



VERIFICATION / CERTIFICATION REPORT

HAPUGASTENNE AND HULU GANGA SMALL HYDROPOWER PROJECTS IN SRI LANKA

Verification Period:
1 January 2003 – 31 December 2005

REPORT No. 2006-9001/1
REVISION No. 03

DET NORSKE VERITAS



VERIFICATION / CERTIFICATION REPORT

Date of first issue: 2006-03-15	Project No.: 61269001/1
Approved by: Einar Telnes Director	Organisational unit: DNV Certification, International Climate Change Services
Client: International Resources Group	Client ref.: Mr. Matthew Mendis

DET NORSKE VERITAS AS

DNV Certification

Veritasveien 1,
1322 HØVIK, Norway
Tel: +47 67 57 99 00
Fax: +47 67 57 99 11
http://www.dnv.com
Org. No: NO 945 748 931 MVA

Summary:

Det Norske Veritas Certification Ltd. (DNV) has performed the first verification of the emission reductions of the “*Hapugastenne and Hulu Ganga Small Hydropower Projects*” in Sri Lanka (Registration Ref No. 0085) for the period 1 January 2003 to 31 December 2005.

In our opinion, the GHG emission reductions reported for the project in the monitoring report of 9 November 2006 are correctly stated. The GHG emission reductions were calculated correctly on the basis of the approved monitoring methodology AMS-I.D and the monitoring plan and formulae given in the Project Design Document of the “*Hapugastenne and Hulu Ganga Small Hydropower Projects*”. Modifications have been applied for the data from the Hapugastenne II unit, as discrepancies were found in the reported data for this unit.

Det Norske Veritas Certification Ltd. is able to certify that the emission reductions from the “*Hapugastenne and Hulu Ganga Small Hydropower Projects*” during the period 1 January 2003 to 31 December 2005 amount to 105 902 tonnes of CO₂ equivalent.

Report No.: 2006-9001/1		Subject Group: Environment	
Report title: Hapugastenne and Hulu Ganga Small Hydropower Projects in Sri Lanka			
Work carried out by: Santhosh Jayaram, Einar Telnes			
Work verified by: Michael Lehmann			
Date of this revision: 2006-11-27	Rev. No.: 03	Number of pages: 8	

Indexing terms	
Key words Climate Change Kyoto Protocol Verification Clean Development Mechanism	Service Area Verification
	Market Sector
	Energy Sector
<div><input checked="" type="checkbox"/> No distribution without permission from the client or responsible organisational unit</div> <div><input type="checkbox"/> free distribution within DNV after 3 years</div> <div><input type="checkbox"/> Strictly confidential</div> <div><input type="checkbox"/> Unrestricted distribution</div>	

© 2002 Det Norske Veritas AS

All rights reserved. This publication or parts thereof may not be reproduced or transmitted in any form or by any means, including photocopying or recording, without the prior written consent of Det Norske Veritas AS.



<i>Table of Content</i>	<i>Page</i>
1 INTRODUCTION	1
1.1 Objective	1
1.2 Scope	1
1.3 GHG Project Description	1
2 METHODOLOGY	3
3 INITIAL VERIFICATION FINDINGS	4
3.1 Remaining issues, CARs, FARs from previous validation	4
3.2 Project Implementation	4
3.2.1 Discussion	4
3.2.2 Findings	4
3.2.3 Conclusion	5
3.3 Evidence Provided for Reported Electricity Generation	5
3.3.1 Discussion	5
3.3.2 Findings	5
3.3.3 Conclusion	5
3.4 External Data	5
3.5 Environmental and Social Indicators	5
3.5.1 Discussion	5
3.5.2 Findings	6
3.5.3 Conclusion	6
3.6 Management and Operational System	6
3.6.1 Discussion	6
4 VERIFICATION STATEMENT	7
5 REFERENCES	8

***Abbreviations***

CAR	Corrective Action Request
CDM	Clean Development Mechanism
CEA	Central Environmental Authority
CEB	Ceylon Electricity Board
CEF	Carbon Emission Factor
CER	Certified Emission Reduction(s)
CH ₄	Methane
CO ₂	Carbon dioxide
CO _{2e}	Carbon dioxide equivalent
DNV	Det Norske Veritas
DNA	Designated National Authority
EPL	Eco Power (Private) Limited
ERU	Emission Reduction Units(s)
FAR	Forward Action Request
GHG	Greenhouse gas(es)
IPCC	Intergovernmental Panel on Climate Change
IRG	International Resources Group
MP	Monitoring Plan
MVP	Monitoring and Verification Plan
N ₂ O	Nitrous oxide
NGO	Non-governmental Organisation
ODA	Official Development Assistance
PDD	Project Design Document
UNFCCC	United Nations Framework Convention for Climate Change
GWP	Global Warming Potential



