VALIDATION REPORT

M/S.KOTHARI SUGARS AND CHEMICALS LIMITED (KSCL)'S BAGASSE BASED COGENERATION PROJECT AT PERAMBALUR, TAMILNADU, INDIA

REPORT NO. 2006-9129

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DET NORSKE VERITAS

VALIDATION REPORT

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Client: Kothari Sugars and Chemicals Limited	Client ref.: Mr. B.H. Kotharii

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Summary:

Det Norske Veritas Certification AS (DNV) has performed a validation of the *"M/S. Kothari Sugars and Chemicals Ltd (KSCL)'s Bagasse Based Co-generation Project, at Perambalur district, Tamil Nadu, India"*on the basis of UNFCCC criteria for the CDM, as well as criteria given to provide for consistent project operations, monitoring and reporting. UNFCCC criteria refer to Article 12 of the Kyoto Protocol, the CDM modalities and procedures and the subsequent decisions by the CDM Executive Board. This validation report summarizes the findings of the validation.

The validation consisted of the following three phases: i) a desk review of the project design and the baseline and monitoring plan, ii) follow-up interviews with project stakeholders and iii) the resolution of outstanding issues and the issuance of the final validation report and opinion.

In summary, it is DNV's opinion that the project, as described in the project design document of version 03 of 08 March 2007, meets all relevant UNFCCC requirements for the CDM and correctly applies the approved baseline and monitoring methodology ACM0006, version 04. Hence DNV requests the registration of the *"M/S. Kothari Sugars and Chemicals Ltd (KSCL)'s Bagasse Based Co-generation Project, at Perambalur district, Tamil Nadu, India"* as a CDM project activity.

Report No.: 2006-9129	Subject Group: Energy	
Report title: M/S. Kothari Sugars and Chemicals Ltd (KSCL)'s Bagasse Based Co-generation Project, at Perambalur district, Tamil Nadu, India		
Work carried out by: Amit Thusu, Vidyacharan Astakala, Michael Lehmann		
Work verified by: C Kumaraswamy		
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Abbreviations

BM	Build Margin
CAR	Corrective Action Request
CDM	Clean Development Mechanism
CEF	Carbon Emission Factor
CER	Certified Emission Reduction
CEA	Central Electricity Authority
CH_4	Methane
CL	Clarification request
CO_2	Carbon dioxide
CO_2e	Carbon dioxide equivalent
DNV	Det Norske Veritas
DNA	Designated National Authority
EIA	Environmental Impact Assessment
GHG	Greenhouse gas(es)
GWP	Global Warming Potential
IPCC	Intergovernmental Panel on Climate Change
KSCL	Kothari Sugars and Chemicals Ltd
MP	Monitoring Plan
MNES	Ministry of Non-Conventional Energy Resources
MVP	Monitoring and Verification Plan
NGO	Non-governmental Organisation
OM	Operating Margin
ODA	Official Development Assistance
PPA	Power Purchase Agreement
PDD	Project Design Document
TPH	Tonnes per hour
TNPCB	Tamilnadu Pollution Control Board
TNEB	Tamil Nadu Electricity Board
UNFCCC	United Nations Framework Convention on Climate Change

1 INTRODUCTION

The Kothari Sugars and Chemicals Ltd (KSCL)) has commissioned Det Norske Veritas Certification AS (DNV) to validate the *"M/S. Kothari Sugars and Chemicals Ltd (KSCL)'s Bagasse Based Co-generation Project, at Perambalur district, Tamil Nadu, India"* (hereafter called "the project"). This report summarises the findings of the validation of the project, performed on the basis of UNFCCC criteria for CDM projects, as well as criteria given to provide for consistent project operations, monitoring and reporting.

The validation team consists of the following personnel:

Mr. Amit Thusu	DNV New Delhi, India	Project Manager and GHG Auditor
Mr. Vidyacharan Astakala	DNV Hyderabad, India	GHG Auditor
Mr. Michael Lehmann	DNV Oslo, Norway	Sector Expert
Mr. C. Kumaraswamy	DNV Bangalore, India	Technical Reviewer

1.1 Validation Objective

The purpose of a validation is to have an independent third party assess the project design. In particular, the project's baseline, monitoring plan, and the project's compliance with relevant UNFCCC and host Party criteria are validated in order to confirm that the project design, as documented, is sound and reasonable and meets the identified criteria. Validation is a requirement for all CDM projects and is seen as necessary to provide assurance to stakeholders of the quality of the project and its intended generation of certified emission reductions (CERs).

1.2 Scope

The validation scope is defined as an independent and objective review of the project design document (PDD). The PDD is reviewed against the criteria stated in Article 12 of the Kyoto Protocol, the CDM modalities and procedures as agreed in the Marrakech Accords and the relevant decisions by the CDM Executive Board, including the approved consolidated baseline and monitoring methodology ACM0006, version 4 /9/. The validation team has, based on the recommendations in the Validation and Verification Manual /11/ employed a risk-based approach, 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 project participants. However, stated requests for clarifications and/or corrective actions may have provided input for improvement of the project design.

1.3 Description of Proposed CDM Project

The *"M/S. Kothari Sugars and Chemicals Ltd (KSCL)'s Bagasse Based Co-generation Project, at Perambalur district, Tamil Nadu, India"* proposed by KSCL involves the installation of a new power plant, adjacent to a new sugar factory being established in Tamil Nadu, India. The project activity is located in the Sathamangalam village, Ariyalur-Taluk, Perambalur district, Tamil Nadu, India. The power plant will combust mainly bagasse generated in the sugar mill (during the cane crushing season) and procured from outside (during the off season). Some quantity of coal is also envisaged to be used during the off season. The net electricity generated (about 139

GWh per year) will be supplied to sugar plant and excess power will be exported to the grid through a TNEB substation /6/.

The project consists of an 80 TPH boiler (86 kg/cm^2) and a 24 MW turbine generator of double extraction cum condensing type. All the bagasse (biomass residue) generated in the sugar plant will be utilised along with other biomass from outside the sugar factory premises.

The main objective of the project is to reduce anthropogenic GHG emissions by displacing fossil fuel based power generation in the southern regional grid through renewable power. The project thereby helps in reducing the dependency on fossil fuel based power in the state of Tamil Nadu, and also contributes towards sustainable development.

Total estimated GHG emissions due to the project activity are expected to be on an average 82 719 tonnes of CO_2 per year during ten years of chosen crediting period.

2 METHODOLOGY

The validation of the project started in September 2006. The validation consists of the following three phases:

i) a desk review of the project design document

ii) follow-up interviews with project stakeholders

iii) the resolution of outstanding issues and the issuance of the final validation report and opinion.

In order to ensure transparency, a validation protocol was customised for the project, according to the Validation and Verification Manual /11/. The protocol shows in transparent manner criteria (requirements), means of verification and the results from validating the identified criteria. The validation protocol serves the following purposes:

- It organises, details and clarifies the requirements a CDM project is expected to meet;
- It ensures a transparent validation process where the validator will document how a particular requirement has been validated and the result of the validation.

The validation protocol consists of three tables. The different columns in these tables are described in Figure 1.

The completed validation protocol for the *"M/S. Kothari Sugars and Chemicals Ltd (KSCL)'s Bagasse Based Co-generation Project, at Perambalur district, Tamil Nadu, India"* is enclosed in Appendix A to this report.

Findings established during the validation can either be seen as a non-fulfilment of validation protocol criteria or where a risk to the fulfilment of project objectives is identified. Corrective action requests (CAR) are issued, where:

i) mistakes have been made with a direct influence on project results;

ii) validation protocol requirements have not been met; or

iii) There is a risk that the project would not be accepted as a CDM project or that emission reductions will not be certified.

The term Clarification may be used where additional information is needed to fully clarify an issue.

Validation Protocol Table 1: Mandatory Requirements for CDM Project Activities			
Requirement	***Reference***	***Conclusion***	***Cross reference***
The requirements the project must meet.	*Gives reference to the legislation or agreement where the requirement is found.*	*This is either acceptable based on evidence provided (**OK**), a **Corrective Action Request (CAR)** of risk or non-compliance with stated requirements or a request for **Clarification (CL)** where further clarifications are needed.*	*Used to refer to the relevant checklist questions in Table 2 to show how the specific requirement is validated. This is to ensure a transparent Validation process.*

Validation Protocol Table 2: Requirement Checklist				
Checklist Question	***Reference***	***Means of verification (MoV)***	***Comment***	***Draft and/or Final Conclusion***
The various requirements in Table 1 are linked to checklist questions the project should meet. The checklist is organised in seven different sections. Each section is then further sub-divided. The lowest level constitutes a checklist question.	*Gives reference to documents where the answer to the checklist question or item is found.*	*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 (**OK**), or a **Corrective Action Request (CAR)** due to non-compliance with the checklist question (See below).A request for **Clarification (CL)** is used when the validation team has identified a need for further clarification.*

Validation Protocol Table 3: Resolution of Corrective Action Requests and Requests for Clarification			
Draft report corrective action requests and requests for clarifications	***Ref. to Table 2***	***Summary of project participants' response***	***Final conclusion***
If the conclusions from the draft Validation are either a Corrective Action Request or a Clarification Request, these should be listed in this section.	*Reference to the checklist question number in Table 2 where the Corrective Action Request or Clarification Request is explained.*	*The responses given by the project participants during the communications with the validation team should be summarised in this section.*	*This section should summarise the validation team's responses and final conclusions. The conclusions should also be included in Table 2, under "Final Conclusion".*

Figure 1 Validation protocol tables

2.1 Review of Documents

The PDD /1/ submitted by KSCL and additional background documents related to the project design and baseline /2/, /3/ were reviewed as a part of validation

2.2 Follow-up Interviews

On 23-24 January 2007, DNV performed interviews with project stakeholders to confirm selected information and to resolve issues identified in the document review. Representatives of KSCL were interviewed /13//14//15//16//17//18. The main topics of the interviews are summarised in Table 1.

