity and contribution to sustainable development to the Host country. The aforementioned LoA does not contain any additional information regarding the PDD of the proposed project activity.

A LoA from the Host Country was not available during the initial PDD review, so **CAR #1 was raised**. In response to CAR #1, the PP has submitted a copy of the Host Country Approval (HCA) letter issued by the Director (CC) of the Ministry of Environment and Forests, Government of India. The HCA (No. 4/15/2008-CCC; dated 12/03/2009) issued by Indian DNA (Ministry of Environment & Forest, Government of India), was cross checked with the original HCA letter and found to be consistent. The DNA of India, DNA Address and Contact Person was referred from http://cdm.unfccc.int/DNA/index.html#I and found to be consistent with the HCA letter. The HCA letter clearly stated the four major requirements as indicated by Para 45 of EB44 Annex 3 (Validation and Verification Manual) which was checked and it could be concluded that India is a Party to the Kyoto Protocol; the participation in the proposed CDM project activity is voluntary and assists India in Sustainable Development. The LoA has also indicated the precise title that is being submitted along with this validation report and is unconditional. The project title as mentioned in the HCA letter was found to be in line with the title mentioned under section A1 of the PDD web hosted for global stake holder's comments towards the CDM project activity. Hence **CAR #1 was closed out.**

4.2 Participation Requirements

The Host Party for this project is India. India has ratified the Kyoto Protocol on 26th August 2002 and is allowed to participate in CDM projects (Weblink: http://maindb.unfccc.int/public/country.pl?country=IN). Energy Development Company Limited has been approved by Indian DNA to participate in this project. The participation requirements to the Kyoto Protocol and contribution to the sustainable development of the host country are confirmed from the Host Country Approval letter (No. 4/15/2008-CCC; dated 12/03/2009) issued by the DNA of India (Ministry of Environment & Forest, Government of India). The participation has been approved by the Indian DNA, and the same has been verified on the basis of the HCA letter issued by the India DNA which is unconditional.

No Annex I Party has been identified in the PDD and the same has been also verified by cross checking the project investment details and it has been validated that the project activity does not involve any investment/contribution from Annex I county at project registration phase. Furthermore the project proponent also submitted the declaration on non-involvement of ODA (self declaration letter dated 03/07/2008)[/22/] same has been checked and found satisfactory. As no Annex I Party is currently involved into the current project activity therefore no further Letter of Approval from Annex I Country is involved at registration phase. It is observed that the CDM EB has agreed that the registration of a CDM project activity can take place without an Annex I Party being involved at the stage of registration although it should be noted that before CER can be transferred to an Annex I Party, a Letter of Approval will need to be submitted. Thus the same was accepted.

4.3 Project Design Document including Project Description

The proposed project activity is a small hydro based renewable energy generation project set up across the run of the river which will harness the potential of the water resource to generate 7MW of electricity to be supplied to the Kerala State Electricity Board which is the part of the southern regional grid of India. The project activity involves deployment of two turbines each of 3.5MW capacity. The project activity is situated at Chittar village, Panthanamthitta District in the State of Kerala, in the Southern India, same was validated

during site verification. The geographical co-ordinates of the project activity have been verified from Google Earth as Latitude- 9°20'30'' and Longitude-76°56'00''.

The technology used in the project activity is available in India and no transfer of technology is involved.

The project technical description along with the specification of the project activity as mentioned in the PDD has been cross checked from project equipment purchase order[/14/]. The plant and machinery of the project consists primarily two S type, horizontal, Kaplan turbines and synchronous generator.

During the site visit it was found that the project activity was not commissioned. The requirement of an extensive initial training and maintenance efforts in order to work as presumed during the project period, was checked and verified while carrying out the validation site visit by conducting interviews and discussions with the operating personnel at the power plant site and was found to have knowledge, qualification and prior experience in the said field. Latter on the project got commissioned on 03/10/2008 and the same has been verified with the commissioning certificate issued by Chief Electrical Inspector to government of Kerala, Thiruvanthapuram, Order no. B3-7909/2007/CEI, dated 03/10/2008.

The project funding, for the current activity, has not involved any ODA utilization. This was discussed with the Project Participant during validation site visit and the project proponent has submitted a self declaration on no ODA utilization[/22/]. Thus it is evident that there has been no ODA utilisation or public funding from Annex I country.

Considering the current project activity as a run of the river small hydro power plant and extensive delay in obtaining Implementation Agreement from Kerala State Electricity Board, Govt. of Kerala **CAR #2 was raised** to justify the implementation schedule of the proposed project activity and the related risk for the project implementation schedule with the selected crediting period. In response to CAR #2 the PP has elaborated the CDM chronology in the section B.5 of the current version of the PDD, which says that the project activity faced a delay around two years to get the signed Implementation Agreement from Kerala State Electricity Board, Govt. of Kerala after continuous follow ups and reminder mails. The copy of the emails and reminder letters were cross checked and the reason for the delay was found justified for the implementation of the project activity as Independent Power Project (IPP). Please refer to the CDM milestone section 4.7.2 of this report. Furthermore the project was commissioned on 03/10/2008 and the same has been verified with the commissioning certificate issued by Chief Electrical Inspector to government of Kerala, Thiruvanthapuram, Order no. B3-7909/2007/CEI, dated 03/10/2008.Thus **CAR #2 was closed out**.

4.4 Eligibility as a Small Scale Project

The proposed CDM project activity is a small hydro power project set up of two turbines each with a capacity of 3.5 MW and a cumulatively installed capacity of 7 MW power. In view of the fact that the project's capacity is less than 15 MW, it is eligible for type I small scale CDM project activity and can apply a simplified baseline methodology. The project applies the baseline methodology stipulated for category I.D of the "simplified modalities and procedure for small scale CDM project activity". Thus it can be concluded that the proposed project activity falls under the small scale project activity and the project design description justifies the applicability criteria of approved small scale methodology AMS-I.D, version 13.

4.5 Applicability of selected methodology to the project activity

The proposed CDM project activity selected the simplified methodology AMS-I.D, version 13 which applies five applicability criteria under AMS-I.D, version 13, methodology. The first criteria refers to the category which comprises renewable energy generation units, such as photovoltaic, hydro, tidal/wave, wind, geothermal and renewable biomass, that supply electricity to and/or displace electricity from an electricity distribution system that is or would have been supplied by at least one fossil fuel fired generating unit. With respect to the above criteria the project activity is a run-of-the-river hydro power plant which will generate electricity and evacuate the net electricity to the southern regional grid which in absence of the project activity would have been generated by the grid mix consisting of carbon intensive fossil fired generating units. Thus it justifies the first criteria which displaces the fossil fuel with the river water based renewable energy source.

The second criteria refers that the unit added has both renewable and non-renewable components (e.g. a wind/diesel unit), the eligibility limit of 15MW for a small-scale CDM project activity applies only to the renewable component. If the unit added co-fires fossil fuel, the capacity of the entire unit shall not exceed the

limit of 15MW. In view of the fact that the project's capacity is less than 15MW, the project is eligible as type I small scale CDM project activity and ensures the applicability criteria under applied methodology.

The third criteria applied for that the project activity which has combined heat and power (co-generation) systems, and those are not eligible as per the applicability criteria. The project activity is not a co-generation project and according to the project activity technology this will generate electrical power from the river water. Thus the third criteria are not applicable for the project activity under consideration.

Fourth criteria is applicable for those project activities that involve the addition of renewable energy generation units at an existing renewable power generation facility, the added capacity of the units added by the project should be lower than 15 MW and should be physically distinct from the existing units. The proposed project activity is a new installation therefore this applicability criterion is not applicable.

The last requirement under this methodology is for those project activities that seek to retrofit or modify an existing facility for renewable energy generation. To qualify as a small scale project, the total output of the modified or retrofitted unit shall not exceed the limit of 15 MW. As stated above the proposed project is a new facility, therefore 4th applicability criteria is also not applicable for this project.

4.6 Project Boundary

The project system boundary includes the power plant from the diversion weir to transmission system till the evacuation point of electricity. The proposed project activity consists of two 3.5MW horizontal, S type, Kaplan turbines. The spatial boundary of the project activity includes the southern regional grid system of India.

	GHGs involved	**Description of the emission sources**
Baseline emission	CO_2	Emissions equivalent to the amount of net electricity supplied by the project activity that would otherwise be generated by power plants connected to the Kerala State Electricity Board grid, which is a part of southern regional grid system of India.
Project emission	CO_2	Emissions from the Diesel Generator set during emergency or exigency condition during the proposed crediting period of the proposed project activity.
Leakage	Not applicable	Not applicable, as the energy generating equipment is not transferred from another activity.

The selected sources and gases as indicated above are justified for the project activity, with reference to the applied methodology

4.7 Baseline Selection and Additionality

The project applies the approved small scale methodology AMS-I.D "Grid connected renewable electricity generation", version 13. The baseline methodology is applicable since the project involves generation of 7 MW power using hydro resources and displaces electricity from the southern regional grid of India. The proposed project activity is a small scale project and the project additionality has been demonstrated through EB 35, annex 34 "Non-binding best practice examples to demonstrate additionality for SSC project activities".

The project qualifies as a small scale CDM project activity as it uses AMS-I.D, version 13 and the total installed capacity is 7 MW which is much less than 15 MW, as per Modalities and Procedures for the SSC CDM Project activities. The project participant has identified the most likely baseline scenario as the equivalent power generation at the carbon intensive Southern Regional Grid of India, the baseline data regarding Indian Power Sector has been referred from the "CO_2 Baseline Database for the Indian Power Sector" Version 03, December 2007, published by Central Electricity Authority, Ministry of Power, Govt. of India (http://www.cea.nic.in/planning/c%20and%20e/Government%20of%20India%20website.htm).

Based on the baseline options and combinations directed in the applied methodology the following is arrived at as the most suitable and plausible baseline scenario as Alternative 1 "Continuation of existing scenario: no project activity and electricity generated by the present fossil fuel fired grid connected thermal power plants", which is deemed to be most plausible for the proposed CDM project activity. As the project activity supplies

electricity to the Kerala State Electricity Board grid, which forms a part of the southern regional electricity grid, the baseline for this project activity is a function of the generation mix of the southern regional grid. The selected baseline scenario is found to be as per the requirement of approved methodology, AMS-I.D, version 13. The selection of the southern regional grid as the grid system boundary for the project activity is in line with the EB's guidance for large countries such as India.

4.7.1 Additionality

The additionality of the proposed CDM project activity has been illustrated as per Attachment A to Appendix B of the simplified modalities and procedures for small scale CDM project activities. The project activity mainly focuses on additionality through Investment Barrier. The proposed project activity is small scale project and the additionality has been demonstrated through "Non-binding best practice examples to demonstrate additionality for SSC project activities"; EB35, Annex 34. The current project activity does not require to follow the Additionality Tool, version 5.2. According to the EB 35 Annex 34, the PP shall provide an explanation to show that the project activity would not have occurred anyway due to at least one of the following barriers i.e. Investment barrier, Access-to-finance barrier, Technological barrier, Barrier due to prevailing practice and other barriers. In accordance with the stated requirement the PP demonstrates additionality by discussing Investment Barriers.

Investment barrier:

The initial PDD represented an investment analysis to describe the financial unattractiveness through pay-back-period calculation with respect to the investment return expectation from project promoter's first experience on hydro project set up *i.e.* Harangi Phase-I. at Karnataka, India.

Investment analysis: Choice of approach:

The proposed project activity accumulates financial benefits through the export of electricity only, other than CDM revenue and baseline scenario does not involve any investment , where benchmark/ pay-back-period is applicable. The project promoter has carried out an investment analysis based on the total project cost, tariff structure and cost of production in order to demonstrate that the project is not economically attractive.

As per the guidelines laid down by EB 35, Annex 34 project proponent has further demonstrated the project investment analysis through application of a benchmark analysis and Project Internal Rate of Return has been calculated.

Investment analysis: Input parameters:

On site the additionality has been discussed with the PP and the consultants as well. Further documents have been reviewed on site.

Finally the data, rationales, assumptions, justifications and documentations provided have been cross checked and verified using local knowledge as well as sectoral and financial expertise. The data/ assumptions used for project IRR calculation have been cross checked with reference to the following references:

Parameters	Assumptions/sources of data	value
Capacity	Detail Project Report (DPR) for 2x3.5 MW Ullunkal Hydro Electric Project /32/ The DPR is prepared by EDCL, through a joint preliminary field inspection of the entire project site carried out by Energy Development Company Limited and Boom Systems Private Limited (Manufacturers of hydroelectric power projects - http://www.microhydropower.net/directory/viewdetails.php?ID=402) for a period of 20 days during the monsoon season of 2005.	7 MW

Capital cost with IDC	The total investment cost/capital cost of the project activity has been conceptualized in the Detailed Project Report (DPR) prepared jointly by the project proponent and M/s Boom Systems Private Limited (Manufacturers of hydroelectric power projects) dated 26/10/2005 prior to the investment decision taken by the project proponent. The detailed break-up of the capital cost have been provided in the DPR under the following heads - - Cost of Civil Works, - Cost of Power Plant & Transmission, - Cost of Hydro Mechanical Work & - Cost of Acquisition of assets. The total project cost and it's break up details (Preliminary expenses of INR 13 million; Cost of Civil Works of INR 36.228 million; Cost for Power plant & Transmission of INR 64.256 million; Cost for Hydro-Mechanical Works of INR 22.239 million) has been adopted from the Detail Project Report (DPR) for 2x3.5 MW Ullunkal Hydro Electric Project /32/, same was cross checked and found consistent. Furthermore the Cost for acquisition of Assets as INR 235 million was cross checked from the Agreement signed between Energy Development Company Limited and Tecil Chemicals & Hydro Power Ltd. dated 06/03/2006/33/ and found consistent. The capital cost has further been certified by an independent 3rd party, a Chartered Accountant firm M/s Mehta Paraj & Company (ICAI M.No.58617) on 12.01.2006 prior to the investment decision. Total CAPEX value and detailed cost breakup has been also cross verified with reference to the project cost break-up details duly certified by third party Chartered Accountant firm/11/ and found consistent. Interest During Construction (IDC) component of capital investment is a calculated parameter which has been calculated envisaging that the term loan will be taken in phase-wise manner. The summation of the interest component accumulated each year, calculated from the total term loan accumulated in that particular year represents the total IDC component. Please refer to the IRR computation sheet named "IRR_Ullunkal_Version 03" worksheet named "Capitalized Cost" cell number E26, E27 & E28. The computation worksheet gives clarity on how the parameter has been calculated. The calculation has been certified by the chartered accountant. The detailed break up of the CAPEX has been provided in the worksheet named "Capital Cost Break up". The capital cost further has been further substantiated with the actual cost incurred by the project proponent. The actual cost incurred is higher than the cost envisaged during the point of investment decision. The actual cost has been certified by an independent chartered engineer, the actual project cost has been verified as INR 402,451,790 with reference to the Capital Cost Certification for 2 x 3.5 MW Ullunkal Hydro Electric Project dated 29.04.2009. Furthermore the actual cost of INR 128.98 million incurred for civil works, hydro-mechanical works, electro-	INR 400.783 million

	mechanical works and O&M works has been cross checked from the actual invoices and found that the assumptions made during project conceptual phase are actually on conservative side. The input value for project capital cost as conceptualized in the DPR is valid and applicable at the time of the project investment decision on 27/01/2006. Thus confirm the requirement of VVM version 1.1 Para. 111(c).	
Debt Equity Ratio	"Consultative paper on Purchase requirement of non Conventional energy and determination of tariff for small hydro generating station and wind energy" issued by Kerala State Electricity Regulatory Commission, dated 18/01/2006[10].	70:30
Plant Load factor	The expected electricity output as well as PLF has been arrived at based on the hydrological study as provided in the Detailed Project Report prepared by M/s Boom Systems Private Limited and EDCL. The contract document (EDCL/BSPL/09-05/417; dated 28.09.2005) signed between Boom Systems Private Limited and EDCL for preparation of Detailed Project Report for the 2 X 3.5 MW Ullunkal Hydro power Project was cross checked and found satisfactory. Boom Systems Private Limited is an engineering company (Business type: manufacturer; Product types: hydro energy system components (small); Service types: consulting, design, installation, construction, engineering) verified through publicly available information at (http://www.microhydropower.net/directory/viewdetails.php?ID=402 and http://energy.sourceguides.com/businesses/byGeo/byC/India/byP/hydro/microhydrocomp/microhydrocomp.shtml#36852) *Therefore consideration of PLF value for project investment analysis has been found inline to the available guidance Para 3 (b) of EB48 (Annex 11).* Consideration of 45% PLF value at project conceptual phase found realistic and logical with reference to the "Consultative paper on Purchase requirement of non Conventional energy and determination of tariff for small hydro generating station and wind energy" issued by Kerala State Electricity Regulatory Commission, dated 18/01/2006[10] which suggests a PLF of 45% for all run of the river projects in Kerala state. For tariff determination of hydro projects in Kerala, Notification (No. 1/1/KSERC-2006/XV) issued by Kerala State Electricity Regulatory Commission (KSERC), dated 24th June, 2006 (http://www.erckerala.org/codes/regulationXV.pdf) is followed which suggests a benchmark PLF of 30% for hydel projects. Following VVM para 111 (c), the PLF was further cross checked. The average PLF of all the hydro power projects in Kerala comes out to be about 43%. The same has been validated from http://kseboard.com/ (Refer to the Section energy potential of the generating stations). For the sake of conservativeness the project proponent has considered the higher Plant Load Factor i.e. 45% for the calculation of IRR for the proposed CDM project activity, which is found justified and acceptable.	45%