1 INTRODUCTION

The International Resources Group has commissioned Det Norske Veritas Certification Ltd. (DNV) to carry out the first verification and certification of emission reductions reported by the “Hapugastenne and Hulu Ganga Small Hydropower Projects” in Sri Lanka (the project) (Registration Ref No. 0085) for the period 1 January 2003 to 31 December 2005. This report contains the findings from the first verification and a certification statement for the certified emission reductions.

The verification team consists of the following personnel:

Mr Santhosh Jayaram	DNV Colombo, Sri Lanka	Team Leader, GHG auditor
Mr Einar Telnes	DNV Oslo, Norway	Sector expert
Mr Michael Lehmann	DNV Oslo, Norway	Technical reviewer

1.1 Objective

Verification is the periodic independent review and *ex post* determination by the Designated Operational Entity (DOE) of the monitored reductions in GHG emissions that have occurred as a result of the a registered CDM project activity during a defined verification period.

Certification is the written assurance by a DOE that a project activity achieved the emission reductions as verified during a defined time period.

1.2 Scope

The verification scope 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 high level of assurance about whether the reported GHG emission reduction data is free from material misstatement,
- to verify that the reported GHG emission data is sufficiently supported by evidence.

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

The validation team has, based on the recommendations in the Validation and Verification Manual /7/, employed a risk-based approach, focusing on the identification of significant reporting risks and verifying the mitigation measures for these.

1.3 GHG Project Description

Project Parties:	Sri Lanka and the Netherlands
Title of project activity:	Hapugastenne and Hulu Ganga Small Hydropower Projects
CDM registration no:	0085



Project Participants: Eco Power (Private) Limited (EPL) of Sri Lanka, IFC-Netherlands Carbon Facility (INCaF).

Location of the project activity: Sri Lanka

Project's crediting period: 1 January 2003 to 31 December 2013

Reporting period: 1 January 2003 to 31 December 2005

The project is a bundle of four small-scale, run-of-river hydro power plants in Sri Lanka. The four projects are Hapugastenne Phase 1 and 2 and Hulu Ganga Phase 1 and 2. The Hapugastenne Phase 1 and 2 projects are located at the Sabaragamuwa province, Ratnapura district and the Hulu Ganga Phase 1 and 2 are located at the Central province, Kandy district. Electricity generated is supplied to the national grid through Ceylon Electricity Board (CEB).

Hapugastenne Phase 1 consists of 2 Pelton turbines of rated capacities 2526 kW each and Phase 2 comprises of a single Pelton turbine of rated capacity 2526 kW. Hulu Ganga Phase 1 consists of 2 Francis turbines of rated capacity 1500 kW each. Hulu Ganga Phase 2 is still under construction. It is expected to have similar capacity of Phase 1.

The project's emission reductions are determined by multiplying the amount of net electricity generated by the project with a validated *ex-ante* fixed grid emission coefficient of 0.8496 tCO₂ per MWh. According to the validated project design, there are no project emissions and leakage effects associated with the project.

Following a request for review by the CDM Executive Board on the request for issuance of emissions reductions from the project, DNV requested an update of the monitoring report.

The following table summarises the emission reduction from the project during the period 1 January 2003 to 31 December 2005:

Project	Electricity Output (kWh)	Emission Reduction (tCO ₂)
Hapugastenne Phase 1	56 130 860	47 689
Hapugastenne Phase 2	51 399 393	43 669
Hulu Ganga Phase 1	17 119 350	14 544
Hulu Ganga Phase 2	0	0
TOTAL	124 649 603	105 902



2 METHODOLOGY

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

- i) Review of project documentation.
- ii) The reported net electricity supplied by the project to ENEC which is multiplied with a fixed grid emission coefficient of 0.8496 tCO₂ per MWh and
- iii) The actual installed capacity of the hydropower plant to ensure the project's eligibility as type I small-scale CDM project activity.