Table 1 Interview topics

Interviewed organisation	Interview topics
KSCL	➢ Approval of Host country (India). ➢ Determination of project additionality and ascertaining that CDM was considered during the project conceptualisation. ➢ Clarifications on establishment of baseline, monitoring plan and emission reduction calculations. ➢ Resources, training needs and procedures for operation and maintenance. ➢ Monitoring methodology. ➢ Environmental consents & EIA Approvals

2.3 Resolution of Clarification and Corrective Action Requests

The objective of this phase of the validation was to resolve any outstanding issues which needed to be clarified for DNV's positive conclusion on the project design. The corrective action requests (CAR) and requests for clarifications (CL) raised by DNV, were presented to the project participant in DNV's draft validation report and were resolved during communication between the client and DNV. To guarantee the transparency of the validation process, the concerns raised and responses given are documented in the validation protocol in Appendix A (Table 3). Since modification to the project design were necessary to resolve DNV's concerns, the client decided to revise the PDD and resubmitted the PDD (version 03) of 08 March 2007. After reviewing the revised PDD, DNV issued this final validation report and opinion.

2.4 Internal Quality Control

The draft validation report including the initial validation findings underwent a technical review before being submitted to the project participants. The final validation report underwent another technical review before requesting registration of the project activity. The technical review was performed by a technical reviewer qualified in accordance with DNV's qualification scheme for CDM validation and verification.

3 VALIDATION FINDINGS

In the following sections the findings of the validation are stated. The validation criteria (requirements), the means of verification and the results from validating the identified criteria are documented in more detail in the validation protocol in Appendix A.

3.1 Participation Requirements

The project's host Party is India and the participating Annex-I country is U.K. Both India and the United Kingdom fulfil the participation requirements and have ratified the Kyoto protocol. The project participants are Kothari Sugars and Chemicals Ltd. of India and the Carbon Resource Management Ltd of U.K. The DNA of India has approved its voluntary participation in the project and has confirmed that project assists in achieving sustainable development /4/. The approval by the DNA of the United Kingdom has also been obtained /4/.

3.2 Project Design

The *"M/S. Kothari Sugars and Chemicals Ltd (KSCL)'s Bagasse Based Co-generation Project, at Perambalur district, Tamil Nadu, India"* proposed by KSCL involves the installation of a new power plant, adjacent to a new sugar factory being established in Tamil Nadu, India. The project activity is located in the Sathamangalam village, Ariyalur- Taluk, Perambalur district, Tamil Nadu, in India. The power plant will combust mainly bagasse generated in the sugar mill (during the cane crushing season) and procured from outside (during the off season). Some quantity of coal is also envisaged to be used during the off season.

The project has a rated generation capacity of 24 MW and aims to export power to the Tamil Nadu state electricity grid which forms a part of the southern regional grid of India. The project is connected to the grid through a 110 KV substation, which is situated around 5 km from the project site.

The technology used is available in India and no transfer of technology is envisaged. The project consists of a 24 MW generation set (turbine generator of double extraction cum condensing type) coupled to a high pressure configuration boiler having a steam generation capacity of 80 tonnes per hour at of 86 kg/cm^2 pressure and 515^{0}C temperature. The co-generation project meets the steam and power requirements of the sugar mill and exports surplus power to the connected grid. The project results in reduction of GHG emissions by capacity addition to the grid with clean power.

The start date of the project activity is 22 September 2005 and the expected operational lifetime of the project activity is 25 years which is deemed reasonable. The project developer has chosen a fixed crediting period of 10 years starting from 15 July 2007 or the date of registration (which ever is later).

Emission reductions are generated by displacing fossil-fuel based grid-electricity. Over a 10 years crediting period, the project's expected annual emission reductions will be on an average 82 719 tonnes of CO2 equivalents (tCO2e).

No public funding is involved in the project, and the validation did not reveal any information that indicates the project to be seen as a diversion of ODA funding.

3.3 Baseline Determination

The project applies the approved consolidated baseline methodology ACM0006 – *Consolidated baseline methodology for grid-connected electricity generation from biomass residues* /9/. The project fulfils the conditions under which ACM0006, version 4 is applicable. The project is in accordance with scenario 3 of ACM0006, i.e. the project activity involves the installation of a new power plant, supplying power and steam to the adjacent new sugar plant with excess power to the grid using both bagasse supplied by the new sugar plant and purchased from outside as a fuel, at a site where no power was generated prior to the implementation of the project activity.

In the absence of the project activity, a new biomass boiler plant (in the following referred to as "reference plant"), supplying steam to the adjacent new sugar plant, would be installed instead of the project activity at the same site and surplus bagasse would be left to decay under naturally aerobic conditions. The power requirement of the sugar plant would be met from the grid power. The alternatives considered for the determination of baseline scenario include alternatives for power, biomass and heat. The chosen baseline is a combination of the following baseline scenarios given in ACM0006:

For power generation:	The generation of power in existing and/or new grid-connected power plants (P4);
For heat generation:	The generation of heat in boilers using the same type of biomass residues (H4);
For biomass use:	The biomass residues are used for heat and/or electricity generation at the project site (B4) and the excess biomass residues are dumped or left to decay under mainly aerobic conditions. This applies, for example, to dumping and decay of biomass residues on fields (B1) or burned without any energy utilization (B3).

The selected baseline scenario is the construction of a conventional "business as usual" power plant utilising bagasse which will generate heat to meet the sugar mill's steam demand and the surplus bagasse would be left to decay naturally. The power requirement of the sugar plant would be met from the grid power. The "reference plant" would have utilised the same amount of bagasse as the project plant.

In accordance with ACM0006, an electricity baseline emission factor is calculated in accordance with ACM0002 as the combined margin emission coefficient, consisting of the combination of a simple operating margin (OM) emission coefficient and a build margin (BM) emission coefficient (see section 3.6). Both the OM and BM emission coefficient will be fixed for the entire crediting period and are determined ex-ante. The electricity system selected to determine the combined margin emission coefficient is the southern regional grid in India. The weighted average of the OM and the BM emission coefficient for the southern regional grid of India has been calculated to be 0.95 tCO_2/MWh. The OM emission factor has been estimated based on the "simple OM" approach as the low cost / must run plants constitute less than 50% of the generation of southern regional grid. For the OM calculation the vintage data for the years 2002~2003, 2003~2004 and 2004~2005 have been used and operating margin emission factor is calculated to be 1.19 t CO_2/ MWh, based on the generation weighted average. For the build margin, the 20% most recently installed plants have been accounted for, in terms of electricity

generation. The build margin emission factor has been evaluated to be 0.71 t CO_2/MWh. The completeness of the set of power plants as well as the correctness of the reported fuel consumption and electricity generation data has been verified. All data has been sourced from data published by the central electricity authority (CEA).

DNV is able to verify, that instead of estimated value (0.95 T tCO_2/MWh as indicated above) of emission coefficient for southern regional grid of India, KSCL are using the conservative CEA combined margin emission coefficient for southern regional grid of India (Source: http://www.cea.nic.in/planning/c%20and%20e/Government%20of%20India%20website.htm) 0.86 tCO_2/MWh) for the baseline emission calculations.

Hence, in order to determine baseline emissions, the net electricity generation as a result of the project activity is multiplied with the baseline grid emission factor of 0.86 tCO_2/MWh (for southern regional grid as per CEA Study), determined ex-ante and fixed for the entire crediting period.

3.4 Additionality

Additionality has been addressed through the use of "The tool for the demonstration and assessment of additionality", version 03 /10/:

Step 1: One alternative emerges after eliminating all other identified alternatives (as considered for determining the baseline as per the methodology):

[1] Installation of a boiler for steam generation using bagasse generated from the new sugar plant, and surplus bagasse being dumped and power for sugar plant being purchased from the grid.

This identified alternative is in compliance with all prevailing laws and there is no legal compulsion or mandatory requirement for the implementation of the project.

Step 2: This step has not been considered.

Step 3: The project demonstrates additionality through the existence of investment, institutional, technical and policy related barriers. DNV was able to verify that the project had to overcome the following sectoral barriers which act as disincentives:

- High or equal capital cost of the cogeneration facility as compared to that of the sugar plant;
- High cost of establishing a high pressure cogeneration facility (86 kg/cm^2 pressure) as compared to that of the low pressure co-generation plant (21 – 44 kg/cm^2 pressure)
- Investment barriers due to high interest and cost of debt from banks (2% higher interest than that for infrastructure projects) /7/;
- Requirement of signed PPA /8/ initially (not a normal practice at loan approval stage) by financial institutions leading to delays and uncertainties /7/;
- Absence of provision of escrow account facilities with the Tamil Nadu electricity board, which is insisted upon by financial institutions;
- Risks due to lower tariffs (in comparison to MNES guidelines for biomass based cogeneration projects) and fixed tariffs with no annual escalation for five years starting from year 2006;

- Technical risks exist as sugar manufacturing units that do not possess the technical infrastructure (for water treatment) required for operation and maintenance of high pressure boilers and in the absence of adequate incentives to venture into initiating such extra efforts for acquiring the requisite technical skills, current prevailing practice of using bagasse only to meet the process steam needs would continue.

Step 4: Common practice: DNV confirms that the prevailing practice among sugar manufacturers is to install a less technologically challenging project activity – a lower efficiency boiler generating just enough steam to meet only captive needs, which is representing the common practice in India.

In the State of Tamil Nadu, only 12 out of 38 sugar mills export power to the grid, , despite the fact that 78% of the power is fossil fuel based. Out of an estimated 3500 MW bagasse based cogeneration potential, only about 500 MW is currently exploited, indicating that it is not prevailing common practice.

