# VERIFICATION REPORT

## EN+ MAGNESIUM LIMITED

## INITIAL AND 1ST PERIODIC VERIFICATION OF THE "INCREASE IN EFFICIENCY OF WATER RESOURCES USE AT BRATSK HPP, IRKUTSK REGION, RUSSIAN FEDERATION"

## BUREAU VERITAS CERTIFICATION

REPORT NO. RUSSIA/0050-2/2010, VERSION 2

Verification Report on JI project
"Increase in efficiency of water resources use at Bratsk HPP, Irkutsk region, Russian Federation"

# VERIFICATION REPORT

| Date of first issue: | Organizational unit: |
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| 29/03/2010 | Bureau Veritas Certification Holding SAS |
| Client: | Client ref.: |
| EN+ Magnesium Limited | Mr. N. Sakharov |

Summary:

Bureau Veritas Certification has been commissioned by EN+ Magnesium Limited to carry out, under JI track 1 procedure, the initial and 1st periodic verification of GHG emission reduction by the JI project "Increase in efficiency of water resources use at Bratsk HPP, Irkutsk region, Russian Federation" (sectoral scope 1), based on UNFCCC criteria for the JI, as well as criteria given to ensue consistent project operations, monitoring and reporting. UNFCCC criteria refer to Article 6 of the Kyoto Protocol, the JI rules and modalities and the subsequent decisions by the JI Supervisory Committee, as well as the host country criteria.

The project presents an effective energy efficiency measure, which envisages the replacement of six old degraded-efficiency wheels of Bratsk HPP with the new high-performance ones. The extra electric energy produced by HPP at the same water resource replaces the electricity that would be generated by Irkutskenergo coal fired Cogeneration Heat and Power Plants in condensing mode.

The verification covers the period from January 1st 2008 to December 31st 2008.

The verification is carried out as a combined Initial and 1st Periodic Verification. A risk-based approach has been followed to perform the verification. In the course of verification, 2 Corrective Action Requests (CAR) were raised and successfully closed. 2 Forward Action Requests (FAR) are left pending until the next periodic monitoring.

The verification is based on the Monitoring Report (covers January 1st 2008 – December 31st 2008), the Monitoring Plan as set out in the determined PDD, Version 6 dated November 2009, with insignificant deviations, and supporting documents made available to Bureau Veritas Certification by the project participant.

As a result of the Initial Verification, the Bureau Veritas Certification confirms that all operations of the project are implemented as planned and described in the PDD, the installed wheels run reliably, measuring equipment is calibrated appropriately, the monitoring system is in place and functional. The project is continuously generating emission reductions. It is observed, however, that the project did not receive approvals from the involved parties.

As a result of the 1st Periodic Verification, the Bureau Veritas Certification confirms that the GHG emission reductions are calculated without material misstatement in conservative and appropriate manner. Bureau Veritas Certification herewith confirms that the project has achieved emission reductions in the above mentioned reporting period as of 341 131 tCO2e.

| Report No.: | Subject Group: |
|---|---|
| RUSSIA/0050-2/2009 | JI |
| Project title: "Increase in efficiency of water resources use at Bratsk HPP, Irkutsk region, Russian Federation" | |
| Work carried out by: Leonid Yaskin – Team Leader, Lead Verifier | |
| Work reviewed by: Ivan Sokolov – Internal Technical Reviewer | |

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Indexing terms: *Climate Change, JI, Emission Reductions, Verification, Kyoto Protocol*

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## Abbreviations

| | |
|---|---|
| AIE | Accredited Independent Entity |
| BHPP | Bratsk Hydro Power Plant |
| BVC | Bureau Veritas Certification |
| C | Carbon |
| CAR | Corrective Action Request |
| CL | Clarification Request |
| $CO_2$ | Carbon Dioxide |
| DR | Document Review |
| EIA | Environmental Impact Assessment |
| EMS | Environmental Management System |
| ERU | Emission Reduction Unit |
| FAR | Forward Action Request |
| GHG | Green House Gas(es) |
| JI | Joint Implementation |
| JISC | Joint Implementation Supervisory Committee |
| I | Interview |
| IE | JSC "Irkutskenergo" |
| IETA | International Emissions Trading Association |
| IPCC | Intergovernmental Panel on Climate Change |
| MP | Monitoring Plan |
| MR | Monitoring Report |
| JSC | Joint Stock Company |
| PCF | Prototype Carbon Fund (World Bank Carbon Finance Unit) |
| PDD | Project Design Document |
| PP | Project Participant |
| $tCO_2e$ | tonnes $CO_2$ equivalent |
| UNFCCC | United Nations Framework Convention for Climate Change |
| VR | Verification Report |

# 1 INTRODUCTION

EN+ Magnesium Limited (hereafter referred EN+) has commissioned Bureau Veritas Certification to carry out the initial and 1st periodic verification of GHG emission reduction by the JI project "Increase in efficiency of water resources use at Bratsk HPP, Irkutsk region, Russian Federation" (hereafter referred "the project"). JSC "National Carbon Sequestration Foundation" (hereafter called NCSF), being PDD developer, coordinated the monitoring and verification processes on behalf of the EN+ and the project participant JSC "Irkutskenergo" (hereafter referred IE).

This report summarizes the findings of the verification of the project, performed based on UNFCCC criteria, as well as criteria given to ensure consistent project operations, monitoring and reporting. UNFCCC criteria refer to Article 6 of the Kyoto Protocol, the JI rules and modalities and the subsequent decisions by the JI Supervisory Committee, as well as the host country criteria.

The verifier has reviewed the GHG data collected for the period from January 1st 2008 to December 31st 2008.

## 1.1 Objective

The purpose of this verification is a combined initial and 1st verification.

The objective of the initial verification is to verify that the project is implemented as planned and described in the PDD, to confirm that the monitoring system is in place and fully functional, and to assure that the project will generate verifiable emission reductions.

The objective of the periodic verification is the review and ex post determination by the AIE of the GHG emission reductions. It includes the verification of the data given in the monitoring report by checking the monitoring records and the emissions reduction calculation.

## 1.2 Scope

The verification of this project is based on the Project Design Document Version 6 dated November 2009, the Monitoring Report (covers the period of January 1st 2008 – December 31st 2008), the monitoring plan as set out in the PDD, supporting documents made available to Bureau Veritas Certification, and information obtained through the on-site interviews and on-site assessment. The documents and information are reviewed against Kyoto Protocol requirements, UNFCCC rules and associated interpretations.

Bureau Veritas Certification, based on the recommendations in the Validation and Verification Manual (IETA/PCF), has employed a risk-based approach in the verification, focusing on the identification and reporting of significant risks and on reliability of project monitoring and generation of Emission Reductions Units (ERU).

The verification is not meant to provide any consulting towards the Client. However, stated requests for forward actions and corrective actions may provide input for improvement of the project monitoring towards reductions in the GHG emissions.

## 1.3 GHG Project Description (quoted by PDD Section A.2)

Bratsk hydroelectric plant (BHPP) is the second HPP of the coordinated hydroelectric system downstream the Angara river and the world's leader in the total volume of electricity production since putting into operation of the first generating unit. The installed capacity of Bratsk HPP is 4500 MW (18 generating units by 250 MW). The annual output under the design is some 21-22 billion kWh. The share of BHPP in the total electricity production of JSC «Irkutskenergo» is about 40%. Due to the unique and sufficiently stable water resources, Bratsk HPP plays an important role in providing the steady-state reliable functioning of Irkutsk region. BHPP supplies the electric energy through the Irkutsk power grid to the regional industrial enterprises, population and to the neighbor deficit power systems.

The project provides extra electricity production due to efficiency increase in water resources use in connection with BHPP efficiency increase caused by replacement of wheels on the 6 hydro generating units. As a result of project activity at BHPP additional 692 million kWh it will be generated a year.

The project is additional and one of the substantiations is that the existing wheels are in operational conditions and can serve till at least 2013.

The project activity will result in reducing electricity generation by the existing coal fired TPPs of JSC "Irkutskenergo".

Estimated reduction of GHG emissions should be about 4 009 995 $tCO_2e$ in the period of 2008-2012 or 801 999 $tCO_2e$ per a year. It will lead to additional carbon financing from ERU sales.

BHPP was put in operation in 1961. Because of cavitation wear the turbine's efficiency decreases in time and each 6-8 years overhaul repair works take place at each turbine wheel when they are restored by facing 600-700 kg of metal per one maintenance campaign. Nevertheless maintenance works can't increase efficiency to the initial level and from the time of commissioning the efficiency fell down from initial 93.5% to approximately 88,1.