Gross generation	Calculated parameter assuming Plant Load Factor of 45%	27.59 GWh
Net energy sent to grid	Calculated parameter assuming an outage of 5%, auxiliary consumption of 0.5% and transformation loss of 1% on Gross generation. *Consideration of outage loss of 5% has been validated through "GUIDELINES FOR FORMULATION OF DETAILED PROJECT REPORTS FOR HYDRO ELECTRIC SCHEMES, THEIR ACCEPTANCE AND EXAMINATION FOR CONCURRENCE" published by CEA." Weblink: http://www.cea.nic.in/hydro/Special_reports/GUIDELINES%20for%20formulationof%20DPR%20for%20HE%20Schemes.pdf [Please refer Page No. 40, clause 1.4 of Appendix – 1]*	25.82 GWh
Power selling rate/unit	The electricity tariff rate during the time of investment decision has been adopted based on "Consultative paper on Purchase requirement of non Conventional energy and determination of tariff for small hydro generating station and wind energy" issued by Kerala State Electricity Regulatory Commission, dated 18/01/2006 /10/ which specifies power tariff for all hydro project developers and the tariff remains fixed for a period of 25 years. The relevance and importance of this reference is discussed further after this table.	Rs 2.40/kWh
Escalation Rate	These assumptions have been verified from "Consultative paper on Purchase requirement of non Conventional energy and determination of tariff for small hydro generating station and wind energy" issued by Kerala State Electricity Regulatory Commission, dated 18/01/2006 /10/. The relevance and importance of this reference is discussed further after this table. The O&M cost has been assumed to be 1.5% of the total project cost, during the time of investment decision. This is in accordance with the tariff guidelines as provided by the Kerala Electricity Regulatory Commission (KERC), available at http://www.erckerala.org/codes/regulationXV.pdf	0%
O&M charges inclusive insurance		1.5%
O&M escalation rate		4%/year
Depreciation rate as per electricity act		3.6%
Depreciation for Building	Depreciation value of Buildings as 3.34% and Plant & Machinery as 5.28% has been adopted from the Companies Act, 1956 Schedules, same was checked and verified against the document made publicly available through the web link (http://www.mca.gov.in/MinistryWebsite/dca/actsbills/pdf/Companies_Act_1956_Part_2.pdf) and found correct.	3.34%
Depreciation for Machineries		5.28%
Min Alt. Tax (MAT)	As per Income Tax Act 1961 (http://www.indiainbusiness.nic.in/investment/taxation.htm)	11.33%
Income Tax Rate	As per Income Tax Act 1961 (http://www.indiainbusiness.nic.in/investment/taxation.htm)	33.66%

A significant number of the project investment analysis assumptions were adopted from the "Consultative paper on Purchase requirement of non Conventional energy and determination of tariff for small hydro generating station and wind energy" published by Kerala State Electricity Regulatory Commission (KSERC) /10/. For power tariff determination all the hydro power generating units in Kerala have to follow the regulations as specified by KSERC. The above document was the document based on which KSERC (Power Procurement from Renewable Sources by Distribution Licensee) Regulations, July 2006 was finalized. Thus all the assumptions which were taken based on the Consultative paper can further also be verified from the KSERC regulations, July 2006 which has to be followed by all the hydro projects in Kerala.

The values or assumptions used for project financial calculation are all thoroughly traceable and found suitable and valid during the time of project decision. As discussed above, the main assumptions for project investment analysis have been adopted from the Detailed Project Report (DPR) dated 26/10/2005 and "Consultative paper on Purchase requirement of non Conventional energy and determination of tariff for small hydro generating station and wind energy" issued by Kerala State Electricity Regulatory Commission (KSERC), dated 18/01/2006. Consecutively the project decision has been conceptualized by the Board of Directors of EDCL to take over the Ullunkal SHP as an IPP with the consideration CDM revenues on 27/01/2006. The timeline gaps observed between DPR preparation and project decision is grossly 3 months and between KSERC Consultative Paper and project decision is grossly less than a month. Therefore following VVM para 111 (a), it has been found acceptable that all the assumptions were still valid during project decision making.

Investment analysis: Benchmark selection:

The benchmark value for project investment analysis has been considered as Benchmark Prime Lending Rate (BPLR) of the Indian Public Sector Banks according to Reserve Bank of India (RBI) in the financial year 2005-2006, which is the year for project conceptualisation and subsequent project decision. The benchmark value 10.75% has been cross checked with the Reserve Bank of India web portal http://rbidocs.rbi.org.in/rdocs/Publications/PDFs/87456.pdf and found satisfactory. The RBI document "Table 74: Structure of Interest Rates" as validated, states that the Prime Lending Rate during the period the financial year 2005-2006 was between 10.25%-10.75percent. However the weighted average prime lending rate during the same period was 10.7%. The same was also cross checked from the Annual Report 2006-2007 of RBI (http://rbidocs.rbi.org.in/rdocs/AnnualReport/PDFs/79541%20.pdf; pp. 21) where it is clearly mentioned till the FY 05-06 *i.e.* till March'06 the weighted average PLR of Indian Public Sector Banks was 10.7% and that of private sector banks was 12.4%. Hence a PLR of 10.75% was accepted to be on the conservative side.

Therefore, consideration of benchmark value was found in line with the guideline laid down by EB 41 Annex 4 thus accepted.

Investment analysis: IRR Calculation and conclusion:

The project IRR for has been validated as 9.35% which is much below the benchmark value of 10.75% of the Public Sector Banks according to Reserve Bank of India in the year 2005-2006 same was cross checked from Reserve Bank of India web portal (http://rbidocs.rbi.org.in/rdocs/Publications/PDFs/87456.pdf) and found satisfactory. The benchmark for project investment analysis and further financial unattractiveness of the project IRR also verified considering the country risk premium of 6.00%. The country risk premium for India has been cross checked from "Country Default Spreads and Risk Premiums" by Aswath Damodaran, Professor of Finance at the Stern School of Business at New York University and corporate finance specialist (please refer the web-link http://pages.stern.nyu.edu/~adamodar/New_Home_Page/datafile/ctryprem.html).

Thus the project activity is not financially viable and is additional due to financial calculations. Investment analysis of the project activity has been carried out in the feasibility study carried out at the time of conceptualization of the project activity. The project cost and investment analysis related other assumptions have been checked and which was available at the time of conceptualization of project activity.

Investment analysis: Sensitivity analysis:

The sensitivity analysis has been demonstrated for the most sensitive parameters in order to check the influence of the following factors in the project IRR calculations. In sensitivity analysis the variable chosen are the Plant Load Factor (PLF) and Project Cost. The units of electricity generated by the run of the river hydro power project activity grossly depends on the availability of the water and relative effect of power plant PLF on the project IRR is significant along with the direct impact of deflection in project cost. The power tariff rate which is directly related to the project revenue is fixed as per the Kerala State Electricity Regulatory Commission, same was cross checked against the Consultative paper on Purchase requirement of non Conventional energy and determination of tariff for small hydro generating station and wind energy issued by Kerala State Electricity Regulatory Commission, dated 18/01/2006[/10/] and found justified. Thus the parameter, power tariff were not considered to be a realistic variable, hence not considered in the sensitivity analysis.

- *Plant Load factor:* The PLF have been taken from "Consultative paper on Purchase requirement of non Conventional energy and determination of tariff for small hydro generating station and wind

energy, dated 18th January, 2006" which suggests a PLF of 45% for all run of the river projects in Kerala. Plant Load Factor mainly depends on the capacity of generation or vis-à-vis, which mainly fluctuates on the water availability at the head of the turbo-generator set. Availability of water is a very sensitive parameter as it depends on the climatic condition of the particular region. Hence plant load factor may vary +/- 10% with the actual assumption.

- *Project cost:* According to the Director's Report to the shareholders (Ayyappa Hydro Power Limited (AHPL), Annual report 2006-2007, AHPL is the parent company of EDCL) the project work was assumed to be completed by the year 2007, but due to the unavailability of Implementation Agreement project work was delayed by a year. The construction period took more than 2.5 years. Delay in establishment of the project activity is directly related with the project cost of hydro power plant. Hence project cost can not be a constant parameter and may vary +/- 10% with the actual assumption.

The following table will provide the clear and transparent overview after the variance of the sensitive parameters as per the EB guidelines:

Parameters	Variation	Project IRR
PLF	-10%	8.09%
	0%	9.35%
	10%	10.56%
Project Cost	-10%	10.74%
	0%	9.35%
	10%	8.13%

A chosen range of variation of the % change in the PLF and Project Cost (in the range between -10% to +10% and its effect on the project IRR were found to be as per the Guidance on the Assessment of Investment Analysis (EB 41, Annex 45). The outcome of the sensitivity analysis is found to be robust against the Internal Rate of Return determined prior to decision making for the project case subject to the said variable and variation range, thus accepted.

4.7.2 Prior Consideration of the Clean Development Mechanism

The starting date of the project activity has been demonstrated using the Letter of Award (Ref. No. EDCL/BSPL/LOA/240A) dated 19th February 2007 to Boom Systems Private Limited for Power Generation Equipment (Turbine Generator Set) and the Letter of Award copy was checked with the same as the earliest project initiative and found in line with the CDM project start date definition as provided in the "Glossary of CDM terms", version 3 and EB 41 meeting report paragraph 67, hence accepted.

The consistency of the project start date with the discussion of the project additionality was not transparent. Also, how and when the CDM was taken into serious consideration as per EB 41 Annex 46 guideline in the decision to go ahead with the project activity along with the detail CDM project milestone activities was also not clear especially on the following reason:

- The starting date of the project activity as per the initial PDD version 01 is 27/01/2006.
- Further explanation was required regarding selection of project start date and the appropriateness of the same with project start date definition.
- How and when the CDM was taken into serious consideration in the decision to go ahead with the project activity is not clear and the same has to be properly substantiated.

Thus CAR #3 was raised to provide clarification along with reliable evidences on the above points.

Start date for the current project activity has been re-determined by the PP and the equipment purchase order dated 19/02/2007[14] has been considered as the project start date. The reported project start date has been found inline to the EB 41 Meeting Report, Para 67 being the earliest date at which the implementation of the project activity begins and the date on which the project participant has committed to expenditures related to the implementation or related to the construction of the project activity. It was accepted by the DOE.

Below mentioned CDM project chronology table provides clear evidences towards CDM consideration prior to the start date of the project activity i.e. awareness of CDM, Board approval for the project activity under CDM consideration and the real action taken to implement the project activity.
The CDM project chronology and supporting documentary evidences have been reviewed and prior CDM knowledge and serious CDM consideration for the proposed project activity has been demonstrated in the following milestone activities –

CDM Project milestone activities	**Timeline**	**Documentary evidences reviewed**
Awareness of CDM		
EDCL considered CDM for their project Harangi Phase II, which is also a small hydro power plant to be set up. Hence during the conceptualization of the Ullunkal project (as an IPP) EDCL was aware of CDM.	29/10/2005	Copy of the Board Resolution for the Harangi Phase II project Web-link to PDD uploading on UN for Harangi Phase II : http://cdm.unfccc.int/Projects/Validation/DB/KX1MNTZLORNR8CU48XL3DGLAQT1GGY/view.html
Project Approval with consideration of CDM		
The Board of Directors of EDCL took the decision to take over the Ullunkal SHP as an IPP with the consideration CDM revenues.	**27/01/2006**	**Copy of the Board Resolution**[/12/]
Continuing and Real Actions Undertaken		
Communications between CDM consultants and EDCL regarding the project activity under CDM path.	20.03.2006 & 27/03/2006	Email communications between EDCL & CDM consultants dated 20.03.2006 & 27.03.2006
Proposal sent by CDM consultants to EDCL for consultant engagement to develop the project activity under CDM route.	06/04/2006	Email communication between CDM consultants and EDCL dated 06.04.2006
Communication in between EDCL and CDM consultant, that they will enter into the CDM cycle soon after the transfer of the Ullunkal SHP as an IPP from the Government of Kerala & signing of the Implementation Agreement.	20/04/2006 & 27/04/2006	Email communication between CDM consultants and EDCL dated 20.04.2006 27.04.2006
Transfer of Ullunkal Hydro Power Project as an IPP to M/s Energy Development Company Limited by the Government of Kerala	**22/05/2006**	**Reference: G.O(MS)No 14/2006/PD dated 22.05.2006**[/13/]
Without the Implementation Agreement being signed it is not possible for the project proponent to implement the project activity as well as take steps pertaining to CDM *i.e.* if the IA is not granted the project proponent could not set up project. Hence EDCL	22.06.2006 to 27.10.2006	Letter from M/s Energy Development Company Limited to the Chief Engineer, Kerala State Electricity Board (KSEB) regarding signing of IA.

communicated to the CDM consultants that they would enter into the CDM cycle only on receiving feedback from KSEB regarding the signing of the IA. All these communications highlighted the problem EDCL was facing regarding the signing of the IA. There was no certainty of the very implementation of the project activity even after the take over from TECIL as there was no response from the KSEB's side regarding the signing of IA till 06.11.2006. Immediately after this response from KSEB EDCL considered the appointment of CDM consultants.		[Reference: EDCL/BLR/F-82./2006-07/190-92; dated 22/06/2007) Letter from M/s Energy Development Company Limited to the Chairman, KSEB regarding signing of IA. [Reference: EDCL/BLR/F-82/2006-07/230-32; dated 04/07/2006]. Letter from M/s Energy Development Company Limited to the Chief Engineer, KSEB regarding signing of IA. [Reference: EDCL/BLR/F-82/2006-07/259-60; dated 11.07.2006] Email communication between CDM consultants and EDCL dated: 24.07.2006 26.07.2006 Letter from M/s Energy Development Company Limited to the Chairman, KSEB regarding signing of IA. [Reference: EDCL/BLR/F-82A/2006-07/409-10; dated 14.08.2006] Letter from M/s Energy Development Company Limited escalating the concern to Honourable Minister, Power Department Government of Kerala Regarding signing of IA [EDCL/BLR/F-82./2006-07/641; dated 11.10.2006] Letter from M/s Energy Development Company Limited to the Chairman, KSEB regarding signing of IA. [Reference: EDCL/BLR/F-82A/2006-07/688-89; dated

		27.10.2006].
First response from KSEB regarding Implementation Agreement.	06/11/2006	KSEB letter reference no. CP/BD/121-G1/SHP/2007/82, dated 06/11/2006[16]
Response from EDCL to the Chief Engineer, KSEB and submitted the required details of the company, financial strength and technical capabilities of the persons.	30/11/2006 & 12/01/2007	Reference: EDCL/BLR/F-82A/2006-07/808-10, dated 30/11/2006 and EDCL/BLR/F-82A/2006-07/896-98, dated 12/01/2007
Communication from EDCL to CDM consultants for further procedure as the proposed project activity is unviable without CDM revenue.	16/01/2007	Email communication between CDM consultants and EDCL dated: 16/01/2007
Letter of Award for the Turbo-generator set	**19/02/2007**	**Reference: EDCL/BSPL/LOA/240A, dated 19/02/2007[14]**
CDM consultant appointment	**16/04/2007**	**EDCL letter reference no. EDCL/E&Y/CDM/LOA/04/2007-08/001, dated 16/04/2007[15].**
PDD submission to MoEF for the Host County Approval and validation of the project activity could not take place due to unavailability of the Implementation Agreement. Email communications in between CDM consultant & project proponent regarding PDD finalization.	03/05/2007 to 04/10/2007	Email communication between CDM consultants and EDCL dated 02/07/2007, 10/07/2007, 19/07/2007 & 04/10/2007.
Second response from KSEB (Response from Energy Management Centre, Government of Kerala regarding signing of IA)	02/11/2007	Reference: NO.EMC/SHP/EDC-AHP/01, dated 02/11/2007
Third response from Energy Management Centre, Govt. of Kerala	01/01/2008	Reference: NO.EMC/SHP/EDC-AHP/01, dated 01/01/2008
DOE appointment	**05/05/2008**	**Signed contract available with SGS.**
PDD web hosted for global stake holders consultation process	20/05/2008	http://cdm.unfccc.int/Projects/Validation/DB/SYB3DHL6WAX58BJ03V3GWWTXYKAZ6Z/view.html
Implementation Agreement signed	**30/06/2008**	**Energy Management Centre letter reference no. EMC/SHP/EDC-AHP/02, dated 30/06/2008[6]**
Project activity commissioned	**03/10/2008**	**Commissioning certificate issued by Chief Electrical Inspector to**

		Government of Kerala, Thiruvanthapuram. Order no. B3-7909/2007/CEI, Dated 03/10/2008.
Receipt of Host Country Approval	**12/03/2009**	**Host Country Approval from Govt. of India, Ministry of Environment & Forests. (Ref. no. No.4/15/2008-CCC, dated 12/03/2009)**

With reference to the above mentioned chronology of the project milestone activities and the supporting documents, it has been found justified that CDM revenue was considered in the decision to implement the project activity and project participant has demonstrated continued and real actions were taken to secure CDM status for the project in parallel with its implementation as per guidelines set in EB41 Annex 46. Therefore with reference to the above mentioned discussions, the serious prior consideration of the CDM revenue for the project activity has been found evident. Therefore **CAR #3 was closed out.**

4.7.3 Identification of alternatives (if applicable)

As mandated by the methodology AMS-I.D Version 13, the project participants have identified the credible alternatives as per the guideline mentioned under applied methodology. The project promoter identified all credible and realistic alternatives to the project activity as follows:

Alternative 1: Continuation of existing scenario: no project activity and electricity generated by the present fossil fuel fired grid connected thermal power plants.

