VERIFICATION REPORT

SREDEN ISKAR CASCADE HPP PORTFOLIO PROJECT IN BULGARIA

(ITL Project ID: BG2000012/reference number 0063)

Monitoring Period:
1 January 2011 to 31 December 2011

REPORT NO. 2012-9122

REVISION NO. 01

DET NORSKE VERITAS

VERIFICATION REPORT

Date of first issue: 2012-02-03	Project No.: PRJC-361147-2012-CCS-CZE
Approved by: Ole A. Flagstad	Organisational unit: DNV KEMA Energy & Sustainability, Accredited Climate Change Services
Client: Vez Svoghe OOD	Client ref.: Patick Pauletto

DNV CLIMATE CHANGE SERVICES AS

Veritasveien 1,
1322 HØVIK, Norway
Tel: +47 67 57 99 00
Fax: +47 67 57 99 11
http://www.dnv.com
Org. No: 994 774 352 MVA

Summary:

DNV Climate Change Services AS (DNV) has performed the verification of the emission reductions reported for the "Sreden Iskar Cascade HPP Portfolio Project in Bulgaria" (ITL Project ID BG2000012/reference number 0063) for the period 1 January 2011 to 31 December 2011.

In our opinion, the GHG emission reductions reported for the project in the monitoring report (Version 01) of 20 January 2012 are fairly stated.

The GHG emission reductions were calculated correctly on the basis of the approved CDM monitoring methodology ACM0002 (version 07) and the monitoring plan contained in the Project Design Document of 15 October 2007.

DNV Climate Change AS is able to verify that the emission reductions from the "Sreden Iskar Cascade HPP Portfolio Project in Bulgaria" during the period 1 January 2011 to 31 December 2011 amount to 22 562 tonnes of CO_2 equivalent.

Report No.: 2012-9122	Subject Group: Environment	
Report title: Sreden Iskar Cascade HPP Portfolio Project in Bulgaria		
Work carried out by: Zuzana Andrtová		
Work verified by: Agnes Dudek		
Date of this revision: 7 August 2012	Rev. No.: 01	Number of pages: 18

Indexing terms

Key words Climate Change Kyoto Protocol Validation Clean Development Mechanism	Service Area Verification Market Sector Process Industry

☒ No distribution without permission from the client or responsible organisational unit

☐ free distribution within DNV after 3 years

☐ Strictly confidential

☐ Unrestricted distribution

Table of Content *Page*

Abbreviations

AIE	Accredited Independent Entity
CAR	Corrective Action Request
CEF	Carbon Emission Factor
CL	Clarification Request
CO_2	Carbon dioxide
CO_{2e}	Carbon dioxide equivalent
DNV	Det Norske Veritas
DNA	Designated National Authority
ERU	Emission Reduction Units(s)
FAR	Forward Action Request
GHG	Greenhouse gas(es)
HPP	Hydro Power Plant
IPCC	Intergovernmental Panel on Climate Change
JI	Joint Implementation
MP	Monitoring Plan
MoEW	Ministry of Environment and Water
MVP	Monitoring and Verification Plan
NGO	Non-governmental Organisation
NEK	National Elektricheska Kompania (National Electricity Company)
ODA	Official Development Assistance
PPA	Power Purchase Agreement

1 INTRODUCTION

Vez Svoghe OOD has commissioned DNV Climate Change Services AS (DNV) to carry out the verification of the emission reductions reported for the "Sreden Iskar Cascade HPP Portfolio Project in Bulgaria" (the project) in the period 1 January 2011 to 31 December 2011. This report contains the findings from the verification and a verification statement for the certified emission reductions.

1.1 Objective

Verification is the periodic independent review and *ex post* determination by an Accredited Independent Entity (AIE) of the monitored reductions in GHG emissions that have occurred as a result of a Joint Implementation (JI) project activity during a defined monitoring period.

The objective of this verification was to verify the emission reductions reported for the "Sreden Iskar Cascade HPP Portfolio Project in Bulgaria" for the period 1 January 2011 to 31 December 2011.

DNV is an Independent Entity accredited by the Joint Implementation Supervisory Committee (JISC) for all sectoral scopes.

1.2 Scope

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 emission reduction data is free from material misstatement.
- To verify that 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.

1.3 Description of the Project Activity

Project Parties:	*Bulgaria (Host) and Netherlands (Sponsor Party)*
Title of project activity:	*Sreden Iskar Cascade HPP Portfolio Project in Bulgaria*
ITL Project ID:	BG2000012/reference number 0063
CDM baseline and monitoring methodology	*ACM0002 (version 07)*
Project Entity:	*Vez Svoghe OOD, Porsche Center, Christopher Columbus Blvd, 4, 1000 Sofia, Bulgaria and EBRD, One Exchange Square London EC2A 2JN, United Kingdom*

Location of the project activity: *Individual planned stages are placed on the river Iskar near Sofia, Bulgaria*

Project's crediting period: *1 January 2008 to 31 December 2012*

Period verified in this verification: *1 January 2011 to 31 December 2011*

The project involves the installation and commissioning of 9 small run-of-the-river hydro power plants on the river Iskar near the town of Sofia in Bulgaria. The total installed capacity of the project is 25.65 MW. The project is expected to generate 415.5 GWh of electricity over the entire crediting period starting from 1 January 2008 and extending to 31 December 2012 and it is estimated that the expected reduction is on average 74 194 tCO_2 emissions per year by displacing electricity produced by existing and upcoming fossil fuel fired power plants connected to the electrical grid.