Findings established during the initial verification can either be seen as a non-fulfilment of criteria ensuring the proper implementation of a project or where a risk to deliver high quality emission reductions is identified. Corrective action requests (CAR) are issued, where:

- i) there is a clear deviation concerning the implementation of the project as defined by the PDD;
- ii) requirements set by the MP or qualifications in a validation opinion have not been met; or
- iii) there is a risk that the project would not be able to deliver (high quality) CERs.

Forward action requests (FAR) are issued, where:

- i) the actual status requires a special focus on this item for the next consecutive verification, or
- ii) an adjustment of the MP is recommended.

The verification team may also use the term "clarification request", which would be where:

- i) additional information is needed to fully clarify an issue.

The project's monitoring report of 1 February 2006 for the period 1 January 2003 to 31 December 2005 /1/ and the electricity generation invoices verified and certified by CEB /3/ were reviewed as a part of the verification. In addition the project's Project Design Document (PDD) /4/, in particular the monitoring plan contained in the PDD, and the project's completed validation protocol was reviewed /5/.

On 9th and 10th March 2006, DNV carried out a site visit at the Hapugastenne Phase 1 and 2 and Hulu Ganga Phase 1 projects. The Hulu Ganga Phase 2 was not included in the site visit, since the project is still under construction and is not included in the emission reduction calculations.

In this site visit, DNV verified that the actual implementation of the project was as described in the PDD. This included in particular the verification of the actual nameplate capacities of the hydropower plants in order to ensure the project's eligibility as type I small-scale CDM project activity.

Following the request for review and request for information caused by the review itself, the monitoring report was updated to reflect the lowest of internal generation numbers for the



Hapugastenne II unit and the number invoiced to CEB. The calibration data for the CEB meters were also reconfirmed.

3 INITIAL VERIFICATION FINDINGS

The initial validation identified one corrective action request and one forward action request.

The identified corrective action request is pertaining to calibration of monitoring equipment. The proof of calibration of the monitoring equipment was not evidenced. This corrective action request was closed after the test reports were submitted for verification and reviewed /6/.

The forward action request is related to monitoring of environmental parameters, as the project approval given by Central Environmental Authority (CEA) requires monitoring of various environmental parameters, but the same is not part of the monitoring plan. It is agreed by the project participants to include the same in the subsequent monitoring reports.

3.1 Remaining issues, CARs, FARs from previous validation

No open issues identified in the validation report.

3.2 Project Implementation

3.2.1 Discussion

The project commissioning dates are as given below:

Hapugastenne Phase 1 – 14 August 2001

Hapugastenne Phase 2 – 9 September 2002

Hulu Ganga Phase 1 – 3 June 2003

Although the project parts started functioning at different periods, 1 January 2003 is considered as start date for crediting in order to meet the requirement of single crediting period.

3.2.2 Findings

The actual/anticipated operational date for Hulu Ganga Phase 2 project in PDD was given as January 2006, but this part of the project is still under construction.

As per the letter issued by CEB, the Hulu Ganga Phase 1 power plant became formally recognised as being connected to the grid from 3 June 2003. However, electricity was already delivered to the grid in May 2003 during the trial phase and the monitoring report includes emission reduction through electricity exported from May 2003. It was verified that the invoices claiming the electricity generation during May 2003 is certified by officials of CEB.

During the on-site visit DNV identified that the actual nameplate capacities of the turbines for Hapugastenne phase 1 and 2 were slightly higher than stated in the PDD, i.e. 2526 kW instead of 2400 kW.

Although the PDD indicates that the meters will be tested and calibrated annually, no calibration records were provided for evidencing this during the site visit. The meters were tested later and the test reports were submitted /6/. The calibration and accuracy of these meters was again confirmed as a consequence of the review by the CDM Executive Board.



3.2.3 Conclusion

Considering the capacity of the Hulu Ganga Phase 2 will be 3MW, the project's total capacity will be less than 15 MW and the project thus remains eligible as type I small-scale CDM project activity.

3.3 Evidence Provided for Reported Electricity Generation

3.3.1 Discussion

The electricity invoices from the CEB were used to verify the emission reduction. As an off-taker of the electricity, CEB has its own calibrated meters which determine the amount of electricity sold to them. This thus represents a reliable third party acceptance of the amount of electricity sold to them. In addition, the daily reported generation for some months were used to crosscheck the aggregated monthly generation.