Alternative 2: The proposed project activity not undertaken as a CDM project activity

The list of alternatives to supply the above mentioned results, which are also presented in the current version of the PDD, includes the project activity undertaken without being registered as CDM project. The remaining alternative presented does include all plausible scenarios taking into account the local and sectoral situations for the mentioned results. The list of alternatives is therefore considered complete.

Alternative 1 has been observed as the common scenario for the electrical power generation sector of southern regional grid of India, thus this option has been considered further for arriving at the baseline scenario.

Alternative 2 has not been considered as the viable option due to the financial unattractiveness (as discussed in the following part of this report) without considering CDM revenue.

Identification of the most plausible baseline alternative via the alternatives-elimination-route as well as the appropriateness of such alternative is being assessed with the proper evidences. Based on the baseline options and combinations directed in the applied methodology the following is arrived as the most suitable and plausible baseline scenario as Alternative 1 “Continuation of existing scenario: no project activity and electricity generated by the present fossil fuel fired grid connected thermal power plants”, which is deemed to be most plausible for the proposed CDM project activity.

For identified baseline scenario the mandatory law and regulation in the host country has been verified and found in compliance with all laws and regulations of the host country India. The baseline alternative identified is inline with the applied methodology and found plausible for implementation at the project site.

4.7.4 Investment analysis (if applicable)

Current project activity is small scale activity and the additionality of the same has been demonstrated through Investment barrier analysis following guidelines laid down by “Non-binding best practice examples to demonstrate additionality for SSC project activities”; EB35, Annex 34.

4.7.5 Barrier analysis (if applicable)

The proposed project activity is a small scale project and as per guidelines EB 35 Annex 34 i.e. "Non-binding best practice examples to demonstrate additionality for the SSC project activities", PP described the barrier analysis and identified the related barriers which are restricting the implementation of the project. In order to establish additionality of the project, the PP has considered investment barrier. Please refer Section 4.7.1 of this report for detail discussion on Investment barrier and IRR calculations. However, CAR #4 was raised due to the following reason in connection to the additionality discussion in the first version of PDD:

1. The investment barrier description was not transparent in the initial PDD and the PP was needed to substantiate the following –

- As per PDD version 01, the project activity originally belonged to Travancore Chemicals & Hydro Power Limited (TECIL) which suffered heavy losses. Financial report of Travancore Chemicals & Hydro Power Limited of the loss making years, was required to be submitted.
- Documentary evidence when EDCL took over the project activity from Tecil after repaying INR 23.5 Crores was required to be submitted to the DOE.
- Justification regarding why pay back period has been considered as financial indicator instead of IRR where as IRR provides much more appropriate scenario for assessment of project financial viability.
- Clarification and substantiation towards the pay back period of the project activity with the company's internal benchmark for similar kind of project activities.
- Justification towards determination procedure for company's internal benchmark and also clarify its applicability for the project financing.
- Substantiation towards he detail project payback calculation sheet along with proper traceability of the data/ assumptions used.
- The proof for the investment required towards the total project cost along with the source of funds and the related terms and conditions, made available to the project activity for its implementation.
- Documentary evidence towards the power tariff and the escalation clauses along with all other evidences considered with respect to energy generation, operation & maintenance and depreciation parameters pro-vided in the PDD.

2. The Institutional Barrier as mentioned in the PDD, version 01 was needed to be further clarified towards evidence regarding delay, in finalizing the Power Purchase Agreement (PPA) due to the changing in status from CPP to IPP of the proposed project activity.

3. Other barriers due to water sump in the power house area were not justified, as this is due to civil construction related issues, which were supposed to have been checked during the project designing phase. The PP needs to provide further clarification for the same.

4. The Common Practice Barrier as mentioned in the PDD, version 01 was not clear, the same needed to be further clarified as per the CDM requirement.

In response to CAR #4, the PP has further represented the project additionality with reference to the guideline laid down by "Non-binding best practice examples to demonstrate additionality for SSC project activities"; EB35, Annex 34. Investment barrier has been demonstrated as the prime barrier towards project implementation and all other barrier discussion has been withdrawn in the revised version of the PDD.

Project investment barrier analysis has been duly demonstrated through project investment analysis, selecting Project IRR as financial indicator and applying benchmark analysis approach. The investment analysis approach followed was found in line with the relevant guideline of UNFCCC. All the assumption used for project investment analysis was cross checked and found justified and valid during the time of project decision making stage. The project IRR value has been validate as 9.35% against the selected benchmark value of 10.75%. The benchmark value for project investment analysis has been considered as Benchmark Prime Lending Rate (BPLR) of the Indian Public Sector Banks according to Reserve Bank of India in the financial year 2005-2006, which is the year for project conceptualisation and subsequent project decision. The benchmark value 10.75% has been cross checked with the Reserve Bank of India web portal http://rbidocs.rbi.org.in/rdocs/Publications/PDFs/87456.pdf and found satisfactory. Thus **CAR #4 was closed out.**

For detailed discussion on project additionality and investment analysis please refer Section 4.7.1 of this validation report.

4.7.6 Common practice analysis

Current project activity is small scale activity and the additionality of the same has been demonstrated through Investment barrier analysis following guidelines laid down by "Non-binding best practice examples to demonstrate additionality for SSC project activities"; EB35, Annex 34.

4.8 Application of Baseline Methodology and Calculation of Emission Factors

According to the applied methodology AMS-I.D, version 13, the PP has correctly calculated all the necessary equations to calculate project emission, baseline emission, leakage and thus emission reduction.

The project activity primarily aims to generate electricity from hydro technology by using the river water. As per the requirement of the applied Baseline methodology, the project activity used the following equation:

$BE_y = EG_y * EF_{GRID}$

Where,

BE_Y=Baseline Emissions due to displacement of electricity during the year y (in tCO_2)

EG_Y=Net units of electricity substituted in the grid during the year y (in MWh)

EF_{GRID}=Emission Factor of the grid (tCO_2/MWh) calculated *ex-ante* and fixed for the entire crediting period.

After the detailed analysis of the above mentioned equation project activity meets the entire requirement as stated in the methodology and provided all the parameters in the current version of the PDD in terms of ex-ante and ex-post in the respective section of the PDD i.e. section B.6.2 and B.7.1. The project activity describes the following parameter as ex-ante:

EF_{GRID} = Emission Factor of the grid (tCO_2/MWh) calculated *ex-ante* and fixed for the entire crediting period

The grid emission factor value 0.85 tCO2/MWh for Southern Regional Grid of India has been cross from the "CO_2 Baseline Database for the Indian Power Sector" Version 03, December 2007, published by Central Electricity Authority, Ministry of Power, Govt. of India (http://www.cea.nic.in/planning/c%20and%20e/Government%20of%20India%20website.htm) and found consistent.

4.9 Application of Monitoring Methodology and Monitoring Plan

The project applies the approved monitoring methodology AMS-I.D, version 13, "Grid connected renewable electricity generation" for Type I – Renewable Energy Projects, according to Appendix B of the "Simplified modalities and procedures for small-scale CDM project activities. Given that the emission factor is estimated and fixed ex-ante in the line with the monitoring methodology AMS-I.D, version 13, the data to be monitored are the electricity supplied by the project activity. The diesel consumption in the D.G set during emergency will also be monitored.

The net electricity supplied to the grid will be monitored by main meter and check meter. Data registering procedure of total electricity generated and auxiliary electricity will be available in the Distributed Control System (DCS), furthermore the readings will be recorded directly in the Central Control Room on daily basis. The recorded data will be cross checked with the sales invoice. Diesel consumption will be monitored and recorded in the D.G log book and proper project emission will be calculated according to the applied methodology. Detailed monitoring methodology and management plan for the data storage have been reviewed during site visit and found in line with the revised version of the PDD.

The PP identified the following parameter as the monitored data after the implementation of the project activity as *ex-post*:

EG_Y=Net units of electricity substituted in the grid during the year y (in kWh)

The aforementioned all the parameters have been utilized to determine the baseline emission calculation and further discussed the emission reduction by applying the equation

Emission reduction = Baseline emission – Project emission – Leakage

Where Project emission is considered as zero, as the project not utilized any fossil fuel during the operation, however fossil fuel consumption will be measured through out crediting period whenever consumed. In the project activity, there is no transfer of energy generating equipment from another activity and no transfer of the existing equipment to another activity hence no leakage is considered.

Based on the above discussion it was found that the proposed project activity fulfils the entire monitoring requirement of the applied methodology and well supported with the assumed data mentioned in the baseline emission calculation procedure. Thus the values used in the baseline calculation are being considered as reasonable in the context of the proposed project activity.

CL #6 was raised to provide the CER calculation excel sheet with the evidences for the assumptions used in the calculation of the project CER estimation through out the crediting period. The project proponent has submitted the CER calculation excel sheet with the detail assumptions as taken to predict the CER emission during the fixed crediting period. The calculation algorithm used in *ex-ante* Emission Reduction calculation excel sheet was cross checked along with assumptions related to Power Plant capacity of 7 MW (acceptable as per project design), PLF of 45% (justified as per "Consultative paper on Purchase requirement of non Conventional energy and determination of tariff for small hydro generating station and wind energy, dated 18th January, 2006" /10/), Operational 365 days (standard assumption), Outage of 5% (justified as per reference /31/), Auxiliary consumption of 0.5% (justified as per http://www.cea.nic.in/planning/c%20and%20e/Final%20User%20Guide.pdf; pp 16) and Transformation loss of 1% (satisfactory as per the logic for electricity generation at 6.6 KV and then upgrade to 11KV and 33KV to be exported to grid. The loss due to this has been assumed to be 1% taking into account the efficiency of transformers to be 99%) and found satisfactory, hence **CL #6 was closed out.**

To calculate the project emission during the proposed crediting period due to the diesel consumption in the D.G sets during the emergency period by the project activity, the project developer has been included the following equations as well as parameters in the Annex-4 of the current version of the PDD:

$PE_{DG} = (FF_{DG} \times D_{DG} / 10^6) \times NCV_{DG} \times Oxid \times EF_{DG}$

Where,

PE_{DG} = Project Emissions due to electricity generation from the in-house DG set
NCV_{DG} = Net Calorific Value of Diesel=43 TJ/Gg (Source: IPCC, to be kept fixed *ex-ante*)
FF_{DG} = Fuel consumption of the DG set (To be Monitored)
Oxid = Oxidation factor=1 (Source: IPCC, to be kept fixed *ex-ante*)
EF_{DG} = Emission Factor of Diesel=74.1tCO_2/TJ (Source: IPCC, to be kept fixed *ex-ante*)
D_{DG} = Density of Diesel = 0.89 kg/litre (Source: IPCC, to be kept fixed *ex-ante*)

CL #5 was raised to clarify whether DG sets will be in use within the project boundary for monitoring the project emission during the proposed crediting period. In response to CL #5 the PPt has included the monitoring procedure of diesel consumption in the DG sets during proposed crediting period due to the emergency situation or power failure at the proposed project activity site in the section B.6.1, B.6.2 and B.7.1 of the final PDD. The same has been verified with the revised PDD and found satisfactory. Thus **CL #5 was closed out.**

4.10 Environmental Impacts

The proposed CDM project activity contributes to generation of green power, thus the project activity is expected to have only beneficial impacts on the environment and no adverse impacts are foreseen. There is no local and national legislative mandate for carrying out an environmental impact assessment study for such project activity. Relevant statutory clearances/19/,/23/ have been reviewed and verified by the DOE and found in line with host country environmental legal requirements.

4.11 Local Stakeholder Comments

Project proponent has considered the following stake holders mentioned below:

- Chittar Village panchayet.
- Employees of EDCL.
- Local NGO
- Local club

During the validation site visit it has been verified that the identified local stakeholders have been informed and requested to express their views and provide their feedback on the same. The PP has provided the copy of written communication letters[/26,27, 28/] issued to the local stakeholders informing them regarding the project activity to be set up and the time, date and venue of the interactive session organized for the same requesting them to join and provide their feedbacks.

The notice was circulated on 24/12/2007 and the interactive sessions were conducted on 01/01/2008 and 15/01/2008.

The positive comments and feedback provided by the local stake holders regarding the project activity to be set up by Energy Development Company Limited have been reviewed[/26, 27, 28, 29/] and discussed during the validation site visit by on-site interviews, and no negative comments towards the project activity has been observed.

5. Comments by Parties, Stakeholders and NGOs

In accordance with sub-paragraphs 40 (b) and (c) of the CDM modalities and procedures, the project design document of a proposed CDM project activity shall be made publicly available and the DOE shall invite comments on the validation requirements from Parties, stakeholders and UNFCCC accredited non-governmental organizations and make them publicly available. This chapter describes this process for this project.

5.1 Description of How and When the PDD was Made Publicly Available

The Project Design Document for this project was made available on the UNFCCC website: http://cdm.unfccc.int/Projects/Validation/DB/SYB3DHL6WAX58BJ03V3GWWTXYKAZ6Z/view.html and was open for comments from 20/05/2008 until 18/06/2008. Comments were invited through the UNFCCC CDM homepage

5.2 Compilation of all Comments Received

Comment Number	Date Received	Submitter	Comment
1	18-06-08 1:58am	Name: Eleni Organisation: None City: Houston Country: Mauritania	This project received 1 comment which was detected as being a spam mail.
2	18-06-08 1:49pm	Name: Priya Mehta Organisation: Individual City: UP Country: India	The promoter of this project EDCL is also a promoter for Karikkayam project under Validation, http://cdm.unfccc.int/Projects/Validation/DB/SYB3DHL6WAX58BJ03V3GWWTXYKAZ6Z/view.html. The comments raised to Karikkayam project will remain same to this project too as the concept, the implementation taken over from TECIL. Looks like project is lacking additionality. The Ullunkal Hydro Electric project activity originally belonged to Travancore Electro Chemical Industries Limited (TECIL)" which is identified fact, wherein the source (http://www.srpc.kar.nic.in/july06/p19-22.pdf) states the Ullunkal SHP has been allotted to TECIL before 2000 and the work had been stopped since March 2001. This means the concept of the project has been allotted to a promoter way back before 2000. Major work for this hydro project had started way before (source: http://expert-eyes.org/projects.html). The PP agrees to the fact that project implementation has been started way before 2000, As observed from the PDD, The Implementation initially allocated to TECIL when the project was being

Comment Number	Date Received	Submitter	Comment
			developed as a Captive Power Project". With this the start date of activity is contradictory. So the start date of the project remains a conflict and has to be checked by the DOE very carefully no matter whenever the CDM go decision is. It is EDCL's wish to decide when to go for CDM, but here the point to be noted is concept of the project, implementation of the project, draft PPA already laid by TECIL way back, and today EDCL coming forward taking over the project and saying facing many problems, right from the inception stage CDM is considered are not at all accepted and even DOE should accept this fact. It is EDCL's headache to take such kind of project from TECIL which suffered heavy losses due to labor unrest and some other factors in a financial mess. It is PP's problem and has nothing to do with the CDM activity. This delay in finalizing the PPA, Implementation Agreement etc would have anyway happened in absence of CDM project activity. Don't take this change of company as an advantage and use everywhere as barrier w.r.t CDM project which is quiet evident that the project has no additionality other than grabbing project from sick company like TECIL. It is DOE's responsibility to check the additionality. The DOE should asssess the additionality of the project w.r.t EDCL's point of view, how EDCL is having barrier w.r.t this activity. Any barriers related to delay or loss of financial of TECIL cannot be accepted as a barrier to the EDCL neither to the CDM project actitivty. The project would have anyway happened in absence of the CDM revenue with the same timeline of delay even if TECIL would have continued this project till now. So any problem related to TECIL will not be a barrier to EDCL nor CDM project activity. Please DOE keep this in mind and kindly assess. As per the Methodology Tool (Tool for the demonstration and assessment of additionally) financial indicator can be anyone of the following: IRR, NPV, cost

Comment Number	Date Received	Submitter	Comment
			benefit ratio, or unit cost of service First of all Pay back period is not a relevant financial indicator w.r.t CDM, though it is known financial indicator used by bank as stated in the PDD. The project is not additional in this case and investment barrier is utterly not acceptable, unless you prove the investment barrier by using valid indicators as given above and in tools laid by CDM EB. It is DOE's duty to assess the investment barrier analysis throughout the lifetime. Other barriers: is not acceptable as it will be same case for every. PDD states: "Barriers due to prevailing practice: Accepted EDCL is second IPP to go CDM, but PP states second IPP for hydro which is not true at all. There are 24 hydro power projects owned by KSEB and 2 by private agencies and are being developed for captive purposes". This PP being one of the second IPP to develop a hydro project is absolutely wrong and unacceptable. Since there are few hydro projects developed by IPP, please see from this link http://expert-eyes.org/projects.html. If you are talking about TECIL, yes it might be one of the first IPPs, since it has started the concept of Karikkayam project way back in 1994 and the ullunkal project in 2000. So in what sense the PP (EDCL) is second, please justify clearly and substantiate. Grid emission factor is 854.933tCO2/GWh as per CEA database guidelines version 3. Hence overall, the project cannot prove investment barrier, prevailing practice barrier, impact of CDM revenue, so additionality. The start date of project is not applicable for CDM which is 2000 when implementation started and since 2001 project kept hold. It is DOE's duty to check as stated in the PDD : "The Implementation Agreement was attained by TECIL when the project was being Developed as a Captive Power Project.", which means the EDCL is now continuing this agreement to IPP,

Comment Number	Date Received	Submitter	Comment
			however the origin / concept of the project remains same which started earlier 2000. and it also means that EDCL is not the conceptualizer, is just a secondary who took over. So the project start date is not 2006 as mentioned, the project start date is somewhere in 2000 when TECIL started implemented.