Construction of the first two HPPs started in July 2006. The first HPP (Lakatnik) was commissioned on 2 July 2008 /12/ and the second HPP (Svhrazen) was commissioned in May 2009 /13/. The Tzerovo power plant is under testing now and final testing is planned in first of week in March according to Plant manager. The next two power plants (Opletnia and Prokopanik) are under construction /22//23/. The statuses of plants under construction were confirmed during the site visit. The scheduled sequence in the PDD has been changed and the same is presented in the table below:

Phase	HPP	Starting date of the operation	Planned starting date of operation in the PDD /1/
I.	Lakatnik	July 2008	January 2008
	Svrazhen	May 2009	January 2008
II.	Tzerovo	under testing – final testing should be in April 2012	July 2011
	Opletnia	under construction – should be finish in 2012	April 2010
	Prokopanik	under construction – should be finish in 2012	July 2011
III.	Gavrovnitsa	Commissioning is planned in 2015	April 2010
	Levitshe	Commissioning is planned in 2015	April 2010
	Bov-Sud	Commissioning is planned in 2015	July 2011
	Bov-Nord	Commissioning is planned in 2015	July 2011

1.4 Methodology for Determining Emission Reductions

The emission reductions are calculated as the difference between baseline emissions and project emissions and leakages. The baseline emissions are calculated as the product of the net electricity generation supplied to the Bulgarian grid and the emission factor for Bulgarian grid established by Ministry of Environment and Water of Bulgaria (MoEW). Hereinto, project emissions and leakages for the project are considered to be zero as per the methodology ACM0002 /32/.

The emission factor was calculated *ex-ante* by NEK for the Bulgarian government and it was supposed in the registered PDD that the emission factor will be annually ex-post renewed by MoEW of Bulgaria. Bulgarian MoEW has not renewed the emission factor yet and MoEW confirmed the validity of the old calculation and its applicability for this monitoring period /16/. Thus the values presented in Baseline Carbon Emission Factor of Bulgarian Electricity and Heat Power System (NEK "Study") /17/ are still valid for this project.

The delivered electricity of the project is monitored continuously for each plant and sum of delivered amounts is total value of delivered electricity to the grid.

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) Records related to measuring quantity of delivered electricity to grid /18//19/;

ii) Emission factor issued by NEK (0.884 tCO_2/MWh for 2011) /16//17/;

iii) Calculation of the baseline emissions based on the determined and validated baseline emission factor /3/;

iv) Records on validation and/or calibration of the used measuring equipment, and calculation software /5//6//20/

Verification team

				Type of involvement					
Role	***Last Name***	***First Name***	***Country***	Desk review	Site visit / Interviews	Reporting	Supervision of work	Technical review	TA1.2 competence
Team leader (Verifier)	Andrtová	Zuzana	Czech Republic	✓	✓	✓	✓		✓
Technical reviewer	Dudek	Agnes	Norway					✓	✓

Duration of verification

Preparations: *27 January 2012*

On-site verification: *1 and 2 January 2012*

Reporting, calculation checks and QA/QC*: From 3 February 2012 to 7 August 2012*

2.1 Review of Documentation

The monitoring report /3/ version 1 dated 20 January 2012 was the main document for review during the desk review. This report /3/ included all invoices from HPPs Lakatnik and

Svrazhen as well as audit reports from 10 May 2011 and 16 December 2011, and a confirmation e-mail dated 21 December 2011 /16/ from Kiril Bankov (junior expert of Climate Change Directorate of MoEW) regarding the applicability of the emission factor of the Bulgarian Electricity Power System for the year 2011 and the "NEK Study" /17/ for this monitoring period.

Supporting documents that were checked included the project PDD /1/ dated 15 October 2007, monitoring procedures of Vez Svoghe for the project /2/, the "NEK study" for the calculation of the grid emission factor for the Bulgarian Electricity Power System /17/. The previous DNV reports /14//15/ (determination and verification reports from 1st, 2nd and 3rd verification) were also checked for the purpose of this monitoring period desk review.

Operation records such as protocols from electricity meter readings /18//19/, calibration protocols /5//6/, training records /25/, construction and other obligatory permits /7/~/13/,/21/~/23/ as well as the power purchase agreement (PPA) /4/ were provided during the site visit.

Information and formulas provided in the monitoring report were compared with PDD and electricity sales receipts. The comparison confirmed that used formulas and values are correctly applied.