Moreover, there are 517 sugar mills in India, 22 of which have bagasse cogeneration capacities greater than 22 MW. These represent only 4% of penetration of the potential in terms of the number of sugar mills employing co-generation systems. Thus from the proposed project activity with a capacity of 24 MW, it is clear that the project is not a common practice in Tamil Nadu nor in India.

In conclusion, it is deemed likely that the project activity would not have been implemented in the absence of the CDM.

3.5 Monitoring Plan

The project applies the approved consolidated monitoring methodology ACM0006, version 4 – *Consolidated baseline methodology for grid-connected electricity generation from biomass residues* /9/. The project also applies ACM0002 ("*Consolidated baseline methodology for grid-connected electricity generation from renewable sources*") for calculation of the southern grid emission factor.

The proposed monitoring methodology adopted is applicable and justified as the project activity is a green field co-generation project using bagasse (biomass residue) as a main fuel and is grid connected. The monitoring plan adequately addresses all the necessary parameters required for the estimation of emission reductions and all such critical data are either measured or calculated and archived for a period of two years after the crediting period. The emission factor for the southern regional grid is calculated ex-ante using the combined margin approach as referred in ACM0002 but the more conservative value of 0.86 tCO_2/MWh (from CEA study) are used for emission reduction calculations.

The monitoring plan indicates the electricity generated will be continuously monitored and measured through duly calibrated meters for both total generations, power to sugar plant and auxiliary consumption. These records are then collated and emission reduction reports are generated.

Fossil fuels such as coal may be used in the project activity in the off-season when sufficient biomass residue is not available. Quantity of biomass (bagasse) supplied from adjacent new sugar plant will be measured through a belt weigher, and the quantity of biomass purchased from outside will be measured by duly calibrated weighbridges and crosschecked with transporters receipts. The quantity of coal used will be measured by belt weigher. The reconciliation of

energy used and biomass consumed will be carried out through material and energy balance at the end of each year. Also, the monitoring plan provides for monitoring of the project emissions due to biomass (purchased from outside) transportation.

The monitoring plan provides for monitoring of parameters, on yearly basis, necessary for ruling out leakages by application of L2 of ACM0006 (version 04).

Calibration and maintenance of process instrumentation including electricity meters are also in line with the approved monitoring methodology and are governed by established procedures of organisation.

Detailed responsibilities and authorities for project management, monitoring procedures, calibration procedures and QA/QC procedures have been presented and were verified during follow up interviews. The monitoring practices are considered appropriate.

3.6 Calculation of GHG Emissions

The calculation of the GHG emissions has been done as per ACM0006. All the aspects related to the direct and indirect GHG emissions have been addressed and the calculations are presented in a transparent manner.

In order to determine baseline emissions, the net quantity of electricity generation (power consumed by the sugar plant and the surplus power exported to the grid) as a result of the project activity and the baseline grid emission factor of 0.86 tCO_2/MWh (for southern region grid), determined ex-ante, has been applied. The baseline grid emission factor of 0.86 tCO_2//MWh will remain fixed for the entire crediting period of the project. The baseline emissions arising from the natural decay of biomass are not claimed and therefore contribute to conservative emission reductions estimates.

As referred earlier, fossil fuels (coal) will be used during off-season (if required due to non availability of biomass) and there is no transportation of bagasse from the new sugar plant (as the bagasse is supplied by the adjacent sugar mill and transported by conveyors to the site). The project emissions are hence only due to biomass (purchased from outside) transportation.

The leakage has been demonstrated to be zero by application of L2 based on the published data /5/ which is considered reasonable by DNV. However, KSCL will be monitoring and addressing the leakage, by the application of L2 as per ACM0006, ex-post each year throughout the crediting period.

The project is expected to result in annual average reduction of 82 719 t of CO_2 per year during the chosen fixed ten years crediting period. DNV has verified all the factors and calculations and confirm the reasonableness of the forecasted emission reductions.

3.7 Environmental Impacts

The environment impact assessment (EIA) of the project has been carried out on voluntary basis and the project has evaluated the environmental impacts due to the project activity. No adverse environmental impacts are foreseen. The summary of findings has been addressed in the project design document.

The applicable and valid permits and consents as dictated by the Indian environmental regulations are verified to be in place /12/.

3.8 Comments by Local Stakeholders

While a formal stakeholder process is not required for this type of project under Indian environmental regulations and EIA, KSCL has identified the elected body of representatives administering the local area, Ministry of Environment & Forest (MoEF), Government of India, TNPCB and TNEB as the key stakeholders. The project participant invited comments for local stakeholder consultation process through questionnaires and through invitation letters. Meetings and direct consultation with the stakeholders did reveal that the project has two comments from local stakeholder process on 1) measures to prevent pollution and 2) to plant more trees at project site. The management of KSCL declared (through minutes of the meeting) to implement suitable pollution control measures as directed by TNPCB and as per the EIA clearance and committed to plant 50 000 trees in 230 acres area. This needs be verified by the DOE at the time of first verification of the project.

4 COMMENTS BY PARTIES, STAKEHOLDERS AND NGOS

The PDD (version 3.2) of 06 September 2006 was made publicly available on DNV's climate change website and Parties, stakeholders and NGOs were through the CDM website (Source: http://www.dnv.com/certification/climatechange/Projects/ProjectDetails.asp?ProjectId=766) invited to provide comments during a 30 days period from 14 September 2006 to 13 October 2006. No comments were received.

5 VALIDATION OPINION

Det Norske Veritas Certification AS (DNV) has performed a validation of the "M/S. Kothari Sugars and Chemicals Ltd (KSCL)'s Bagasse Based Co-generation Project, at Perambalur district, Tamil Nadu, India" in India. The validation was performed on the basis of UNFCCC criteria for the Clean Development Mechanism and host country criteria, as well as criteria given to provide for consistent project operations, monitoring and reporting.

The review of the project design documentation and the subsequent follow-up interviews have provided DNV with sufficient evidence to determine the fulfilment of stated criteria.

The host country is India and Annex I country is the United Kingdom. Both India and the United Kingdom fulfil the participation criteria, have approved the project activity and authorized the project participants. The DNA of India confirms that the project assists in achieving sustainable development.

The project correctly applies ACM0006 (version 04) "Consolidated baseline (and monitoring) methodology for grid-connected electricity generation from biomass residues".

The installation and the implementation of a new high efficiency biomass fired power plant, supplying power and steam to the adjacent new sugar plant with excess power to the grid (using both bagasse supplied by the new sugar plant and biomass residues from outside sources), displaces fossil fuel based grid power. Hence the project results in reductions of CO_2 emissions that are real, measurable and give long-term benefits to the mitigation of climate change. 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 on the average 82 719 tCO_2e per year over the selected 10 year crediting period. The emission reduction forecast has been checked and it is deemed likely that the state amount is achieved given that the underlying assumptions do not change.

Adequate training and monitoring procedures have been implemented.

In summary, it is DNV's opinion that the "M/S. Kothari Sugars and Chemicals Ltd (KSCL)'s Bagasse Based Co-generation Project, at Perambalur district, Tamil Nadu, India", as described in the PDD, version 03 of 8 March 2007, meets all relevant UNFCCC requirements for the CDM and all relevant host country criteria and correctly applies the baseline and monitoring methodology ACM0006 (version 04). DNV thus requests the registration of the "M/S. Kothari Sugars and Chemicals Ltd (KSCL)'s Bagasse Based Co-generation Project, at Perambalur district, Tamil Nadu, India" as a CDM project activity.

REFERENCES

Documents provided by the project proponent that relate directly to the project:

/1/ Kothari Sugars and Chemicals Ltd (KSCL): CDM PDD for the *"M/S. Kothari Sugars and Chemicals Ltd (KSCL)'s Bagasse Based Co-generation Project, at Perambalur district, Tamil Nadu, India"* in India. Version 3.2 (of 06 September 2006), 02 (of 20 January 2007) and 03 (of 08 March 2007).

/2/ Kothari Sugars and Chemicals Ltd (KSCL): *Spreadsheets documenting the OM and BM emission coefficient calculations (ITPI_CRM_southerngrid_cal_sheet.xls).*

/3/ Kothari Sugars and Chemicals Ltd (KSCL): *Spreadsheets documenting the emission reduction calculations (Calculation_used_KSCL_CHP_PDD.xls)*

/4/
- HCA: Ministry of Environment and Forests (DNA of India): *Letter of Host Country Approval* F.No. 4/21/2006-CCC dated 22 January 2007.
- Annex I country Approval: The Department for Environment, Food and Rural Affairs (DNV of U.K.): *Letter of Annex I country Approval: DNA Ref: CRML/19/2007 issued on 20 March 2007.*

/5/ National Biomass Resource Assessment Program, supported by MNES: *"Biomass to Energy, Advanced Bioresidue Energy Technologies Society"*, Indian Institute of Science, 2003, p.91.

/6/ Detailed Project Report: *For KSCL Cogeneration project*

/7/ Evidences for additionality (Investment barrier due to high interest debt costs andrequirement of ESCROW account facility with TNEB):
- Indian Bank: Letter dated 06 February 2006.
- SREI: Letter No. SREIIPF: HO:KSCL:05-06-057 dated 9th March 2006.

/8/ Kothari Sugars and Chemicals Ltd (KSCL): *Documents for copy of Power Purchase Agreement (PPA) dated 04th August 2006.*

Background documents related to the design and/or methodologies employed in the design or other reference documents:

/9/ CDM Executive Board: ACM0006 - Consolidated baseline (and monitoring) methodology for grid-connected electricity generation from biomass residues (Version 04 / EB27).

/10/ CDM Executive Board: *Tool for the demonstration and assessment of additionality.* Version 03.