In the absence of the project activity, the BHPP would continue to provide electricity with the historical average efficiency coefficient, until the time at which the generation facility would likely be replaced or retrofitted. From this point of time onwards, the baseline scenario is assumed to correspond to the project activity, and no emission reductions are assumed to occur.

Emission reduction happens because of BHPP efficiency coefficient increase.

For the purposes of the project it should be specially noted the following:
- BHPP generates cheap electricity (i.e. it is the «low-cost» energy source) and it is also the «must-run» source in the power system that is loaded in the primary order.
- Water regime of BHPP which means the support of water level in the reservoir in the prescribed range, the control of overflow water in the period of snowmelt flood, etc. is specified by the Yenisei Basin Water Directorate, the requirements of navigation, conservation of fish resources in the river Angara and normal water stream in the lower reach is taken into account. The Operative Group of the Ministry of Natural Resources can give out the recommendations on running the water schedule. Thus, the BHPP generates maximal electricity with the specified restrictions of water resources utilization. This principle doesn't depend of the retrofit works at BHPP and is true for both baseline scenario and project activity.
- There is electricity demand growth in the region that predetermines also the maximal utilization of BHPP capacities;
- The electricity loads of BHPP and its units are dispatched by the regional branch of JSC "System Operator of UES".

**Table A.2.1. Schedule of capacities retrofit at BHPP**

| Replacement of wheel | The date of putting into operation |
|---|---|
| No. 13 | 12.2010 |
| No. 14 | 10.2008 |
| No. 15 | 02.2010 |
| No. 16 | 03.2007 |
| No. 17 | 03.2008 |
| No. 18 | 12.2009 |

*Source of data: JSC "Irkutskenergo"*

The projected area of BHPP reservoir surface is 5470 $km^2$, and as JSC «Irkutskenergo» declared, it would remain invariable under project activity, i.e. stay the same under the baseline scenario and project activity. The long-term water schedules of BHPP operation prescribed by State bodies are expected not to be changed.

The new wheels are made of stainless steel at JSC «Leningradsky Engineering Metal Works», St Petersburg. They have much less cavitations wear of metal (18 kg of metal a year).

The project was considered as a Joint Implementation (JI) from the appearance of the investment proposal in 2004 when JSC Irkutskenergo first took the appropriate decision (the copy of the protocol of 22.04.2004 is attached in Annex 4). Since that time the decision to implement the investment project was made by the Irkutskenergo Board of the Directors (2004). It should be pointed out that the Kyoto Protocol entered into force only in 2005 when

the negotiations with the JI Project developer and a potential carbon investor were started. In 2006 the appropriate agreements were signed. In parallel the investment project's realization was under way.

By the time of developing PDD Version No. 4 (September 2009) three wheels have been already replaced at turbines No. 14, 16 and 17 and refurbishment of No.18 is under way. The increase of efficiency was confirmed by tests carried out for turbine No.16 by "Turboinstitute" (city Ljubljana, Slovenia) in 2007: annual average wheel efficiency was 95.2% at nominal head 100 m. All other new wheels are of the same design, the conditions under which the turbines retrofit is carried out and their operation takes place are the same[2], there are all reasons to accept the efficiency of 95.2% for all other retrofitted turbines for the purpose of emission reduction assessment. The efficiency 95.2% for all new wheels is guaranteed by the wheels' manufacturer LMW. Increasing of wheel efficiency coefficient till 95,2% will results in hydraulic unit efficiency coefficient increasing till 93,5% taking into account loses between generator and wheel (in the project calculation hydraulic unit efficiency coefficient is taken under capacity 232 MW and equal to 92,9%)

**Table A.2.2. BHPP efficiency coefficient before and after the project implementation**

| Indicator | BHPP Efficiency % |
|---|---|
| Efficiency coefficient of BHPP turbines in 2002-2007 ( $\eta_{baseline}$) | 85.92% |
| Efficiency coefficient of BHPP turbines in 2008-2012 (average $\eta_y$) | 88.65% |

Excel table with the data for each year is presented in PDD Annex 8 (separate file).

# 2 METHODOLOGY

The verification of the project consisted of the following activities:

- On-site assessment and interviews held on 24/02/2010;
- Publication of the 1st Monitoring Report on the BV site 0n 26/03/2010;
- Desk review of the 1st Monitoring Report and supporting documents;
- Preparation of the draft Initial Verification Protocol v.1 (Appendix A);
- Preparation of the draft First Periodic Verification Protocol v.1 (Appendix B);
- Following communications with the project participant by phone and mails;
- Resolution of requests for corrective and forward actions;
- Preparation of the Verification Report v.1; issued on 29/03/2010;
- Internal Technical Review of the Verification Report v.1;
- Response to ITR requests on 04/04/2010;
- ITR closed on 04/04/2010.
- Issuance of the Verification Report v.2 on 09/04/2010.

## 2.1 Verification Protocol

According to the Validation and Verification Manual (IETA/PCF) a verification protocol is used as part of the verification. The protocol shows, in a transparent manner, criteria

(requirements), means of verification and the results from verifying the identified criteria. The verification protocol serves the following purposes:

- It organizes, details and clarifies the requirements the audit is expected to meet; and
- It ensures a transparent verification process where the verifier will document how a particular requirement has been verified and the result of the verification.

The verification protocol (IETA/PCF) consists of five tables. The different columns in these tables are described in Figure 1. Table 1 relates to Initial Verification, Tables 2 - 5 to Periodic Verification.

In the present Verification Report the IETA/PCF tables were handled as follows:

| IETA/PCF tables | Tables in the present Verification Report |
|---|---|
| Table 1 | Appendix A Table 1 |
| Table 2 | Appendix B Table 1 |
| Tables 3 and 4 | Appendix B Table 2 (combined) |
| Table 5 | Appendix C Table 1 |

The overall verification, from Contract Review to Verification Report & Opinion, was conducted using Bureau Veritas Certification procedures.

| **Initial Verification Protocol Table 1** | | | |
|---|---|---|---|
| **Objective** | **Reference** | **Comments** | **Conclusion (CARs/FARs)** |
| The requirements the project must meet | Gives reference to where the requirement is found. | Description of circumstances and further comments on the conclusion | This is either acceptable based on evidence provided (OK), or a Corrective Action Request (CAR) of risk or non-compliance of the stated requirements. Forward Action Request (FAR) indicates essential risks for further periodic verifications. |

| **Periodic Verification Protocol Table 2: Data Management System/Controls** | | |
|---|---|---|
| **Identification of potential reporting risk** | **Identification, assessment and testing of management controls** | **Areas of residual risks** |
| The project operator's data management system/controls are assessed to identify reporting risks and to assess the data management system's/control's ability to mitigate reporting risks. The GHG data management system/controls are assessed against the expectations detailed in the table. | A score is assigned as follows:<br>• Full - all best-practice expectations are implemented.<br>• Partial - a proportion of the best practice expectations is implemented<br>• Limited - this should be given if little or none of the system component is in place. | Description of circumstances and further commendation to the conclusion. This is either acceptable based on evidence provided (OK), or a Corrective Action Request (CAR) of risk or non compliance with stated requirements. The corrective action requests are numbered and presented to the client in the verification report. The Initial Verification has additional Forward Action Requests (FAR). FAR indicates essential risks for further periodic verifications. |

| **Periodic Verification Protocol Table 3: GHG calculation procedures and management control testing** |
|---|