2.2 Site Visits

The site visit was conducted by Zuzana Andrtová of DNV on 1 and 2 February 2012. All hydropower plants operating (Lakatnik and Svrazhen) and under construction (Tzerovo, Opletnia and Prokopanik) were visited. Final review of documents and procedures for archiving of data was done in the central office of Vez Svoghe in Sofia. During the site visit, representative of DNV has interviewed key personnel of the plants Lakatnik and Svrazhen as well as project manager and project's responsible people. The status of operating plants and the plants in construction has been verified as situation described in chapter 1.3.

The data flow is as follow, the net electricity delivered to the grid is read and recorded in a protocol for electricity meter reading /18//19/ every month jointly by responsible persons of ČEZ and Vez Svoghe. These protocols are the basis for invoicing. The invoiced amount is recorded in Vez Svoghe's electronic calculation database for the project. The calculation as well as other folders related to project is stored on Vez Svoghe server and protected by password.

Calibration procedures are in compliance with monitoring requirement included in the PDD /1/ and PPA /4/ but the electricity meter for Svrazhen had delay in calibration against internal rules (see CAR1 - details are in the chapter related to monitoring).

The key personnel interviewed are summarized in the table below:

Name	Organization and position	Topic of interview
Patrick Pauletto	Project Manager, Vez Svoghe AD, Bulgaria.	QA/QC of the project, Project management, plants visit, construction sites presentation
Tsuetan Parov	Operator, Vez Svoghe AD, Bulgaria.	Operational reporting, logbooks,

		SCADA system, plants visit, monitoring equipment
Krestiyan Kolev	Legal Deparment, Vez Svoghe AD, Bulgaria.	Information about schedule of construction works, construction sites presentation, documentation of permits
Chiara di Silvestro	Technical Consultant, MWH S.p.A, Italia.	QA/QC of the project, Project management, site visit

2.3 Reporting of Findings

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 JI 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.

One CAR related to calibration of Svrazhen's electricity meter and one CL related to starting date of construction has been identified. All issues were properly solved by project participant.

3 VERIFICATION FINDINGS

This section summarises the findings from the verification of the emission reductions reported for the "Sreden Iskar Cascade HPP Portfolio Project in Bulgaria" for the period 1 January 2011 to 31 December 2011.

3.1 Remaining Issues, CARs, FARs from Previous Validation or Verification

One FAR was open from the previous verification. The FAR is related to back-up metering procedure in case there is a breakdown of the official measurement device. Vez Svoghe sent a letter to ČEZ at the beginning of this monitoring period /24/ requesting a clarification of the procedure stated in the PPA /4/ which aim to address the situation when the main meter breakdown. As per the date of this verification ČEZ has not answered yet. DNV has verified during the site visit that this situation has not happen so far. In this context, DNV decide to close this FAR and consider the procedure as described in the PPA /4/. I.e.the situation will be solved by conservative approach, which will be agreed by both contracted parties. The solution will be presented to DNV for verification and if DNV will not accept the alternative way for determining net electricity, the emission reduction for this period will be conservative calculated as zero.

3.2 Project Implementation

The project is delayed against its implementation schedule as originally mentioned in the PDD /1/. Two power plants, only Lakatnik and Svrazhen, are in operation during this monitoring period. The project second phase started with the construction of Tzerovo power plant on 8 June 2010 /21/. Opletnia started later in October 2010 /22/ and Prokopanik is started in January 2012 /23/. Third phase is expected to start in 2013.

The actual operation of the project activity I phase is in line with the registered PDD /1/ however construction phases II and II are delayed and thus these phases are not in operation yet. The details have also been earlier presented in Chapter 1.3.

Electricity was generated and supplied to the Bulgarian grid. The net generated electricity of 25 522 MWh was supplied to the grid during the monitored period from 1 January 2011 to 31 December 2011.

Lakatnia and Svrazhen hydropower plants generate electricity however the request from the grid is lower than it was estimated for these plants and year in the PDD /1/. The total emission reductions reported for the period 1 January 2011 to 31 December 2011 was verified to be 22 562 tCO_2e. The emission reductions are lower than that the emission reduction of 102 566 tCO_2e predicted in the registered PDD /1/. The lower emission reductions for the verification period are attributed to the lower rainfall /29/, the drop at low flow rate of the turbine /28/ as well as due to delays of operational dates against PDD construction schedule (all hydropower plants should have been in operation in 2011 and generate electricity, however what was not achieved as verified during the site visit).

The data presented in the monitoring report is in compliance with the information in the PDD /1/ except the grid emission factor that was not determined *ex-post* as stated here. As stated in

PDD on page 25, "the baseline grid emission factors will be monitored using the document "Baseline Study of Joint Implementation projects in the Bulgarian energy sector" performed annually by the NEK" /17/. However, DNV confirmed directly from the MoEW /16/ that this baseline study was not updated and is still valid for JI projects in Bulgaria. Hence, the emission factor of this study published on the web sites of the Ministry is the most recent baseline emission factor determined for Bulgaria. DNV also confirms that the necessary data to recalculate the emission factor based on more recent data is not publicly available.