/11/ International Emission Trading Association (IETA) & the World Bank's Prototype Carbon Fund (PCF): Validation and Verification Manual. http://www.vvmanual.info

Persons interviewed during the validation, or persons who contributed with other information that are not included in the documents listed above:

/12/
- "*Consent to Establish- For Air*" from environmental angle from Tamil Nadu Pollution Control Board (TNPCB) No. 3493 dated 02-11-2006.
- "*Consent to Establish- For Water*" from environmental angle from Tamil Nadu Pollution Control Board (TNPCB) No. 3549 dated 02-11-2006.

/13/ Mr. P.V. Ramadasan, General Manager (KSCL)

/14/ Mr. Rangarajan, Sr. Manager -Operations (KSCL)

/15/ Mr. S. Sivadasan, Senior Manager -Tech & Business Development (KSCL)

/16/ Mr. Nishant Bhardwaj, Consultant (IT Power)

/17/ Mr. Srikanth, Consultant (IT Power)

/18/ Mr. Sudhir Anananamuri, Consultant (IT Power)

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APPENDIX A

CDM VALIDATION PROTOCOL

Table 1 Mandatory Requirements for Clean Development Mechanism (CDM) Project Activities

Requirement	Reference	Conclusion	Cross Reference / Comment
1. The project shall assist Parties included in Annex I in achieving compliance with part of their emission reduction commitment under Art. 3	Kyoto Protocol Art.12.2	OK	Table 2, Section E.4.1
2. The project shall assist non-Annex I Parties in achieving sustainable development and shall have obtained confirmation by the host country thereof	Kyoto Protocol Art. 12.2, CDM Modalities and Procedures §40a	**~~CAR 1~~ OK**	Clarification of the status of approval by the DNA of India, DNA of U.K. and letter of participation is required.
3. The project shall assist non-Annex I Parties in contributing to the ultimate objective of the UNFCCC	Kyoto Protocol Art.12.2.	OK	Table 2, Section E.4.1
4. The project shall have the written approval of voluntary participation from the designated national authority of each party involved	Kyoto Protocol Art. 12.5a, CDM Modalities and Procedures §40a	**~~CAR 1~~ OK**	Clarification of the status of approval by the DNA of India, DNA of U.K. and letter of participation is required.
5. The emission reductions shall be real, measurable and give long-term benefits related to the mitigation of climate change	Kyoto Protocol Art. 12.5b	OK	Table 2, Section E
6. Reduction in GHG emissions shall be additional to any that would occur in absence of the project activity, i.e. a CDM project activity is additional if anthropogenic emissions of greenhouse gases by sources are reduced below those that would have occurred in the absence of the registered CDM project activity	Kyoto Protocol Art. 12.5c, CDM Modalities and Procedures §43	OK	Table 2, Section B.2
7. In case public funding from Parties included in Annex I is used for the project activity, these Parties shall provide an affirmation that such funding does not result in a diversion of official development assistance and is separate from and is not counted towards the financial obligations of these Parties.	Decision 17/CP.7, CDM Modalities and Procedures Appendix B, § 2	OK	No public funding from Annex I countries is involved in the project.
8. Parties participating in the CDM shall designate a national	CDM Modalities and	OK	India: The National Clean

Requirement	Reference	Conclusion	Cross Reference / Comment
authority for the CDM	Procedures §29		Development Mechanism (CDM) Authority Ministry of Environment and Forests. UK: Department for Environment, Food and Rural Affairs
9. The host Party and the participating Annex I Party shall be a Party to the Kyoto Protocol	CDM Modalities §30/31a	OK	India has ratified the Kyoto protocol on 26 August 2002 UK has ratified the Kyoto protocol on 31 May 2002
10. The participating Annex I Party's assigned amount shall have been calculated and recorded	CDM Modalities and Procedures §31b	OK	The assigned amounts of the United Kingdom have been calculated. The United Kingdoms assigned amount is 92% of the emissions in 1990.
11. The participating Annex I Party shall have in place a national system for estimating GHG emissions and a national registry in accordance with Kyoto Protocol Article 5 and 7	CDM Modalities and Procedures §31b	OK	UK has in place a national registry and annually reports its GHG inventory to the UNFCCC.
12. Comments by local stakeholders shall be invited, a summary of these provided and how due account was taken of any comments received	CDM Modalities and Procedures §37b	OK	Table 2, Section G
13. Documentation on the analysis of the environmental impacts of the project activity, including transboundary impacts, shall be submitted, and, if those impacts are considered significant by the project participants or the Host Party, an environmental impact assessment in accordance with procedures as required by the Host Party shall be carried out.	CDM Modalities and Procedures §37c	**~~CL 3~~ OK**	Table 2, Section A.3.1.
14. Baseline and monitoring methodology shall be previously approved by the CDM Executive Board	CDM Modalities and Procedures §37e	OK	Table 2, Section B.1.1 and D.1.1
15. Provisions for monitoring, verification and reporting shall be in	CDM Modalities and	OK	Table 2, Section D

Requirement	Reference	Conclusion	Cross Reference / Comment
accordance with the modalities described in the Marrakech Accords and relevant decisions of the COP/MOP	Procedures §37f		
16. Parties, stakeholders and UNFCCC accredited NGOs shall have been invited to comment on the validation requirements for minimum 30 days, and the project design document and comments have been made publicly available	CDM Modalities and Procedures §40	OK	Parties, stakeholders and NGOs were invited to provide comments through the CDM website (http://www.dnv.com/certification/climatechange/Projects/ProjectDetails.asp?ProjectId=766) during a 30 days period from 14 September 2006 to 13 October 2006. No comments were received.
17. A baseline shall be established on a project-specific basis, in a transparent manner and taking into account relevant national and/or sectoral policies and circumstances	CDM Modalities and Procedures §45c,d	OK	Table 2, Section B.2
18. The baseline methodology shall exclude to earn CERs for decreases in activity levels outside the project activity or due to force majeure	CDM Modalities and Procedures §47	OK	Table 2, Section B.2
19. The project design document shall be in conformance with the UNFCCC CDM-PDD format	CDM Modalities and Procedures Appendix B, EB Decision	~~**CL 1**~~ **OK**	PDD is accordance with the latest version 03 of the CDM-PDD. However, the version number in the PDD is reported as 3.2 dated 6 September 2006 instead of version 01 which needs a clarification.

Table 2 Requirements Checklist

Checklist Question	Ref.	MoV*	Comments	Draft Concl	Final Concl
A. General Description of Project Activity *The project design is assessed.*					
A.1. Project Boundaries *Project Boundaries are the limits and borders defining the GHG emission reduction project.*					
A.1.1. Are the project's spatial (geographical) boundaries clearly defined?	/1/	DR, I	The project is proposed to be located at Sathamangalam village, Perambur Dist, Tamil Nadu, India. Bagasse transfer system from the crusher unit, high pressure boilers, turbine generator, spent steam used for meeting process heat requirements, step-up transformers, means of biomass transport, transmission line and the connected southern grid define the project boundary.		OK
A.1.2. Are the project's system (components and facilities used to mitigate GHGs) boundaries clearly defined?	/1/	DR	The plant has installed one Isgec Thomson 80 TPH boiler, and a Hongzhou make turbine with an installed capacity of 24 MW, 5 KM long power transmission line to the nearest sub-station, bagasse transfer system from the crusher to the storage yard and boiler, ash handling systems, and a 5 KM long EHV transmission systems; these are the main components of the project activity.		OK

Checklist Question	Ref.	MoV*	Comments	Draft Concl	Final Concl
A.2. Technology to be employed *Validation of project technology focuses on the project engineering, choice of technology and competence/ maintenance needs. The validator should ensure that environmentally safe and sound technology and know-how is used.*					
A.2.1. Does the project design engineering reflect current good practices?	/1/	DR, I	Cogeneration is an efficient and cost-effective means to save energy and reduce pollution, resulting in primary fuel savings of about 35%. An 80 TPH high pressure boiler (86 kgs/cm^2 pressure @ 515^0 C), 24 MW double extraction and condensing type Hongzhou turbine (steam inlet 84 kgs/cm^2 pressure @ 510^0 C), are being installed along with the necessary pollution abatement equipment. The project design engineering details reflect good practices.		OK
A.2.2. Does the project use state of the art technology or would the technology result in a significantly better performance than any commonly used technologies in the host country?	/1/	DR, I	Majority of the sugar factories use bagasse only to meet the heat requirements of cane processing. Few conventional cogeneration facilities in India have been using back-pressure system, but are limited to generating power just adequate to meet captive needs. Generating excess power and feeding it to the grid is by itself an improvement on the prevailing trend of technology and engineering practices in the country.		OK
A.2.3. Is the project technology likely to be substituted by other or more efficient technologies within the project period?	/1/	DR	Since the project is opting for currently recommended best engineering practices, it is unlikely to be substituted by other		OK

Checklist Question	Ref.	MoV*	Comments	Draft Concl	Final Concl
			technologies in the project period.		
A.2.4. Does the project require extensive initial training and maintenance efforts in order to work as presumed during the project period?	/1/	DR/I	The promoters have no previous experience in installation, maintenance and operation of power generating turbines which are connected to the grid, so trained personnel are needed to operate and maintain the facility. Details of plans to impart such skills to its personnel may be provided. Provision for providing the requisite skills for operation, maintenance of the plant is requested.	~~CL 2~~	OK
A.2.5. Does the project make provisions for meeting training and maintenance needs?	/1/	DR	Same as in A.2.4.	~~CL 2~~	OK
A.3. Contribution to Sustainable Development *The project's contribution to sustainable development is assessed.*					
A.3.1. Is the project in line with relevant legislation and plans in the host country?	/1/	DR	Consent to establish the facility issued by the Tamil Nadu pollution control board and approval of plans from boiler and electrical inspectorate, are verified by DNV. However, the environmental clearance from MoEF and environmental impact assessment report (EIA) which is said to be awaiting approval may be submitted for verification.	~~CL 3~~	OK
A.3.2. Is the project in line with host-country specific CDM requirements?	/1/	DR	Clarification of the status of approval by the DNA of India and letter of participation is required.	~~CAR 1~~	OK
A.3.3. Is the project in line with sustainable development policies of the host country?	/1/	DR	As in A.3.2	~~CAR 1~~	OK
A.3.4. Will the project create other environmental or	/1/	DR	Creation of fresh employment opportunities,		OK

