



VCS VERIFICATION REPORT

300MW HYDROPOWER PROJECT by JHPL

MONITORING PERIOD:
1 JANUARY 2013 TO 30 JUNE 2013

REPORT N°2013-1229
REVISION No. 01

Project Title	300MW Hydropower project by JHPL
Version	01
Report ID	2013-1229

Report Title	VCS Verification Report for 300MW Hydropower project by JHPL
DNV Ref.	PRJC-491668-2013-CCS-IND
Client	Jaiprakesh Power Venture Limited
Pages	35
Date of Issue	24 September 2013
Prepared By	DNV Climate Change Services AS
Contact	Veritasveien 1, 1322 HØVIK, Norway Tel: +47 67 57 99 00 Email: climatechange@dnv.com http://www.dnv.com
Approved By	Michael Lehmann
Work Carried Out By	Sharmistha Shome
Technical review by:	Kakaraparthi Venkata Raman

Summary:

DNV Climate Change Services AS (DNV) has performed the verification of the emission reductions reported for the “300MW Hydropower project by JHPL” (VCS Project ID: 92) for the period 1 January 2013 to 30 June 2013 to review and determine the monitored reductions in GHG emissions that have occurred as a result of the project activity.

The verification was performed on the basis of VCS Programme Guidelines & Standard version 3.3 for VCS projects, as well as criteria given to provide for consistent project operations, monitoring and reporting. The verification was conducted by means of document review, follow-up interviews and site inspection, and the resolution of outstanding issues.

In our opinion, the GHG emission reductions reported for the project in the monitoring report (version 1.1) of 24 September 2013 are fairly stated. The GHG emission reductions were calculated correctly on the basis of approved methodology ACM0002 (version 08) and the monitoring plan contained in the VCS PD of 25 December 2008.

Hence, DNV Climate Change Services AS (DNV) is able to certify that the emission reductions from the “300MW Hydropower project by JHPL” during the period amount to 408 467 tonnes CO₂ equivalent.

DNV does not assume any responsibility towards the issuance and utilization of the VCUs hereby verified and certified. Request for issuance of VCUs shall be made by the project proponent to an approved VCS Program Registry based on the requirements set out under the most recent version of the VCS Program Guidelines clause on VCS Registration.

The verification of reported emission reductions is based on the information made available to DNV and the engagement conditions detailed in this report. DNV cannot be held liable by any party for decisions made or not made based on this report.

Table of Contents

1	INTRODUCTION	4
1.1	OBJECTIVE	4
1.2	SCOPE AND CRITERIA	4
1.3	LEVEL OF ASSURANCE	4
1.4	SUMMARY DESCRIPTION OF THE PROJECT	5
2	VALIDATION PROCESS, FINDINGS AND CONCLUSION	5
2.1	VALIDATION PROCESS	5
2.2	VALIDATION FINDINGS	5
2.2.1	GAP VALIDATION	5
2.2.2	METHODOLOGY DEVIATIONS	5
2.2.3	PROJECT DESCRIPTION DEVIATIONS	6
2.2.4	NEW PROJECT ACTIVITY INSTANCES	6
2.3	VALIDATION CONCLUSION	6
3	VERIFICATION PROCESS	6
3.1	METHOD AND CRITERIA	6
3.2	DOCUMENT REVIEW	7
3.3	INTERVIEWS	8
3.4	SITE INSPECTIONS	8
3.5	RESOLUTION OF ANY MATERIAL DISCREPANCY	9
4	VERIFICATION FINDINGS	9
4.1	PROJECT IMPLEMENTATION STATUS	9
4.2	ACCURACY OF GHG EMISSION REDUCTION OR REMOVAL CALCULATIONS	21
4.3	QUALITY OF EVIDENCE TO DETERMINE GHG EMISSION REDUCTIONS OR REMOVALS	23
4.4	MANAGEMENT AND OPERATIONAL SYSTEM	23
5	VERIFICATION CONCLUSION	24
6	REFERENCES	26
APPENDIX A		CORRECTIVE ACTION REQUESTS, CLARIFICATION REQUESTS AND FORWARD ACTION REQUESTS

1 INTRODUCTION

Jaiprakesh Power Venture Limited has commissioned DNV Climate Change Services AS (DNV) to carry out the verification and certification of emission reductions reported for the “300MW Hydropower project by JHPL” (the project) in the period 1 January 2013 to 30 June 2013. This report contains the findings from the verification and includes verification statement for the verified carbon units.

1.1 Objective

Verification is the periodic independent review and ex-post determination by an accredited verification body of the monitored reductions in GHG emissions that have occurred as a result of the registered VCS project activity during a defined verification period.

A verification statement is the written assurance by a verification body that, during a specific period in time, a project activity achieved the emission reductions as verified.

The objective of this verification was to verify and provide a verification statement of emission reductions reported for the “300MW Hydropower project by JHPL” for the period 1 January 2013 to 30 June 2013.

1.2 Scope and Criteria

The scope of the verification is:

- To verify that actual monitoring systems and procedures are in compliance with the monitoring systems and procedures described in the monitoring plan.
- To evaluate the GHG emission reduction data and express a conclusion with a reasonable level of assurance about whether the reported GHG emissions reduction data is free from material misstatement.
- To verify that reported GHG emissions data is sufficiently supported by evidence.

The criteria of the verification are:

- VCS Program Guide version 3.4
- VCS Standard version 3.3 and other relevant requirements defined by VCSA.
- The approved methodology ACM0002 (version 08).

The verification shall ensure that reported emission reductions are complete and accurate in order to be verified.

1.3 Level of assurance

The verification report expresses a conclusion with a reasonable level of assurance about whether the reported GHG emissions reduction data is free from material misstatement. DNV applied a materiality threshold of 1% with respect to omission or misstatements concerning reported quantities as per VCS standard 3.3.

1.4 Summary Description of the Project

The project is a run-of-the-river hydro power plant with an installed capacity of 300MW, consisting of three numbers of 100MW pelton turbines. The diversion barrage of the project is located across river Baspa, at Kuppa in Himachal Pradesh and the power house is located at Karcham village in Kinnaur District. The project activity is an initiative of Jaiprakash Hydro Power Limited (JHPL) a part of the Jaypee Group.