5.3 Explanation of How Comments Have Been Taken into Account

Project Proponent Response:

The Ullunkal Hydro project was originally alloted to TECIL as a CPP (Captive Power Project) by KSEB on 30.12.1994. Due to the consistent losses, TECIL was not in a position for completion of the project which was then hived off to EDCL for being set as an IPP (Independent Power Project). The sequence of pertaining to the project activity has been already mentioned earlier.

This further substantiates that the hydro power project as a CPP did not exist anymore. The project activity under consideration is the IPP. So the project activity under consideration never started before 2000. It was taken up by EDCL with the consideration of an upfront investment of 23.5 Crores to TECIL and with the consideration CDM revenues as evident in the board resolution (dated 27/01/2006) for approval of the project activity.

The project activity under consideration is the IPP and not the CPP. Hence the start date of the project activity had been taken as the date of Board Resolution i.e. 27.01.2006 when the board members of EDCL decided to take over the project activity as an IPP. According to the Executive Board the start date of a CDM project activity is the earliest of the dates at which the implementation or construction or real action of the project activity begins.

“Glossary of CDM terms” defines the start date of a CDM project activity as: “the earliest date at which either the implementation or construction or real action of a project activity begins”. Moreover in accordance to the EB 41 it was further clarified that “the start date shall be considered to be the date on which the project participant has committed to expenditures related to the implementation or related to the construction of the project activity” Hence in accordance to this guidelines the start date of the project activity has been revised to the date of purchase order of the Turbo-generator set *i.e.* 19.02.2007. The same has been modified in the PDD/version 3. The relevant document substantiating the same has been provided to the DOE.

The IA (Implementation Agreement), PPA (Power Purchase Agreement) which was with TECIL was not valid anymore due to the change in the status of the project from CPP to IPP. So the delay in obtaining fresh clearances is solely related to the project activity *i.e.* the IPP.

The problems faced by TECIL are not taken as a barrier for the project activity. The delay in signing of IA is not related to the change of company. Copies of the repeated communications to KSEB from EDCL supporting the same have been provided to the DOE. Moreover the investment barrier faced in the project activity financing is related to the costs incurred by EDCL and not by TECIL. Documentary evidences supporting the same have been provided to the DOE.

The project proponent took over the project activity from a sick company like TECIL. There was no possibility of TECIL continuing with the project activity due to their financial condition. The Financial report of TECIL has been submitted to the DOE substantiating the same. Moreover the barriers that faced by EDCL is no way related to TECIL. The Investment barrier is related to the investments made by EDCL. The Institutional

Barrier is also related to the IPP *i.e.* the project activity by EDCL and not the CPP which was allotted to TECIL. Documentary evidences of all the barriers faced have been provided to the DOE.

The additionality of the project is based on Investment Barrier as mentioned in the PDD/Version 03. During financial feasibility study for the project activity under consideration, the project proponent assessed the project on the basis of the pay-back period of its 1st hydro project *i.e.* Harangi Phase I. This has been clearly substantiated in the board resolution passed for the approval of the Ullunkal hydro power project. The same is being consistently followed for all similar projects taken up by the project proponent *i.e.* Harangi Phase II project and Karikkayam Hydro project. The payback period of the project activity is much higher than that of the payback period of Harangi Phase I. The cash flows of Harangi Phase I has been submitted to the DOE to justify the procedure of calculation of the pay-back period of Harangi Phase I. In addition to this the project also faced financing problems such rejection of loan from banks and other non-banking financial institutions further showing the project returns were not attractive. Hence for all the hydro projects pay-back period have been the internal assessment criteria for EDCL. However as per the requirement of UNFCCC investment analysis Project Internal Rate of Return was calculated based on the assumption of the parameters has been taken during the point when the investment decision was taken by the Board of Directors of M/s Energy Development Company Limited. The results are given below:

IRR of the project activity	**Benchmark (Reserve Bank of India Benchmark Weighted Average Prime Lending rates of the Public Sector Banks (PSBs) in 2005-06)** (http://rbidocs.rbi.org.in/rdocs/Publications/PDFs/87456.pdf)
9.35%	10.75%

Based on the above figures it is quite evitable that the project IRR was lower than the benchmark figure.

The justification of the same has been provided in the previous paragraph.

The same has been revised in the PDD/Version 03.

The Barriers due to prevailing practice has been withdrawn from the PDD and further the additionality of the project activity is determined based on “Non-binding best practice examples to demonstrate additionality for SSC project activities”; EB35, Annex 34.

The same has been modified in PDD version 3

The justification of the same has been provided earlier.

DOE Remarks:

Project start date – The Captive Power Plant (CPP) project initiative taken by Travancore Electro Chemical Industries Limited (TECIL) is not related with the current project activity. As per the public domain information (http://www.srpc.kar.nic.in/july06/p19-22.pdf) it is evident that the initiatives related to CPP development had been stopped since March 2001 and the current project activity has been allotted to the project proponent as an Independent Power Plant (IPP) by the Power Department, Government of Kerala [Ref. G.O.(MS) 14/2006/PD; dated 22.05.2006] on 22/05/2006. The different allotment procedure for small hydro electric projects to Captive Power Producers and Independent Power Producers is clearly demonstrated vide Order (G.O.(MS)No. 5/2006/PD; dated 17.03.2006: http://www.keralaenergy.gov.in/pdf/pd_go_ms_5_2006_pd.pdf) issued by Government of Kerala. Thus the IPP project approach taken up by M/s Energy Development Company Limited is completely different from the initiative earlier taken by Travancore Electro Chemical Industries Limited.

Start date for the current project activity has been re-determined by the PP and the equipment purchase order date (19/02/2007)[14] has been considered as the project start date. Consideration of the project start has been found justified as the earliest date at which the implementation of the project activity begins and the date on which the project participant has committed to expenditures related to the implementation or related to the construction of the project activity (EB 41 Meeting Report, Para 67), thus accepted.

Project Additionality – The additionality description of the current project activity has not included any critical issue related to Travancore Electro Chemical Industries Limited and has been directly demonstrated with reference to the project proponent's (M/s Energy Development Company Limited) point of view.

The additionality of the project activity has been demonstrated through "Non-binding best practice examples to demonstrate additionality for SSC project activities"; EB35, Annex 34 and Investment Barrier was established as the main barrier to the project activity implementation and Barriers due to prevailing practice was withdrawn from the PDD.

As per the guidelines laid down by EB 35, Annex 34 project proponent has further demonstrated the project investment analysis through application of a benchmark analysis. The IRR calculation has been cross checked with reference to the objective evidences for the assumptions used and found to be low (9.35%) from the investment benchmark value considered (10.75%) even at a ±10% variation of the project PLF value and project cost, which considered to the be the most sensitive parameter involved in the investment analysis. For detail discussion on project additionality, please refer above Section 4.7.1 of this report.

6. List of Persons Interviewed

Date	Name	Position	Short Description of Subject Discussed
08/07/2008	Mr. Sanjeev Saraf Mr. L.K. Sadani	Executive Director Advisor	Project proponents view on CDM project activity and project design and monitoring plan.
08/07/2008	Mr. Sanjeev Saraf Mr. L.K. Sadani	Executive Director Advisor	Awareness towards the project activity and type and extent of socio- economic and environmental well being by the project activity.
08/07/2008	Mr. Arghya Paul	CDM Consultant	Baseline and Additionality

7. Document References

Category 1 Documents (documents provided by the Client that relate directly to the GHG components of the project, (i.e. the CDM Project Design Document, confirmation by the host Party on contribution to sustainable development and written approval of voluntary participation from the designated national authority):

/1/ PDD, version 01, dated 12/05/2008 (web hosted)
/2/ PDD, version 02, dated 02/02/2009 & PDD, version 03, dated 21/07/2009 (intermittent)
/3/ PDD, version 04, dated 04/08/2009 (Final)
/4/ HCA letter, 4/15/2008-CCC, dated 12/03/2009
/5/ Modalities of Communication, dated 01/06/2009

Category 2 Documents (background documents used to check project assumptions and confirm the validity of information given in the Category 1 documents and in validation interviews):

/6/ Implementation Agreement letter ref. no. EMC/SHP/EDC-AHP/02, dated 30/06/2008
/7/ Ullunkal Hydro ER calculation (Final)
/8/ IRR calculation excel sheet version 01,
IRR calculation excel sheet version 02 and
IRR calculation excel sheet version 03 (Final)
/9/ Kerala Gazette published by Kerala State Electricity Regulatory Commission, dated 04/07/2006
/10/ Consultative paper on purchase requirement of Non conventional energy and determination of tariff for small hydro generating stations and wind energy, dated 18/01/2006

The above Consultative paper was the paper based on which KSERC regulations, July 2006 was finalized at present the paper is not publicly available. However the reference of the same is present in publicly available documents. Refer to- www.erckerala.org/codes/Annual%20Report%202005-06.pdf (Page 8, 22 & 23 refers to this paper based on which KSERC regulations, July 2006 were finalized)

/11/ Chartered Accountant (Mehta Paraj & Co.; ICAI M. No. 58617) Certified financial calculations, dated 12/01/2006
/12/ Board resolution copy, dated 27/01/2006 on project decision.
/13/ Transfer of Ullunkal Hydro Power Project as an IPP to M/s Energy Development Company Limited by the Government of Kerala, letter ref. no. G.O(MS)No 14/2006/PD dated 22.05.2006
/14/ Letter of Award for the Turbo-generator set to Boom Systems Private Limited, letter ref. no. EDCL/BSPL/LOA/240A, dated 19/02/2007 and Annexure 01 to Annexure 05.
/15/ CDM consultant appointment, EDCL letter reference no. EDCL/E&Y/CDM/LOA/04/2007-08/001, dated 16/04/2007.
/16/ First response from KSEB, KSEB letter reference no. CP/BD/121-G1/SHP/2007/82, dated 06/11/2006
/17/ Second response from KSEB, Reference: NO.EMC/SHP/EDC-AHP/01, dated 02/11/2007
/18/ Third response from Energy Management Centre, Govt. of Kerala, Reference: NO.EMC/SHP/EDC-AHP/01, dated 01/01/2008
/19/ Ref. no. GO. (MJ) 14/2006/PD, dated 22/05/2006 (Govt. of Kerala, Power Department – Transfer of Ullunkal small hydro electric projects to EDCL) and TC.5/1056/1997, dated 23/02/2007
/20/ EDCL declaration letter dated 03/07/2008 (regarding non substitution of technology)
/21/ Internal training record of EDCL, dated 15/04/2008, regarding CDM
/22/ Declaration from EDCL regarding non involvement of public funding, dated 03/07/2008
/23/ Consent to operate/ authorisation from Kerala State pollution Control Board (Ref. no. ICO/PTA/358/2008, dated 22/09/2008)
/24/ 60th Annual report of TECIL Chemicals and Hydro Power Limited, dated 31/03/2005
/25/ Power potential of current CDM project activity, by EDCL.
/26/ EDCL notice dated 24/12/2007, regarding Local Stake holders consultation procedure for the proposed CDM project activity.

/27/ Employees of Ullunkal Hydro Electric Project Association letter, dated 15/01/2008
/28/ Letter from Lions Club of Chittar, dated 01/01/2008
/29/ Letter from Chittar Gram Panchayat, dated 01/01/2008
/30/ Capital Cost Certification for 2 x 3.5 MW Ullunkal Hydro Electric Project dated 29.04.2009.
/31/ "GUIDELINES FOR FORMULATION OF DETAILED PROJECT REPORTS FOR HYDRO ELECTRIC SCHEMES, THEIR ACCEPTANCE AND EXAMINATION FOR CONCURRENCE" published by CEA." Weblink: http://www.cea.nic.in/hydro/Special_reports/GUIDELINES%20for%20formulationof%20DPR%20for%20HE%20Schemes.pdf
/32/ Detail Project Report of 2x3.5 MW Ullunkal Hydro Electric Project dated 26/10/2005.

The above DPR was prepared by EDCL, through a joint preliminary field inspection of the entire project site carried out by Energy Development Company Limited and Boom Systems Private Limited for a period of 20 days during the monsoon season of 2005.
/33/ Agreement signed between Energy Development Company Limited and Tecil Chemicals & Hydro Power Ltd. dated 06/03/2006, Milestone Dates.

- o0o -

A.1 Annex 1: Local Assessment

This checklist is designed to provide confirmation of in-country data and information provided in the Project Design Document for "2 x 3.5 MW Ullunkal Hydro Power Project in Kerala, India".

It serves as a "**reality check**" on the project that is completed by a local assessor from SGS India.

Issue	Findings	Source/Means of Verification	Further Action / Clarification / Information Required?
Host Country Approval Letter	Host Country Approval from Govt. of India, Ministry of Environment & Forests. (Ref. no. No.4/15/2008-CCC, dated 12/03/2009) has been submitted.	Document review.	~~CAR 01~~ Appropriate and accepted.
Purchase order for the project activity	The copy of the Letter of Award for Turbine Generator set to Booms Systems Private Limited (Ref. no. EDCL/BSPL/LOA/240A, dated 19/02/2007) has been submitted.	Document review.	Appropriate and accepted.
The documentary evidence is required to be provided by the PP with regard to the ownership of the Project activity.	Ref. no. GO. (MJ) 14/2006/PD, dated 22/05/2006 (Govt. of Kerala, Power Department – Transfer of Ullunkal small hydro electric projects to EDCL) and TC.5/1056/1997, dated 23/02/2007 has been submitted.	Document review.	Appropriate and accepted.
Evidence for no use of ODA	Declaration from EDCL regarding public funding/ no use of ODA, dated 03/07/2008	Document review.	Appropriate and accepted.
Evidence is required to be submitted that the technology used would not be changed during the crediting period.	Declaration (EDCL declaration letter dated 03/07/2008) by the project proponent, not to substitute the project activity by any other more efficient technology within the crediting period has been verified with the submitted documents	Document review.	Appropriate and accepted.
The media used to invite the local stakeholders.	Employees of Ullunkal Hydro Electric Project Association letter, dated 15/01/2008 have been submitted.	Document review.	Appropriate and accepted.

Issue	Findings	Source/Means of Verification	Further Action / Clarification / Information Required?
MoM of local stakeholder consultation is required. Discussions with the local stakeholders are required to be submitted.	Letter from Lions Club of Chittar, dated 01/01/2008 and Letter from Chittar Gram Panchayat, dated 01/01/2008 have been submitted.	Document review.	Appropriate and accepted.
Evidence of the start date of the project activity.	Letter of Award for the Turbo-generator set to Booms Systems Private Limited (Ref. no. EDCL/BSPL/LOA/240A, dated 19/02/2007) has been submitted.	Document review.	Appropriate and accepted.
It is required to be checked whether the project activity is a de-bundled components or not.	Checked during site visit and found that the project is not de-bundled component of large scale project activity.	Discussion with the project proponent during the site visit.	Appropriate and accepted.
Consents and approvals from the relevant Govt. sectors for the establishment of the project activity at the site.	Consent to operate/ authorisation from Kerala State pollution Control Board (Ref. no. ICO/PTA/358/2008, dated 22/09/2008) has been submitted.	Document review.	Appropriate and accepted.
Modalities and Communication for the project activity.	Modalities of Communication, dated 01/06/2009 have been submitted by the project proponent.	Document review.	Appropriate and accepted.

A.2 Annex 2: Validation Checklist

Table 1 Participation Requirements for Clean Development Mechanism (CDM) Project Activities (Ref PDD, Letters of Approval and UNFCCC website)

Requirement	Reference	Comments	Conclusion/CARs/CLs
1. All Parties involved have approved the project activity 1.1. Has the DNA of each Party involved in the proposed CDM project activity in section A.3 of the PDD provided a written letter of approval which confirms 1.1.1. The country is a Party to the Kyoto Protocol 1.1.2. Participation is Voluntary 1.1.3. The Host Party confirming that the proposed CDM project activity contributes to sustainable development of the country Non-Annex 1 Party shall submit a letter of approval 1.1.4. It refers to the precise proposed CDM project activity title in the PDD being submitted for registration	Annex 3, Clean Development Mechanism, Validation and Verification Manual, Version 01 (from this point forwarded referenced as VVM) - 49a-d /54a-b/125 Paragraph 37 CDM Modalities and procedures	India has ratified the Kyoto protocol on 26th August 2002 and is allowed to participate. http://maindb.unfccc.int/public/country.pl?country=IN Letter of Approval (LoA) from Indian DNA is to be provided by the project Participant	~~CAR 01~~ Y LoA is submitted. CAR 01 was closed
1.2. The letter/s of approval are unconditional with respect to 1.1.1 to 1.1.4 above	VVM Para. 49/54	Pending CAR 01	~~Pending CAR 01~~ Y CAR 01 was closed out.