Project owner updated used version of methodology ACM0002 /32/ in its monitoring procedures /2/ and in the monitoring report /3/ to version 7 against version 6 used in the PDD /1/. As the registered PDD still refers to version 6, DNV has assessed difference from version 6 to version 7 /32/ and confirms that the provided documents following version 7 fulfills requirements of version 6. The version update does not have any influence to emission reduction calculation. Emission factor calculation is still in the deviation, as is presented below. This deviation is based on confirmation of MoEW /16/ about validity of original NEK study /17/ presented in the PDD /1/.

3.3 Completeness of Monitoring

No changes have been realized in monitoring system from previous verification site visit. The monitoring procedure is described in the monitoring report /3/ and it was verified as correct. The electricity meters are owned by ČEZ and placed close by the hydropower plants. The monitoring is realized continuously. The values of monthly net electricity supplied to the grid are recorded to protocols /18//19/, which are provided by ČEZ employee together with responsible person from Vez Svoghe. The correctness of the net electricity supplied to the grid is confirmed in writing by both parties.

The values are compared with data provided by SCADA system, which stored electricity measurement from devices owned by Vez Svoghe. Electricity meters installed in hydropower plants are not included in the monitoring plan and they are used for internal cross checking only. The net electricity supplied to the grid was evidenced by invoices /3/ and the protocols /18//19/, which are mentioned above.

The power purchase agreement /4/ contains a paragraph for the situation, when the electricity meter will be out of function. This situation was requested to be clarified (FAR1 from previous verifications /15/). Vez Svoghe requested a clarification to ČEZ through a letter /24/ but no response from ČEZ has been received. As this decision does not depend on Vez Svoghe and the main meter did not breakdown during this monitoring period. In this context, DNV decide to close this FAR and consider the procedure as described in the PPA /4/. I.e. the situation will be solved by conservative approach, which will be agreed by both contracted parties. The solution will be presented to DNV for verification and if DNV will not accept the alternative way for determining net electricity, the emission reduction for this period will be conservative calculated as zero

The electricity meters owned by ČEZ are calibrated according to local legislation /27/ and PPA /4/. The electricity meter of HPP Svrazhen had delay with calibration against internaly set 2 years period because the legal rules set the period as 4 years newly /27/.. As the power purchase agreement /4/ contains paragraph related to calibration: "*Inspections of commercial metering devices shall be made at the request of the user, the end supplier or on the electricity distribution company. Electricity distribution company shall be obliged to check the*

connection with calibrated standard within five (5) days of the request. Reading of the commercial metering devices shall not be considered for review" and does not contain any calibration interval, the situation is correct under local legislation /27/, however the period internally set by project owner has been exceed. Calibration protocol from 15 February 2012 /6/ confirmed proper function of the electricity meter of Svrazhen. Thus its metering in period from 10 July 2011 to the end of 2011 could be accepted as correct. The detailed information is provided in following tables. The laboratory that calibrated the devices has authorization for calibration /20/.

The grid emission factor did not change according to the decision of Bulgarian MoEW /16/ as was presented in chapter above and thus it was not object of monitoring.

The metering system on both plants is owned by ČEZ and it meets requirements of the monitoring plan and it is in accordance with ACM0002 methodology version 7 /32/.

	Assessment/ Observation
Data / Parameter: (as in monitoring plan of PDD):	The net electricity delivered to the grid - Lakatnik
Measuring frequency:	Continuously measured.
Reporting frequency:	Every month.
Is measuring and reporting frequency in accordance with the monitoring plan and monitoring methodology? (Yes / No)	Yes.
Type of monitoring equipment:	Actaris SL761C071 (model SL 7000), serial No. 36039153, bidirectional. The meter is owned by CEZ and is located on transmission connection to the grid
Is accuracy of the monitoring equipment as stated in the PDD? If the PDD does not specify the accuracy of the monitoring equipment, does the monitoring equipment represent good monitoring practise?	No meter accuracy is defined in the registered PDD. The accuracy of the meter is 0.5s as verified by DNV through visual inspection of the meter during the site visit. The meter accuracy represents a good monitoring practice and additionally it is according to local Commercial Code and metrology rules /27/ since it is invoicing measurement.
Calibration frequency /interval:	Every two years according to the project owner internal rules. newly every 4 years according to the Metrology rules of Bulgaria /27/.
Is the calibration interval in line with the monitoring plan of the PDD? If the PDD does not specify the frequency of calibration, does the selected frequency represent good monitoring practise?	No calibration frequency is defined in the registered PDD. The statement in the monitoring plan is that calibration will be according to metering legislation and this corresponds with information provided on site /4/ /27/. The project owner is not the owner of the metering device and access to monitoring device is possible only for view. The checking

	of the meter is done every month, when in last day the revenue meter is checked jointly with the grid company. The calibration frequency of once every 2 years (and newly 4 years /27/) is used by this project meets the requirement /4/ and represents a good monitoring practice in Bulgaria.
Company performing the calibration:	Otdel Merene – CEZ – authorized by State Agency for Metrology and Technical Supervision /20/
Did calibration confirm proper functioning of monitoring equipment? (Yes / No):	Yes.
Is (are) calibration(s) valid for the whole reporting period?	The meter was calibrated on: • 8 June 2009 /5/, no validity period is indicated in the calibration protocol. • 26 January 2011 /5/, no validity period is indicated in the calibration protocol.
If applicable, has the reported data been cross-checked with other available data?	The data are cross-checked with values from the electricity meter owned by the project owner.
How were the values in the monitoring report verified?	The values from the monthly electricity invoices /3/ were cross-checked with monthly protocols /18//19/.
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?	The meter is not own electricity meter. Thus the data management is realized only from monthly reading of delivered electricity amount to the final calculation. The management ensure correct calculation of emission reduction
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?	NA.