The generated power by the project is supplied to the HPSEB grid as per the power purchase agreement /17/. The electricity generated by the project activity is stepped up to 400 kV and is evacuated by two circuits of 400 kV lines from the power station to Jhakri substation, which is about 55 Km from the project site. The project also includes two numbers of diesel generator sets of capacity 625kVA which are used in case of emergency. In addition, grid electricity import also takes place from a separate 22 kV line to the project site and the same is monitored by the HPSEB energy meter, located at the sub-station. The project site also includes five numbers of SF₆ cylinders, with four cylinders of capacity 38.4 kg each and the cylinder of capacity 590 kg. Any leakage of SF₆ from any of these 5 cylinders are monitored as per the registered PD /23/.

The electricity supplied and imported from the grid by the project is continuously monitored and recorded on monthly basis. The monitoring is performed by the set of main and check energy meters of accuracy class 0.2S at both the circuits of 400 kV lines. The net electricity supplied by the project is monthly recorded by the HPSEB representative in presence of the project proponent. The monthly joint meter reading (JMR) report /10/ generated from the monthly reading is signed by HPSEB official and representative of the project proponent.

The net power exported by the project during the present monitoring period is 509 128.98 MWh.

2 VALIDATION PROCESS, FINDINGS AND CONCLUSION

2.1 Validation Process

Not applicable as the project activity has already been validated as per VCS standard 2007.1

2.2 Validation Findings

2.2.1 Gap Validation

Not applicable as the project activity has already been validated as per VCS standard 2007.1

2.2.2 Methodology Deviations

Not applicable as the project activity has already been validated as per VCS standard 2007.1. The project activity has applied ACM0002, version 08 and is registered as VCS project (project ID-92). No methodology deviation is involved.

2.2.3 Project Description Deviations

As per the registered PD /23/, the energy meters are to be installed at the Jhakri substation, which is about 55 Km from the project site. However, the main meters and check meters have been shifted from the Jhakri substation to the power house of the project activity on 12 May 2011. Due to the change in location of the energy meters, a transmission loss at the rate of 0.65% of the electricity exported to the grid is accounted for every month, in line with the power purchase agreement (PPA) /17/. It has been assessed that the change in the metering location does not impact:

- The applicability of the methodology ACM0002 version 08/21/.
- The additionality or the baseline scenario.

The project activity and the monitoring plan is applicable to the applied methodology. Hence, as per Section 3.6 of the VCS Standard document version 3.3, this deviation from the monitoring plan is deemed acceptable.

2.2.4 New Project Activity Instances

Not applicable as the project activity is not grouped project.

2.3 Validation Conclusion

Not applicable as the project activity has already been validated as per VCS standard 2007.1.

3 VERIFICATION PROCESS

3.1 Method and Criteria

The verification was performed through means of the following three phases in accordance with the requirement of the registered VCS PD, the applied methodology, and the VCS Standard version 3.3 and other relevant VCS requirements.

- A desk review of the monitoring report and all support documents.
- Follow-up interviews with project stakeholders and site inspection.
- The resolution of outstanding issues and the issuance of the verification report and statement.

The following sections outline each step in more detail.

The verification of the emission reductions has assessed all factors and issues that constitute the basis for emission reductions from the project. These include:

- The emission reduction calculations and the relevant data records /2/-/6/,/9/,/10/,/15/.
- The calibration and maintenance records for the monitoring instruments /7//11//12//13/.
- The management systems to support the project operation and monitoring /14/.

Verification team

Role	Last Name	First Name	Country	Type of involvement					
				Desk review	Site visit	Reporting	Supervision of work	Technical review	TA 1.2 competence
Team leader (Verifier)	Shome	Sharmistha	India	✓	✓	✓	✓		✓
Technical reviewer	Kakaraparthi	Venkata Raman	India					✓	✓

Duration of verification

Preparations: 6 September 2013 to 12 September 2013
On-site verification: 18 September 2013
Reporting, calculation checks and QA/QC: 19 September 2013 to 24 September 2013

3.2 Document Review

In addition to the monitoring report (version 1 dated 24 September 2013) /1/, DNV reviewed:

- The PD for the project activity /23/
- The previous validation and verification report /19/
- Baseline and monitoring methodology ACM0002, version 08 /21/
- Emission reduction excel sheet /2/.
- Joint meter reading certificates and invoices covering the monitoring period /10//5/.
- Calibration certificates of the main and check energy meters /7/, calibration certificate of the electronic balance /11/ used for the weighing SF₆ cylinders at project site and calibration certificate of the digital pressure indicator /12/.
- Daily log book of electricity generation, diesel consumption, HPSEB invoices for the electricity import from the 22 kV line /9/.
- Shutdown and maintenance log book maintained by the JPVL /14/.
- Log book for the weight measurement /4/ of the SF₆ gas cylinders, daily alarm log sheet /3/ for the SF₆ cylinder pressure dip and pressure measurement log sheet at various compartments /15/.

During the desk review, DNV has applied standard auditing techniques to assess the quality of information provided. The following activities were performed:

- A review of the data and information presented to verify their completeness /1/-/15/;
- A review of the monitoring plan and monitoring methodology, paying particular attention to the frequency of measurements, the quality of metering equipment including calibration requirements, and the quality assurance and quality control procedures;

An evaluation of data management and the quality assurance and quality control system in the context of their influence on the generation and reporting of emission reductions /2/.

Relevant decisions, clarifications and guidance from the VCSA;

Any other information and references relevant to the project activity's resulting emission reductions (e.g., IPCC reports, data on electricity generation in the national grid or laboratory analysis and national regulations).

3.3 Interviews

DNV has conducted the site visit on 18 September 2013. Following personnel were interviewed during the site visit:

Name	Organisation	Topic
Mr. K. Srinivasan	Jaiprakesh Power Venture Limited	Monitoring plan
Mr. V. C. Gupta	Jaiprakesh Power Venture Limited	Operation and maintenance procedure
Mr. S. K. Jha	Jaiprakesh Power Venture Limited	Data monitoring systems, monitoring and recording frequency
Mr. Ravi Kumar Gupta	Jaiprakesh Power Venture Limited	Calibration of the energy meters and pressure indicator.
Mr. Amit Gupta	Emergent Venture (India) Limited	Weighing of the SF ₆ cylinders

3.4 Site Inspections

On 18 September 2013, DNV performed on-site assessment of the project activity. The key personnel of the project were interviewed or assisted the verification team.