Requirement	Reference	Comments	Conclusion/CARs/CLs
2. Parties, stakeholders and UNFCCC accredited NGOs shall have been invited to comment on the validation requirements for a minimum of 30 days, and the project design document and comments have been made publicly available	VVM Para. 128 Marrakech Accords, CDM Modalities, §40	The PDD has been web-hosted in the UNFCCC website for invitation of comments on the project activity as the global stakeholder consultation process: Website: http://cdm.unfccc.int/Projects/Validation/DB/SYB3DHL6WAX58BJ03V3GWWTXYKAZ6Z/view.html Start date: 20 May 08 Close date: 18 June 08 Number of comments received: 1	Y
3. The project design document is in accordance with the applicable CDM requirements for completing PDDs.	VVM Para. 57 Marrakech Accords, CDM Modalities, Appendix B, EB Decisions	The project design document is in conformance with the UNFCCC SSC PDD format.	Y
4. The project participants shall submit a letter on the modalities of communication (MoC) before submitting a request for registration	EB-09 F_CDM_REG form	The letter on the modalities of communication (MoC) has been submitted by PP	~~LAC/Site visit~~ Y

Table 2 PDD

Checklist Question	Ref. ID	MoV*	Comments	Conclusion/ CARs/CLs
A. General Description of Project Activity				
A.1. Project Title				
A.1.1. Does the used project title clearly enable the reader to identify the unique CDM activity?	VVM Para.56 Guidelines for completing a CDM-PDD (PDD) section A.1	DR	The project title used in the PDD version 01 is clearly enabling to identify the unique CDM project activity.	Y
A.1.2. Is there an indication of a revision number and the date of the revision?	VVM Para.56 PDD section A.1	DR	The version number (01) and date of version (20/06/2008) has been properly mentioned in Section A.1 of the PDD.	Y
A.2. Description of the Project Activity				
A.2.1. Does the description of the proposed CDM project activity as contained in the PDD sufficiently cover all relevant elements accurately?	VVM Para.59 PDD section A.2 see also A.4, A.4.3 and B.3	DR	As per the description provided under section A.2 of PDD version 01, the project activity is a small hydro power project set up which utilizes the upstream water of the Kakkad river. The project activity involves the construction of diversion weir across the river Kakkad by which diverted water will led through two individual penstock intake structures followed by two turbines each of 3.5 MW capacity and cumulatively giving the production of 7 MW power, which will be thereafter evacuated to the nearest 11KV grid substation of Kerala State Electricity Board, a part of the Southern Regional Electricity Grid of India. The project is likely to take care of the sustainable development issues.	Y
A.2.2. Does the information provide the reader with a clear understanding of the proposed CDM activity?	VVM Para.60 PDD section A.2 see also A.4, A.4.3 and B.3	DR	The project activity details as mentioned in the PDD are consistent. The same has been cross-checked during the site visit. PP needs to submit Purchase orders/ contracts for the equipments involved in the project activity.	LAC~~/Site visit~~ Y
A.2.3. Is all information provided consistent and in compliance with the	VVM Para.64 PDD section A.2	DR	The implementation schedule for the project activity is not clear according to the PDD and the related risk for project implementation details with the selected crediting period	~~CAR 02~~ Y

* MoV = Means of Verification, DR= Document Review, I= Interview

Checklist Question	Ref. ID	MoV*	Comments	Conclusion/ CARs/CLs
actual situation or planning?	see also A.4, A.4.2 and B.3		needs to be clarified.	~~CAR 02~~ was closed out.
A.2.4. Is all information provided consistent with details provided in further chapters of the PDD?	VVM Para.64 PDD section A.2	DR	The project activity details as mentioned in the PDD are consistent	Y
A.3. Project Participants				
A.3.1. Is the table required for the indication of project participants correctly applied?	VVM Para. 51 PDD section A.3	DR	The table under section A.3 of the PDD version 01 required for the indication of project participants has been applied correctly.	Y
A.3.2. Is all information provided in consistency with details provided by further chapters of the PDD (in particular annex 1)?	VVM Para. 51 PDD section A.3	DR	*Only project participants should be included in these sections.* All the information regarding project participants is consistent with details provided by further chapters of the PDD (in particular annex 1: contact information on participants in the project activity).	Y
A.4. Technical Description of the Project Activity				
A.4.1. Does the information provided on the location of the project activity allow for a clear identification of the site(s)? Are the latitude and longitude of the site indicated (decimal	VVM Para.64 PDD section A.4	DR	The information provided regarding the location of the project activity is clear. The project activity is situated at Chittar village, Panthanamthitta District in the State of Kerala, in the Southern India. The geographical co-ordinates of the project activity are Latitude- 9°20'30'' and Longitude-76°56'00''.	Y

Checklist Question	Ref. ID	MoV*	Comments	Conclusion/ CARs/CLs
points)				
A.4.2. Does the proposed CDM project activity involve the alteration of existing installations or process?	VVM Para.64 PDD section A.4	DR	The project activity is a green field project and there is no alteration of existing installations.	Y
A.4.3. Do the project participants possess ownership or licenses which will allow the implementation of the project at that site / those sites?	VVM Para.64 PDD section A.4	DR	The documentary evidence to be provided by the PP with regard to the ownership and relevant licenses and approvals allowing the implementation of such a project activity to establish and operate.	LAC/ ~~Site visit~~ Y
A.4.4. Is the category(ies) of the project activity correctly identified?	VVM Para.64 PDD section A.4	DR	The project correctly applies the category of the project activity as Scope 1 – Energy Industries (renewable / Non Renewable)	Y
A.4.5. Is all information provided in compliance with actual situation or planning as available by the project participants?	VVM Para.64 PDD section A.4	DR	This has to be checked during the site visit.	~~Site Visit~~. Y
A.4.6. Is the table required for the indication of projected emission reductions correctly applied?	VVM Para.64 PDD section A.4	DR	The table for emission reduction calculations correctly applied	Y
A.5. Debundling				
A.5.1. Is the small-scale project activity a debundled component of a large scale project	VVM Para. 134c	DR	This is an independent project and not a debundled component of a larger project activity. This has to be verified during the validation site visit.	~~Pending site visit~~

* MoV = Means of Verification, DR= Document Review, I= Interview

Checklist Question	Ref. ID	MoV*	Comments	Conclusion/ CARs/CLs
activity				Y
A.5.2. If the project is a debundled component of a larger project, does the larger project fall within the limits for small-scale CDM project activities	VVM Para. 134c	DR	This is an independent project and not a debundled component of a larger project activity. The same should be checked during the site visit.	~~Pending site visit~~ Y
A.6. Public Funding				
A.6.1. Does the information on public funding provided conform to the actual situation or planning as presented by the project participants?	PDD section A.4.4	DR	The PDD states that no public funding will be invested in the project activity. The same should be checked during the site visit and PP should provide proper substantiation for the same.	~~Pending site visit~~ Y
A.6.2. Is all information provided consistent with details provided by further chapters of the PDD (in particular annex 2)?	PDD section A.4.4	DR	All information regarding Public Funding provided under PDD is consistent with details provided by further chapters of the PDD.	Y
A.6.3. In case of public funding from Annex I Parties is it confirmed that such funding does not result in a diversion of official development assistance	PDD section A.4.4	DR	As per PDD no public funding from Annex I party has been identified for the project activity. Please refer section A.5.1 above.	Y

* MoV = Means of Verification, DR= Document Review, I= Interview

Checklist Question	Ref. ID	MoV*	Comments	Conclusion/ CARs/CLs
B. Baseline and Monitoring Methodology				
B.1. Choice and Applicability				
B.1.1. Is the baseline methodology previously approved by the CDM Methodology Panel?	VVM Para.68 PDD section B.1	DR	The methodology used is AMS I D version 13; the same is an approved methodology and is valid.	Y
B.1.2. Has the methodology (incl. the tools) been altered from the original version as referenced in the PDD?	VVM Para.69 PDD section B (B.1-B.2)	DR	The methodology AMS I.D, version 13 has been applied correctly without any alteration from the original version.	Y
B.1.3. Does the project activity qualify as small scale project?	VVM Para. 134a	DR	The project capacity is 7 MW which is far below the limit of 15 MW for small scale project, hence, the project activity qualify as small scale project.	Y
B.1.4. Is the category(ies) of the project activity correctly identified in accordance with Appendix B to the simplified modalities and procedures for small-scale CDM project activities?		DR	The category of the project activity is correctly identified.	Y

* MoV = Means of Verification, DR= Document Review, I= Interview

Checklist Question	Ref. ID	MoV*	Comments	Conclusion/ CARs/CLs
B.1.5. Is the selected simplified methodology applicable to the project activity in the PDD?	VVM Para.75/66a/68/73 PDD section B (B.1-B.2)	DR	PDD, section A.4.2. Discuss the applicability of the simplified methodology AMS I D, version 13. The proposed CDM project activity will evacuate electricity through the regional grid from a renewable source (Hydro power plant) and the capacity of the project activity is below 15 MW (7 MW <15 MW). Hence, the project applicability has been justified.	Y
B.1.6. Does the project activity conform to one of the approved small-scale categories?	VVM Para. 134b	DR	The proposed project activity confirms to AMS I D, under sectoral scope -01(Energy industries renewable-. Non- renewable sources) and justification for the applicability criteria has been mentioned in the PDD.	Y
B.1.7. Is the project activity a bundle of several small scale activities and if so does it contain any sub-bundles?		DR	The project activity is not a bundle of several small scale activities as per PDD. However, this has been checked during site visit by discussing with PP and UNFCCC site.	~~Pending site visit~~ Y
B.1.8. If the project activity is a bundle of several small scale activities, does the sum of the total bundle (including any subbundles) fall within the limits for small scale projects		DR	The project activity is not a bundle of several small scale activities.	Y

* MoV = Means of Verification, DR= Document Review, I= Interview

Checklist Question	Ref. ID	MoV*	Comments	Conclusion/ CARs/CLs
B.1.9. If the project activity is a bundle of several small scale activities, has the form with information related to the bundle been submitted and is it correctly used		DR	The project activity is not a bundle of several small scale activities.	Y
B.1.10. Is the discussion in the PDD in conformance with all applicability criteria of the applied methodology?	VVM Para.75/66b/68 PDD section B (B.1-B.2)	DR	The PDD discuss all the applicability criteria of the applied methodology AMS I D, version 13, in relation to the proposed CDM project activity and provide the justification. However, the applicability criteria for the project activity need to be checked during the site visit.	~~Site visit~~ Y
B.2. Project Boundary				
B.2.1. Are all emission sources and gases related to the baseline scenario, project scenario and leakage clearly identified and described in a complete and transparent manner? Is there information on GHG emissions in proposed CDM project activity boundary as a result of the implementation of the proposed CDM project activity which are expected to	VVM Para.79/76 /67a PDD section B.3	DR	It encompasses the physical, geographical site of the renewable generation source. The project has been set up in the state of Kerala and export electricity to the Southern Regional Grid of India. As per the PDD version 01, the project boundary is clear according to the project category.	Y

Checklist Question	Ref. ID	MoV*	Comments	Conclusion/ CARs/CLs
contribute more than 1% of the overall expected average annual emissions reductions, which are not addressed by the applied methodology.				
B.2.2. In case of grid connected electricity projects: Is the relevant grid correctly identified in accordance with the tool to calculate emission factor of electricity system (wherever applicable) and the underlying methodology?	VVM Para.79 PDD section B.3	DR	The project has been set up in the state of Kerala which belongs to the southern regional grid of India. The relevant grid has been correctly identified in accordance with the EB guidance.	Y
B.2.3. Does the project boundary include the physical delineation of the proposed CDM project activity?	VVM Para.78/79 PDD section B.3 also see section A.4.2	DR	The PDD of the project boundary description is correct and meets the requirements of the selected baseline methodology.	Y
B.2.4. Are the project's geographical boundaries and the project's system boundaries (components and facilities used to mitigate GHGs) clearly defined?	VVM Para.76/79 PDD section B.3 also see section A.4.2	DR	The PDD version 01 clearly states about the project boundary which will facilitate the proposed GHG emission reduction but the same has to be checked during the site visit.	~~Pending Site Visit~~ Y

Checklist Question	Ref. ID	MoV*	Comments	Conclusion/ CARs/CLs
B.3. Identification of the Baseline Scenario				
B.3.1. Does the PDD discuss the identification of the most likely baseline scenario? Does the PDD follow the steps to determine the baseline scenario required by the methodology and is the application of the methodology and the discussion and determination of the chosen baseline transparent?	VVM Para.67b.80/82/86 PDD Section B.4/B.5	DR	The PDD has identified the most likely baseline scenario as the equivalent power generation at the carbon intensive Southern Regional Grid of India, which is found, justified.	Y
B.3.2. Are all tools/procedures in the methodology correctly applied to identify the most reasonable baseline scenario? This includes all potential realistic and credible baseline scenarios in the discussion taking into account relevant national and/or sectoral policies, macro-economic trends and political aspirations?	VVM Para.81/82/86a-d/83/84 PDD Section B.4/B.5	DR	The project activity is small scale project activity and the discussion and determination of the chosen baseline is transparent and supported by the available power sector data adopted from Central Electricity Authority, Ministry of Power and Government of India. "CO2 Baseline Database for the Indian Power Sector" Version 03, December 2007, published by Central Electricity Authority, Ministry of Power, Govt. of India (http://www.cea.nic.in/planning/c%20and%20e/Government%20of%20India%20website.htm)	Y
B.3.3. Is the choice of the baseline compatible	VVM Para.86b-	DR	The choice of baseline data is compatible with the available data.	Y

* MoV = Means of Verification, DR= Document Review, I= Interview

Checklist Question	Ref. ID	MoV*	Comments	Conclusion/ CARs/CLs
with the available data?	c/95 PDD Section B.4/B.5			
B.3.4. Is conservativeness addressed in the way of identifying the baseline?	VVM Para.90 PDD Section B.4/B.5	DR	The baseline data regarding Indian Power Sector has been referred from the "CO2 Baseline Database for the Indian Power Sector" Version 03, December 2007, published by Central Electricity Authority, Ministry of Power, Govt. of India, made publicly available which is justified.	Y
B.3.5. Does the selected baseline represent the most likely scenario among other possible and/or discussed scenarios?	VVM Para.90/91 PDD Section B.4/B.5	DR	The selected baseline scenario is the most likely scenario in accordance with the applied methodology.	Y
B.3.6. Is there a verifiable description of the baseline scenario? Does this include a description of the technology that would be employed and/or the activities that would take place in the absence of the proposed CDM project activity?	VVM Para.86e/85 PDD Section B.4/B.5	DR	The description of the baseline scenario is verifiable through power sector data published by Central Electricity Authority, Ministry of Power, Govt. of India.	Y
B.4. Additionality				
B.4.1. Does the PDD clearly demonstrate the additionality using the approach as specified in the methodology and	VVM Para.67d/95 PDD Section B.1/B.4/B.5	DR	The PDD in section .B.5 addressed the additionality as per the methodology.	Y

* MoV = Means of Verification, DR= Document Review, I= Interview

Checklist Question	Ref. ID	MoV*	Comments	Conclusion/ CARs/CLs
by following all the required steps?				
B.4.2. In case of using the additionality tool: Is the 'Additionality Tool' used in the PDD latest version? If an earlier version has been used, do the changes impact the discussion in the PDD? Are all steps followed in a transparent manner?	PDD Section B.1/B.4/B.5	DR	PP has used the guidance mentioned in the additionality tool for the calculation of benchmark analysis. PP needs to check the financial calculations as per guidance on investment analysis.	~~CAR 04~~ CAR 04 closed out.
B.4.3. Has all information been backed up with references, sources and certification? Is the data presented credible and reliable with complete transparency to all available data and documentation?	VVM Para.93/91 PDD Section B	DR	PP needs to submit the excelsheet for the financial calculations. It is not clear about the appropriateness of input data mentioned in the excel spreadsheet.	~~CAR 04~~ CAR 04 closed out.
B.4.4. Is the discussion on additionality and the evidence provided consistent with the starting date of the project? If the project activity start date is prior to the validation is it discussed how the CDM was	VVM Para.102b PDD Section B.5	DR	The starting date of the project activity as per the PDD version 01 is 27/01/2006. ➢ Further explanation is required regarding selection of project start date and the appropriateness of the same with UNFCCC project start date definition. ➢ The proper documentary evidence towards the start date of the project activity needs to be provided by the project proponent. ➢ How and when the CDM was taken into serious consideration in the decision to go ahead with the project activity is not clear and the same has to be properly substantiated.	~~CAR 03~~ CAR 03 was closed out.

Checklist Question	Ref. ID	MoV*	Comments	Conclusion/ CARs/CLs
taken into account in the decision to go ahead with the project activity				
B.4.5. If an investment analysis has been used, has it been shown that the proposed project activity is economically or financially less attractive than at least one other alternative without the revenue from the sale of CERs?	VVM Para. 106, 107, 109 112a-c PDD Section B.5	DR	Financial analysis has been done and compared with benchmark. The input values needs to be as per para 6 of guidance of investment analysis. Pending closure of CAR 04.	~~Pending~~ Y
B.4.6. If a benchmark is used, is it ensured that it is selected in accordance with the requirements of the tool /methodology and it represents standard returns in the market (not linked to the subjective profitability expectation or risk profile of a particular project developer).	VVM Para. 110 PDD Section B.5	DR	Pending closure of CAR 04.	~~Pending~~ Y
B.4.7. If a barrier analysis has been used, has it been shown that the proposed project	VVM Para. 114 115a-b/116	DR	As per Attachment A to Appendix B of the simplified modalities & procedures for Small Scale project activity, PDD demonstrates barriers by discussing Investment barriers, Institutional barrier, other barriers and risk.	~~CAR 04~~ CAR 04 closed out.