	Assessment/ Observation
Data / Parameter: (as in monitoring plan of PDD):	Net electricity delivered to the grid – Svrazhen.
Measuring frequency:	Continuously measured.
Reporting frequency:	Every month.

Is measuring and reporting frequency in accordance with the monitoring plan and monitoring methodology? (Yes / No)	Yes.
Type of monitoring equipment:	Actaris SL761C071 (model SL 7000), Serial No.36039199,bidirectional The meter is owned by CEZ and is located at transmission connection to the grid
Is accuracy of the monitoring equipment as stated in the PDD? If the PDD does not specify the accuracy of the monitoring equipment, does the monitoring equipment represent good monitoring practise?	No meter accuracy is defined in the registered PDD. The accuracy of the meter is 0.5s as verified by DNV through visual inspection during the site visit, which represents a good monitoring practice and additionally it is according to local Commercial Code and metrology rules /27/ since it is invoicing measurement.
Calibration frequency /interval:	Every two years according to internal rules, newly every 4 years according to the Metrology rules of Bulgaria /27/.
Is the calibration interval in line with the monitoring plan of the PDD? If the PDD does not specify the frequency of calibration, does the selected frequency represent good monitoring practise?	No calibration frequency is defined in the registered PDD. The statement in the monitoring plan is that calibration will be according to metering legislation and this corresponds with information /4/ /27/ provided on site. The project owner is not the owner of the metering device and access to monitoring device is possible only for view. The checking of the meter is done every month, when in last day the revenue meter is checked jointly with the grid company. The calibration frequency of once per 2 years (and newly 4 years) used by this project meets the requirement /4/ and represents a good monitoring practice in Bulgaria.
Company performing the calibration:	Otdel Merene – CEZ authorized by State Agency for Metrology and Technical Supervision /20/
Did calibration confirm proper functioning of monitoring equipment? (Yes / No):	Yes, however the calibration has been delayed against internally set calibration period. The reason for acceptance of this situation is in the next answer.
Is (are) calibration(s) valid for the whole reporting period?	The meter was calibrated on: • 9 June 2009 /6/, no validity period is indicated in the calibration protocol. • 15 February 2012 /6/. This calibration protocol appears to be delay against previously internally set calibration of 2 years period. However, DNV has verified

	that the new Bulgarian metrology rules /27/ prolonged this period till 4 years. And as the calibration period is not directly set in the PDD /1/ nor in the PPA /4/, the situation is in accordance with local metrology legislation /27/. Also both calibration protocols confirm the proper functioning of the meter.
If applicable, has the reported data been cross-checked with other available data?	The data are cross-checked with values from the electricity meter owned by the project owner.
How were the values in the monitoring report verified?	The values from the monthly electricity invoices /3/ were cross-checked with monthly protocols /19/.
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?	The project participants do not own the electricity meter. Thus the data management is realized from monthly reading of delivered electricity amount to the final calculation. The management ensure correct calculation of emission reduction
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?	NA.

3.4 Accuracy of Emission Reduction Calculations

The emissions reduction was correctly calculated during the reporting period with the validated calculation formulae and baseline emission factors given in the PDD /1/.

The emission factor was derived from the “Baseline Study of Joint Implementation projects in the Bulgarian energy sector” issued in May 2005 /17/ by NEK. The study determined an operating margin emission factor by applying a model to forecast the emission factor based on a dispatch analysis applying actual generation and fuel consumption data from 2000-2004. The model takes into account new capacities.

It must be noted, as in previous DNV verification reports /15/, that the approach selected by NEK in the “Baseline Study of Joint Implementation projects in the Bulgarian energy sector” is not in full compliance with the requirements of ACM0002 to which the monitoring plan in the final PDD refers to /1/. The emission factor determined for the years 2006-2012 and thus the emission factor for 2011 selected by the project participants for this monitoring period i) is based on a model and not actual generation and fuel consumption data for these years and

ii) represents the operating margin only although considering likely future capacities in the dispatch analysis model applied.

Nonetheless, the use of model data instead of actual generation and fuel consumption data is in DNV's opinion acceptable as the model uses conservative assumptions and the Bulgarian Ministry of Environment and Water confirmed (e-mail from 21 December 2011 /16/) that the baseline study published in 2005 was not updated and is still valid for JI projects in Bulgaria and year 2011 /17/.

In the context of the project activity, DNV finds it also acceptable to not consider the build margin and only future capacity additions in the dispatch analysis model applied to estimate the operating margin emission factor. Due to the small generation of the project, it is reasonable to assume that the project will not have any effect on other power sector investments /33/ and thus the build margin. Moreover, in Bulgaria, like in many Eastern European countries, the number of new plants in recent years is also very low, given the decrease in electricity demand /33/.