| **Identification of potential reporting risk** | **Identification, assessment and testing of management controls** | **Areas of residual risks** |
|---|---|---|
| Identify and list potential reporting risks based on an assessment of the emission factor calculation procedures, i.e.<br>• the calculation methods,<br>• raw data collection and sources of supporting documentation,<br>• reports/databases/information systems from which data is obtained.<br>Identify key source data. Examples of source data include metering records, process monitors, operational logs, laboratory/analytical data, accounting records, utility data and vendor data. Check appropriate calibration and maintenance of equipment, and assess the likely accuracy of data supplied.<br>Focus on those risks that impact the accuracy, completeness and consistency of the reported data. Risks are weakness in the GHG calculation systems and may include:<br>• manual transfer of data/manual calculations,<br>• unclear origins of data,<br>• accuracy due to technological limitations,<br>• lack of appropriate data protection measures? For example, protected calculation cells in spreadsheets and/or password restrictions. | Identify the key controls for each area with potential reporting risks. Assess the adequacy of the key controls and eventually test that the key controls are actually in operation.<br>Internal controls include (not exhaustive):<br>• Understanding of responsibilities and roles<br>• Reporting, reviewing and formal management approval of data;<br>• Procedures for ensuring data completeness, conformance with reporting guidelines, maintenance of data trails etc.<br>• Controls to ensure the arithmetical accuracy of the GHG data generated and accounting records e.g. internal audits, and checking/ review procedures;<br>• Controls over the computer information systems;<br>• Review processes for identification and understanding of key process parameters and implementation of calibration maintenance regimes<br>• Comparing and analysing the GHG data with previous periods, targets and benchmarks.<br>When testing the specific internal controls, the following questions are considered:<br>1. Is the control designed properly to ensure that it would either prevent or detect and correct any significant misstatements?<br>2. To what extent have the internal controls been implemented according to their design;<br>3. To what extent have the internal controls (if existing) functioned properly (policies and procedures have been followed) throughout the period?<br>4. How does management assess the internal control as reliable? | Identify areas of residual risks, i.e. areas of potential reporting risks where there are no adequate management controls to mitigate potential reporting risks<br>Areas where data accuracy, completeness and consistency could be improved are highlighted. |

| **Periodic Verification Protocol Table 4: Detailed audit testing of residual risk areas and random testing** | | |
|---|---|---|
| **Areas of residual risks** | **Additional verification testing performed** | **Conclusions and Areas Requiring Improvement (including Forward Action Requests)** |

| | | |
|---|---|---|
| List the residual areas of risks (Table 2 where detailed audit testing is necessary.<br><br>In addition, other material areas may be selected for detailed audit testing. | The additional verification testing performed is described. Testing may include:<br>1. Sample cross checking of manual transfers of data<br>2. Recalculation<br>3. Spreadsheet 'walk throughs' to check links and equations<br>4. Inspection of calibration and maintenance records for key equipment<br>• Check sampling analysis results<br>• Discussions with process engineers who have detailed knowledge of process uncertainty/error bands. | Having investigated the residual risks, the conclusions should be noted here. Errors and uncertainties should be highlighted.<br><br>Errors and uncertainty can be due to a number of reasons:<br>• Calculation errors. These may be due to inaccurate manual transposition, use of inappropriate emission factors or assumptions etc.<br>• Lack of clarity in the monitoring plan. This could lead to inconsistent approaches to calculations or scope of reported data.<br>• Technological limitations. There may be inherent uncertainties (error bands) associated with the methods used to measure emissions e.g. use of particular equipment such as meters.<br>• Lack of source data. Data for some sources may not be cost effective or practical to collect. This may result in the use of default data which has been derived based on certain assumptions/conditions and which will therefore have varying applicability in different situations.<br><br>The second two categories are explored with the site personnel, based on their knowledge and experience of the processes. High risk process parameters or source data (i.e. those with a significant influence on the reported data, such as meters) are reviewed for these uncertainties. |

| **Periodic Verification Protocol Table 5: Resolution of Corrective Action and Clarification Requests** | | | |
|---|---|---|---|
| **Report clarifications and corrective action requests** | **Ref. to checklist question in tables 2/3** | **Summary of project owner response** | **Verification conclusion** |
| If the conclusions from the Verification are either a Corrective Action Request or a Clarification Request, these should be listed in this section. | Reference to the checklist question number in Tables 2, 3 and 4 where the Corrective Action Request or Clarification Request is explained. | The responses given by the Client or other project participants during the communications with the verification team should be summarized in this section. | This section should summarize the verification team's responses and final conclusions. The conclusions should also be included in Tables 2, 3 and 4, under "Final Conclusion". |

**Figure 1 IETA/PCF Verification Protocol tables**

## 2.2 Review of Documents

The preliminary and final Monitoring Reports and supporting documentation submitted by the project participants as well as additional background documents related to the project design and baseline, i.e. country Law, Kyoto Protocol, JI implementation guidelines, Project Design Document were reviewed.

The verification findings presented in this Verification Report Version 2 relate to the project as described in the PDD Version 6 dated November 2009 and the Monitoring Report Version 2 dated March 2010 for the period of January 1st 2008 - December 31st 2008.

Versions 2 of the VR and MR were issued in response to ITR requests dated 31/03/2010.

## 2.3 Follow-up Interviews

In the frame of Initial Verification, Bureau Veritas Certification verifier Leonid Yaskin conducted a visit to the project site on 24/02/2010. On-site interviews with the project participant and inspection of the project and monitoring equipment were conducted to collect information needed for the verification of emission reduction. Representatives of JSC "Irkutskenergo", EN+ project manager and NCSF consultant were interviewed (see the list of interviewees in Section 6). The main topics of the interviews are summarized in Table 1.

**Table 1. Interview topics**

| Interviewed organization | Date | Interview and/or inspected topics |
|---|---|---|
| IE<br>EN+<br>NCSF | 24/02/2010 | ➢ Status of project equipment<br>➢ Monitoring plan<br>➢ Deviations from the monitoring plan<br>➢ Requirements to competence<br>➢ Roles and responsibilities for data collection<br>➢ Training to monitoring procedures<br>➢ Data to be collected<br>➢ Measurement equipment (inspection, characteristics, status)<br>➢ Data logging<br>➢ Data archiving<br>➢ Data reporting<br>➢ Use of calculation tool<br>➢ Emission calculations<br>➢ Baseline emission factor<br>➢ Monitoring report verification and validation<br>➢ QC and QA procedures<br>➢ IT management<br>➢ EMS |

## 2.4 Resolution of Clarification, Corrective and Forward Action Requests

The objective of this phase of the verification is to raise the requests for corrective actions, and clarification and any other outstanding issues that needed to be clarified for Bureau Veritas Certification positive conclusion on the GHG emission calculation.

Findings established during the verification can either be seen as a non-fulfillment of criteria ensuring the proper implementation of the project or where a risk to deliver high quality ERUs is identified.

Corrective Action Requests (CAR) are issued, where:
i) there is a clear deviation concerning the implementation of the project as defined in the PDD;
ii) requirements set by the Methodological Procedure or qualifications in a verification opinion have not been met; or
iii) there is a risk that the project would not be able to deliver high quality ERUs.

Forward Action Requests (FAR) are issued, where:
iv) the actual status requires a special focus on this item for the next consecutive verification, or
v) an adjustment of the Methodological Procedure is recommended.

Clarification Request (CL) are issued, where:
vi) additional information is needed to fully clarify an issue.

To guarantee the transparency of the verification process, the concerns raised are documented in more detail in the initial and first verification protocols in Appendixes A and B respectively.

# 3 VERIFICATION FINDINGS

In the following sections, the findings of the verification are stated. The verification findings for each verification subject are presented as follows:

1) Where Bureau Veritas Certification had identified issues that needed clarification or that represented a risk to the fulfillment of the project objectives, a Corrective Action Request or Forward Action Request, respectively, have been issued. Corrective Action Requests and Forward Action Requests are referred, where applicable, in the following sections and are further documented in the Initial Verification Protocol (Appendix A) and the First Periodic Verification Protocol (Appendix B).

The verification of the project resulted in 2 Corrective Action Requests and 2 Forward Action Requests.

2) In the context of Forward Action Requests, risks have been identified, which may endanger the delivery of high quality ERUs in the future, i.e. by deviations from standard procedures as defined by the Monitoring Methodology. As a consequence, such aspects should receive a special focus during the next consecutive verification. A FAR may originate from lack of data sustaining claimed emission reductions. Forward Action Requests are understood as recommendation for future project monitoring; they are stated, where applicable, in the following sections and are further documented in the Initial Verification Protocol, Appendix A (Table 1).

2 Forward Action Requests are left open till the next Periodic Verification.

3) The final verification team conclusions for verification subject are presented.

Requests for actions and clarifications from the Initial Verification and First Periodic verification are summarized in Appendix C Table 1. Verification trials during the Periodic Verification are listed in Appendix B Table 2 Column "Additional verification testing performed".

The verification findings relate to the project operation as documented and described in the Monitoring Report.

## 3.1 Initial Verification Findings

### 3.1.1 Remaining issues, CAR's, FAR's, CL's from previous verification

CAR 01 (pending approval by Host Party) from Determination Report remained open.

Please refer to the verifier's Note Part b) in Determination Report, Appendix A, Table 1, item 1:

"JISC Glossary of JI terms/Version 01 defines the following:
(b) At least one written project approval by a Party involved in the JI project, other than the host Party(ies), should be provided to the AIE and made available to the secretariat by the AIE when submitting the first verification report for publication in accordance with paragraph 38 of the JI guidelines, at the latest.