During the on-site assessment, DNV has applied standard auditing techniques to assess the quality of information provided. The following aspects of the VCS project activity have been verified:

The on-site assessment involves:

- (i) Assessment of the implementation and operation of the proposed VCS project activity as per the registered VCS PD /23/;
- (ii) Review of information flows for generating, aggregating and reporting the monitoring parameters /2//15/;
- (iii) Interviews with relevant personnel to confirm that the operational and data collection procedures are implemented in accordance with the monitoring plan in the VCS PD /23/;
- (iv) A cross-check between information provided in the monitoring report and data from other sources such as plant log books, inventories, purchase records or similar data sources /3//15/;
- (v) A check of the monitoring equipment including calibration performance and observations of monitoring practices against the requirements of the PD and the selected methodology /7//11//12/;
- (vi) Review of calculations and assumptions made in determining the GHG data and emission reductions /2/;
- (vii) Identification of quality control and quality assurance procedures in place to prevent or identify and correct any errors or omissions in the reported monitoring parameters.

3.5 Resolution of Any Material Discrepancy

A corrective action request (CAR) is issued, where:

- i. Non-conformities with the monitoring plan or methodology are found in monitoring and reporting, or if the evidence provided to prove conformity is insufficient;
- ii. Mistakes have been made in applying assumptions, data or calculations of emission reductions which will impair the estimate of emission reductions;
- iii. Issues identified in a FAR during validation to be verified during verification have not been resolved by the project participants.

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

A forward action request (FAR) is issued for actions if the monitoring and reporting require attention and/or adjustment for the next monitoring period.

The verification identified one CARs and two CLs. The CARs and CLs were satisfactorily addressed by the project participants by among other revising the monitoring (please refer to Appendix A for further details). No FAR has been raised. All the changes in the revised monitoring report is in response to the CAR/CL.

4 VERIFICATION FINDINGS

4.1 Project Implementation Status

As part of the site visit DNV was able to confirm that the project implementation is in accordance with the project description contained in registered VCS PD of 25 December 2008 /23/, and that the monitoring has been carried out in accordance with the monitoring plan contained in the registered VCS PD of 25 December 2008, except for the electricity metering location. As aforementioned, the location of the sets of main and check meters were shifted from Jhakri substation to the power house of the project activity on

12 May 2011 /19/ by the electricity board officials. The change in the location of the energy meters does not impact the applicability of the methodology, additionality or the project activity's monitoring plan compliance with the applied methodology ACM0002 version 08. Hence, the change has been accepted as per Section 3.6 of the VCS Standard document, version 3.3 /20/.

The monitoring and reporting frequency of all the relevant parameters are performed as per the registered VCS PD. The calibration certificates of the energy meters, electronic balance and pressure indicator has been done as per the VCS PD.

Following the monitoring parameters:

	Assessment/ Observation		
Data / Parameter: (as in monitoring plan):	EG _y : Net Electricity supplied to the grid by the project activity during the year y		
Measuring frequency:	Continuous monitoring and recorded monthly		
Reporting frequency:	Monthly		
Is measuring and reporting frequency in accordance with the monitoring plan and monitoring methodology? (Yes / No)	Yes.		
Type of monitoring equipment:	Energy meters of accuracy class 0.2S.		
Is accuracy of the monitoring equipment equal or more accurate as stated in monitoring plan? If the monitoring plan does not specify the accuracy of the monitoring equipment, does the monitoring equipment represent good monitoring practise?	Yes, the accuracy of the energy meters is 0.2S as per the registered monitoring plan.		
Calibration frequency /interval:	Annual		
Is the calibration interval in line with the monitoring plan of the monitoring plan? If the monitoring plan does not specify the frequency of calibration, does the selected frequency represent good monitoring practise?	Yes, the calibration has been performed as per the registered monitoring plan. The meter numbers, date of calibrations /7/, verified, are as:		
	Line 1 /7/:		
	Meter number	Calibration date	Calibration validity
	HPU 02547 (main meter; replaced by	19 January 2012	18 January 2013

	UPU 01237)		
	UPU 01237 (main meter)	19 January 2013	18 January 2014
	HPU 02548 (check meter; replaced by UPU 01235)	19 January 2012	18 January 2013
	UPU 01235 (check meter)	19 January 2013	18 January 2014
	The main meter HPU 02547 and check meter HPU 02548 has been replaced by UPU 01237 and UPU 01235 respectively on 21 January 2013.		
	Line 2 /7/:		
	Meter number	Calibration date	Calibration validity
	HPU 02549 (main meter; replaced by UPU 01238)	19 January 2012	18 January 2013
	UPU 01238 (main meter)	19 January 2013	18 January 2014
	HPU 02550 (check meter; replaced by UPU 01236)	19 January 2012	18 January 2013
	UPU 01236 (check meter)	19 January 2013	18 January 2014
	The main meter HPU 02549 and check meter HPU 02550 has been replaced by UPU 01238 and UPU 01236 respectively on 22 January 2013.		
Company performing the calibration:	Power grid corporation of India Limited (A government of India enterprise) /7/		
Did calibration confirm proper functioning of monitoring equipment? (Yes / No):	Yes.		

Is (are) calibration(s) valid for the whole reporting period? If the calibration does not cover the whole period please indicated how the project has revised its GHG calculations for the period that calibration was not valid.	Yes. The calibration is valid for the present monitoring period.
If applicable, has the reported data been cross-checked with other available data?	Monthly invoices to HPSEB by the project proponent covering the monitoring period/5/.
How were the values in the monitoring report verified?	Monthly Joint meter reading reports covering the monitoring period /10/.
Does the data management (from monitoring equipment to emission reduction calculation) ensure correct transfer of data and reporting of emission reductions and are necessary QA/QC processes in place?	Yes.
In case only partial data are available because activity levels or non-activity parameters have not been monitored in accordance with the registered monitoring plan, has the most conservative assumption theoretically possible been applied or has a request for deviation been approved?	Not applicable.

	Assessment/ Observation
Data / Parameter: (as in monitoring plan):	Q_{SF_6} : Quantity of SF_6 loss during the year y
Measuring frequency:	Weighing of the SF_6 cylinders are done quarterly.
Reporting frequency:	As per the registered PD, this is to be monitored annually.
Is measuring and reporting frequency in accordance with the monitoring plan and monitoring methodology? (Yes / No)	As per the registered PD, the monitoring frequency is annually. However, the project proponent has monitored the weight of the cylinders once in every quarter, as a good practice.
Type of monitoring equipment:	Electronic balance of class III.
Is accuracy of the monitoring equipment equal or more accurate as stated in monitoring plan? If the monitoring plan does not specify the	The registered monitoring plan does not mention any accuracy of the electronic balance. The electronic balance of accuracy class III is