The emission factor applied for 2011 year is 0.884 tCO_2/MWh.

The average load factor for this period is 46.54% for Lakatnik hydropower plant and 43.93% for Svrazhen hydropower plant. Plant load factor for individual months are listed bellows in the tables as well as electricity production and emission reductions.

DNV confirms that the load factors varied for different months due to river water flow /29/ (the rainfall was lower in 2011) and machinery operation conditions (drop at the low flow rate of turbine /28/). The power stations invoices from January 2011 to December 2011 /3/ were checked and cross checked by protocols /18//19/ during the site visit.

Lakatnik hydropower plant:

Period	Max possible Power Generated (MWh)	Net Power Supplied (MWh)	Load Factor	Emission Reductions (tCO_2)
2011				
January 2011	2 157.60	2 038.67	94.49%	1 802.18
February 2011	1 948.80	1 635.27	83.91%	1 445.58
March 2011	2 157.60	1 781.57	82.57%	1 574.90
April 2011	2 088.00	1 309.42	62.71%	1 157.53
May 2011	2 157.60	1 088.95	50.47%	962.63
June 2011	2 088.00	846.03	40.52%	747.89
July 2011	2 157.60	714.74	33.13%	631.83
August 2011	2 157.60	469.39	21.76%	414.94
September 2011	2 088.00	324.23	15.53%	286.62
October 2011	2 157.60	550.13	25.50%	486.31
November 2011	2 088.00	487.87	23.37%	431.28
December 2011	2 157.60	575.86	26.69%	509.06
Total	**25 404.00**	**11 822.12**	**46.72%**	**10 451**

Svrazhen hydropower plant:

Period	Max possible Power Generated (MWh)	Net Power Supplied (MWh)	Load Factor	Emission Reductions (tCO_2)
2011				
January 2011	2 648.64	2 274.55	85.88%	1 713.71
February 2011	2 392.32	1 879.38	78.56%	1 332.78
March 2011	2 648.64	2 025.60	76.48%	2 028.93
April 2011	2 563.20	1 478.30	57.67%	1 925.42
May 2011	2 648.64	1 278.68	48.28%	1 223.36
June 2011	2 563.20	998.64	38.96%	1 524.53
July 2011	2 648.64	830.49	31.36%	718.94
August 2011	2 648.64	552.53	20.86%	745.66
September 2011	2 563.20	450.32	17.57%	591.51
October 2011	2 648.64	667.06	25.19%	1 284.79
November 2011	2 563.20	570.71	22.27%	713.39
December 2011	2 648.64	693.43	26.18%	1 666.90
Total	**31 185.60**	**13 699.69**	**44.10%**	**12 111**

Total emission reduction for the project is 22 562 tCO_2e, which represents 22% of total emission reductions estimated for 2011 year in the PDD /1/. Lakatik achieved 63.83% of estimated ERU for this power plant in 2011 as per the PDD /1/ and Svrazhen achieved 65.58% of estimated ERU for this power plant in 2011 as per the PDD /1/. The lower result of these individual plants is resulted by lower water flow as product of low rainfall in 2011/29/ as well as turbine drop at low flow rate /28/.

The significant lower total result for the project is caused by PDD's presumption that all power plants would produce electricity in 2011. The construction of second phase is delayed as described in table in chapter 1 and third phase would be in operation in 2015 only. Thus still, two hydropower plants are for this monitoring period in operation only.

DNV also can confirm that the reductions of anthropogenic emissions by sources or enhancements of anthropogenic removals by sinks reported by project participant are accurate and free of material errors, omissions, or misstatements. DNV verification opinion is based on a reasonable level of assurance by using the materiality thresholds as it is defined in paragraph 4 a) of the Standard for applying the concept of materiality in verifications /34/,

3.5 Quality of Evidence to Determine Emission Reductions

The calculation is based on the net electricity supplied to the grid and the grid emission factor /17/. The net electricity supplied to the grid is measured by calibrated measurement devices and recorded into a protocol /18//19/, which is signed by representatives of both parties (ČEZ and Vez Svoghe) and this is the basis for the invoice. Invoices are official documents for quantity calculation and they are included in monitoring report for 2011 /3/.

3.6 Management System and Quality Assurance

Due to the relatively simple management system requirements for this project, all procedures related to management and operational system were described in the project owner's monitoring procedures /2/. The procedures are fully implemented now. Internal audit has been conducted /3/; two internal auditors have been properly trained /25/. No changes in the management system from previous verifications.

4 VERIFICATION STATEMENT

DNV Climate Change AS (DNV) has performed the verification of the emission reductions that have been reported for the "Sreden Iskar Cascade HPP Portfolio Project in Bulgaria" (UNFCCC Registration Reference No. BG2000012/reference number 0063) for the period 1 January 2011 to 31 December 2011.

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 PDD.