So far there is no clarity as to how the above JISC requirement will be fulfilled under Track 1.

### 3.1.2 Project Implementation

On the day of audit, four wheels # 14,16,17,18 were operational. In the 1st monitoring period 01/01/08 – 31/12/08 three new wheels # 14, 16, 17 operated. During the monitoring period, no changes were made to the operational equipment.

The starting date of the crediting period did not change and remains 1st January 2008.

The Monitoring System is in place and operational. Monitoring of GHG emission reductions was carried out as per the Monitoring Plan with minor deviations, which are described and justified by the project participant, in line with the Decision 17/CP.7 Annex H Clause 57, in MR Section B.5. The verifier found these deviations appropriate to the project conditions.

Outstanding issue related to the Project Implementation, PP's response and BV Certification's conclusion are described in Appendix C Table 1 (refer to FAR 01).

FAR 01 is left open till the next Monitoring Report.

### 3.1.3 Internal and External Data

The collected data (measured, estimated, and calculated) are presented in MR Section C and Excel file with calculations.

Internal data to be collected throughout the crediting period are: annual electricity production by turbine No. 1-18; annual electricity production by Bratsk HPP; annual operation hours for turbine No. 1-18; the number of years from the last repair for turbine No 1-18; daily upper and lower pool levels.

Default parameter is the ex-post emission factor for Irkutskenergo TPP in condensing mode.

Used models are the equations for calculation of wheel efficiency and mechanical capacity.

The verifier checked the appropriateness of default and measured internal data, the state of monitoring equipment, the calibration procedures, data control, and assessed the qualification of personnel.

No outstanding issues are recorded related to Internal and External Data.

### 3.1.4 Environmental Indicators

Generation of additional electric energy at BHPP replaces power capacities of Irkutskenergo what should result in reduction of coal combustion and lowering of environmental impact of Irkutskenergo power plants. The monitoring plan does not specify any environmental or social indicators to be monitored for the success of the project activity. All environmental measures are not exceeding the local legal requirements.

No outstanding issues are recorded related to Environmental Indicators.

### 3.1.5 Management and Operational System

The company management and operational system for GHG emission monitoring and reporting is described in the specially prepared manual "Regulation and scheme for process of GHG emission reduction monitoring" which was approved by the IE General Manager Order. The Regulation provides the scope of application, definition of primary data, requirements to and responsibilities for data collection, recording, storage, protection, transfer, consolidation, processing, reporting. The Regulation was prepared by the personnel concerned that is well informed and qualified for performing the monitoring and reporting tasks.

Outstanding issues related to Management and Operation System, PP's responses and BV Certification's conclusions are described in Appendix C Table 1 (refer to CAR 01, FAR 02).

FAR 02 is left open till the next Monitoring Report.

## 3.2 Periodic Verification Findings

Generation of additional electric energy at BHPP replaces power capacities of Irkutskenergo what should result in reduction of coal combustion and lowering of environmental impact of Irkutskenergo power plants. The project as such presents the repair activity: replacement of wheels. It does not impact environment in air, soil, and water. Therefore, the monitoring plan does not specify any environmental or social indicators to be monitored for the success of the project activity. All routine environmental measures taken at BHPP ensure fulfillment of local legal requirements. Social impact of the project is not identified. This is beyond JI mechanism.

### 3.2.1 Completeness of Monitoring

The realized monitoring of the project is complete, effective and reliable and in accordance with monitoring plan contained in the determined PDD. Minor deviations from the monitoring plan are duly addressed in the Monitoring Report Section B.5. Most of them relate to the management and reporting structure and do not affect the value of emission reductions. More accurate definition of the inter-repair period resulted in 0,2% deviation of emission reduction which is observed as insignificant. The relevant emission source is duly covered by the monitoring plan. The boundaries of the project are defined correctly and transparently. All pertinent parameters were monitored and determined as prescribed. The collected data were stored during the whole monitoring period. The monitoring methodologies and sustaining records were sufficient to enable verification of emission reductions. During the verification process, no significant lacks of evidence were detected. The data gathering and reporting procedures, which were described in the MR and examined during the on-site visit, were found to reflect the ones defined by the original monitoring plan.

Outstanding issue related to Completeness of Monitoring, PP's responses and BV Certification's conclusions are described in Appendix C Table 1 (refer to CAR 02).

### 3.2.2 Accuracy of Emission Reductions Calculation

Owing to the use of the justified methodology, there was no need to make adjustments to the measured values in order to ensure conservative emission reduction calculation. All used data was of a high quality to assure accurate calculation. It is evidenced that the whole monitoring system was fully operational during the entire monitoring period. The calibration results ensure the correct functionality of all the relevant measuring equipment. The verifier received access to all relevant documentation needed to verify the emission reduction calculation. All used information was traceable and appropriately archived.

The verifier confirms that emission reduction calculations have been performed according to the monitoring plan and to the calculation methodology reported in the MR in accordance with the PDD. The verification team checked the transfer of monitored data sets to spreadsheets used by PP, correctness of the formulae versus the PDD, programming of formulae and connections, as well as calculations of emission reductions. No inaccuracies in calculations were detected by the verifier. The calculation excel tool was checked by the verifier and no flaws were found.

No outstanding issues are recorded related to Accuracy of Emission Reductions Calculation.

### 3.2.3 Quality of Evidence to Determine Emission Reductions

The evidences that were obtained by the verification team in order to provide confidence in the provided emission reduction calculation, such as

- IE General Manager Order on GHG emission monitoring
- Internal "Regulation for the process of GHG emission reduction monitoring"
- Clear allocation of roles, responsibilities and authorities
- Competence and commitments of personnel
- Maintained and calibrated measuring equipment
- The present-day metrological control
- Automatic data acquisition system
- Reliable IT
- Procedures for protection and back up of electronic and paper data
- Appropriate archiving system
- QC and QA procedures
- Use of excel spreadsheets
- Implementation of data traceability
- Checking of transfer of formulas and algorithms into excel
- Review for adequacy of any excel spreadsheet
- Verification of data handling by Senior Managers
- Checks for consistency and adequacy of calculations and data in the MR
- Validation of the MR by the IE top manager
- Reliable IE data for coal fired power plants

are observed as consistent and to high quality. All used parameters were of sufficient and appropriate quality to assure an accurate monitoring.

### 3.2.4 Management System and Quality Assurance

To ensure quality of project operation and monitoring an efficient Management and Operation System is developed and maintained as discussed as a part of the Initial Verification in Section 3.1.5 above.

## 4 PROJECT SCORECARD

| Risk Areas | | Conclusions | | | Summary of findings and comments |
|---|---|---|---|---|---|
| | | Baseline Emissions | Project Emissions | Calculated Emission Reductions | |
| Completeness | Source coverage/ boundary definition | ✓ | ✓ | ✓ | All relevant sources are covered by the monitoring plan and the boundaries of the project are defined correctly and transparently. |
| Accuracy | Physical Measurement and Analysis | ✓ | ✓ | ✓ | State-of-the-art technology is applied in an appropriate manner. Appropriate back-up solutions are provided. |
| | Data calculations | ✓ | ✓ | ✓ | Emission reductions are calculated correctly. |
| | Data management & reporting | ✓ | ✓ | ✓ | Data management and reporting were found to be satisfying. Potential for improvement is indicated by open FARs 1 and 2. |
| Consistency | Changes in the project | ✓ | ✓ | ✓ | Results are consistent with underlying raw data. |

## 5 VERIFICATION STATEMENT

Bureau Veritas Certification was commissioned by EN+ Magnesium Limited to carry out, under JI track 1 procedure, the initial and 1st periodic verification of the JI project "Increase in efficiency of water resources use at Bratsk HPP, Irkutsk region, Russian Federation" (sectoral scope 1), based on UNFCCC criteria for the JI, as well as criteria given to ensue consistent project operations, monitoring and reporting. UNFCCC criteria refer to Article 6 of the Kyoto Protocol, the JI rules and modalities and the subsequent decisions by the JI Supervisory Committee, as well as the host country criteria. The verification covers the period from January 1st 2008 to December 31st 2008.

The project presents an effective energy efficiency measure, which envisages the replacement of six old degraded-efficiency wheels of Bratsk HPP with the new high-performance ones. The extra electric energy produced by HPP at the same water resource replaces the electricity that would be generated by Irkutskenergo coal fired Cogeneration Heat and Power Plants in condensing mode.