accuracy of the monitoring equipment, does the monitoring equipment represent good monitoring practise?	considered to be good monitoring practice and as per the national standard. As per the registered PD, the capacity of the balance is 2000 kg and has a least count of 200 gm.				
Calibration frequency /interval:	Annually				
Is the calibration interval in line with the monitoring plan of the monitoring plan? If the monitoring plan does not specify the frequency of calibration, does the selected frequency represent good monitoring practise?	Yes, the calibration has been performed annually as per the registered monitoring plan.				
Company performing the calibration:	Metrological Department of India, Himachal Pradesh (Government of India) /11/.				
Did calibration confirm proper functioning of monitoring equipment? (Yes / No):	Yes.				
Is (are) calibration(s) valid for the whole reporting period? If the calibration does not cover the whole period please indicated how the project has revised its GHG calculations for the period that calibration was not valid.	Yes, the calibration is valid for the monitoring period/11/. <table border="1"> <tr> <th>Date of calibration</th><th>Calibration Validity</th></tr> <tr> <td>21 August 2012</td><td>20 August 2013</td></tr> </table>	Date of calibration	Calibration Validity	21 August 2012	20 August 2013
Date of calibration	Calibration Validity				
21 August 2012	20 August 2013				
If applicable, has the reported data been cross-checked with other available data?	No cross checking is applicable as per the registered monitoring plan.				
How were the values in the monitoring report verified?	Plant log book of weighing records of the 5 cylinders of SF ₆ /4/. The weight of the cylinders were measured and recorded on 20 September 2012, 19 December 2012, 14 March 2013, 10 June 2013 and 9 September 2013. It has been observed that there is no difference in the weight of the cylinders during September 2012 to September 2013.				
Does the data management (from monitoring equipment to emission reduction calculation) ensure correct transfer of data and reporting of emission reductions and are necessary QA/QC processes in place?	Yes.				
In case only partial data are available because activity levels or non-activity parameters have not been monitored in accordance with the registered monitoring plan, has the most conservative assumption theoretically possible	Not applicable.				

been applied or has a request for deviation been approved?	
--	--

	Assessment/ Observation
Data / Parameter: (as in monitoring plan):	P _{BAY VT} : SF ₆ gas pressure in the BAY VT
Measuring frequency:	Daily monitoring with GIS alarm system /3/. The pressure is checked with digital pressure indicator once in a calendar year /15/.
Reporting frequency:	Consolidated monthly or as and when any abnormalities are observed.
Is measuring and reporting frequency in accordance with the monitoring plan and monitoring methodology? (Yes / No)	Yes.
Type of monitoring equipment:	Digital pressure indicator (DPI-705) of least count 0.001 bar and range 0-20 bars /12/.
Is accuracy of the monitoring equipment equal or more accurate as stated in monitoring plan? If the monitoring plan does not specify the accuracy of the monitoring equipment, does the monitoring equipment represent good monitoring practise?	The registered PD does not mention any accuracy of the digital pressure indicator. The specifications of the pressure indicator is consistent with the registered monitoring plan.
Calibration frequency /interval:	Annually.
Is the calibration interval in line with the monitoring plan of the monitoring plan? If the monitoring plan does not specify the frequency of calibration, does the selected frequency represent good monitoring practise?	Yes, the calibration has been performed as per the registered monitoring plan.
Company performing the calibration:	Quick Logic Controls and Calibration /12/
Did calibration confirm proper functioning of monitoring equipment? (Yes / No):	Yes.
Is (are) calibration(s) valid for the whole reporting period? If the calibration does not cover the whole period please indicated how	Yes, the calibration is valid for the monitoring period /12/.

the project has revised its GHG calculations for the period that calibration was not valid.	Date of Calibration	Calibration Validity
	5 September 2012	4 September 2013
If applicable, has the reported data been cross-checked with other available data?	No cross-checking is applicable as per the registered PD.	
How were the values in the monitoring report verified?	Plant daily GIS alarm log sheet, consolidated on monthly basis /3/. The pressure is checked with digital pressure indicator once in a calendar year /15/. The SF₆ cylinders at bay require topping if the pressure is below 3.5 bar. Yearly pressure reading of the cylinders as monitored by the DPI-705.	
Does the data management (from monitoring equipment to emission reduction calculation) ensure correct transfer of data and reporting of emission reductions and are necessary QA/QC processes in place?	Yes. The correctness of DPI-705 is checked by measuring the pressure of SF ₆ Gas Cylinder and comparing it with the pressure measured by the built-in dial gauge of the filling machine.	
In case only partial data are available because activity levels or non-activity parameters have not been monitored in accordance with the registered monitoring plan, has the most conservative assumption theoretically possible been applied or has a request for deviation been approved?	Not applicable.	

	Assessment/ Observation
Data / Parameter: (as in monitoring plan):	P _{breaker} : SF ₆ gas pressure in the Breaker
Measuring frequency:	Daily monitoring with GIS alarm system /3/
Reporting frequency:	Consolidated monthly or as and when any abnormalities are observed.
Is measuring and reporting frequency in accordance with the monitoring plan and monitoring methodology? (Yes / No)	Yes.
Type of monitoring equipment:	Digital pressure indicator (DPI-705) of least count 0.001 bar and range 0-20 bars /12/.

Is accuracy of the monitoring equipment equal or more accurate as stated in monitoring plan? If the monitoring plan does not specify the accuracy of the monitoring equipment, does the monitoring equipment represent good monitoring practise?	The registered PD does not mention any accuracy of the digital pressure indicator. The specifications of the pressure indicator is consistent with the registered monitoring plan.				
Calibration frequency /interval:	Annually.				
Is the calibration interval in line with the monitoring plan of the monitoring plan? If the monitoring plan does not specify the frequency of calibration, does the selected frequency represent good monitoring practise?	Yes, the calibration has been performed as per the registered monitoring plan.				
Company performing the calibration:	Quick Logic Controls and Calibration				
Did calibration confirm proper functioning of monitoring equipment? (Yes / No):	Yes.				
Is (are) calibration(s) valid for the whole reporting period? If the calibration does not cover the whole period please indicated how the project has revised its GHG calculations for the period that calibration was not valid.	Yes, the calibration is valid for the monitoring period /12/. <table border="1"> <tr> <th>Date of Calibration</th><th>Calibration Validity</th></tr> <tr> <td>5 September 2012</td><td>4 September 2013</td></tr> </table>	Date of Calibration	Calibration Validity	5 September 2012	4 September 2013
Date of Calibration	Calibration Validity				
5 September 2012	4 September 2013				
If applicable, has the reported data been cross-checked with other available data?	No cross-checking is applicable as per the registered PD.				
How were the values in the monitoring report verified?	Plant daily GIS alarm log sheet, consolidated on monthly basis /3/. The pressure is checked with digital pressure indicator once in a calendar year /15/. The SF₆ cylinders at breaker require topping if the pressure is below 4.95 bar. Yearly pressure reading of the cylinders as monitored by the DPI-705.				
Does the data management (from monitoring equipment to emission reduction calculation) ensure correct transfer of data and reporting of emission reductions and are necessary QA/QC processes in place?	Yes. The correctness of DPI-705 is checked by measuring the pressure of SF ₆ Gas Cylinder and comparing it with the pressure measured by the built-in dial gauge of the filling machine.				
In case only partial data are available because activity levels or non-activity parameters have not been monitored in accordance with the	Not applicable.				