DNV conducted the verification on the basis of the CDM monitoring methodology ACM0002 (version 07), the monitoring plan contained in the registered Project Design Document of 15 October 2007 and the monitoring report (Version 01) dated 20 January 2012. 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 "Sreden Iskar Cascade HPP Portfolio Project in Bulgaria" (ITL project ID BG2000012/reference number 0063) for the period 1 January 2011 to 31 December 2011 are fairly stated in the monitoring report (Version 01) dated 20 January 2012.

The GHG emission reductions were calculated correctly on the basis of the approved CDM baseline and monitoring methodology ACM0002 (version 07) and the monitoring plan contained in the registered PDD of 15 October 2007 and are accurate and free of material errors, omissions, or misstatements.

DNV Climate Change AS is able to verify that the emission reductions from the "Sreden Iskar Cascade HPP Portfolio Project in Bulgaria" during the period 1 January 2011 to 31 December 2011 amount to 22 562 tonnes of CO_2 equivalent.

Prague and Oslo, 7 August 2012

Zuzana Andrtová
JI Verifier
DNV Prague, Czech Republic

Ole A. Flagstad
Approver,
DNV Climate Change AS

5 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/ MWH Global: PDD – Sreden Iskar Cascade HPPs portfolio Project Rev. 2 dated 15 October 2007.

/2/ MWH Global: Sreden Iskar Cascade Hydropower Plants Monitoring Procedures – Final version, 26 February 2010.

/3/ MWH Global: Monitoring report Sreden Iskar Cascade HPPs portfolio Project, version 1 dated 20 January 2012.

/4/ ČEZ and VEZ Svoghe: Agreement for purchase of electricity energy No.78 dated 14 July 2008 and its prolongation where is included Svrazhen dated 18 May 2009 and prolongation from 26 April 2010.

Automatically renewed because VEZ Svoghe has not requested for its termination.

/5/ CEZ LABORATORIES BULGARIA EOOD: Calibration Protocols for electricity measurement (provided by ČEZ) – Lakatnik:

No. 1000005960 from 8 June 2009 and No. 1000007181 from 26 January 2011

/6/ CEZ LABORATORIES BULGARIA EOOD: Calibration Protocols for electricity measurement (provided by ČEZ) – Svrazhen:

No. 1000005961 from 8 June 2009 and No.1000007325 from 15 February 2012

/7/ Water Permit for Lakatnik – No. 100950 dated 16 May 2005 and prolongation by Decision No. 52/04.04.2007 dated 4 April 2007 and No.11140101 dated 18 February 2011 (validity from 4 March 2011 to 16 May 2025).

/8/ Water Permit for Svrazhen – No. 100949 dated 16 May 2005 and prolongation by Decision No. 51/04.04.2007 dated 4 April 2007and No.111401021 dated 18 February 2011 (validity from 4 March 2011 to 16 May 2025).

/9/ Water Permit for Tzerovo – No. 11140103 dated 23 February 2011(valid 9 March 2011 till 20 May 2025)

/10/ Water Permit for Opletnia – No. 11140104 dated 23 February 2011(valid 9 March 2011 till 20 May 2025)

/11/ Water Permit for Prokopanik No. 11140105 dated 23 February 2011 validity 9 March 2011 till 20 May 2025

/12/ Use Permit for Lakatnik No. CT-12-612 2008 of 2 July 2008.

/13/ Use Permit for Svrazhen No. CT-05-518 of 16 May 2009.

/14/ DNV: Determination report for Sreden Iskar Cascade HPP Portfolio Project in Bulgaria No. 2006-1811, revision 3b dated 3 December 2007.

/15/ DNV: Verification report for Sreden Iskar Cascade HPP Portfolio Project in Bulgaria, Verification Period: 1 January 2008 - 31 December 2008 No. 2009-9059.

DNV: Verification report for Sreden Iskar Cascade HPP Portfolio Project in Bulgaria, Verification Period: 1 January 2009 - 31 December 2009 No. 2010-9054

DNV: Verification report for Sreden Iskar Cascade HPP Portfolio Project in Bulgaria,

Verification Period: 1 January 2010 - 31 December 2010 No. 2011-9067

/16/ Kiril Bankov, Junior Expert in Climate Change Policy Department: E-mail confirmation that the EF for Bulgaria from NEK study issued 5 May 2005 (see reference /17/) is still valid for 2011 year, dated 21 December 2011

/17/ NEK: Baseline Carbon Emission Factor of Bulgarian Electricity and Heat Power System (NEK "Study"), issued 5 May 2005, last visit of the webpage on 5 March 2012 http://www.moew.government.bg/recent_doc/climate/Baseline%20CEF%20Summary.pdf

/18/ ČEZ and Vez Svoghe: Protocols from electricity meter reading – Lakatnik (from January to December 2011).

/19/ ČEZ and Vez Svoghe: Protocols from electricity meter reading – Svrazhen (from January to December 2011).

/20/ State Agency for Metrology and Technical Supervision: Authorisation No. A-G-015 for CEZ LABORATORIES BULGARIA EOOD, issued by on 7 March 2008, valid for 5 years.