Checklist Question	Ref.	MoV*	Comments	Draft Concl	Final Concl
social benefits than GHG emission reductions?			improved economic status of the local populace as a result of creation of a reliable market for sugar cane trash and other types of biomass, new opportunities for local service providers to transport biomass, are expected to happen as a result of project implementation resulting in attendant social benefits.		
B. Project Baseline *The validation of the project baseline establishes whether the selected baseline methodology is appropriate and whether the selected baseline represents a likely baseline scenario.*					
B.1. Baseline Methodology *It is assessed whether the project applies an appropriate baseline methodology.*					
B.1.1. Is the baseline methodology previously approved by the CDM Executive Board?	/1/	DR	Following approved methodologies have been used to determine the baseline scenario: ACM0006, "Consolidated baseline methodology for grid-connected electricity generation from biomass residues", version 04 (as per EB27), and ACM 0002, "Consolidated baseline methodology for grid-connected electricity generation from biomass residues		OK
B.1.2. Is the baseline methodology the one deemed most applicable for this project and is the appropriateness justified?	/1/	DR	The project activity is a green field grid connected, biomass fired, cogeneration plant. It is being installed where there is no power was generated prior to the implementation of the project activity. The		OK

Checklist Question	Ref.	MoV*	Comments	Draft Concl	Final Concl
			project activity is based on the operation of power generating unit in the sugar mill generating bagasse as a biomass residue. Bagasse generated in the main plant and in other plants in the vicinity of the project site and owned by the same project promoters, as also other biomass residues which conform to the definition of the term biomass residue in ACM0006 are proposed to be used. Boiler is suitably designed to obviate the need for fossil fuel firing for start-up operations. However, some quantity of coal may be co-fired to overcome the problems of procurement of biomass residues, especially in the initial phase of the project life. The Implementation of the project activity does not result in increase of the processing capacity of sugar cane, which is the raw input. Bagasse generated is used for the project activity as it is generated and may be stored only at the end of the crushing season for few months to aid start-up operations of the next season. Thus biomass residues will be stored for less than one year. No significant energy is expended on any kind of prior processing of the biomass, except on transportation of the biomass, for fuel combustion. The project scenario of the proposed activity and its baseline scenario are identified in the methodology ACM 0006 and is therefore applicable. This approved methodology refers to the ACM0002		

Checklist Question	Ref.	MoV*	Comments	Draft Concl	Final Concl
			("Consolidated baseline methodology for grid-connected electricity generation from renewable sources") and the latest version of the "Tool for the demonstration and assessment of additionality". Thus, the methodologies chosen are most appropriate and applicable.		
B.2. Baseline Determination *The choice of baseline will be validated with focus on whether the baseline is a likely scenario, whether the project itself is not a likely baseline scenario, and whether the baseline is complete and transparent.*					
B.2.1. Is the application of the methodology and the discussion and determination of the chosen baseline transparent?	/1/	DR	Yes, the application of the chosen methodology, the discussion and determination are done in a transparent manner.		OK
B.2.2. Has the baseline been determined using conservative assumptions where possible?	/1/	DR	All plausible scenarios have been analysed and the most realistic and credible alternatives have been considered in detail.		OK
B.2.3. Has the baseline been established on a project-specific basis?	/1/	DR	Power baseline scenarios P1, P2 & P4, heat baseline scenarios H1, H2, H4 and H6, and biomass baseline scenario B3 & B4 have been established. Out of these possible baseline scenarios, P1, P2, H1 & H2 have been shown to suffer from significant barriers for implementation. H6 and B1 are wasteful and do not make economic sense. Thus, P4, H4 and B4, B1 emerge as the only possible alternatives, which tallies with baseline scenario 3 mentioned in the		OK

Checklist Question	Ref.	MoV*	Comments	Draft Concl	Final Concl
			methodology.		
B.2.4. Does the baseline scenario sufficiently take into account relevant national and/or sectoral policies, macro-economic trends and political aspirations?	/1/	DR	There is a potential of about 3500 MW power generation locked up in bagasse; Currently, less than 500 MW is being generated and another 300 MW is under implementation. Thus, implementation of the proposed project activity meets the national need of producing clean electrical energy.		OK
B.2.5. Is the baseline determination compatible with the available data?	/1/	DR	Currently, all sugar factories use bagasse as a fuel in the boiler to produce steam to meet the sugar cane processing requirements. Some have adopted cogeneration techniques, majority of them generating electricity just adequate to meet captive power requirements. Very few have opted for installation of high pressure boilers and improved design turbine generators to produce excess power for feeding to the grid. Baseline for the project scenario has been determined in line with this current prevailing situation scenario.		OK
B.2.6. Does the selected baseline represent the most likely scenario among other possible and/or discussed scenarios?	/1/	DR	In the final analysis, it becomes apparent that the only credible alternatives would be utilisation of bagasse to meet the heat and captive energy requirements of the sugar manufacturing unit or to establish a project to generate surplus power to be fed to the grid while fulfilling the heat requirements of the main unit.		OK
B.2.7. Is it demonstrated/justified that the project activity itself is not a likely baseline scenario?	/1/	DR	Yes, there are economic and technological barriers to plan for the establishment of the		OK

Checklist Question	Ref.	MoV*	Comments	Draft Concl	Final Concl
			proposed project activity and it is certainly not a likely baseline scenario as is evident from the following analysis: **STEP 1a:** One alternatives emerge after eliminating other impractical alternatives: [1] Installation of a boiler using bagasse generated from the new sugar plant and surplus bagasse be dumped and power for sugar plant be purchased from the grid. **STEP 1b:** The above listed alternatives comply with all existing statutory rules and regulations. There is no legal requirement necessitating the implementation of the project activity. **STEP 2:** Omitted. **STEP 3a:** Following sectoral barriers which act as disincentives are listed: ▪ High or equal capital cost of cogeneration facility in comparison to that for the sugar plant; ▪ High cost of high pressure cogeneration facility in comparison to that for the low pressure co-generation plant; ▪ Investment barriers due to high interest cost debt from banks (2% higher interest than that for infrastructure projects); ▪ requirement of signed PPA initially (not a normal practice at loan approval stage) by financial institutions leading to delays and uncertainties; ▪ absence of provision of escrow account facilities with the Tamil Nadu Electricity		

Checklist Question	Ref.	MoV*	Comments	Draft Concl	Final Concl
			Board, which is insisted upon by financial institutions; ▪ risks due to lower tariffs (in comparison to MNES guidelines for biomass based cogeneration projects) and fixed tariffs with no annual escalation for five years starting from year 2006; ▪ technical risks exist as sugar manufacturing units do not possess the technical infrastructure (for water treatment) required for operation and maintenance of high pressure boilers and in the absence of adequate incentives to venture into initiating such extra efforts for acquiring the requisite technical skills, current prevailing practice of using bagasse only to meet the process steam needs would continue. **STEP 3b:** These sectoral barriers affect all units. However, this does not prevent the implementation of alternative [1] listed under STEP 1a. The prevailing practice among sugar manufacturers is to install a less technologically challenging project activity – a lower efficiency boiler generating just enough steam to meet only captive needs, thereby avoiding the risks of the aforementioned sectoral and technical barriers. **STEP 4a:** On an all India basis, there are only 22 cogeneration power plants out of 517 sugar mills, which generate more than		

Checklist Question	Ref.	MoV*	Comments	Draft Concl	Final Concl
			22 MW of power. Moreover, in the State of Tamilnadu, only 12 mills export power to the grid, out of 38 sugar mills, despite the fact that 78% of power is fossil fuel based. Out of an estimated 3500 MW bagasse based cogeneration potential, only about 500 MW is currently exploited, indicating that it is not prevailing common practice. The prospects of obtaining CDM registration and of allotment of CERs provide the much needed relief from the economic and sectoral barriers described. CDM revenues act as an incentive to motivate sugar producing units to take the additional risk of installing high pressure boilers and establishing the necessary technical infrastructure for operation and maintenance of such equipment.		
B.2.8. Have the major risks to the baseline been identified?	/1/	DR	No major risks are foreseen.		OK
B.2.9. Is all literature and sources clearly referenced?	/1/	DR	Yes, all sources of information and data cited in the PDD have been clearly referenced except the following: ▪ Source for emission factor of Coal (1.89 tCO_2/tonne of coal) used in calculation of project emissions from fossil fuels. ▪ Source for average CO_2 emission factor for transportation of bagasse/ biomass by trucks (0.56 $kgCO_2$/km) used in calculation of project emissions from	~~CL 4~~	OK

Checklist Question	Ref.	MoV*	Comments	Draft Concl	Final Concl
			biomass transportation is requested to be provided to DNV.		
C. Duration of the Project/ Crediting Period *It is assessed whether the temporary boundaries of the project are clearly defined.*					
C.1.1. Are the project's starting date and operational lifetime clearly defined and reasonable?	/1/	DR/I	The starting date of the project is 22 September 2005 and an operational life time of 25 years is forecast, which is reasonable.		OK
C.1.2. Is the assumed crediting time clearly defined (renewable crediting period of seven years with two possible renewals or fixed crediting period of 10 years with no renewal)?	/1/	DR	A fixed crediting period of ten years starting from 15 July 2007 (or date of registration) has been opted for, whichever is later.		OK
D. Monitoring Plan *The monitoring plan review aims to establish whether all relevant project aspects deemed necessary to monitor and report reliable emission reductions are properly addressed ((Blue text contains requirements to be assessed for optional review of monitoring methodology prior to submission and approval by CDM EB).*					
D.1. Monitoring Methodology *It is assessed whether the project applies an appropriate baseline methodology.*					
D.1.1. Is the monitoring methodology previously approved by the CDM Executive Board?	/1/	DR	The monitoring methodology adopted is "Consolidated monitoring methodology for grid-connected electricity generation from biomass residues" contained in the		OK