registered monitoring plan, has the most conservative assumption theoretically possible been applied or has a request for deviation been approved?	
--	--

	Assessment/ Observation
Data / Parameter: (as in monitoring plan):	P_{feeder} : SF ₆ gas pressure in the Feeder
Measuring frequency:	Daily monitoring with GIS alarm system /3/
Reporting frequency:	Consolidated monthly or as and when any abnormalities are observed.
Is measuring and reporting frequency in accordance with the monitoring plan and monitoring methodology? (Yes / No)	Yes.
Type of monitoring equipment:	Digital pressure indicator (DPI-705) of least count 0.001 bar and range 0-20 bars /12/.
Is accuracy of the monitoring equipment equal or more accurate as stated in monitoring plan? If the monitoring plan does not specify the accuracy of the monitoring equipment, does the monitoring equipment represent good monitoring practise?	The registered PD does not mention any accuracy of the digital pressure indicator. The specifications of the pressure indicator is consistent with the registered monitoring plan.
Calibration frequency /interval:	Annually.
Is the calibration interval in line with the monitoring plan of the monitoring plan? If the monitoring plan does not specify the frequency of calibration, does the selected frequency represent good monitoring practise?	Yes, the calibration has been performed as per the registered monitoring plan.
Company performing the calibration:	Quick Logic Controls and Calibration
Did calibration confirm proper functioning of monitoring equipment? (Yes / No):	Yes.
Is (are) calibration(s) valid for the whole reporting period? If the calibration does not cover the whole period please indicated how	Yes, the calibration is valid for the monitoring period /12/.

the project has revised its GHG calculations for the period that calibration was not valid.	Date of Calibration	Calibration Validity
	5 September 2012	4 September 2013
If applicable, has the reported data been cross-checked with other available data?	No cross-checking is applicable as per the registered PD.	
How were the values in the monitoring report verified?	Plant daily GIS alarm log sheet, consolidated on monthly basis /3/. The pressure is checked with digital pressure indicator once in a calendar year /15/. The SF₆ cylinders at feeder require topping if the pressure is below 4.55 bar. Yearly pressure reading of the cylinders as monitored by the DPI-705.	
Does the data management (from monitoring equipment to emission reduction calculation) ensure correct transfer of data and reporting of emission reductions and are necessary QA/QC processes in place?	Yes. The correctness of DPI-705 is checked by measuring the pressure of SF ₆ Gas Cylinder and comparing it with the pressure measured by the built-in dial gauge of the filling machine.	
In case only partial data are available because activity levels or non-activity parameters have not been monitored in accordance with the registered monitoring plan, has the most conservative assumption theoretically possible been applied or has a request for deviation been approved?	Not applicable.	

	Assessment/ Observation
Data / Parameter: (as in monitoring plan):	Q _{diesel} : Quantity of diesel consumed during the year y
Measuring frequency:	Daily monitoring
Reporting frequency:	Monthly recording
Is measuring and reporting frequency in accordance with the monitoring plan and monitoring methodology? (Yes / No)	Yes.
Type of monitoring equipment:	Level gauge provided on the fuel injection tank of each DG set.
Is accuracy of the monitoring equipment equal	No accuracy is mentioned in the registered PD.

or more accurate as stated in monitoring plan? If the monitoring plan does not specify the accuracy of the monitoring equipment, does the monitoring equipment represent good monitoring practise?	Static graduated level gauges on the fuel injection tanks are used for the diesel consumption monitoring by the DG sets.
Calibration frequency /interval:	Static graduated level gauges on the fuel injection tanks are used for the diesel consumption monitoring by the DG sets. No calibration is applicable for the same.
Is the calibration interval in line with the monitoring plan of the monitoring plan? If the monitoring plan does not specify the frequency of calibration, does the selected frequency represent good monitoring practise?	Static graduated level gauges on the fuel injection tanks are used for the diesel consumption monitoring by the DG sets. No calibration is applicable for the same.
Company performing the calibration:	No calibration is applicable for the same.
Did calibration confirm proper functioning of monitoring equipment? (Yes / No):	No calibration is applicable for the same.
Is (are) calibration(s) valid for the whole reporting period? If the calibration does not cover the whole period please indicated how the project has revised its GHG calculations for the period that calibration was not valid.	No calibration is applicable for the same.
If applicable, has the reported data been cross-checked with other available data?	Diesel receipts /6/.
How were the values in the monitoring report verified?	Diesel consumption log book /6/.
Does the data management (from monitoring equipment to emission reduction calculation) ensure correct transfer of data and reporting of emission reductions and are necessary QA/QC processes in place?	Yes.
In case only partial data are available because activity levels or non-activity parameters have not been monitored in accordance with the registered monitoring plan, has the most conservative assumption theoretically possible been applied or has a request for deviation been approved?	Not applicable.

	Assessment/ Observation
Data / Parameter: (as in monitoring plan):	E _{22 kV} : Electricity consumed during the year y (Electricity imported by the project activity from HPSEB grid)
Measuring frequency:	Continuously and hourly monitored.
Reporting frequency:	Monthly
Is measuring and reporting frequency in accordance with the monitoring plan and monitoring methodology? (Yes / No)	Yes
Type of monitoring equipment:	Energy meter of accuracy class 0.5S
Is accuracy of the monitoring equipment equal or more accurate as stated in monitoring plan? If the monitoring plan does not specify the accuracy of the monitoring equipment, does the monitoring equipment represent good monitoring practise?	Accuracy of the energy meter is not mentioned in the registered PD. The energy meter is under the perview of HPSEB and is maintained by HPSEB.
Calibration frequency /interval:	The energy meter is under the perview of HPSEB and is maintained by HPSEB. It has been verified from the letter from HPSEB that the calibration is performed by HPSEB periodically /13/.
Is the calibration interval in line with the monitoring plan of the monitoring plan? If the monitoring plan does not specify the frequency of calibration, does the selected frequency represent good monitoring practise?	The registered PD does not mentioned any calibration interval. The calibration is performed by HPSEB periodically /13/.
Company performing the calibration:	The calibration is performed by HPSEB periodically /13/.
Did calibration confirm proper functioning of monitoring equipment? (Yes / No):	The calibration is performed by HPSEB periodically /13/.
Is (are) calibration(s) valid for the whole reporting period? If the calibration does not cover the whole period please indicated how the project has revised its GHG calculations for the period that calibration was not valid.	The calibration is performed by HPSEB periodically /13/.