* MoV = Means of Verification, DR= Document Review, I= Interview

Checklist Question	Ref. ID	MoV*	Comments	Conclusion/ CARs/CLs
activity faces barriers that prevent the implementation of this type of proposed project activity but would not have prevented the implementation of at least one of the alternatives?	PDD Section B.5		The investment barrier is not transparent and the project proponent needs to substantiate the following – ♦ As per PDD version 01, the project activity originally belonged to Tecil Chemicals & Hydro Power Limited which suffered heavy losses. Please provide the financial report of Tecil Chemicals & Hydro Power Limited of the loss making years. ♦ Please provide documentary evidence when EDCL took over the project activity from Tecil after repaying INR 23.5 Crores. ♦ Please clarify and substantiate the pay back period of the project activity with the company's internal benchmark for similar kind of project activities. ♦ Please justify why pay back period has been considered as financial indicator instead of IRR where as IRR provides much more appropriate scenario for assessment of project financial viability. ♦ Please justify the determination procedure for company's internal benchmark and also clarify its applicability for the project financing. ♦ Please provide the detail project payback calculation sheet along with proper traceability of the data/ assumptions used. ♦ The proof for the investment required towards the total project cost along with the source of funds and the related terms and conditions, made available to the project activity for its implementation. ♦ The PP would have to provide documentary evidence towards the power tariff and the escalation clauses along with all other evidences considered with respect to energy generation, operation & maintenance and depreciation parameters provided in the PDD. 2. The Institutional Barrier as mentioned in the PDD, version 01 needs to be further clarified –	

Checklist Question	Ref. ID	MoV*	Comments	Conclusion/ CARs/CLs
			Please provide evidence regarding delay, in finalizing the Power Purchase Agreement (PPA) due to the changing in status from CPP to IPP of the proposed project activity. 3. Other barriers due to water sump in the power house area is not justified, as this is due to civil construction related issues, which was supposed to be checked during project designing phase. Project proponent needs to provide further clarification for the same. ♦ 4. The Common Practice Barrier as mentioned in the PDD, version 01 is not clear, the same needs to be further clarified.	
B.4.8. Is the discussion on additionality consistent with the identification of all plausible and credible baseline scenarios?	VVM Para. 105 PDD Section B.5	DR	PP has demonstrated the project specific barrier of financial calculations and project IRR is compared with benchmark IRR. Pending closure of CAR 04	~~Pending~~ Y
B.4.9. Do the identified baseline scenarios include technologies and practices that include outputs or services comparable with the proposed CDM project activity. Do they also abide by the same applicable laws and legislations?	VVM Para. 105 PDD Section A.4.2/B.5	DR	The same output has been considered in the baseline scenario. Pending closure of CAR 04	~~Pending~~ Y

* MoV = Means of Verification, DR= Document Review, I= Interview

Checklist Question	Ref. ID	MoV*	Comments	Conclusion/ CARs/CLs
B.4.10. Has it been shown that the project is not common practice?	VVM Para. 119a/b PDD Section B.5	DR	Not applicable, as the project activity mainly focuses additionality through Investment Barrier. The proposed project activity is small scale project and as per EB 35, annex 34 guidelines project proponent carried out the Non-binding best practice examples to demonstrate additionality for the current SSC project activities. Thus the current project activity does not require using Additionality Tool, version 5.2. According to the EB 35 Annex 34, the project proponent shall provide an explanation to show that the project activity would not have occurred anyway due to at least one of the following barriers i.e. Investment barrier, Access-to-finance barrier, Technological barrier, Barrier due to prevailing practice and other barriers. In accordance with the stated requirement project proponent demonstrates additionality by discussing Investment Barriers.	Y
B.4.11. What are they key distinctions between the project activity and any similar projects that are widely used as common practice?	VVM Para. 118, 119c/d PDD Section B.5	DR	Please refer section B.4.10	Y
B.5. Application of the Simplified Methodology				
B.5.1. Has the simplified methodology been applied correctly for determining **baseline emissions**?	VVM Para. 91d PDD Section B (B.6.1 -B.71)	DR	The project proponent has applied the baseline methodology AMS-I.D version 13 correctly.	Y
B.5.2. Has the simplified methodology been applied correctly for determining **project emissions**?	VVM Para. 90/91d PDD Section B (B.6.2-B.71)	DR	The project emission calculation in the PDD has been done as per AMS ID / version 13. The equation applied for determining the project emission as mentioned in the PDD is in line with the approved methodology AMS ID/ version 13 used. Please clarify whether DG sets will be in use with in the project boundary.	~~CL 05~~ Y CL 05 was closed out.

* MoV = Means of Verification, DR= Document Review, I= Interview

Checklist Question	Ref. ID	MoV*	Comments	Conclusion/ CARs/CLs
B.5.3. Has the simplified methodology been applied correctly for determining **leakage**?	VVM Para. 91d PDD Section B (B.6.2 -B.71)	DR	As per AMS-ID version 13 leakages will be considered if there is a transfer of energy generating equipment from another activity or if the existing equipment is transferred to another activity. As per Section B.6.1 of PDD version 01 the project activity involves electricity generation by utilizing the hydro potential of the Kakkad river basin of an amount of 7 MW. There are no anthropogenic emissions identified by sources outside the project boundary attributable to the project activity. The equipments used by the project activity are all newly procured and not transferred from any other project.	~~Pending site visit~~ Y
B.5.4. Where applicable, has the simplified methodology been applied correctly for the **direct calculation of emission reductions?**	VVM Para 88/91d PDD Section B (B.6.2 -B.71)	DR	PP needs to submit excel for emission reduction calculation	~~CL 06~~ Y CL 06 was closed out.
B.5.5. Where there is an option between different equations or parameters, has the methodological choices for the project been explained, have they been properly justified and are they correct?	VVM Para.89/90/91 PDD Section B (B.6.2 -B.71)	DR	The PDD explains all the methodological choices clearly. The steps and formulas mentioned in methodology are used correctly in the PDD.	Y

Checklist Question	Ref. ID	MoV*	Comments	Conclusion/ CARs/CLs
B.5.6. Are uncertainties in the GHG emissions estimates properly addressed in the documentation?	PDD Sections B.5-C	DR	According to PDD version 01, the uncertainty level is low when calculating the GHG emissions because in the referred PDD version 01 section B.7.1, it is mentioned that the main meter is calibrated and sealed by KSEB and check meter should be calibrated by project proponent. Net electricity exported to the grid will be monitored daily by EDCL on the basis of check meter reading and monthly joint meter reading will be taken by KSEB and EDCL officials from main meter & check meter interconnection point and that can be cross checked by the monthly export bills generated by EDCL. Therefore the uncertainties in the GHG emissions estimates are properly addressed in the documentation.	Y
B.6. Ex-ante Data and Parameters Used				
B.6.1. Are the data provided in compliance with the methodology?	VVM Para. 91/67c PDD Section B.6.3B.6.4	DR	The ex-ante determined grid emission factor for Southern regional grid is fund in compliance with the methodology.	Y
B.6.2. Is all the data derived from official data sources or replicable records and have these been correctly quoted?	VVM Para. 91a/b PDD Section B.6.3/B.6.4	DR	All the data derived from official data sources.	Y
B.6.3. Is the vintage of the baseline data correct?	PDD Section B.6.3/B.6.4	DR	The CEA data base for EF of the eastern regional grid referred to is version 3 which is the current version at the time of PDD web-hosting.	Y
B.6.4. Is all the data appropriate and correctly applied to the CDM project activity?	VVM Para. 91c PDD Section B.6.3/B.6.4	DR	All the data has been appropriate and correctly applied to the CDM project activity	Y
B.6.5. Are data and parameters that are not being monitored and remained fixed	VVM Para. 90 PDD Section B.6.3/B.6.4	DR	The ex-ante fixed parameters has been appropriately assessed and found transparent.	Y

* MoV = Means of Verification, DR= Document Review, I= Interview

Checklist Question	Ref. ID	MoV*	Comments	Conclusion/ CARs/CLs
throughout the crediting period appropriately assessed, correct, and will they result in conservative estimates?				
B.7. Calculation of Emissions Reductions				
B.7.1. Has the simplified methodology been applied correctly for determining **emission reductions**?	VVM Para. 91d PDD Section A.4.3/B.6	DR	The PDD have applied the approved methodology correctly for determining the emission reductions. The excel sheet for calculation of emission reductions is required to be submitted along with evidences for the assumptions used.	~~CL 06~~ Y CL 07 was closed out.
B.7.2. Are the emission reduction calculations documented in a complete and transparent manner?	VVM Para. 91e PDD Section B.6	DR	Pending closure of CL 06.	~~Pending~~ Y
B.7.3. Is the projection based on same procedures as used for later monitoring or acceptable alternative models?	PDD Section B.6	DR	Pending closure of CL 06.	~~Pending~~ Y
B.7.4. Is the calculation of the emission reduction correct?	VVM Para. 91e PDD Section B.6	DR	Pending closure of CL 06.	~~Pending~~ Y
B.8. Emission Reductions				
B.8.1. Is the form/table required for the	PDD Section A.4.3/ Section B.6	DR	The table at section B.6.4 required for the indication of projected emission reductions has been applied correctly in accordance with the Guidelines for completing CDM-SSC-	Y

Checklist Question	Ref. ID	MoV*	Comments	Conclusion/ CARs/CLs
indication of projected emission reductions correctly applied?			PDD, version 05.	
B.8.2. Is the projection in line with the envisioned time schedule for the project's implementation and the indicated crediting period?	PDD Section A.4.3/ Section B.6	DR	According to the Section C of the PDD version 01, the project activity is yet to be commissioned and the start of 10 years fixed crediting period would be the project commissioning date (01/10/2008) or subsequent to the date of registration of the project, whichever is later, which is future date.	Y
B.9. Monitoring Methodology				
B.9.1. Does the monitoring methodology provide a consistent approach in the context of all parameters to be monitored and further information provided by the PDD? Are all parameters and data that are available at validation consistent with the simplified methodology. Has this data been interpreted and applied correctly?	VVM Para. 67e PDD Section B.7-B.8 see also Annex 4	DR	The monitoring plan of the PDD has followed the methodology in the context of the parameter to be monitored. In this project activity the only parameter to be monitored is the net electricity exported to the southern regional grid.	Y
B.9.2. Does the monitoring methodology apply consistently the choice	PDD Sections B and C	DR	The monitoring methodology applies the choice of both options for monitoring project and baseline emissions correctly.	Y

* MoV = Means of Verification, DR= Document Review, I= Interview

Checklist Question	Ref. ID	MoV*	Comments	Conclusion/ CARs/CLs
of the option selected for monitoring both of project and baseline emissions?				
B.10. Data and Parameters Monitored				
B.10.1. Does the monitoring plan in the PDD comply with the simplified methodology? Provide for the collection and archiving of all relevant data necessary for estimation or measuring the emission reductions within the project boundary during the crediting period?	VVM Para. 91a/91d/121/79 PDD Section B.7-B.7.2	DR	The description towards the data/ parameters monitored has been described under section B.7.1 of the PDD. The Monitoring Plan consists of metering the electricity exported to the southern regional grid of India, from the project activity and the data will be recorded by the main meter at the plant premises which will be sealed and calibrated by Kerala State Electricity Board. There is a check meter as well to the responsibility of the Project promoter. The determination procedure of electricity exported to the grid as mentioned in the annex 4 of the PDD, version 01 is complying with the monitoring methodology described in the Section B.7 of the PDD.	Y
B.10.2. Are the choices of project GHG indicators reasonable and in conformance with the requirements set by the simplified methodology applied?	PDD Section B.7-B.7.2/B.6.2	DR	Please refer B.9.1	Y
B.10.3. Will it be possible to determine the specified project GHG indicators?	PDD Section B.6.2-B.8	DR	According to the description towards the monitoring plan provided under PDD, the GHG indicators will be possible to determine, as the monitoring plan does not involve any critical parameter to be monitored or any critical monitoring equipment to be used. However the project specific description towards the monitoring plan for the project activity is fully transparent.	Y
B.10.4. Is the information given for each monitoring	PDD Section	DR	In the PDD version 01, the monitoring methodology and description towards monitoring plan is stated under section no. B.7 of the referred PDD. The only measuring data is net	Y

* MoV = Means of Verification, DR= Document Review, I= Interview

Checklist Question	Ref. ID	MoV*	Comments	Conclusion/ CARs/CLs
variable by the presented table sufficient to ensure the verification of a proper implementation of the monitoring plan?	B.6.2-B.7.1		electricity exported to the southern regional grid by the project activity is tabulated under section B.7.1, hence presented table ensures proper implementation of the monitoring plan.	
B.10.5. Is the information given for each monitoring variable by the presented table sufficient to ensure the delivery of high quality data free of potential for biases or intended or unintended changes in data records?	PDD Section B.6.2-B.7.1	DR	According to Annex 4 of the PDD version 01, the project proponent can not alter the readings of main meter as well as check meter because it is an on line process. Therefore the provision of intended or unintended changes in data records, not possible. However the same would be verified during site visit.	~~Pending site visit~~ Y
B.10.6. Is the monitoring approach in line with current good practice, i.e. will it deliver data in a reliable and reasonably acceptable accuracy?	PDD Section B.5-B.7.2	DR	As per Annex 4 of the PDD version 01, the project proponent measures the readings of net electricity exported to the southern regional grid by main meter as well as check meter because it is an on line process. However the same would be verified during site visit.	~~Pending site visit~~ Y
B.10.7. Are all formulae used to determine project emission clearly indicated and in compliance with the monitoring methodology.	PDD Section B.6.2-B.7.1	DR	The project emission calculation in the PDD has been done as per AMS ID / version 13. The equation applied for determining the project emission as mentioned in the PDD is in line with the approved methodology AMS ID/ version 13 used. Please clarify whether DG sets will be in use with in the project boundary. Pending closure of CL 05	~~Pending~~ ~~Y~~

* MoV = Means of Verification, DR= Document Review, I= Interview

Checklist Question	Ref. ID	MoV*	Comments	Conclusion/ CARs/CLs
B.11. Quality Control (QC) and Quality Assurance (QA) Procedures				
B.11.1. Is the selection of data undergoing quality control and quality assurance procedures complete?	VVM Para. 121 Refer to all data within the PDD Inc. B.6.2-B.7.1	DR	The selection of data is complete.	Y
B.11.2. Is the belonging determination of uncertainty levels done correctly for each ID in a correct and reliable manner?	Refer to all data within the PDD Inc. B.4/B.7.2/Annex 4	DR	The uncertainty levels for each monitoring parameters have been determined in a correct and reliable manner.	Y
B.11.3. Are quality control procedures and quality assurance procedures sufficiently described to ensure the delivery of high quality data?	VVM Para 121	DR	The Monitoring Plan of the PDD has clearly mentioned the quality control and quality assurance procedures to ensure delivery of high quality data.	Y
B.11.4. Is it ensured that data will be bound to national or internal reference standards?	VVM Para. 86d	DR	The monitoring data will be clearly reproducible and comparable and will not be dependent on site-specific adjustments.	Y
B.11.5. Is it ensured that data provisions will be free of potential conflicts of interests resulting in a tendency of overestimating emission reductions?	VVM Para. 19	DR	According to Annex 4 and section B.7.1 of the PDD version 01, the project proponent can not alter the readings of main meter as well as check meter because it is an on line process. Therefore the provision of overestimation of emission reductions is not possible. However the same would be verified during site visit.	~~Pending site visit~~ Y

* MoV = Means of Verification, DR= Document Review, I= Interview

Checklist Question	Ref. ID	MoV*	Comments	Conclusion/ CARs/CLs
B.12. Operational and Management Structure				
B.12.1. Is the authority and responsibility of project management clearly described?	PDD Section B.8/Annex 1	DR	The PDD version 1 clearly signifies categorically the authority and responsibility of the project management towards the CDM project activity. In the Annex 4 of the PDD the hierarchy of job responsibility is properly furnished.	Y
B.12.2. Is the authority and responsibility for registration, monitoring, measurement and reporting clearly described?	PDD Section B.8/Annex 1	DR	In the Annex 4 of the PDD the hierarchy of job responsibility for registration, monitoring, measurement and reporting is provided clearly.	Y
B.12.3. Are procedures identified for training of monitoring personnel?	PDD Section B.8/Annex 1	DR	Pending site visit.	~~Site visit~~ Y
B.13. Monitoring Plan (Annex 4)				
B.13.1. Is the monitoring plan developed in a project specific manner clearly addressing the unique features of the CDM activity?	VVM Para. 122a	DR	The monitoring plan has been developed in a project specific manner.	Y
B.13.2. Does the monitoring plan completely describe all measures to be implemented for monitoring all parameter required, including measures to be implemented for ensuring data quality?	VVM Para. 122b	DR	The monitoring plan describes the measures to be implemented for monitoring all the parameters required. The information regarding the measures implemented to ensure data quality has been provided in the PDD.	Y

* MoV = Means of Verification, DR= Document Review, I= Interview

Checklist Question	Ref. ID	MoV*	Comments	Conclusion/ CARs/CLs
B.13.3. Does the monitoring plan provide information on monitoring equipment and respective positioning in order to safeguard a proper installation?	VVM Para. 122b	DR	The monitoring plan in the PDD provides specific information regarding the monitoring equipment that is, the energy meters and their respective positioning.	Y
B.13.4. Are procedures identified for calibration of monitoring equipment?	VVM Para. 122a-c	DR	The monitoring plan in the PDD provides specific information regarding the calibration of monitoring equipment.	Y
B.13.5. Are procedures identified for maintenance of monitoring equipment and installations?	VVM Para. 122a-c	DR	The monitoring plan has clearly identified the procedures for maintenance of monitoring equipments and installations.	Y
B.13.6. Are procedures identified for day-to-day records handling (including what records to keep, storage area of records and how to process performance documentation)	VVM Para. 122a-c	DR	The procedure identified for day to day records handling and the related performance documentation has been properly addressed in the Annex – 4 of the current version of the PDD.	Y
B.13.7. Are procedures identified for dealing with possible monitoring data adjustments and missing data allowing redundant reconstruction of data in case of monitoring	VVM Para. 122a-c	DR	Procedures towards dealing with possible monitoring data adjustments and missing data allowing redundant reconstruction of data in case of monitoring problems has been described under monitoring plan of the PDD.	Y