The verification is carried out as a combined initial and 1st periodic verification. A risk-based approach has been followed to perform the verification. In the course of verification, 2 Corrective Action Requests (CAR) and 2 Forward Action Requests (FAR) were raised. The CAR's were successfully closed. The FAR's are left pending until the next periodic monitoring.

The verification is based on the Monitoring Report (covers January 1st 2008 – December 31st 2008), the Monitoring Plan as set out in the determined PDD Version 6 dated November 2009, with insignificant deviations, and supporting documents which were made available to Bureau Veritas Certification by the project participant.

As a result of the Initial Verification, the Bureau Veritas Certification confirms that all operations of the project are implemented as planned and described in the PDD, the installed wheels run reliably, measuring equipment is calibrated appropriately, the monitoring system is in place and functional. The project is continuously generating emission reductions. It is observed, however, that the project did not receive approvals from the involved parties.

As a result of the 1st Periodic Verification, the Bureau Veritas Certification confirms that the GHG emission reductions are calculated without material misstatement in conservative and appropriate manner.

Bureau Veritas Certification herewith confirms that the project has achieved emission reductions in the above mentioned reporting period as of 341 131 tCO2e.

Bureau Veritas Certification

Leonid Yaskin - Lead Verifier

29/03/2010

# 6 REFERENCES

**Reviewed documents available before the audit on site**

| | |
|---|---|
| 1 | Monitoring Report Version 2 (in Russian) dated 03/03/2010 "On emission of green house gases for JI project "Increase in efficiency of water resources use at Bratsk HPP, Irkutsk region, Russian Federation". Monitoring period 01.01.2008 – 31.12.2008. Irkutsk.<br>Annex 1 to Monitoring Report, "Calculation of emission reduction by BHPP project". |
| 2 | Monitoring Report Version 2 (in English) dated March 2010 "On emission of green house gases for JI project "Increase in efficiency of water resources use at Bratsk HPP, Irkutsk region, Russian Federation". Monitoring period 01.01.2008 – 31.12.2008. Irkutsk.<br>Annex 1 to Monitoring Report, "Calculation of emission reduction by BHPP project". |
| 3 | License No P/2006/0082/100/Л of 11/12/2006 granted to state enterprise "Irkutsk Center for Hydrometeorology and Environment Monitoring with regional functions" by Federal Service for Hydrometeorology and Environment Monitoring. |
| 4 | Technical file on BHPP upper pool post of "Irkutsk Center for Hydrometeorology and Environment Monitoring with regional functions" including the report on post inspection dated 15/12/2008. |
| 5 | Technical file on BHPP lower pool post of "Irkutsk Center for Hydrometeorology and Environment Monitoring with regional functions" including the report on post inspection dated 26/09/2008. |
| 6 | PDD "Increase in efficiency of water resources use at Bratsk HPP, Irkutsk region, Russian Federation" Version 6 dated November 2009. |
| 7 | BVC Determination Report on the JI project "Increase in efficiency of water resources use at Bratsk HPP, Irkutsk region, Russian Federation", dated 21/11/2009. |

**Documents obtained at the site on 24/02/2010**

| | |
|---|---|
| 8 | Act of acceptance of hydro aggregate No 16 from capital repair. Dated 11/03/2007. |
| 9 | Act of acceptance of hydro aggregate No 17 from capital repair. Dated 30/03/2008. |
| 10 | Act of acceptance of hydro aggregate No 14 from capital repair. Dated 30/09/2008. |

| | |
|---|---|
| 11 | Certificate of attestation of "Methodology for measurements of electric energy with the use of automated information-measurement system of commercial accounting of electric energy (AIIS KUE) of participant of measurements at wholesale market of electric energy JSC Irkutskenergo BHPP". Issued by JSC UES of Russia on 31/10.2005. |
| 12 | Technological instruction for Automated information-measurement system of commercial accounting of electric energy (AIS KUE). 2005. |
| 13 | Scheme of transfer of hydrometeorological information of JSC Irkutskenergo by "Irkutsk Centre for hydrometeorology and environment monitoring". Update of 22/12/2009. |
| 14 | Certificate RU.E.229.092.A No 36199 dated 20/09/2009 granted to Automation system of measurements of upper and lower pool levels at JSC Irkutskenergo BHPP by Federal Service for technical Regulation and Metrology (open-ended). |
| 15 | Passports of electric counters Alfa of AIIS KUE. |
| 16 | Status of Shop for Technical Automation and Measurements at BHPP. ПСП 212.013.105-2007. Approved 12/11/2007 |
| 17 | Job description ДИ 212.013051-2008 for BHPP lead engineer on control-metering equipment and automation – head of metering group. Approved 11/-6/2008. |
| 18 | "Regulation and scheme for process of GHG emission reduction monitoring". Approved by Order #63 dated 19/02/2010. |
| 19 | Order #63 dated 19/02/2010 "On approval of "Regulation and scheme for process of GHG emission reduction monitoring". |
| 20 | Standard of JSC Irkutskenergo СТП 001.083.001-2005 "Nomenclature and control of normative documents of management system". |
| 21 | Standard of JSC Irkutskenergo STP 001.083.002-2007 "Accounting, copying, storage, revision of normative documents of management system". |
| 22 | Status of Production and Technical Department of BHPP. ПСП 212.008.109-2007. Approved 20/04/2007 |
| 23 | Instruction for accounting water flow though BHPP. Approved 01/06/2006. Updated 12/03/2008. |
| 24 | Federal State Observation Form No 6-ТП (hydro) for 2008. Yearly data on electric energy generated and supplied. |
| 25 | BHPP daily report (sample dated 17/02/2009). Monitoring data: hydro aggregate operation hours; upper pool and lower pool levels. |
| 26 | Record of hydro aggregate No 16 (sample of 13-26/10/2009 ) |

**Persons interviewed on 24/02/2010:**

| | |
|---|---|
| 1 | Sergey Kuchev – JSC "Irkutskenergo", Head of Department for analysis and |

| | |
|---|---|
| | assessment. |
| 2 | Alexander Vinokurov – JSC “Irkutskenergo”, Lead Economist of Department for analysis and assessment. |
| 3 | Sergey Kuznetsov – BHPP, Chief Engineer. |
| 4 | Viktor Pisarev – BHPP, Head of Production and Technical Department. |
| 5 | Alevtina Myasnikova - BHPP, Lead Engineer of Production and Technical Department. |
| 6 | Igor Pashkevich - BHPP, Head of Shop for Technical Automation and Measurements. |
| 7 | Igor Romanov - BHPP, Head of Shift on Control Board. |
| 8 | Svetlana Razuvaeva - BHPP, Engineer on duty at Control Board. |
| 9 | Nikolay Sakharov - EN+, JI Project Manager. |
| 10 | Eugenia Baidakova - NCSF, Lead Specialist. |

# 7 DISCLAIMER

This report contains the results of the determination of whether the ensuing reductions of anthropogenic emissions by sources reported by the project participant meet the relevant requirements of Article 6 of the Kyoto Protocol and the JI guidelines. The used procedure complies with paragraphs 23, 36, 37 of JI guidelines with a reservation that the project approval by the host Party involved is pending. Based on this verification, Bureau Veritas Certification Holding SAS issues, under the contractual arrangements with EN+ Magnesium Limited, an expert opinion on the emission reductions as envisaged by the RF Government Decree # 843 of 28/10/2009 “About measures on realization of Article 6 of Kyoto Protocol to United Nation Framework Convention on Climate Change”.