If applicable, has the reported data been cross-checked with other available data?	No cross-checking is applicable as per the registered PD.
How were the values in the monitoring report verified?	Monthly HPSEB invoice for the 22 kV line /9/.
Does the data management (from monitoring equipment to emission reduction calculation) ensure correct transfer of data and reporting of emission reductions and are necessary QA/QC processes in place?	Yes.
In case only partial data are available because activity levels or non-activity parameters have not been monitored in accordance with the registered monitoring plan, has the most conservative assumption theoretically possible been applied or has a request for deviation been approved?	Not applicable.

4.2 Accuracy of GHG Emission Reduction or Removal Calculations

DNV confirms that appropriate methods and formulae for calculating baseline emissions, project emissions and leakage have been followed, and the assumptions, emission factors and default values that are applied in the calculation have been justified.

4.2.1: Baseline emission:

Baseline emissions (BE_y in tCO_2) are the product of the baseline emission factor (EF_y in tCO_2/MWh) times the net electricity supplied by the project activity to the grid (EG_y in MWh). As verified from the registered PD, EF_y is emission factor of the NEWNE grid of India, was calculated ex-ante and will not be updated during the crediting period. EF_y of the proposed project in the VCS PD is $0.805 tCO_2/MWh$, which has been verified to be correct based on the availability of grid data.

The net electricity supplied to the grid is determined in the joint meter reading certificate /10/ as the electricity supplied to the grid minus the imported electricity from the grid and line losses @ 0.65% of the total power exported to the grid as per the PPA /17/ due to change in the main meter and check meter location. DNV has verified the net electricity supplied to the grid from the joint meter reading of main meter /10/ in the period 1 January 2013 to 30 June 2013 and cross-checked from the energy invoices /5/. The data verified from the joint meter reading certificate /3/ for the monitoring period is as followed:

Power Exported to grid (MWh)	Less Transmission Losses between Baspa II power house and Jhakri substation as per PPA @ 0.65% (MWh)	Power Export to grid after deducting transmission loss (MWh)	Power Import from grid (MWh)	Net power exported to grid (MWh)
512 465	3 331.02	509 133.98	5.00	509 128.98

The baseline emission for the present monitoring period is $409\,848 tCO_2$.

4.2.2 Project emission

Emission from diesel consumption in the DG sets at the site (PE_{y1})

As aforementioned, the project activity has 2 numbers of DG sets of capacity 625 kVA each. These DG sets are operated in the event of emergency. In line with the registered PD, the diesel consumption by the DG sets are monitored and are accounted for as project emission. The diesel consumption by the DG sets are monitored by the level gauge of the DG tank and recorded in the log book. The total diesel consumption by the DG sets during the monitoring period is 49 029 litres as verified from the diesel log book /6/. The consumption has been further verified from the diesel receipts /6/.

$$PE_{y1} = Q_{\text{diesel}} \times \rho_{\text{diesel}} \times EF_{\text{diesel}} / 1000$$

Where

Q_{diesel} = Quantity of diesel consumed in litre. The diesel consumed during the monitoring period is 49 029 litres.

ρ_{diesel} = Density of diesel of 0.860 kg/ litre; sourced from the registered PD and also verified from the IOCL website /16/.

EF_{diesel} = Emission factor of diesel of 3.186 tCO₂e/ tonne sourced from the registered PD and verified from the IPCC default value /22/.

Thus, the project emission from the diesel consumption in the DG sets is 134.337 tCO₂.

Emissions from 22 KV Transmission line (PE_{y2}):

The project activity is connected to 22 kVA line of HPSEB. The electricity is imported from this 22 kVA line by the project activity for meeting its daily electricity requirements. The amount of electricity import by the project activity from 22 kVA line during the monitoring period is 1 545.6 MWh and the same has been verified from the monthly invoices from HPSEB/9/.

$$PE_{y2} = E_{22 \text{ kV}} \times EF_{\text{grid}} / 1000$$

Where

$E_{22 \text{ kV}}$ = Electricity consumed at the site in kWh (1 545 600 kWh)

EF_{grid} = Combined margin grid emission factor for NEWNE Grid of 0.805 tCO₂/Mwh as fixed ex ante in the registered PD.

Thus, the project emission from the import of electricity from 22 kV line is 1 244.208 tCO₂.

Emissions from SF6 (PE_{y3})

As aforementioned, the project activity have five numbers of SF6 cylinders, with four cylinders of capacity 38.4 kg each and the cylinder of capacity 590 kg. The cylinders need topping of SF₆ if there is any change in the cylinder weight or pressure. As per the monitoring plan, the cylinders are weight every quarter /4/ and the pressure of the cylinders are measured by digital pressure indicator (DPI-705) once a year /15/.

The pressure of the cylinders were measured by digital pressure indicator (DPI-705) on 15 December 2012/15/ and is valid till 14 December 2013. It has been verified from the plant log book that there has been no change in the cylinder weight /4/ or pressure /15/ during the monitoring period. The project activity also has GIS alarm system, connected to SCADA system, for daily monitoring of the SF₆ cylinder pressure /3/. The daily report of the GIS alarm has been verified and it is confirmed that there has been no incident of decrease in pressure of SF₆ cylinders. The weight of the cylinders as measure every quarter, covering the monitoring period, are as follows:

Date	Cylinder 1- Gross weight in kg	Cylinder 2- Gross weight in kg	Cylinder 3- Gross weight in kg	Cylinder 4- Gross weight in kg	Cylinder 5- Gross weight in kg
20 September 2012	1046.2	68.6	67.6	73.6	73.4
19 December 2012	1046.2	68.6	67.6	73.6	73.4
14 March 2013	1046.2	68.6	67.6	73.6	73.4
10 June 2013	1046.2	68.6	67.6	73.6	73.4
9 September 2013	1046.2	68.6	67.6	73.6	73.4

Based on the pressure and weight of the cylinders, it is confirmed that there has been no SF₆ leakage. Thus, the project emission from SF₆ is 0.