* MoV = Means of Verification, DR= Document Review, I= Interview

Checklist Question	Ref. ID	MoV*	Comments	Conclusion/ CARs/CLs
problems?				
B.13.8. Are procedures identified for internal audits of GHG project compliance with operational requirements where applicable?	VVM Para.122a-c	DR	The PDD version 01 does not provide any information regarding internal audit procedures required to be executed for GHG project compliance with operational requirements. The same should be checked during the site visit.	~~Pending site visit.~~ Y
B.13.9. Are procedures identified for project performance reviews before data is submitted for verification, internally or externally?	VVM Para. 122a-c	DR	The PDD does not identify for project performance reviews prior to submission of data for verification. Yes, project performance is review before data is submitted for verification, internally or externally.	Y
B.13.10. Describe the ability of the project participants to implement the monitoring plan.	VVM Para. 122c	DR	PP has ability to implement the monitoring plan.	Y
B.14. Baseline Details				
B.14.1. Is there any indication of a date when determining the baseline?	PDD Section B.8/Annex 3	DR	As per the PDD version 1 dated 12/05/2008 the date of completion of the application of the baseline study is 12/05/2008 mentioned under the section B.8. The baseline study has been done by Energy Development Company Limited.	Y
B.14.2. Is this consistent with the time line of the PDD history?	Also see revision history of the PDD	DR	It seems to be consistent with the time line of the PDD history as completion date for baseline study and PDD Version 01 is 12/05/2008.	Y
B.14.3. Is all data required provided in a complete manner by annex 3 of the PDD?	PDD Annex 3	DR	The baseline power generation information regarding southern regional grid system of India mentioned in the annex 3 of the PDD is justified and all the data provided is traceable.	Y

* MoV = Means of Verification, DR= Document Review, I= Interview

Checklist Question	Ref. ID	MoV*	Comments	Conclusion/ CARs/CLs
C. **Duration of the Project / Crediting Period**				
C.1.1. Are the project's starting date and operational lifetime clearly defined and reasonable?	VVM Para. 102a-c PDD Section C.1.1/C.1.2	DR	The starting date of the project activity was mentioned in the initial PDD as 27/01/2006 and expected operational life time of the project activity is 25 years 0 months. Pending closure of CAR 03.	~~Pending~~ Y
C.1.2. Is the assumed crediting time clearly defined and reasonable (renewable crediting period of max 7 years with potential for 2 renewals or fixed crediting period of max. 10 years)?	VVM Para. 102a PDD Section C.2/C.2.1/C.2.2	DR	The PP has stated that starting date of crediting period is 01/10/2008. The length of the first crediting period is 10 years 0 months which is fixed and the same is acceptable to DOE.	Y
C.1.3. Does the project's operational lifetime exceed the crediting period	VVM Para. 102a PDD Section C.1.2/C.2.1.1/C.2.1.2	DR	According to the PDD version 01, the operational lifetime is exceeding the crediting period.	Y
C.1.4. Does the start date indicate whether this is a new project activity or a pre-existing project activity?	VVM Para. 102a/ 98 PDD Section C.1.1/C.2.1.1	DR	The start date of the project activity is before 2nd August 2008 and thus it is a pre – existing project activity.	Y
D. Environmental Impacts				
D.1.1. Does the project comply with environmental	VVM Para. 131/134d	DR	NOC and Consent issued by State Pollution Control Board needs to be provided by the project proponent.	~~Site visit~~ Y

Checklist Question	Ref. ID	MoV*	Comments	Conclusion/ CARs/CLs
legislation in the host country?	PDD section D			
D.1.2. Has an analysis of the environmental impacts of the project activity been sufficiently described?	VVM Para. 131 PDD section D	DR	The project activity does not seem to have any kind of environmental impacts. The same has tobe checked at site.	~~Site visit~~ Y
D.1.3. Are there any Host Party requirements for an Environmental Impact Assessment (EIA), and if yes, is an EIA approved?	VVM Para. 131 PDD section D	DR	Environmental Impact Assessment is not required as mentioned in the PDD. The same has been checked from the notification S.O. 15338, dated 14th September 2006, Ministry of Environment & Forests (MoEF), Govt. of India	Y
D.1.4. Will the project create any adverse environmental effects?	VVM Para. 131 PDD section D	DR	The project activity will not create any adverse environmental effects.	Y
D.1.5. Are trans-boundary environmental impacts considered in the analysis?	VVM Para. 131 PDD section D	DR	No trans – boundary environmental impacts are there for the project activity and has not considered in the PDD	Y
D.1.6. Have identified environmental impacts been addressed in the project design?	VVM Para. 131 PDD section D	DR	Yes, the identified environmental impacts have been addressed in the PDD.	Y
E. Stakeholder Comments				
E.1.1. Have relevant stakeholders been consulted?	VVM Para. 128a PDD Section E.1	DR	The stake holders identified for the project activity as per the PDD are as follows: • Chittar Village Panchayat • Employees of EDCL	Y

* MoV = Means of Verification, DR= Document Review, I= Interview

Checklist Question	Ref. ID	MoV*	Comments	Conclusion/ CARs/CLs
			• Local Non-Governmental Organizations (NGO) • Local club The PP would have to provide information on how the above mentioned stake holders have been consulted for the said project activity.	
E.1.2. Have appropriate media been used to invite comments by local stakeholders?	VVM Para. 128a PDD Section E.1	DR	The PDD, version 01 does not state anything about the involvement of the media to invite comments by the local stakeholders on the project activity. In turn it states that the stakeholders were sent written notification on behalf of the project proponent for comments and feedback on the project activity. Invitation Letter issued towards Local Stakeholder Consultation procedure has to be provided by the Project Proponent. The same will be checked during the site visit.	~~Pending site visit~~ Y
E.1.3. Is the undertaken stakeholder process described in a complete and transparent manner?	VVM Para. 128b PDD Section E.1	DR	As per the PDD version 01, local stakeholder consultation procedure has been carried out by the project proponent as a significant requirement under CDM modalities. The same will be checked during the site visit.	~~Pending site visit~~ Y
E.1.4. Is a summary of the stakeholder comments received provided?	VVM Para. 128b PDD Section E.2	DR	The concerns and comments received from the local stakeholders have been described in the version 01 of the PDD. Feedback received from relevant local stakeholders to be provided by the project proponent. The same will be checked during the site visit.	~~Pending site visit~~ Y
E.1.5. Has due account been taken of any stakeholder comments received?	VVM Para. 128b PDD Section E.3	DR	No adverse comment identified in the PDD. Same has to be cross checked during site visit.	~~Site visit~~ Y

* MoV = Means of Verification, DR= Document Review, I= Interview

References

Reference ID	Title / Description	Comments
1.	PDD version 01, Dated 12/05/2008	The PDD has been checked to complete the desk top review of the project description and further details for CDM project activity configuration.
2.	AMS-ID version 13, dated 14 December 2007.	This has been referred to validate the applicability of the project activity, project boundary, baseline and monitoring methodological choices.
3.	UNFCCC website (http://cdm.unfccc.int/index.html)	UNFCCC website has been referred to check the international stakeholder consultation procedure.
4.	Guidelines for completing CDM-SSC-PDD, version 05	This has been referred to validate the completeness of the PDD
5.	Validation and Verification Manual, version 01, EB-44, Annex-3	This has been referred to validate the applicability of the project activity, project boundary, baseline and monitoring methodological choices, according to the methodology and Additionality tool description.

* MoV = Means of Verification, DR= Document Review, I= Interview

A.3 Annex 3: Overview of Findings

Findings Overview

Findings from validation of "2 x 3.5 MW Ullunkal Hydro Power Project in Kerala, India".
Each Table below represents a finding from the validation assessment. The findings are numbered consecutively, approximately in the order that they have been identified and irrespective of the nature of the findings, for eg.: CAR #1, CAR #2, CL #3, FAR #4 etc.
Description of Table:

Type — Findings are either Corrective Action Requests (CARs), Clarification Requests (CLs), and Forward Action Request (FARs).

A corrective action request (CAR) is raised if one of the following occurs:

I. The project participants have made mistakes that will influence the ability of the project activity to achieve real, measurable additional emission reductions;
II. The CDM requirements have not been met;
III. There is a risk that emission reductions cannot be monitored or calculated.

A clarification request (CL) is raised if information is insufficient or not clear enough to determine whether the applicable CDM requirements have been met

A forward action request (FAR) is raised during validation to highlight issues related to project implementation that require review during the first verification of the project activity. FARs shall not relate to the CDM requirements for registration.

Lead Assessor Comments — Details the content of the finding

Ref — Refers to the item number in the Validation Protocol

Response — Please insert response to finding, starting with the date of entry.

Please Note: This is an open list and more findings may be added as validation progresses.
Responses to each Finding and relevant associated documentation should be recorded in this form by the Client and send back to the Lead Assessor in one submission to SGS (exception of finding linked to Letter of Approval, which can be submitted separately).
SGS reserves the right to review the associated fees and timeline if:

- more than one response submission is received from the Client
- a finding (CL/CAR), raised by the Lead Assessor prior to Technical Review stage, is not closed within 30 days of notification to the Client by SGS.

Rows for comments and further response will be appended to the table until the Findings has been addressed to the satisfaction of the Lead Assessor.

Findings Overview Summary

	CARs	CLs	FARs
Total Number raised	04	02	Nil

Date:	19/06/2008		Raised by:	Ajoy Gupta/ Kaushik Pal	
Type:	CAR	Number:	01	Reference:	Table-1
Lead Assessor Comment:					
Letter of approval from Host Country (India) Designated National Authority (DNA) to be submitted by the project proponent.					
Project Participant Response:			**Date:** 04/05/2009		
Letter of Approval from Host Country (India) Designated National Authority (DNA) has been provided to the validator.					

Documentation Provided by Project Participant:	
Host Country Approval from Govt. of India, Ministry of Environment & Forests. (Ref. no. No.4/15/2008-CCC, dated 12/03/2009)	
Information Verified by Lead Assessor:	
Host Country Approval from Govt. of India, Ministry of Environment & Forests. (Ref. no. No.4/15/2008-CCC, dated 12/03/2009)	
Reasoning for not Acceptance or Acceptance and Close Out:	**Date:** 05/05/2009
Host Country Approval from Govt. of India, Ministry of Environment & Forests has been verified with the letter ref. no. 4/15/2008-CCC dated 12th March 2009, all the project related information have been found consistent and the Host Country Approval was found unconditional. Thus accepted.	
Acceptance and Close out by Lead Assessor: Closed	**Date:** 05/05/2009

Date:	19/06/2008		Raised by:	Ajoy Gupta/ Kaushik Pal	
Type:	CAR	Number:	02	Reference:	A.2.3

Lead Assessor Comment:

The implementation schedule for the project activity is not clear according to the PDD and the related risk for project implementation details with the selected crediting period needs to be clarified.

Project Participant Response: **Date:** 04/05/2009

The sequence of events for the project activity are as follows:

Events	Date	Remarks/Comments
Prior knowledge of Clean Development Mechanism	29.10.2005	EDCL considered CDM for their Harangi Phase II project activity. Hence during the conceptualization of the Ullunkal project EDCL was aware of CDM Reference: Copy of the Board Resolution for the Harangi Phase II project
CDM consideration by the Board of Directors of M/s Energy Development Company Limited	27.01.2006	Reference: Copy of the Board Resolution
Communications between CDM consultants and EDCL	20.03.2006 27.03.3006	Reference: Email communications dated 20.03.2006 & 27.03.2006
Meeting with CDM consultants	03.04.2006	Reference: Email communication from CDM consultants to EDCL dated 06.04.2006
Proposal sent by CDM consultants to EDCL	06.04.2006	Reference: Email communication dated 06.04.2006
Communication from CDM consultants to EDCL and vice versa	Refer to email communication dated : 20.04.2006 27.04.2006	EDCL communicated to the CDM consultants that they will enter into the CDM cycle only after the transfer of the project from the government of Kerala & signing of the Implementation Agreement.
Transfer of Ullunkal Hydro Power Project as an IPP to M/s Energy	22.05.2006	

Development Company Limited by the Government of Kerala		
Letter from M/s Energy Development Company Limited to the Chief Engineer, Kerala State Electricity Board (KSEB) regarding signing of IA.	22.06.2006	The Implementation Agreement is the most essential pre-requisite for a hydro project in Kerala. Without the Implementation Agreement being signed it is not possible for the project proponent to implement the project
Letter from M/s Energy Development Company Limited to the Chairman, KSEB regarding signing of IA.	04.07.2006	
Letter from M/s Energy Development Company Limited to the Chief Engineer, KSEB regarding signing of IA.	11.07.2006	
Further communication with CDM consultants	Refer to Email communications dated: 24.07.2006	
	26.07.2006	activity *i.e.* if the IA is not granted the project proponent could not set up project. Hence EDCL communicated to the CDM consultants that they would enter into the CDM cycle only on receiving feedback from KSEB regarding the signing of the IA. All these communications highlighted the problem EDCL was facing regarding the signing of the IA. There was no certainty of the implementation of the project activity even after the take over from TECIL as there was no response from the KSEB's side regarding the signing of IA till 06.11.2006. Immediately after this response from KSEB EDCL considered the appointment of CDM consultants.
Letter from M/s Energy Development Company Limited to the Chairman, KSEB regarding signing of IA.	14.08.2006	
Letter from M/s Energy Development Company Limited escalating the concern to Honourable Minister, Power Department Government of Kerala Regarding signing of IA	11.10.2006	
Letter from M/s Energy Development Company Limited to the Chairman, KSEB regarding signing of IA.	27.10.2006	
Response from KSEB	06.11.2006	
Response from EDCL to the Chief Engineer, KSEB	30.11.2006	
Reply from M/s Energy Development Company Limited to the Chief Engineer, KSEB regarding signing of IA.	12.01.2007	
Communication from EDCL to CDM consultants	16.01.2007	Immediately after the 1st response from KSEB EDCL communicated with CDM consultants
Communication from CDM consultants to EDCL	30.01.2007	Reply from the CDM consultants
Letter of Award for the Turbo-generator set	19.02.2007	Immediately after the 1st response from KSEB, EDCL also placed the purchase order of the Turbo-generator set which is the start date of the project activity in accordance to EB 41 Annex 46
Further Communication with CDM consultants	Refer to email communications	

	dated: 27.02.2007 30.03.2007	
Letter from EDCL to the Principal Secretary, Power Department, Government of Kerala for signing of the Implementation Agreement	27.03.2007	Further reminder regarding the signing of the IA was sent to the KSEB
Appointment of CDM consultants	16.04.2007	Work order was placed on the CDM consultants for the Ullunkal project

Communication with CDM consultants	03.05.2007	The communication highlighted the start of the preliminary steps of CDM
Activities pertaining to the development of the PDD started immediately after the appointment of the CDM consultants. But the submission to MoEF for the Host County Approval and validation of the project activity could not take place due to unavailability of the Implementation Agreement[1]. Hence the project proponent decided to go for the validation only after the management was sure about the signing of the Implementation Agreement.		
Communications with CDM consultants regarding holding of the MoEF submission	Refer to email communications dated: 02.07.2007 10.07.2007	The MoEF submission was kept on hold due to the absence of the IA. Without the IA the project could not have received the HCA
Communications from EDCL to CDM consultants regarding advancing further in the CDM cycle	19.09.2007	The communication further highlighted the seriousness of the management of EDCL to
Communications from CDM consultants to EDCL regarding finalization of the PDD	04.10.2007	
Response from Energy Management Centre, Government of Kerala regarding signing of IA	02.11.2007	
Response from EDCL to the Director of M/s Energy Management Centre	15.11.2007	
Letter to Chief Engineer, Corporate Planning, KSEB for signing of PPA	31.12.2007	In-spite of repeated pursuits the IA was finally signed on 30.06.2008. It took more than two years for the signing of IA which is the main cause for the delay of the project activity. Even though the implementation agreement was signed the PPA is yet to be signed which caused further time & cost overruns
Response from Energy Management centre to EDCL regarding signing of IA	01.01.2008	
Communication from CDM consultant regarding MoEF submission	01.03.2008	
Submission of PDD to MoEF	28.01.2008	
Validator Appointment	15.05.2008	
Uploading of PDD for Global Stakeholder consultation	20.05.2008	
Signing of the Implementation Agreement[2]	30.06.2008	
Site Visit by validator	13.07.2008	
Presentation to Ministry of Environment & Forests, Government of India	13.08.2008	
Receipt of Host Country Approval	12.03.2009	

Hence it is evident from the above sequence that the status project activity was converted from IPP to CPP. Even though the Government of Kerala allotted the project to EDCL on 22nd May 2006, fresh Implementation Agreement (IA) as well as Power Purchase Agreement needed to be signed between KSEB and EDCL as per the norms of setting up an IPP[3]. However even the project proponent started the communication with KSEB for the signing of IA on 22.06.2006. But it took two years for the implementation agreement to be signed which caused the delay in implementation of the project as well as the different procedures of the CDM cycle since it is the main pre-requisite for implementing the project activity. Since the project proponent was unsure of the implementation of the project activity the different procedures pertaining to the CDM cycle was also delayed.