Checklist Question	Ref.	MoV*	Comments	Draft Concl	Final Concl
			approved methodology ACM0006, version 04, sectoral scope 01 (as per EB27).		
D.1.2. Is the monitoring methodology applicable for this project and is the appropriateness justified?	/1/	DR	Yes, as in B.1.2		OK
D.1.3. Does the monitoring methodology reflect good monitoring and reporting practices?	/1/	DR/I	Yes.		OK
D.1.4. Is the discussion and selection of the monitoring methodology transparent?	/1/	DR	Yes. The selection of the monitoring methodology is appropriate and based on transparent discussion.		OK
D.2. Monitoring of Project Emissions *It is established whether the monitoring plan provides for reliable and complete project emission data over time.*					
D.2.1. Does the monitoring plan provide for the collection and archiving of all relevant data necessary for estimation or measuring the greenhouse gas emissions within the project boundary during the crediting period?	/1/	DR	Milled bagasse during the crushing season is directly fed to the boiler and continuously monitored. Quantity of biomass obtained from off site facilities is monitored to facilitate calculation of project emissions. Collection of data and archiving is in line with the stipulations of the monitoring methodology.		OK
D.2.2. Are the choices of project GHG indicators reasonable?	/1/	DR	Yes.		OK
D.2.3. Will it be possible to monitor / measure the specified project GHG indicators?	/1/	DR	As in D.2.2		OK
D.2.4. Will the indicators give opportunity for real measurements of project emissions?	/1/	DR	As in D.2.2		OK
D.2.5. Will the indicators enable comparison of project data and performance over time?	/1/	DR	As in D.2.2		OK

Checklist Question	Ref.	MoV*	Comments	Draft Concl	Final Concl
D.3. Monitoring of Leakage *It is assessed whether the monitoring plan provides for reliable and complete leakage data over time.*					
D.3.1. Does the monitoring plan provide for the collection and archiving of all relevant data necessary for determining leakage?	/1/	DR	In case of the baseline scenario identified for the project activity, it is demonstrated that there is an abundant surplus of the biomass in the region of the project activity. Thus there is no increase in emissions from fossil fuel combustion due to diversion of biomass to the project plant.		OK
D.3.2. Are the choices of leakage indicators reasonable?	/1/	DR	As in D.3.1		OK
D.3.3. Will it be possible to monitor / measure the specified leakage indicators?	/1/	DR	As in D.3.1		OK
D.3.4. Will the indicators give opportunity for real measurements of leakage effects?	/1/	DR	As in D.3.1		OK
D.4. Monitoring of Baseline Emissions *It is established whether the monitoring plan provides for reliable and complete project emission data over time.*					
D.4.1. Does the monitoring plan provide for the collection and archiving of all relevant data necessary for determining baseline emissions during the crediting period?	/1/	DR	Yes, data regarding baseline emission factor of the grid within the selected electricity system boundary are obtained through publications made by grid, CEA and IPCC standard factors are used for emission factors accounting in the calculations. Grid emission factor is calculated *ex-ante.* Facilities for collection and recording of power generated have		OK

Checklist Question	Ref.	MoV*	Comments	Draft Concl	Final Concl
			been provided.		
D.4.2. Is the choice of baseline indicators, in particular for baseline emissions, reasonable?	/1/	DR	Choice of baseline indicators is in accordance with the requirements of the applicable methodology and is reasonable.		OK
D.4.3. Will it be possible to monitor / measure the specified baseline indicators?	/1/	DR	As in D.4.1		OK
D.4.4. Will the indicators give opportunity for real measurements of baseline emissions?	/1/		The indicators chosen conform to the requirements of the methodology and real measurement of baseline emissions is possible.		OK
D.5. Monitoring of Sustainable Development Indicators/ Environmental Impacts *It is checked that choices of indicators are reasonable and complete to monitor sustainable performance over time.*					
D.5.1. Does the monitoring plan provide the collection and archiving of relevant data concerning environmental, social and economic impacts?	/1/	DR	Environmental indicators as specified by the consent issued by the state pollution control board need to be monitored to evidence compliance with licence conditions.		OK
D.5.2. Is the choice of indicators for sustainability development (social, environmental, economic) reasonable?	/1/	DR	No such indicators are specified in the Host country		OK
D.5.3. Will it be possible to monitor the specified sustainable development indicators?	/1/	DR	As in D.5.2		OK
D.5.4. Are the sustainable development indicators in line with stated national priorities in the Host Country?	/1/	DR	As in D.5.2		OK

Checklist Question	Ref.	MoV*	Comments	Draft Concl	Final Concl
D.6. Project Management Planning *It is checked that project implementation is properly prepared for and that critical arrangements are addressed.*					
D.6.1. Is the authority and responsibility of project management clearly described?	/1/	DR, I	The operation and management structure does not detail the following: • authority and responsibility for registration, monitoring, measurement and reporting in the PDD. • procedures identified for calibration of monitoring equipment • procedures identified for maintenance of monitoring equipment and installations • identified for day-to-day records handling (including what records to keep, storage area of records and how to process performance documentation) • procedures identified for dealing with possible monitoring data adjustments and uncertainties • procedures identified for review of reported results/data • Procedures for internal audit of GHG, performance reviews and corrective actions • The periodicity of the reporting of calorific value needs to be mentioned. Responsibility of carrying out the energy balance needs to be clarified. QA & QC procedure for carrying out the energy balance needs to be elaborated.	~~CL 5~~	OK

Checklist Question	Ref.	MoV*	Comments	Draft Concl	Final Concl
D.6.2. Is the authority and responsibility for registration, monitoring, measurement and reporting clearly described?	/1/	DR	As in D.6.1.	~~CL 5~~	OK
D.6.3. Are procedures identified for training of monitoring personnel?	/1/	DR	As in A.2.5	~~CL 2~~	OK
D.6.4. Are procedures identified for emergency preparedness for cases where emergencies can cause unintended emissions?	/1/	DR	As in D.6.1.	~~CL 5~~	OK
D.6.5. Are procedures identified for calibration of monitoring equipment?	/1/	DR	As in D.6.1.	~~CL 5~~	OK
D.6.6. Are procedures identified for maintenance of monitoring equipment and installations?	/1/	DR	As in D.6.1.	~~CL 5~~	OK
D.6.7. Are procedures identified for monitoring, measurements and reporting?	/1/	DR	As in D.6.1.	~~CL 5~~	OK
D.6.8. Are procedures identified for day-to-day records handling (including what records to keep, storage area of records and how to process performance documentation)	/1/	DR	As in D.6.1.	~~CL 5~~	OK
D.6.9. Are procedures identified for dealing with possible monitoring data adjustments and uncertainties?	/1/	DR	As in D.6.1.	~~CL 5~~	OK
D.6.10. Are procedures identified for review of reported results/data?	/1/	DR	As in D.6.1.	~~CL 5~~	OK
D.6.11. Are procedures identified for internal audits of GHG project compliance with operational requirements where applicable?	/1/	DR	As in D.6.1.	~~CL 5~~	OK
D.6.12. Are procedures identified for project performance reviews before data is submitted for verification, internally or externally?	/1/	DR	As in D.6.1.	~~CL 5~~	OK
D.6.13. Are procedures identified for corrective actions	/1/	DR	As in D.6.1.	~~CL 5~~	OK

Checklist Question	Ref.	MoV*	Comments	Draft Concl	Final Concl
in order to provide for more accurate future monitoring and reporting?					
E. Calculation of GHG Emissions by Source *It is assessed whether all material GHG emission sources are addressed and how sensitivities and data uncertainties have been addressed to arrive at conservative estimates of projected emission reductions.*					
E.1. Project GHG Emissions *The validation of ex-ante estimated project GHG emissions focuses on transparency and completeness of calculations.*					
E.1.1. Are all aspects related to direct and indirect GHG emissions captured in the project design?	/1/	DR	Yes.		OK
E.1.2. Are the GHG calculations documented in a complete and transparent manner?	/1/	DR	As in E.1.1		OK
E.1.3. Have conservative assumptions been used to calculate project GHG emissions?	/1/	DR	Yes		OK
E.1.4. Are uncertainties in the GHG emissions estimates properly addressed in the documentation?	/1/	DR	No such uncertainties are foreseen.		OK
E.1.5. Have all relevant greenhouse gases and source categories listed in Kyoto Protocol Annex A been evaluated?	/1/	DR	Grid emission factor, emissions due to consumption of fossil fuel, and emissions due to transport of biomass and fossil fuel have been considered.		OK

Checklist Question	Ref.	MoV*	Comments	Draft Concl	Final Concl
E.2. Leakage *It is assessed whether there leakage effects, i.e. change of emissions which occurs outside the project boundary and which are measurable and attributable to the project, have been properly assessed and estimated ex-ante.*					
E.2.1. Are potential leakage effects beyond the chosen project boundaries properly identified?	/1/	DR	As in D.3.1		OK
E.2.2. Have these leakage effects been properly accounted for in calculations?	/1/	DR	Demonstrate how the PDD has ruled out leakage by application of L2. The PDD should mention the compliance to conditions of L2 (in the ACM0006) quantitatively with figures.	~~CL 6~~	OK
E.2.3. Does the methodology for calculating leakage comply with existing good practice?	/1/	DR	As in D.3.1		OK
E.2.4. Are the calculations documented in a complete and transparent manner?	/1/	DR	As in D.3.1		OK
E.2.5. Have conservative assumptions been used when calculating leakage?	/1/	DR	As in D.3.1		OK
E.2.6. Are uncertainties in the leakage estimates properly addressed?	/1/	DR	As in D.3.1		OK
E.3. Baseline Emissions *The validation of ex-ante estimated baseline GHG emissions focuses on transparency and completeness of calculations.*					
E.3.1. Have the most relevant and likely operational characteristics and baseline indicators been chosen as reference for baseline emissions?	/1/	DR	The reference chosen for baseline emissions are representative and adequate. • For calculation of OM factor, simple OM has been chosen as in southern region		OK