Hence, the emission reduction during the monitoring period is 408 467 tCO₂. As outlined above, the input data for calculating the emission reductions /2/, the calculating process and the result are complete and transparent. Therefore, DNV is able to confirm the accuracy of the emission reductions.

4.3 Quality of Evidence to Determine GHG Emission Reductions or Removals

DNV confirms that a complete set of data for this monitoring period was available to be verified and was in accordance with the approved monitoring plan /1/.

All necessary documentation were collected, referenced and aggregated and were easily accessible in hard-copy and electronic format. Measurements are performed by calibrated equipment, and the key data were cross-checked via other sources (invoices). Weight and pressure of the SF₆ cylinders are regularly monitored as per the monitoring plan. No assumptions are used that have any material influence on reported emission reductions.

4.4 Management and Operational System

The organizational structure includes on-site shift-in-charge involved in the day – to day operations of the plant. Site supervisors are responsible for checking the reliability of data and also monthly report preparation. The Staff- technical and officers, involved in day to day operation of the power plant has adequate experience and all the essential equipment are operating smoothly. All the collected data are reviewed by the senior management at the site and also by the top management at Head Office.

5 VERIFICATION CONCLUSION

DNV Climate Change Services AS (DNV) has performed the verification of the emission reductions that have been reported for the VCS project “300MW Hydropower project by JHPL” (VCS Registration No. 92) for the period 1 January 2013 to 30 June 2013.

The project participants are responsible for the collection of data in accordance with the monitoring plan and the reporting of GHG emissions reductions from the project.

It is DNV's responsibility to express an independent verification statement on the reported GHG emission reductions from the project. DNV does not express any opinion on the selected baseline scenario or on the validated and registered VCS PD /23/.

DNV conducted the verification on the basis of the approved methodology ACM0002 (version 08) /21/, the monitoring plan contained in the registered VCS PD of 25 December 2008 and the monitoring report (version 1.1) dated 24 September 2013 . The verification included i) checking whether the provisions of the monitoring methodology and the monitoring plan were consistently and appropriately applied and ii) the collection of evidence supporting the reported data.

DNV's verification approach draws on an understanding of the risks associated with reporting of GHG emission data and the controls in place to mitigate these. DNV planned and performed the verification by obtaining evidence and other information and explanations that DNV considers necessary to give reasonable assurance that reported GHG emission reductions are fairly stated.

In our opinion the GHG emissions reductions of the “300MW Hydropower project by JHPL” (VCS Project ID No. 92) for the period 1 January 2013 to 30 June 2013 are fairly stated in the monitoring report (version 1.1) dated 24 September 2013 .

The GHG emission reductions were calculated correctly on the basis of the approved methodology ACM0002 (version 08) and the monitoring plan contained in the registered VCS PD of 25 December 2008.

DNV Climate Change Services AS is able to certify that the emission reductions from the “300MW Hydropower project by JHPL” during the period 1 January 2013 to 30 June 2013 amount to 408 467 tonnes of CO₂ equivalent, detailed as below.

Reporting period: 1 January 2013 to 30 June 2013

Verified GHG emission reductions or removals in the above reporting period:

GHG Emission Reductions or Removals	tCO ₂ e
Baseline Emissions	409 848.83
Project Emissions	1 378.545
Leakage	0
Net GHG emission reductions or removals	408 467

DNV does not assume any responsibility towards the issuance and utilization of the VCU's hereby verified and certified. Request for issuance of VCU's shall be made by the project proponent to an approved VCS

Program Registry based on the requirements set out under the most recent version of the VCS Program Guidelines clause on VCS Registration.

The verification of reported emission reductions is based on the information made available to DNV and the engagement conditions detailed in this report. DNV cannot be held liable by any party for decisions made or not made based on this report.



Sharmistha Shome

Verifier

DNV Bangalore, India



Michael Lehmann

Director of Services and Technologies

DNV Climate Change Services AS

6 REFERENCES

Documents provided by the Project Participants that relate directly to the GHG components of the project. These have been used as direct sources of evidence for the periodic verification conclusions, and are usually further checked through interviews with key personnel.

/1/	Jaiprakesh Power Venture Limited: Monitoring report of “300MW Hydropower project by JHPL”, version 1, dated 29 August 2013 and version 1.1, dated 24 September 2013			
/2/	Jaiprakesh Power Venture Limited: Emission reduction excel sheet, version 1, dated 29 August 2013 and version 1.1, dated 24 September 2013			
/3/	Jaiprakesh Power Venture Limited: Daily GIS alarm monitoring report of SF ₆ gas pressure covering the monitoring period 1 January 2013 to 30 June 2013.			
/4/	Jaiprakesh Power Venture Limited: Plant log book of weighing of SF ₆ cylinders every quarter covering the monitoring period 1 January 2013 to 30 June 2013.			
/5/	Jaiprakesh Power Venture Limited: Monthly electricity invoice to HPSEB covering the monitoring period 1 January 2013 to 30 June 2013.			
/6/	Jaiprakesh Power Venture Limited: Monthly diesel consumption report and the diesel receipts covering the monitoring period 1 January 2013 to 30 June 2013			
/7/	Power Grid Corporation of India Limited: Calibration certificates of the energy meters: Line 1:			
	Meter number	Calibration date	Calibration validity	
	HPU 02547 (main meter; replaced by UPU 01237)	19 January 2012	18 January 2013	
	UPU 01237 (main meter)	19 January 2013	18 January 2014	
	HPU 02548 (check meter; replaced by UPU 01235)	19 January 2012	18 January 2013	
	UPU 01235 (check meter)	19 January 2013	18 January 2014	
	Line 2:			
	Meter number	Calibration date	Calibration validity	
	HPU 02549 (main meter; replaced by UPU 01238)	19 January 2012	18 January 2013	
	UPU 01238 (main meter)	19 January 2013	18 January 2014	
	HPU 02550 (check meter; replaced by UPU 01236)	19 January 2012	18 January 2013	
	UPU 01236 (check meter)	19 January 2013	18 January 2014	
	/8/	HPSEB: Certificate of change of energy main and check meters, dated 22 January 2013.		
	/9/	HPSEB: Electricity bills for the 22 kV line covering the monitoring period 1 January 2013 to 30 June 2013.		
	/10/	HPSEB: Joint meter reading for the project activity covering the monitoring period 1 January 2013 to 30 June 2013.		