3.3.2 Findings

Following a request for review by the CDM Executive Board on the request for issuance of emissions reductions from the project, DNV requested more details about the difference between the reported data based on CEB invoices and the apparent generation for the Hapugastenne II unit. The assessment of the reported electricity generation of this unit against the theoretical generation revealed that the reported electricity generation exceeds the theoretical output at Hapugastenne II unit in August 2004 (for all other months the load factor, if based on the potential for generation, is below 92% or below 101%, if the rated capacity is used for load factor determination). The further investigation of this showed that there was a dispute between the project operator and the CEB about invoiced electricity for August 2004.

As such, when comparing invoices to CEB with internal generation data DNV could not establish that CEB invoices for Hapugastenne II could be deemed as reliable information for determining emission reductions. Hence, DNV requested an update of the monitoring report.

3.3.3 Conclusion

The revised monitoring report compares the monthly amount stated in the CEB invoice data with the amount determined based on internal generation data for the Hapugastenne II unit. The lower amount for each months was used as basis for emission reduction calculations for the Hapugastenne II unit.

3.4 External Data

No external data are required for the calculation of emission reductions.

3.5 Environmental and Social Indicators

3.5.1 Discussion

The monitoring report includes monitoring of number of people employed and contribution to local development projects.



3.5.2 Findings

The project approval given by CEA requires monitoring of various environmental parameters, but the same is not part of the monitoring plan. It is agreed by the project participants to include the same in the subsequent monitoring reports.

3.5.3 Conclusion

The social indicators presented as part of the monitoring report was verified.

3.6 Management and Operational System

3.6.1 Discussion

Monitoring and reporting of electricity generation is part of normal operations for the power plant. The site operators are trained on the job for operating the equipment. There is no formal internal audits and management review, but the CEO of EPL reviews the project performance at least once in a month.



4 VERIFICATION STATEMENT

Det Norske Veritas Certification Ltd. (DNV) has performed the first verification of the emission reductions of the “Hapugastenne and Hulu Ganga Small Hydropower Projects” in Sri Lanka (Registration Ref No. 0085) for the period 1 January 2003 to 31 December 2005.

In our opinion, the GHG emission reductions reported for the project in the monitoring report of 9 November 2006 are correctly stated.

The GHG emission reductions were calculated correctly on the basis of the approved monitoring methodology AMS-I.D and the monitoring plan and formulae given in the Project Design Document of the “Hapugastenne and Hulu Ganga Small Hydropower Projects”.

Det Norske Veritas Certification Ltd. is able to certify that the emission reductions from the “Hapugastenne and Hulu Ganga Small Hydropower Projects” during the period 1 January 2003 to 31 December 2005 amount to 105 902 tonnes of CO₂ equivalent.



5 REFERENCES

Category 1 Documents:

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 initial verification conclusions, and are usually further checked through interviews with key personnel.

- /1/ Eco Power (Private) Limited (EPL): *Monitoring Report – Hulu Ganga and Hapugastenne PDD*, Dt. Feb 1 2006, for the period 1 January 2003 to 31 December 2005
- /2/ Eco Power (Private) Limited (EPL): *Monitoring Report – Hulu Ganga and Hapugastenne PDD*, Dt. Nov 9 2006, for the period 1 January 2003 to 31 December 2005
- /3/ Eco Power (Private) Limited (EPL): Invoices raised for electricity generated for each month for each project, verified and certified by Ceylon Electricity Board (CEB).
- /4/ Project Design Document of the *Hapugastenne and Hulu Ganga Small Hydropower Projects*.
- /5/ SGS: *Annex 4 Validation Protocol UK.AU4 CDM.VAL0023 HH*, Project No. CDM.VAL0023.
- /6/ Ceylon Electricity Board (CEB): *HV meter test reports*, Dt. June 13 2006.

Category 2 Documents:

Background documents related to the design and/or methodologies employed in the design or other reference documents. Where applicable, Category 2 documents have been used to cross-check project assumptions and confirm the validity of information given in the Category 1 documents and in verification interviews.

- /7/ International Emission Trading Association (IETA) & the World Bank's Prototype Carbon Fund (PCF): *Validation and Verification Manual*. <http://www.vvmanual.info>
- /8/ Appendix B of the simplified modalities and procedures for small-scale CDM project activities: *Indicative simplified baseline and monitoring methodologies for selected small-scale CDM project activity categories*. Version 06: 20 September 2005.

Persons interviewed:

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

- /8/ Dr. Romesh Dias Bandarnaike, Chief Executive Officer, Eco Power (Private) Limited.