## APPENDIX A: COMPANY JI PROJECT INITIAL VERIFICATION PROTOCOL

**Table 1 Initial Verification Protocol**

| Objective | Reference | Comments | Conclusion (CARs/FARs) |
|---|---|---|---|
| ***1. Opening Session*** | | | |
| **1.1. Introduction to audits** | N/A | The Initial Verification and 1st Periodic Verification audit was carried out on the project site on 24/02/10. Prior to the audit, the questionnaire (verification protocol forms) and the audit programme were provided to the client. The opening meeting and interviews were performed in Head Office of Bratsk HPP followed by interviews and inspection of project implementation on the site.<br>Participants of the opening meeting were:<br>- Leonid Yaskin – Bureau Veritas Certification, Lead Verifier<br>- Sergey Kuchev – JSC "Irkutskenergo", Head of Department for analysis and assessment<br>- Alexander Vinokurov – JSC "Irkutskenergo", Economist of Department for analysis and assessment<br>- Sergey Kuznetsov – BHPP, Chief Engineer<br>- Viktor Pisarev – BHPP, Head of Production and Technical Department<br>- Nikolay Sakharov – EN+, JI Project Manager.<br>- Eugenia Baidakova – NCSF, Lead Specialist. | OK |
| **1.2. Clarification of access to data archives, records, plans, drawings etc.** | N/A | The verifier received the open access to all relevant plans, data, records, drawings and equipment. | OK |

| Objective | Reference | Comments | Conclusion (CARs/FARs) |
|---|---|---|---|
| **1.3. Contractors for equipment and installation works**<br>*Who has installed the equipment? Who was contracted for planning etc.?* | /6/ | The new wheels are manufactured JSC «Leningradsky Engineering Metal Works, Saint Petersburg» of Concern "Silovye Machines". Installation was carried out by JSC «Hydroenergoservise – Remont". | OK |
| **1.4. Actual status of installation works**<br>*Project installation should be finished at time of initial verification in so far as the project should be ready to generate emission reductions afterwards.* | /8-10/ | On the day of audit, four wheels # 14,16,17,18 were operational. In the 1st monitoring period 01/01/08 – 31/12/08 three new wheels # 14, 16, 17 operated. Refer to the acts of turbine acceptance from repair. | OK |
| ***2. Open issues indicated in validation report*** | | | |
| **2.1. Missing steps to final approval**<br>*Especially in projects which are not yet registered at JISC, there might be some outstanding issues which should have been indicated by the validation report* | /7/ | The project did not receive the host Party's approval. | CAR 01 in [7] |
| ***3. Implementation of the project*** | | | |

| Objective | Reference | Comments | Conclusion (CARs/FARs) |
|---|---|---|---|
| *This part is covering the essential checks during the on-site inspection at the project's site, which is indispensably for an initial verification* | | | |
| **3.1. Physical components** *Check the installation of all required facilities and equipment as described by the PDD.* | /6/ | The installation was checked on site, all facilities correspond with PDD. | OK |
| **3.2. Project boundaries** *Check whether the project boundaries are still in compliance with the ones indicated by the PDD.* | /6/ | The project boundaries are BHPP and Thermal Power Plants (TPP) of JSC Irkutskenergo, in line with PDD Section B.3. | OK |
| **3.3. Emission reduction achieved** *Compare the value of emission reduction achieved with that estimated in PDD and explain the difference if any* | /1,6/ | Estimated amount of emission reductions in 2008 is 341 915 $tCO_2e$ whereas the amount achieved is 341 130 $tCO_2e$. The difference 0,2% is negligible for the purpose of Initial Verification. This cause for the deviation is explained in MR Section B.5 (the use of more accurate values of water levels and life between wheels overhauls). | OK |
| **3.4. Monitoring and metering systems** *Check whether the required metering systems have been installed. The meters have to* | /3-5,11-14/ | The metering system is installed and it was inspected on site. It is in compliance with national law and power industry regulations. Electric energy is measured with the use of the certified Automated information-measurement system of commercial accounting of electric energy industry (AIIS KUE). Upper pool and lower pool levels are measured by licensed "Irkutsk Centre for | OK |

| Objective | Reference | Comments | Conclusion (CARs/FARs) |
|---|---|---|---|
| *comply with appropriate quality standards applicable for the used technology.* | | hydrometeorology and environment monitoring" and duplicated by the certified Automation system of measurements of upper and lower pool levels at JSC Irkutskenergo BHPP. | |
| **3.5. Data uncertainty**<br>*How will data uncertainty be determined for later calculations of emission reductions? Is this in compliance with monitoring and metering equipment?* | /3-5,11-14/ | A special requirement for data uncertainty was not defined in the PDD. All used metering systems are certified (see 3.4 above). | OK |
| **3.6. Calibration and quality assurance**<br>*Check how monitoring and metering systems are subject to calibration and quality assurance routines*<br>*a) with installation*<br>*b) during future operation* | /15-17/ | The measurements are carried out by metering equipment calibrated in accordance with the Federal Law №102 "About Unity of Measurements". During the audit, the passports of all the used electric counters were checked and their status of calibration was positively verified (calibration once per 8 years). Responsibility for maintenance of metering equipment is established, documented and communicated. | OK |
| **3.7. Data acquisition and data processing systems**<br>*Check the eligibility of used systems.* | /11-14/ | Please refer to 3.4 above. | OK |
| **3.8. Reporting procedures**<br>*Check how reports with relevance for the later determination of emission reductions will be generated* | /18-21/ | Detailed reporting procedures are described in "Regulation and scheme for process of GHG emission reduction monitoring" (further Regulation) approved by JSC Irkutskenergo Order #63 dated 19/02/2010. Normative documentation of the company management system is controlled by Irkutskenergo Standards. | OK |

| Objective | Reference | Comments | Conclusion (CARs/FARs) |
|---|---|---|---|
| **3.8. Documented instructions** *Check whether the personnel performing tasks with sensitivity for the monitoring of emission reductions have access and knowledge of documented instructions, forming a part of the project's management system.* | /1,18/ | The staff concerned has developed the manual "Regulation and scheme for process of GHG emission reduction monitoring" and therefore is well aware of the monitoring and reporting tasks. Two departments are directly involved in monitoring: Department for Analysis and Assessment (IE Strategy Directorate) and Production and Technological Department (BHPP). Refer to list of Persons interviewed (numbers 1-5). | OK |
| **3.9. Qualification and training** *Check whether the personnel performing tasks with sensitivity for the monitoring of emission reductions has the appropriate competences, capabilities and qualifications to ensure the required data quality.* | /1,18/ | The personal in charge of monitoring and reporting tasks are the managers and lead specialists of Department for Analysis and Assessment (IE Strategy Directorate) and Production and Technological Department (BHPP). Refer to list of Persons interviewed (nos.1-5). | OK |
| **3.10. Responsibilities** *Check whether all tasks required to gather data and prepare a monitoring report with the necessary quality have been allocated to responsible employees.* | /1,18/ | Responsibilities of the personal concerned (refer to 3.9 above) is established, documented and communicated.<br>However, the following request has to be considered.<br>**FAR 01.** According to MR Section B.1, the monitoring report is to be prepared by JSC NCSF whereas according to the company Regulation, this is the responsibility of Lead Economist from IE Department for Analysis and Assessment. This discrepancy should be eliminated. | Pending |

| Objective | Reference | Comments | Conclusion (CARs/FARs) |
|---|---|---|---|
| **3.11. Troubleshooting procedures**<br>*Check whether there are possibilities of redundant data monitoring in case of having problems with the used monitoring equipment. Such procedures may reduce risks for the buyers of emission reductions (e.g. the Client)* | /11/ | The Automated information-measurement system of commercial accounting of electric energy industry (AIIS KUE) envisages the acquisition of data from two reserved lines. | OK |
| ***4. Internal Data***<br>*Identifying the internal GHG data sources and ways in which the data have been collected, calculated, processed, aggregated and stored should be part of initial verification to assess accuracy and reliability of the internal GHG data.* | | | |
| **4.1. Type and sources of internal data**<br>*Acquire information on type and source of internal GHG data, which is used in calculations of emission reductions. E.g.." continuous direct measurements", "site-specific* | /6/ | Internal data to be monitored throughout the crediting period are:<br>- annual electricity production by turbine No. 1-18;<br>- annual electricity production by Bratsk HPP;<br>- annual operation hours for turbine No. 1-18;<br>- the number of years from the last repair for turbine No 1-18;<br>- daily upper and lower pool levels.<br>Default parameter is the ex-post emission factor for Irkutskenergo TPP in | OK |

| Objective | Reference | Comments | Conclusion (CARs/FARs) |
|---|---|---|---|
| *correlations", "periodic direct measurements", "use of models" and/or "use of default emissions factors".* | | condensing mode.<br>Used models are the equations for calculation of wheel efficiency and mechanical capacity. | |
| **4.2. Data collection**<br>*How is data collected and processed? What are the means of quantifying emissions from the different data sources?* | /1, 6/ | The electricity delivered to the grid is measured continuously by the Automated system AIIS KUE. Data on turbine operating hours and start/completion of repair period are recorded manually in daily operational reports. Data on upper and lower levels are communicated daily by the Irkutsk Centre for hydrometeorology and environment monitoring.<br>The processing of the data is performed according to the Monitoring Plan and described in 1st MR, Section B.2., | OK |
| **4.3. Quality assurance**<br>*Does internal data collection underlie sufficient quality assurance routines?* | /1, 6/ | The internal control of data by second independent persons is on sufficient level as specified in the Regulation, Section "Quality of GHG emission calculations" and 1st MR, Section B.2. | OK |
| **4.4. Significance and reporting risks**<br>*Assess the significance and reporting risks related to the different internal data sources. Potential reporting risks may be related to the calculation methods, accuracy of data sources and data collection and/or the information systems from which data is obtained.* | /1, 6/ | The risks might be human errors done during manual data recording and transfer of measured data to the excel spread sheet. But regarding to control by independent persons, as described above, the risks are minimized. No errors were observed | OK |