/11/	Metrological Department of India, Himachal Pradesh (Government of India): Calibration certificate of the electronic balance:	
	Date of calibration	Calibration Validity
	21 August 2012	20 August 2013
/12/	Quick Logic Controls and Calibration: Calibration certificate of the digital pressure indicator (DPI-705):	
	Date of Calibration	Calibration Validity
	5 September 2012	4 September 2013
/13/	HPSEB: Letter to Jaiprakesh Power Venture Limited confirming on the periodic calibration of the energy meter of the 22 kV line import meter by HPSEB, dated 4 May 2010.	
/14/	Jaiprakesh Power Venture Limited: Plant outage report covering the monitoring period 1 January 2013 to 30 June 2013.	
/15/	Jaiprakesh Power Venture Limited: Log book of the pressure of the SF ₆ cylinder recorded once a year. Latest on 15 December 2012.	
/16/	IOCL: Density of diesel- http://www.iocl.com/Products/DieselSpecifications.pdf	
/17/	Power purchase agreement with HPSEB, dated 28 February 2003.	

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

/18/	VCS: Programme guide, version 3.4
/19/	BVQI: Validation report and previous verification reports https://vcsprojectdatabase2.apx.com/myModule/Interactive.asp?Tab=Projects&a=2&i=92&lat=31%2E833333&lon=78%2E283333&bp=1
/20/	VCS Standard, version 3.3
/21/	CDM Executive Board: <i>Baseline and monitoring methodology</i> ACM0002, version 08
/22/	IPCC default value: 2006 IPCC guidelines for National GHG Inventories - Table 1.2 for NCV value of diesel, and Table 1.4 for carbon oxidation factor and default carbon content for diesel
/23/	Jaiprakesh Power Venture Limited: VCS registered PD, dated 25 December 2008

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

- /24/ Mr. K. Srinivasan - Jaiprakesh Power Venture Limited
- /25/ Mr. V. C. Gupta - Jaiprakesh Power Venture Limited
- /26/ Mr. S. K. Jha - Jaiprakesh Power Venture Limited
- /27/ Mr. Ravi Kumar Gupta - Jaiprakesh Power Venture Limited
- /28/ Mr. Amit Gupta - Emergent Venture (India) Limited

APPENDIX A

CORRECTIVE ACTION REQUESTS, CLARIFICATION REQUESTS AND FORWARD ACTION REQUESTS

Corrective action requests

CAR ID	Corrective action request	Response by Project Participants	DNV's assessment of response by Project Participants
CAR 1	The impact of the change in the metering location has not been explained in the monitoring report.	The location of the main and check energy meters have been shifted from Jhakri substation to powerhouse of the project activity from 12/05/2011 onwards. In the calculation of the baseline emissions, 0.65% transmission loss is being considered by the state electricity utility (HPSEB) as the location of the energy meters is changed from the substation of the HPSEB to power house of the project activity. Hence, the net energy supplied to the grid has been considered after deduction of the 0.65% transmission losses which is conservative and in accordance with the current practice being followed in the project activity after the change in the locations of the energy meters as per PPA.	The monitoring report has been adequately revised to include the impact of change in the location of the main and check meters. In line with the PPA, a transmission loss @0.65% of the electricity exported has been considered. OK. CAR 1 is closed.

Clarification requests

CL ID	Clarification request	Response by Project Participants	DNV's assessment of response by Project Participants
CL 1	Clarification is sort for the reason for reduction of export by 0.2% and increase in import by 0.2% as a correction factor.	Since there is no delay reported in calibration of energy meters so the error is not applicable and hence removed. All applicable corrections are incorporated in revised MR.	It has been verified from the calibration certificates that there is no gap in the calibration. The monitoring report and excel sheet has been adequately revised to remove 0.2% factor. OK. CL 1 is closed.
CL 2	The shut down and maintenance details are not provided in the MR	The shut down and maintenance details are now incorporated in revised MR.	The monitoring report is revised to include the shutdown details of the project plant during the monitoring period. The same has been verified from the plant outage report. OK. CL 2 is closed

Forward action requests from previous verification

FAR ID	Forward action request	Summary of how FAR has been addressed in this reporting period	Assessment of how FAR has been addressed
FAR 1	Not applicable	Not applicable	Not applicable

Forward action requests from this verification

FAR ID	Forward action request	Response by Project Participants	DNV’s assessment of response by Project Participants
FAR 1	Not applicable	Not applicable	Not applicable

APPENDIX C

CURRICULA VITAE OF THE VERIFICATION TEAM MEMBERS

Sharmistha Shome, DNV Bangalore, India holds a Master's Degree in Energy Systems. Her educational qualification covers the fields of sustainable development, power plant technology, renewable energy technology, performance of thermal & electrical utilities and project financing.

She has experience in validation and verification of several CDM projects/JI and other 3rd party validation/verification services.

She has completed the ISO14001 EMS and ISO 50001 EnMS Lead Auditor course. Her qualification and experience in CDM demonstrate her sufficient sectoral competence in renewable energy sector (TA 1.2).

Kakaraparthi Venkata Raman holds a bachelor degree in Chemical Engineering (B.Tech) and a Diploma in Management. He has an overall experience of 18 years in the Chemical Process Industry - Fertilisers and Chemicals industry (FACT). His main areas of work include a) Technical Services (for Ammonia, Urea, Co-generation thermal power plants (captive), and complex fertilizers plants) for 10 years b) Erection, commissioning and hands-on operation of state of art HTAS 900 TPD Ammonia plant c) Management and operation of Sulphuric acid plant as Plant Manager and d) assisting Management of production unit (General Manager) in management Information System operation and planning of Production & Operations. As a part of the Technical services team, involved in the conduction of technical energy audits of plants and in HAZOP studies (under guidance of EIL).

While in FACT has completed the ISO14001 EMS LA course. Implemented the Environmental Management Systems in the production unit and conducted internal audits.

Experience prior to joining Fertiliser industry includes six months experimental work on charcoal manufacture in Karnataka Regional Engineering college.

Joined DNV in November 2005 as Auditor. Till date has experience of around 7.5 years in validation and verification of CDM/JI projects. For the last five to four years, holding the responsibility of Sernor Manager (Technical) / (Operations), in addition to working on projects as either Team Leader or Technical Reviewer. As per the UNFCCC competency requirements, the industrial experience and project experience in CDM demonstrate sufficient sectoral competence in areas of (a) 1.1 Thermal energy generation from fossil fuels and Biomass as well as thermal electricity from solar (b) 1.2 Energy Generation from renewable energy sources (c) 5.1/4.13/11.1/12.1 Chemical Processes Industries and (d) 13.1 Waste handling and disposal.