Checklist Question	Ref.	MoV*	Comments	Draft Concl	Final Concl
			generation mix, low-cost/must run resources constitute less than 50% of total grid generation in average of the five most recent years. Simple OM factor is calculated using a 3-year average (2002-2005), based on the most recent statistics available. • BM factor is calculated ex-ante based on the most recent information available on plants already built for samples group (from 1999-2005). Based on the guidelines for selection of sample group, it consists of the power plants capacity additions in the electricity system that comprise 20% of the system generation (in MWh) and that have been built most recently. • The combined margin (CM) has been calculated as average of OM and BM.		
E.3.2. Are the baseline boundaries clearly defined and do they sufficiently cover sources and sinks for baseline emissions?	/1/	DR	The project boundaries are clearly defined. The southern grid has been chosen as the system grid which is in line with the recommendations in this regard.		OK
E.3.3. Are the GHG calculations documented in a complete and transparent manner?	/1/	DR	Yes, the calculations have been presented in a transparent manner.		OK
E.3.4. Have conservative assumptions been used when calculating baseline emissions?	/1/	DR	CEA values of Emission factors for all the regional grids of India are available (Ref.: http://www.cea.nic.in/). However, the values of emission factors of the southern region grid calculated in the PDD (0.934 TCO_{2e} /MWh) by Kothari Sugars and Chemicals	~~CAR 2~~	OK

Checklist Question	Ref.	MoV*	Comments	Draft Concl	Final Concl
			Limited are on the higher side than the CEA values (0.86 TCO_{2e} /MWh). So, clarification is requested for not using conservative CEA values for the emission factors of the southern region grid of India. Thus, it remains to be demonstrated that annual average emission reductions are conservatively estimated as 94 684 TCO_{2e}.		
E.3.5. Are uncertainties in the GHG emission estimates properly addressed in the documentation?	/1/	DR	Same as in E.3.4.	~~CAR 2~~	OK
E.3.6. Have the project baseline(s) and the project emissions been determined using the same appropriate methodology and conservative assumptions?	/1/	DR	Same as in E.3.4.	~~CAR 2~~	OK
E.4. Emission Reductions *Validation of ex-ante estimated emission reductions*.	/1/				
E.4.1. Will the project result in fewer GHG emissions than the baseline scenario?	/1/	DR	Same as in E.3.4.	~~CAR 2~~	OK
F. Environmental Impacts *Documentation on the analysis of the environmental impacts will be assessed, and if deemed significant, an EIA should be provided to the validator.*					
F.1.1. Has an analysis of the environmental impacts of the project activity been sufficiently described?	/1/		Same as in A.3.1.	~~CL 3~~	OK
F.1.2. Are there any Host Party requirements for an Environmental Impact Assessment (EIA), and if yes, is an EIA approved?	/1/	DR	Same as in A.3.1.	~~CL 3~~	OK
F.1.3. Will the project create any adverse	/1/	DR	Same as in A.3.1.	~~CL 3~~	OK

Checklist Question	Ref.	MoV*	Comments	Draft Concl	Final Concl
environmental effects?					
F.1.4. Are transboundary environmental impacts considered in the analysis?	/1/	DR	Same as in A.3.1.	~~CL 3~~	OK
F.1.5. Have identified environmental impacts been addressed in the project design?	/1/	DR	Same as in A.3.1.	~~CL 3~~	OK
F.1.6. Does the project comply with environmental legislation in the host country?	/1/	DR	Same as in A.3.1.	~~CL 3~~	OK
G. Stakeholder Comments *The validator should ensure that a stakeholder comments have been invited and that due account has been taken of any comments received.*					
G.1.1. Have relevant stakeholders been consulted?	/1/	DR	Representatives of the local community, community of cane growers, the state electricity board and other interested parties have been consulted on 2 June 2006 during a meeting held for this purpose.		OK
G.1.2. Have appropriate media been used to invite comments by local stakeholders?	/1/	DR	Questionnaire pertaining to project activity has been prepared and participants asked to respond.		OK
G.1.3. If a stakeholder consultation process is required by regulations/laws in the host country, has the stakeholder consultation process been carried out in accordance with such regulations/laws?	/1/	DR	A Stakeholder consultation process has been carried out.		OK
G.1.4. Is a summary of the stakeholder comments received provided?	/1/	DR	Summary of comments received during the meeting with the leaders of the local community is submitted.		OK
G.1.5. Has due account been taken of any stakeholder comments received?	/1/	DR	The promoters are planning to plant about 50,000 trees in response to the comments of the stakeholders. They are also putting in place all pollution prevention systems for		OK

Checklist Question	Ref.	MoV*	Comments	Draft Concl	Final Concl
			abatement of any possible adverse impacts.		

Table 3 Resolution of Corrective Action and Clarification Requests

Draft report corrective action requests and requests for clarifications	Ref. to Table 2	Summary of project participants' response	Final conclusion
CAR 1: Clarification of the status of approval by the DNA of India, DNA of U.K. and letter of participation is required.	Table 1, A.3.2-3.	The approval from DNA of India (F.No. 4/21/2006-CCC dated 22 January 2007) and approval from the DNA of U.K. (DNA Ref: *CRML/19/2007 issued on 20 March 2007*) has been obtained and submitted to DNV.	OK. This has been provided. The CAR is therefore closed.
CAR 2: CEA values of Emission factors for all the regional grids of India are available (Ref.: http://www.cea.nic.in/). However, the values of emission factors of the Southern region grid calculated in the PDD (0.934 TCO_{2e} /MWh) by Kothari Sugars and Chemicals Limited are on the higher side than the CEA values (0.86 TCO_{2e} /MWh). So, clarification is requested for not using conservative CEA values for the Emission factors of the Southern Region Grid of India. Thus, it remains to be demonstrated that annual average emission reductions are conservatively estimated as 93 684 TCO_{2e}.	E.3.4-6, E.4.1.	We have used the CEA numbers in the version 03 of the PDD. Initially the project emission reductions calculations were based on data from the Central Electricity Authority (CEA) published Annual General Review reports on power generation and specific fuel consumption for the southern grid. The emission factor arrived at was 0.934 tCO_2e/MWh. These calculations were made before CEA published its data. However, recently, CEA has published emission factors for all five Indian regional grids and the value for southern grid is 0.86 tCO_2e/MWh. Taking a conservative approach we have revised our emission reduction calculations based on the CEA published data. The revised annual average emission reductions from the project now stand to be 82 719 tCO_2e.	OK. The provided clarifications sufficiently address DNV's request for corrective action and now the PDD uses conservative values (0.86 TCO_{2e} /MWh) for the emission factors of the southern region grid of India (as per CEA). DNV is able to confirm that the emission reductions are correctly and conservatively estimated at 82 719 TCO2/ year and the revised PDD (Version 03) reflects it correctly.

Draft report corrective action requests and requests for clarifications	Ref. to Table 2	Summary of project participants' response	Final conclusion
CL 1: The version number of the PDD is reported as 3.2 dated 6 September 2006 instead of version 01 which needs a clarification.	Table 1	The PDD has undergone several revisions due to revised formats and methodologies. The 6 September 2006 version (for stakeholder comments) underwent several revisions to comply with the revised versions of methodology ACM006 and some further clarification. The final version of the PDD is version 3.0 dated 08 March 2007	OK. The provided response sufficiently address DNV's request for clarification.
CL 2: The promoters have no previous experience in installation, maintenance and operation of power generating turbines which are connected to the grid, so trained personnel are needed to operate and maintain the facility. Details of plans to impart such skills to its personnel may be provided. Provision for providing the requisite skills for operation, maintenance of the plant is requested.	A.2.4-5, D.6.3.	The power plant supplier will train KSCL on operation and maintenance aspects of the boiler and its auxiliaries. Later, a detailed training programme will be provided to develop skills for all plant operators at KSCL plant prior to project implementation. Experienced professionals/ technical consultants from power plants will be hired to train the plant operators on regular basis.	OK. The implementation of the training plans shall be checked by the DoE carrying out the initial or/ and first verification of the project to demonstrate compliance with training requirements.
CL 3: The environmental clearance from MoEF and environmental impact assessment report (EIA) which appears to be awaiting approval may be submitted for verification.	Table1, A.3.1, F.1.1-6.	All necessary statutory Environmental Clearance from Tamil Nadu state pollution control board have been obtained and submitted for verification. Clearance from MoEF is not a requirement for co-generation projects	OK. The relevant consents have been provided to DNV including the EIA study report, carried out as voluntary initiative. The provided response sufficiently address DNV's request for clarification.
CL 4: The following clarification is requested to be provided to DNV.	B.2.9.	• The unit of NCV of coal is now corrected and source for coal is given in B.6.2. of the PDD.	OK. The provided response sufficiently address DNV's request for clarification.