| Objective | Reference | Comments | Conclusion (CARs/FARs) |
|---|---|---|---|
| *The significance of and risks associated with the data source indicate the level of verification effort required at a later stage.* | | | |
| ***5. External Data***<br>*Especially for data of baseline emissions there might be the necessity to include external data sources. The access to such data and a proof of data quality should be part of initial verification. If it is deemed to be necessary, an entity delivering such data should be audited.* | | | |
| **5.1. Type and sources of external data**<br>*Acquire information on type and source of external data, which is used in calculations of emission reductions.* | N/A | Not applicable. External data are not used. | OK |
| **5.2. Access to external data**<br>*How is data transferred? How can reproducibility of data set be ensured?* | N/A | Not applicable. | OK |
| **5.3. Quality assurance**<br>*Does external data underlie any* | N/A | Not applicable. | OK |

| Objective | Reference | Comments | Conclusion (CARs/FARs) |
|---|---|---|---|
| *quality assurance routines?* | | | |
| **5.4. Data uncertainty**<br>*Is it possible to assess the data uncertainty of external data? Are such routines included in reporting procedures?* | N/A | Not applicable. | OK |
| **5.5. Emergency procedures**<br>*Are there any procedures, which will be applicable if there is no access to relevant external data?* | N/A | Not applicable. | OK |
| ***6. Environmental and Social Indicators***<br>*A Monitoring Plan may comprise environmental and/or social indicators, which could be necessary to monitor for the success of the project activity.* | | | |
| **6.1. Implementation of measures**<br>*A project activity may demand for the installation of measures (e.g. filtering systems or compensation areas), which are exceeding the local legal requirements. A check of the* | /6/ | Generation of additional electric energy at BHPP replaces power capacities of Irkutskenergo what should result in reduction of coal combustion and lowering of environmental impact of Irkutskenergo power plants. The monitoring plan does not specify any environmental or social indicators to be monitored for the success of the project activity. All environmental measures are not exceeding the local legal requirements. Social impact of the project is not identified. | OK |

| Objective | Reference | Comments | Conclusion (CARs/FARs) |
|---|---|---|---|
| *implementation or realization of such measures should be part of the initial verification.* | | | |
| **6.2. Monitoring equipment** *Check where necessary whether the required metering systems have been installed. The meters have to comply with appropriate quality standards applicable for the used technology.* | N/A | Not applicable. Refer to 6.1 above | OK |
| **6.3. Quality assurance procedures** *What quality assurance procedures will be applied for such data?* | N/A | Not applicable. Refer to 6.1 above | |
| **6.4. External data** *Check the quality, reproducibility and uncertainty of external data.* | N/A | Not applicable. Refer to 6.1 above | |
| **7. Management and Operational System** *In order to ensure a successful operation of a Client project and the credibility and verifiability of the ERs achieved, the project must have a well-defined* | | | |

| Objective | Reference | Comments | Conclusion (CARs/FARs) |
|---|---|---|---|
| *management and operational system.* | | | |
| **7.1. Documentation** *The system should be documented by manuals and instructions for all procedures and routines with relevance to the quality of emission reductions. The accessibility of such documentations to persons working on the project has to be secured.* | /18,19/ | The company management and operational system for GHG emission monitoring and reporting is described in the specially prepared manual "Regulation and scheme for process of GHG emission reduction monitoring" which was approved by the IE General Manager Order. The Regulation provides the scope of application, definition of primary data, requirements to and responsibilities for data collection, recording, storage, protection, transfer, consolidation, processing, reporting. The Regulation was prepared by the personal concerned that is well informed and qualified for performing the monitoring and reporting tasks. | OK |
| **7.2. Qualification and training** *The system should describe the requirements on qualification and the need of training programs for all persons working on the emission reduction project. Performed training programs and certificates should be archived by the system.* | /18/ | Please refer to 3. 9 and 7.1 above. | OK |
| **7.3. Allocation of responsibilities** *The allocation of responsibilities should be documented in written* | /18,19/ | Please refer to 3.10 and 7.1 above. | OK |

| Objective | Reference | Comments | Conclusion (CARs/FARs) |
|---|---|---|---|
| *manner.* | | | |
| **7.4. Emergency procedures** *The system should contain procedures, which provide emergency concepts in case of unexpected problems with data access and/or data quality.* | N/A | **FAR 02**. Please develop a procedure, which provides emergency concepts in case of unexpected problems with data access and/or data quality. | Pending |
| **7.5. Data archiving** *The system should provide routines for the archiving of all data, which is required for verifying the project's performance in the context of consecutive verifications.* | /1,18/ | Requirements for data archiving are defined in the Regulation and 1st MR. | OK |
| **7.6. Monitoring report** *The system includes procedures for the calculation of emission reductions and the preparation of the monitoring report.* | /1,18/ | Procedures for the calculation of emission reductions and the preparation of the monitoring report are defined in the Regulation and 1st MR.<br>Conclusion is pending a response to FAR 01. | Pending |
| **7.7. Internal audits and management review** *The system includes internal control procedures, which allow the identification and solution of problems at an early stage.* | N/A | **CAR 01**. Please develop and implement procedure of independent internal audit and management review of the 1st monitoring process. | OK |

## APPENDIX B: COMPANY PERIODIC VERIFICATION PROTOCOL

### Table 1 Data management system/controls

| Expectations for GHG data management system/controls | Scores | Verifiers Comments (including *Forward Action Requests*) |
|---|---|---|
| A. Defined organisational structure, responsibilities and competencies | | |
| **A.1. Position and roles**<br>Position and role of each person in the GHG data management process is clearly defined and implemented, from raw data generation to submission of the final data. Accountability of senior management must also be demonstrated. | Full | The company management and operational system for GHG emission monitoring and reporting is described in the specially prepared manual "Regulation and scheme for process of GHG emission reduction monitoring" (further Regulation) which was approved by the IE General Manager Order #63 dated 19/02/2010. (further Order).<br>In particular, the Order defines roles and responsibilities of Deputy General Manager on Strategy and Development, Head of IE Strategy Directorate, Head of IE Directorate for Information Technologies, Head of IE Department for Analysis and Assessment, Technical Director of BHPP, Head of BHPP Production and Technical Department.<br>The Regulation clearly defines the scope of application, types of primary data, responsibilities of each person for and requirements to data collection, recording, storage, protection, transfer, consolidation, processing, reporting.<br>The 1st Monitoring Report (further MR) dated February 2010 for the monitoring period from 01/01/2008 to 31/12/2008 takes most provisions of the Regulation. |
| **A.2. Responsibilities**<br>Specific monitoring and reporting tasks and responsibilities are included in job descriptions | Partial | General and specific monitoring and reporting tasks and responsibilities of relevant functions on IE and BHPP levels are specified by the Order.<br>However, FAR 01 from Initial Verification Protocol has to be responded. |

| | | |
|---|---|---|
| or special instructions for employees. | | |
| **A.3. Competencies needed**<br>Competencies needed for each aspect of the GHG determination process are analysed. Personnel competencies are assessed and training programme implemented as required. | Full | The competencies for each step of the GHG monitoring process have been checked. Knowledge of the GHG operational monitoring process is available. The Regulation was prepared by the managers and lead specialists of IE and BHPP who themselves are in charge of monitoring and reporting tasks. Hence there was no need of special training. |
| **B. Conformance with monitoring methodology** | | |
| **B.1. Reporting procedures**<br>Reporting procedures should reflect the monitoring methodology content. Where deviations from the monitoring plan occur, the impact of this on the data is estimated and the reasons justified. | Full | Reporting procedures fully reflect the monitoring methodology content. Minor deviations from PDD Monitoring Plan are specified in MR Section B.5. The impact of these on the data is analyzed and reasonable conclusion about insignificant influence is made. . |
| **B.2. Necessary Changes**<br>Necessary changes to the monitoring methodology are identified and changes are integrated in local procedures as necessary. | Full | No changes from the PDD monitoring methodology are introduced. |
| **C. Application of GHG determination methods** | | |
| **C.1. Methods used**<br>There are documented description of the methods used to determine GHG emissions and justification for the chosen methods. If applicable, procedures for capturing emissions from non-routine or exceptional events are in place and implemented. | Full | The used monitoring methodology formalized in terms of the electronic tool was properly documented in MR and closely followed. The tool was made available to the verifier at the determination stage, so it was easy to check the calculations reported in MR. |
| **C.2. Information/process flow** | Partial | Annex 1 to the Order contains a process flow scheme, describing the entire |