/21/ Svoghe Municipality: Building Permit for HPP Tserovo, No. 29, dated 8 June 2010

/22/ Svoghe Municipality: Building Permit for HPP Opletnia, No. 51, dated 16 September 2010

/23/ Svoghe Municipality: Building Permit for HPP Prokopanik No. 88 dated 15 December 2011

/24/ Vez Svoghe: Letter about clarification of PPA procedures for erroneous cases in measurement No. 100000009076/19 T 2011 dated 19 January 2011

/25/ Vez Svoghe: Certificate of training for internal audits of the monitoring plan of Sreden Iskar Cascade Hydro Power plants for Anton Milchev and Marina Dimitrova, dated 29 October 2008.

/26/ Vez Svoghe: Protocol of construction starting date of HPP Opletnia, dated 23 August 2011

/27/ State Agency for Metrological and Technical Surveillance: Order № A-441/13.10.2011 – prolongation of Order № A-102/05.03.2010 – determined subsequent inspections period, 13 October 2011

/28/ OSC: Study Optimal on-cam determination, 14 July 2010

/29/ National Institute of Meteorology and Hydrology: The hydrological data for Iskar river for 2011, January 2012

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

/30/ JI Supervisory Committee, Determination and verification manual, version 01 adopted at JISC 19

/31/ JI Supervisory Committee, Guidance on criteria for baseline setting and monitoring, version 02 adopted at JISC18

/32/ CDM Executive Board: ACM0002 "Consolidated baseline methodology for grid connected electricity generation from renewable sources", version 6 of 19 May 2006 and version 7.

/33/ Organisation for Economic Co-operation and Development (OECD) and International

Energy Agency (IEA), Practical baseline recommendations for greenhouse gas mitigation projects in the electric power sector. Information paper of 2002. (http://www.oecd.org/dataoecd/45/43/1943333.pdf)

/34/ JI Supervisory Committee, Standard for applying the concept of materiality in verifications, version 1

- o0o -

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	Provided calibration protocol for electricity meter of Svrazhen HPP is from 8 July 2009 and it is valid for two years. The following protocol has not been provided during site visit.	Since during the site visit it has been noticed that the last calibration has occurred more than two years ago, Vez Svoghe has requested CEZ to calibrate Svrazhen's meter. According to the new "Terms and Conditions of use of distribution networks THE "CEZ BULGARIA" AD, updated on the 26.04.2010, CEZ is "*obliged to check the connection with calibrated standard within five (5) days of the request*". The protocol proving the calibration of Svrazhen's meter has been provided on the 15th February 2012.	As the situation is in compliance with local legislation /4/ /27/and new calibration protocol from 15 February 2012 confirmed proper function of the electricity meter of HPP Svrazhen, the measurement in the period from 9 July 2011 till 15 February 2012 can be accepted as correct. Further the period was set by project proponent and it is not requested in the PDD even any other local requirements /4//27/. Newly issued official calibration period for this type of the measurement devices is set 4 years according to Order № A-441/13.10.2011 /27/. The CAR is closed

Clarification requests

CAR ID	Corrective action request	Response by Project Participants	DNV's assessment of response by Project Participants
CL 1	Starting date of construction for Opletnia HPP should be justified.	The protocol for the start-up of Opletnia's construction works has been provided.	The protocol for the start-up of Opletnia /26/ confirmed date 23 August 2011 as starting date for construction of HPP Opletnia. The CL 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	Vez Svoghe should clarify with ČEZ, how delivered electricity from plants will be calculated if ČEZ electricity meters break down. The paragraph in PPA /4/ does not contain the exact way of calculation. If the Vez Svoghe's meters will be used, the meters have to be calibrated (include calibration period setting).	The extract of par.V, art8 (3), (4) of PPA between Vez Svoghe and CEZ partially clarify the procedure in case of failure of meters (considered very improbable by CEZ): "If after the technical check-up there is wrong and/or inaccurate measuring and/or calculation of the quantities electrical energy, a report should be prepared for the quantities that were incorrectly measured and/or calculated electrical energy. No later than 5 days from the composition of the report under the previous paragraph Vez Svoghe shall issue debit (credit) notification for the difference between the recalculated and invoiced quantities electric energy on the basis of the findings of the electricity – distribution company, verified in the report which is integral part of the rectification document." Since the articles do not fully clarify the issue, Vez Svoghe has been pushing ČEZ to get a more proper clarification on that. However, Vez Svoghe is still waiting for an official answer from ČEZ.	Vez Svoghe request clarification to the ČEZ through a letter dated 19 January 2011 /24/ sent at the beginning of this monitoring period. However, ČEZ has not yet responded at the time of this verification. As this decision does not depend on Vez Svoghe and the main meter did not breakdown during this monitoring period, In this context, DNV decide to close this FAR and keep the procedure, which is described in the PPA /4/. I.e. the situation will be solved by conservative approach, which will be agreed by both contracted parties. The solution will be presented to DNV for verification and if DNV will not accept the alternative way for determining net electricity, the emission reduction for this period will be conservative calculated as zero The FAR is closed

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	NA		

- o0o -