Draft report corrective action requests and requests for clarifications	Ref. to Table 2	Summary of project participants' response	Final conclusion
▪ Source for emission factor of coal (1.89 TCO_2/Tonne of coal) used in calculation of project emissions from fossil fuels. ▪ Source for average CO_2 emission factor for transportation of bagasse/ biomass by trucks (0.56 $KgCO_2$/Km) used in calculation of project emissions from biomass transportation is requested to be provided to DNV.		**Fuel / NCV (TJ/kt) / EF (tC/TJ) / OXID / COEF (tCO2e/t)** Coal 20.0 25.8 100% 1.890 Diesel 43.0 20.2 100% 3.185 sources: latest IPCC data and the national data (Annual Statistics of Central Electricity Authority) for NCV of coal. • A soft copy of the" India Road Transport Service Efficiency Study", World Bank South Asia Regional Office has been provided to DNV, which indicates a truck with a load carrying capacity of 9 tons, runs 4.5 Km/ litre of diesel. This leads to average CO_2 emission factor (0.56 $KgCO_2$/Km) for transportation of bagasse/ biomass by trucks.	
CL 5: The operation and management structure does not detail the following: • Authority and responsibility for registration, monitoring, measurement and reporting in the PDD. • procedures identified for calibration of monitoring equipment • procedures identified for maintenance of monitoring equipment and installations • identified for day-to-day records handling	D.6.1-2, D.6.4-13.	▪ The necessary authority and responsibility has been described including the procedures for calibration of monitoring equipments, maintenance of these equipments, record handling, internal audit, performance review, implementing corrective actions management are described in the Annex 4 of the PDD (Version 03) . • The NCV of the biomass is not	OK. The provided response sufficiently address DNV's request for clarification.

Draft report corrective action requests and requests for clarifications	Ref. to Table 2	Summary of project participants' response	Final conclusion
(including what records to keep, storage area of records and how to process performance documentation) • procedures identified for dealing with possible monitoring data adjustments and uncertainties • procedures identified for review of reported results/data • Procedures for internal audit of GHG, performance reviews and corrective actions The periodicity of the reporting of calorific value needs to be mentioned. Responsibility of carrying out the energy balance needs to be clarified. QA & QC procedure for carrying out the energy balance needs to be elaborated.		required in the calculations! In ACM0006v3 it was explicitly not required unless we incorporate methane emissions from the biomass. ACM0006v4 seems to suggest we need it for an energy balance, but only if we estimate the amount of biomass combusted from the amount of biomass delivered. This is not the case. The amount of biomass combusted is determined with a belt weigher (at the time of combustion).	
CL 6: Demonstrate how the PDD has ruled out leakage by application of L2. The PDD should mention the compliance to conditions of L2 (in the ACM0006) quantitatively with figures.	E.2.2.	There is a sufficient biomass residue from agricultural crops available in Tamil Nadu for 1357.64MW. This proposed project has an installed capacity of 24MW. Therefore the proposed project represents less than 1.8% of the potential generation! L2 requires us to demonstrate that there is at least 25% more biomass available than that current used plus the project needs. There is currently nearly 50% more biomass residue available than that projected to be used currently and by the project. This is added to the PDD.	OK. The provided response sufficiently address DNV's request for clarification and demonstrates leakage through the application of L2. Thus, leakage can be assumed as zero for estimation of the emission reduction forecast at the validation stage.

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APPENDIX B

CERTIFICATES OF COMPETENCE

CERTIFICATE OF COMPETENCE

Amit Thusu

Qualification in accordance with DNV's Qualification scheme for CDM/JI (ICP-9-8-i1-CDMJI-i1

GHG Auditor:	Yes		
CDM Validator:	--	***JI Validator:***	--
CDM Verifier:	--	***JI Verifier:***	--
Industry Sector Expert for Sectoral Scope(s):	--		
Technical Reviewer for (group of) methodologies:			
ACM0001, AM0002, AM0003, AM0010, AM0011, AM0012, AMS-III.G	--	*AM0021*	--
ACM002, AMS-I.A-D, AM0019, AM0026, AM0029	--	*AM0023*	--
ACM003, ACM0005, AM0033, AM0040	--	*AM0024*	--
ACM0004	--	*AM0027*	--
AM0018, VERSION 01, AM0007, AM0015, AM0036, AM0042	--	*AM0028, AM0034*	--
ACM0007	--	*AM0030*	--
ACM0008	--	*AM0031*	--
ACM0009, AM0008, AMS-III.B	--	*AM0032*	--
AM0006, AM0016, AMS-III.D	--	*AM0035*	--
AM0009, AM0037	--	*AM0038*	--
AM0013, AM0022, AM0025, AM00379, AMS-III.H, AMS-III.I	--	*AM0041*	--
AM0014	--	*AM0034*	--
AM0017	--	*AMS-II.A-F*	--
AM0018	--	*AMS-III.A*	--
AM0020	--	*AMS-III.E, AMS-III.F*	--

Høvik, 6 November 2006

Einar Telnes
Director, International Climate Change Services

Michael Lehmann
Technical Director

CERTIFICATE OF COMPETENCE

Vidyacharan Astakala

Qualification in accordance with DNV's Qualification scheme for CDM/JI (ICP-9-8-i1-CDMJI-i1

GHG Auditor:	Yes		
CDM Validator:	--	***JI Validator:***	--
CDM Verifier:	--	***JI Verifier:***	--
Industry Sector Expert for Sectoral Scope(s):	--		
Technical Reviewer for (group of) methodologies:			
ACM0001, AM0002, AM0003, AM0010, AM0011, AM0012, AMS-III.G	--	*AM0021*	--
ACM002, AMS-I.A-D, AM0019, AM0026, AM0029	--	*AM0023*	--
ACM003, ACM0005, AM0033, AM0040	--	*AM0024*	--
ACM0004	--	*AM0027*	--
AM0018, VERSION 01, AM0007, AM0015, AM0036, AM0042	--	*AM0028, AM0034*	--
ACM0007	--	*AM0030*	--
ACM0008	--	*AM0031*	--
ACM0009, AM0008, AMS-III.B	--	*AM0032*	--
AM0006, AM0016, AMS-III.D	--	*AM0035*	--
AM0009, AM0037	--	*AM0038*	--
AM0013, AM0022, AM0025, AM00379, AMS-III.H, AMS-III.I	--	*AM0041*	--
AM0014	--	*AM0034*	--
AM0017	--	*AMS-II.A-F*	--
AM0018	--	*AMS-III.A*	--
AM0020	--	*AMS-III.E, AMS-III.F*	--

Høvik, 6 November 2006

Einar Telnes
Director, International Climate Change Services

Michael Lehmann
Technical Director

CERTIFICATE OF COMPETENCE

Kumaraswamy Chandrashekara

Qualification in accordance with DNV's Qualification scheme for CDM/JI (ICP-9-8-i1-CDMJI-i1

GHG Auditor:	Yes		
CDM Validator:	Yes	***JI Validator:***	--
CDM Verifier:	Yes	***JI Verifier:***	--
Industry Sector Expert for Sectoral Scope(s):	Sectoral scope 4 & 5		
Technical Reviewer for (group of) methodologies:			
ACM0001, AM0002, AM0003, AM0010, AM0011, AM0012, AMS-III.G	Yes	*AM0021*	Yes
ACM002, AMS-I.A-D, AM0019, AM0026, AM0029	Yes	*AM0023*	Yes
ACM003, ACM0005, AM0033, AM0040	Yes	*AM0024*	Yes
ACM0004	Yes	*AM0027*	Yes
AM0018, VERSION 01, AM0007, AM0015, AM0036, AM0042	Yes	*AM0028, AM0034*	Yes
ACM0007	Yes	*AM0030*	Yes
ACM0008	Yes	*AM0031*	Yes
ACM0009, AM0008, AMS-III.B	Yes	*AM0032*	Yes
AM0006, AM0016, AMS-III.D	Yes	*AM0035*	Yes
AM0009, AM0037	Yes	*AM0038*	Yes
AM0013, AM0022, AM0025, AM00379, AMS-III.H, AMS-III.I	Yes	*AM0041*	Yes
AM0014	Yes	*AM0034*	Yes
AM0017	Yes	*AMS-II.A-F*	Yes
AM0018	Yes	*AMS-III.A*	Yes
AM0020	Yes	*AMS-III.E, AMS-III.F*	Yes

Høvik, 6 November 2006

Einar Telnes
Director, International Climate Change Services

Michael Lehmann
Technical Director

CERTIFICATE OF COMPETENCE

Michael Lehmann

Qualification in accordance with DNV's Qualification scheme for CDM/JI (ICP-9-8-i1-CDMJI-i1

GHG Auditor:	Yes		
CDM Validator:	Yes	***JI Validator:***	Yes
CDM Verifier:	Yes	***JI Verifier:***	Yes
Industry Sector Expert for Sectoral Scope(s):	Sectoral scope 1,2,3 & 9		
Technical Reviewer for (group of) methodologies:			
ACM0001, AM0002, AM0003, AM0010, AM0011, AM0012, AMS-III.G	Yes	*AM0021*	Yes
ACM002, AMS-I.A-D, AM0019, AM0026, AM0029	Yes	*AM0023*	Yes
ACM003, ACM0005, AM0033, AM0040	Yes	*AM0024*	Yes
ACM0004	Yes	*AM0027*	Yes
AM0018, VERSION 01, AM0007, AM0015, AM0036, AM0042	Yes	*AM0028, AM0034*	Yes
ACM0007	Yes	*AM0030*	Yes
ACM0008	Yes	*AM0031*	Yes
ACM0009, AM0008, AMS-III.B	Yes	*AM0032*	Yes
AM0006, AM0016, AMS-III.D	Yes	*AM0035*	Yes
AM0009, AM0037	Yes	*AM0038*	Yes
AM0013, AM0022, AM0025, AM00379, AMS-III.H, AMS-III.I	Yes	*AM0041*	Yes
AM0014	Yes	*AM0034*	Yes
AM0017	Yes	*AMS-II.A-F*	Yes
AM0018	Yes	*AMS-III.A*	Yes
AM0020	Yes	*AMS-III.E, AMS-III.F*	Yes

Høvik, 6 November 2006

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