Documentation Provided by Project Participant:	
Revised PDD	
Information Verified by Lead Assessor:	
Revised PDD	
Reasoning for not Acceptance or Acceptance and Close Out:	**Date:** 05/05/2009
In response to CAR 02 project proponent has elaborated the CDM chronology in the section B.5 of the current version of the PDD, which says that the project activity faced a delay around two years to get the signed Implementation Agreement from Kerala State Electricity Board, Govt. of Kerala after huge follow ups and reminder mails. The same copy of the emails and reminder letters were cross checked and found justified the reason of delay for the implementation of the project activity as Independent Power Project (IPP). Furthermore the project got commissioned on 03/10/2008 and the same has been verified with the commissioning certificate issued by Chief Electrical Inspector to government of Kerala, Thiruvanthapuram, Order no. B3-7909/2007/CEI, dated 03/10/2008.Thus **CAR 02** was closed out.	
Acceptance and Close out by Lead Assessor: Closed	**Date:** 05/05/2009

Date:	19/06/2008		Raised by:	Ajoy Gupta/ Kaushik Pal		
Type:	CAR	Number:	03		Reference:	B.4.4
Lead Assessor Comment:						
The starting date of the project activity as per the initial PDD version 01 is 27/01/2006. ➢ Further explanation is required regarding selection of project start date and the appropriateness of the same with UNFCCC project start date definition. ➢ The proper documentary evidence towards the start date of the project activity needs to be provided by the project proponent. ➢ How and when the CDM was taken into serious consideration in the decision to go ahead with the project activity is not clear and the same has to be properly substantiated.						
Project Participant Response:				**Date:** 04/05/2009		
The start date of the project activity had been taken as the date of Board Resolution *i.e.* 27.01.2006 in the PDD/Version 01. ➢ However "Glossary of CDM terms" defines the start date of a CDM project activity as: "the earliest date at which either the implementation or construction or real action of a project activity begins". Moreover in accordance to the EB 41 it was further clarified that "the start date shall be considered to be the date on which the project participant has committed to expenditures related to the implementation or related to the construction of the project activity" Hence in accordance to this guidelines the start date of the project activity has been revised to the date of purchase order of the Turbo-generator set *i.e.* 19.02.2007 ➢ The document substantiating the same has been submitted to the DOE. ➢ The consideration of CDM is evident from the Board resolution dated 27.01.2006. The copy of the same has been provided to the DOE.						
Documentation Provided by Project Participant:						

[1] Communications with CDM consultants have been provided to the validator

[2] After the signing of the Implementation Agreement the PDD was again submitted to MoEF. Since earlier due to the absence of IA the project could not obtain the Host Country Approval

[3] http://www.keralaenergy.gov.in/pdf/pd_go_ms_5_2006_pd.pdf

➢ Revised PDD ➢ Letter of Award for the Turbo-generator set to Boom Systems Private Limited, letter ref. no. EDCL/BSPL/LOA/240A, dated 19/02/2007 ➢ Board resolution copy, dated 27/01/2006
Information Verified by Lead Assessor:
➢ Revised PDD ➢ Letter of Award for the Turbo-generator set to Boom Systems Private Limited, letter ref. no. EDCL/BSPL/LOA/240A, dated 19/02/2007 ➢ Board resolution copy, dated 27/01/2006

Reasoning for not Acceptance or Acceptance and Close Out:	**Date:** 25/07/2009

Start date for the current project activity has been re-determined by the project proponent and the equipment purchase order date (19/02/2007) has been considered as the project start date. Consideration of the project start has been found justified as the earliest date at which the implementation of the project activity begins and the date on which the project participant has committed to expenditures related to the implementation or related to the construction of the project activity (EB 41 Meeting Report, Para 67), thus accepted.

Project chronology and continuous CDM project development approach as mention in the final PDD has been validated with reference to the objective documentary evidences submitted by the project proponent. With reference to the validated project chronology of the project milestone activities and the supporting documents, it has been found justified that CDM revenue was considered in the decision to implement the project activity and project participant has demonstrated continued and real actions were taken to secure CDM status for the project in parallel with its implementation as per guidelines set in EB41 Annex 46. Therefore with reference to the above mentioned discussions, the serious prior consideration of the CDM revenue for the project activity has been found evident. Therefore CAR 03 was closed out.

Acceptance and Close out by Lead Assessor:	**Date:** 25/07/2009

Date:	19/06/2008		Raised by:	Ajoy Gupta/ Kaushik Pal	
Type:	CAR	Number:	04	Reference:	B.4.3 & B.4.7
Lead Assessor Comment:					

1. The investment barrier is not transparent and the project proponent needs to substantiate the following –

- As per PDD version 01, the project activity originally belonged to Tecil Chemicals & Hydro Power Limited which suffered heavy losses. Please provide the financial report of Tecil Chemicals & Hydro Power Limited of the loss making years.
- Please provide documentary evidence when EDCL took over the project activity from Tecil after repaying INR 23.5 Crores.
- Please justify why pay back period has been considered as financial indicator instead of IRR where as IRR provides much more appropriate scenario for assessment of project financial viability.
- Please clarify and substantiate the pay back period of the project activity with the company's internal benchmark for similar kind of project activities.
- Please justify the determination procedure for company's internal benchmark and also clarify its applicability for the project financing.
- Please provide the detail project payback calculation sheet along with proper traceability of the data/ assumptions used.
- The proof for the investment required towards the total project cost along with the source of funds and the related terms and conditions, made available to the project activity for its implementation.
- The PP would have to provide documentary evidence towards the power tariff and the escalation clauses along with all other evidences considered with respect to energy generation, operation & maintenance and depreciation parameters pro-vided in the PDD.

2. The Institutional Barrier as mentioned in the PDD, version 01 needs to be further clarified –
Please provide evidence regarding delay, in finalizing the Power Purchase Agreement (PPA) due to the changing in status from CPP to IPP of the proposed project activity.
3. Other barriers due to water sump in the power house area is not justified, as this is due to civil construction related issues, which was supposed to be checked during project designing phase. Project proponent needs to provide further clarification for the same.
4. The Common Practice Barrier as mentioned in the PDD, version 01 is not clear, the same needs to be further clarified as per the CDM requirement.

Project Participant Response:	**Date:** 04/05/2009

1.

- The annual reports of TECIL substantiating the consistent loss making condition of TECIL have been submitted to the DOE
- The document substantiating the amount of money that EDCL gave while taking over the Ullunkal project has been submitted to the DOE.
- During financial feasibility study for the project activity under consideration, the project proponent assessed the project on the basis of the pay-back period of its 1st hydro project *i.e.* Harangi Phase I. This has been clearly substantiated in the board resolution passed for the approval of the Ullunkal hydro power project. The same is being consistently followed for all similar projects taken up by the project proponent *i.e.* Harangi Phase II project and Karikkayam Hydro project. Hence for all the hydro projects pay-back period have been the internal assessment criteria for EDCL. The payback period for the project activity comes out to be 13 years without taking CDM into consideration which is quite higher than the company's internal acceptability limit of 8-10 years. However these figures are based on a Plant Load Factor of around 50%. But if we take into consider a realistic PLF of 45% of small hydro projects as per the notification of KSERC as well as the consultative Paper of KSERC dated 18th January, 2006 the payback period goes up to 15 years making the project further unviable. However the project proponent computed the IRR figures according to the guidelines of investment analysis (Reference: EB 41 Annex45) just during the period of the start date of the project activity. The results are given below:

IRR of the project activity	**Benchmark (Reserve Bank of India Benchmark Weighted Average Prime Lending rates of the Public Sector Banks (PSBs) in 2005-06)**
9.35% with PLF of 45%	10.75%

Based on the above figures it is quite evitable that the project IRR was lower than the benchmark figure.

- The payback period of the project activity is much higher than that of the payback period of Harangi Phase I. The cash flows of Harangi Phase I has been submitted to the DOE to justify the procedure of calculation of the pay-back period of Harangi Phase I.
- The pay-back calculation sheet for the project activity and the related assumptions has been submitted to DOE.
- The project proponent during the inception of the project activity considered a debt equity ratio of 70:30. However on account of their unattractive project financials they got loan rejection from the financial institutions. However they took over the project activity from TECIL with an upfront investment of 23.5 Crores with the consideration of CDM revenues. Hence they decided to go ahead with the project activity based on internal accruals with the consideration that future CDM revenue will improve the financials of the project activity. The communications of loan rejections from the banks and non-banking financial institutions have been provided to the DOE.
- All the documents establishing the power tariff and the escalation rate along with all other related assumptions for the computation of pay-back have been submitted to the DOE.

2.

- The delay of signing of PPA/IA has been substantiated by the repeated letters from EDCL to the Government of Kerala, Power Department. The copies of the letters have been submitted to the DOE. The communications between EDCL & KSEB justifies that the signing of the IA was delayed for a period of two years. The PPA is yet to be signed between EDCL & KSEB which is leading to revenue loss for EDCL since the plant is ready to be commissioned

3.

- The same has been modified in the PDD version 2.

4.

- The Common Practice analysis in the PDD refers that even though hydro power accounts for about 60% of the total power in the state, the project activity is only the 2nd IPP in the state of Kerala. The 1st IPP has already been registered with UNFCCC as a CDM project (http://cdm.unfccc.int/Projects/DB/SGS-UKL1200391307.92/view). So this further substantiates that due the history of time and costs overruns of hydro power projects in Kerala the private agencies were always sceptical about taking up hydro power projects. This shows that investing in IPPs in not a common practice for the private players in the state of Kerala as no IPP has been developed till date without the consideration of CDM revenues.

Documentation Provided by Project Participant:

- *Revised PDD*
- *IRR calculation excel work sheet*
- Implementation Agreement letter ref. no. EMC/SHP/EDC-AHP/02, dated 30/06/2008
- Kerala Gazette published by Kerala State Electricity Regulatory Commission, dated 04/07/2006
- Consultative paper on purchase requirement of Non conventional energy and determination of tariff for small hydro generating stations and wind energy, dated 18.01/2006
- 60th Annual report of TECIL Chemicals and Hydro Power Limited, dated 31/03/2005

Information Verified by Lead Assessor:

- *Revised PDD*
- *IRR calculation excel work sheet*
- Implementation Agreement letter ref. no. EMC/SHP/EDC-AHP/02, dated 30/06/2008
- Kerala Gazette published by Kerala State Electricity Regulatory Commission, dated 04/07/2006
- Consultative paper on purchase requirement of Non conventional energy and determination of tariff for small hydro generating stations and wind energy, dated 18.01/2006

60th Annual report of TECIL Chemicals and Hydro Power Limited, dated 31/03/2005

Reasoning for not Acceptance or Acceptance and Close Out:	**Date:** 25/07/2009

Project proponent has further represented the project additionality with reference to the guideline laid down by "Non-binding best practice examples to demonstrate additionality for SSC project activities"; EB35, Annex 34. Investment barrier has been demonstrated as the prime barrier towards project implementation and all other barrier discussion has been withdrawn from the PDD.

Project investment barrier analysis has been duly demonstrated through project investment analysis, selecting Project IRR as financial indicator and applying benchmark analysis approach. The investment analysis approach followed was found in line with the relevant guideline of UNFCCC. All the assumption used for project investment analysis was cross checked and found justified and valid during the time of project decision making stage. The project IRR value has been validate as 9.35% against the selected benchmark value of 10.75%. The benchmark value for project investment analysis has been considered as Benchmark Prime Lending Rate (BPLR) of the Indian Public Sector Banks according to Reserve Bank of India in the financial year 2005-2006, which is the year for project conceptualisation and subsequent project decision. The benchmark value 10.75% has been cross checked with the Reserve Bank of India web portal http://rbidocs.rbi.org.in/rdocs/Publications/PDFs/87456.pdf and found satisfactory. Thus CAR 04 was closed out.

Acceptance and Close out by Lead Assessor: Closed	**Date:** 25/07/2009

Date:	19/06/2008		Raised by:	Ajoy Gupta/ Kaushik Pal		
Type:	CL	Number:	05		Reference:	B.5.2

Lead Assessor Comment:

Please clarify whether DG sets will be in use with in the project boundary.

Project Participant Response:	**Date:** 04/05/2009

In case of extreme emergencies *i.e.* when the power plant will be in a break down mode and all grid connections has been lost; to cater to the auxiliary power requirement DG sets will be used by the project proponent. The monitoring of the DG parameters has been included in the Annex 4 of the PDD/Version 02 to take into account the project emissions if any.

Documentation Provided by Project Participant:

Revised PDD, version 02, dated 06/04/2009

Information Verified by Lead Assessor:

Revised PDD, version 02, dated 06/04/2009	
Reasoning for not Acceptance or Acceptance and Close Out:	**Date:** 05/05/2009
In the section B.6.1, B.6.2 and B.7.1 of the revised PDD, project proponent clarified that they will monitor diesel consumption data in case of exigency period and also accounts the D.G operational time to calculate the project emission. Thus it is accepted.	
Acceptance and Close out by Lead Assessor: Closed	**Date:** 05/05/2009

Date:	19/06/2008		Raised by:	Ajoy Gupta/ Kaushik Pal	
Type:	CL	Number:	06	Reference:	B.5.4 & B.7.1
Lead Assessor Comment:					
The excel sheet for calculation of emission reductions is required to be submitted along with evidences for the assumptions used.					
Project Participant Response:			**Date:** 04/05/2009		
The excel sheet for calculation of emission reductions has been provided to the DOE.					
Documentation Provided by Project Participant:					
Emission reduction calculation excel sheet.					
Information Verified by Lead Assessor:					
Emission reduction calculation excel sheet.					
Reasoning for not Acceptance or Acceptance and Close Out:			**Date:** 05/05/2009		
The project proponent has provided the CER calculation sheet and found satisfactory.					
Acceptance and Close out by Lead Assessor: Closed			**Date:** 05/05/2009		

A.4 Annex 4: Team Members Statements of Competency

Statement of Competence

Name: Gupta, Ajoy SGS Affiliate: SGS India

Status

-	Lead Assessor	x	-	Expert	x
-	Assessor	x	-	Financial Expert	
-	Local Assessor	x	-	Technical Reviewer	x

Scopes of Expertise

1. Energy Industries (renewable / non-renewable) **x**
Sub scope(s): Hydro, Wind, Combined heat and Power & Waste Heat, Biomass Electricity Utilization

2. Energy Distribution
Sub scope(s):

3. Energy Demand
Sub scope(s):

4. Manufacturing
Sub scope(s):

5. Chemical Industry
Sub scope(s):

6. Construction
Sub scope(s):

7. Transport
Sub scope(s):

8. Mining/Mineral Production
Sub scope(s):

9. Metal Production
Sub scope(s):

10. Fugitive Emissions from Fuels (solid, oil and gas)
Sub scope(s):

11. Fugitive Emissions from Production and Consumption of Halocarbons and Sulphur Hexafluoride
Sub scope(s):

12. Solvent Use
Sub scope(s):

13. Waste Handling and Disposal
Sub scope(s):

14. Afforestation and Reforestation
Sub scope(s):

15. Agriculture
Sub scope(s):

Approved Member of Staff by: Siddharth Yadav Date: 28/10/2009

Statement of Competence

Name: Pal, Kaushik SGS Affiliate: SGS India

Status

-	Lead Assessor	x	-	Expert	x
-	Assessor	x	-	Financial Expert	
-	Local Assessor	India and Nepal	-	Technical Reviewer	

Scopes of Expertise

1. Energy Industries (renewable / non-renewable) **x**
Sub scope(s): Biomass based Thermal/ Electricity Utilization

2. Energy Distribution **x**
Sub scope(s): Energy Distribution

3. Energy Demand
Sub scope(s):

4. Manufacturing
Sub scope(s):

5. Chemical Industry
Sub scope(s):

6. Construction
Sub scope(s):

7. Transport
Sub scope(s):

8. Mining/Mineral Production
Sub scope(s):

9. Metal Production
Sub scope(s):

10. Fugitive Emissions from Fuels (solid, oil and gas)
Sub scope(s):

11. Fugitive Emissions from Production and Consumption of Halocarbons and Sulphur Hexafluoride
Sub scope(s):

12. Solvent Use
Sub scope(s):

13. Waste Handling and Disposal
Sub scope(s):

14. Afforestation and Reforestation
Sub scope(s):

15. Agriculture
Sub scope(s):

Approved Member of Staff by: Siddharth Yadav Date: 13 January 2010

Statement of Competence

Name: Mahawar, Abhishek SGS Affiliate: SGS India

Status

-	Lead Assessor		-	Expert	
-	Assessor	x	-	Financial Expert	x
-	Local Assessor	x	-	Technical Reviewer	

Scopes of Expertise

1. Energy Industries (renewable / non-renewable)
Sub scope(s):

2. Energy Distribution
Sub scope(s):

3. Energy Demand
Sub scope(s):

4. Manufacturing
Sub scope(s):

5. Chemical Industry
Sub scope(s):

6. Construction
Sub scope(s):

7. Transport
Sub scope(s):

8. Mining/Mineral Production
Sub scope(s):

9. Metal Production
Sub scope(s):

10. Fugitive Emissions from Fuels (solid, oil and gas)
Sub scope(s):

11. Fugitive Emissions from Production and Consumption of Halocarbons and Sulphur Hexafluoride
Sub scope(s):

12. Solvent Use
Sub scope(s):

13. Waste Handling and Disposal
Sub scope(s):

14. Afforestation and Reforestation
Sub scope(s):

15. Agriculture
Sub scope(s):

Approved Member of Staff by: Siddharth Yadav Date: 12/11/2009