| | | |
|---|---|---|
| An information/process flow diagram, describing the entire process from raw data to reported totals is developed. | | process from raw data to reported totals.<br>**CAR 02.** Please include the process flow scheme in the MR. Closed |
| **C.3. Data transfer**<br>Where data is transferred between or within systems/spreadsheets, the method of transfer (automatic/manual) is highlighted – automatic links/updates are implemented where possible. All assumptions and the references to original data sources are documented. Manual transfer has occurred. | Full | Data transfer between or within different areas of responsibilities on IE and BHPP is clearly described in the Order and MR Section B.1. Manual transfer was occurred both in IE and BHPP. |
| **C.4. Data trails**<br>Requirements for documented data trails are defined and implemented and all documentation are physically available. | Partial | Requirements for documented data trials are implemented as defined in PDD Section D.3 with the only exception: NCSF is included with the function to prepare the MR. This is not envisaged in the Regulation where the responsibility for MR preparation is rested with Lead Economist of IE Department for Analysis and Assessment.<br>FAR 01 from Initial Verification Protocol has to be responded. |
| **D. Identification and maintenance of key process parameters** | | |
| **D.1. Identification of key parameters**<br>The key physical process parameters that are critical for the determination of emission factors are identified. | Full | The key physical process parameters are identified in full compliance with PDD Monitoring Plan. |
| **D.2. Calibration/maintenance**<br>Appropriate calibration/maintenance requirements are determined. | Full | Records of calibration of electric meters were checked and the status of calibration was positively verified. |
| **E. GHG calculations** | | |
| **E.1. Use of estimates and default data** | Partial | Ex-ante Emission Factor (EF) of Irkutskenergo TPP in condensing mode based |

| | | |
|---|---|---|
| Where estimates or default data are used, these are validated and periodically evaluated to ensure their ongoing appropriateness and accuracy, particularly following changes to circumstances, equipment etc. The validation and periodic evaluation of this is documented. | | on data for 2006-2008 was used as default data justified in PDD. |
| **E.2. Guidance on checks and reviews**<br>Guidance is provided on when, where and how checks and reviews are to be carried out, and what evidence needs to be documented. This includes spot checks by a second person not performing the calculations over manual data transfers, changes in assumptions and the overall reliability of the calculation processes. | Full | Internal spot checks and reviews of the calculation results by a second person are envisaged in the Regulation Section 8 and MR Section B.1. |
| **E.3. Internal verification**<br>Internal verifications include the GHG data management systems to ensure consistent application of calculation methods. | Full | According to the Annex 1 to the Order and Regulation Section 10, Head of IE Strategy Directorate endorses the MR submitted by Head of IE Department for Analysis and Assessment. |
| **E.4. Internal validation**<br>Data reported from internal departments should be validated visibly (by signature or electronically) by an employee who is able to assess the accuracy and completeness of the data. Supporting information on the data limitations, problems should also be included in the data trail. | Full | According to the Annex 1 to the Order, Regulation Section 10 and the MR Section B.1, Deputy Director on Strategy and Development Head of IE Strategy Directorate validates by the signature the MR submitted by Head of IE Strategy Directorate. |
| **E.5. Data protection measures**<br>Data protection measures for | Full | Electronic databases and calculation spreadsheets are protected by access restrictions and editor rights in the frame of IE procedures for control of electronic |

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| databases/spreadsheets should be in place (access restrictions and editor rights). | | data bases. |
| **E.6. IT systems**<br>IT systems used for GHG monitoring and reporting should be tested and documented. | Full | Data collection and results reporting are based on standard Microsoft Windows tools. The supporting IT systems are maintained on the basis of IE procedures. Responsibility of Directorate for Informational Technologies is defined by the Order and specified in the Regulation. |

**Table 2 GHG calculation procedures and management control testing & Detailed audit and random testing of residual risk areas**

| Identification of potential reporting risk | Identification, assessment and testing of management controls | Areas of residual risks | Additional verification testing performed | Conclusions and Areas Requiring Improvements (including Forward Action Requests) |
|---|---|---|---|---|
| *The following potential risks were identified and divided and structured according to possible areas of occurrence.* | *The following measures were implemented in order to minimize the corresponding risks.* | *Despite the measures implemented in order to reduce the occurrence probability the following residual risks remain and have to be addressed in the course of verification* | *Additional verification testing performed is described. Testing may include: sample cross checking of manual transfers of data; recalculation; spreadsheet 'walk throughs' to check links and equations; inspection of calibration and maintenance records for key equipment; check sampling analysis results; discussions with process engineers who have detailed knowledge of process uncertainty and error bands.* | *Having investigated the residual risks, the conclusions should be noted here. Errors and uncertainties are highlighted.* |
| **I Raw data generation** | | | | |

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| • Installation of new monitoring equipment<br>• Dysfunction of installed equipment<br>• Maloperation by operational personnel<br>• Downtimes of equipment<br>• Replacement of equipment | • All installed electric energy measuring devices are to high power industry standard<br>• Overall responsibility is assigned to the metrologist function<br>• Only skilled and trained personnel is allowed to operate the relevant equipment and take metering records<br>• Regular visual inspections of equipment<br>• Immediate replacement of dysfunctional equipment<br>• Stand-by equipment is available<br>• Internal checks of technological discipline | • None | • N/A | N/A |

| **II Raw data collection** | | | | |
|---|---|---|---|---|
| • Metering records<br>• Process monitors | • Exclusively installation and operation of duly | • Human mistakes in measurements | • On-site interviews with the personnel in charge | All interviewed staff showed competence |

| | | | | |
|---|---|---|---|---|
| •Operational logs<br>•Calibration and maintenance data<br>•Manuals and other vendor data<br>•Accounting records<br>•Accuracy of data supplied | calibrated equipment<br>•Proper maintenance of data and document control procedure<br>•Implementation of data traceability checking<br>•Responsibilities for the raw data collection are established in the Order<br>•Proper validation of data by an appointed person<br>•Appropriate archiving system defined by the Order<br>•Regular inspections from IE | •Unintended use of old data that has been revised<br>•Incomplete records and documentation<br>•Ex-post corrections of data records<br>•Big amounts of information<br>•Manual data collection mistakes can only be minimized | •Inspection of meters calibration and maintenance records<br>•Passports for key monitoring equipment were inspected<br>•On-site evaluation of the monitoring routines and practices<br>•On-site review of records and documents<br>•Cross-checking of accounting records<br>•Discussions with process engineers who have detailed knowledge of process uncertainty & error ranges | based on training and experience.<br>Human mistakes in measurements are unlikely.<br>No uncertainties or errors regarding the raw data collection were observed in the course of verification. |

| **III Data aggregation** | | | | |
|---|---|---|---|---|
| •AIIS KUE system<br>•IT systems<br>•Spread sheet | • Maintenance of AIIS KUE<br>•Clear allocation of | •Manual data transfer mistakes can only be minimized | •On-site discussions with the personnel in charge<br>•Sample cross checking of | All interviewed staff showed competence based on training and experience. |

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|---|---|---|---|---|
| programming<br>•Manual data transmission<br>•Data protection<br>•Responsibilities<br>•Problems caused by updating, upgrading or change of applied software | responsibilities<br>•Training to MP procedures<br>•Use of internally verified software model<br>•Corporate procedures for protection and back-up of electronic and paper data<br>•Verification of data handling by the experienced engineer | •Unintended change of spread sheet programming of data calculation or data base entries | the information of the data base<br>•All data which was used in the calculation sheets was explicitly checked for consistency and adequacy | Human mistakes in measurements are unlikely.<br>No uncertainties or errors regarding data aggregation were observed in the course of verification. |

| **IV Calculation parameters** | | | | |
|---|---|---|---|---|
| •Data sources<br>•Uncertainties | •All parameters and data to be used are defined in the validated monitoring plan | •Danger of overestimating of baseline emissions due to the use of ex-ante grid emission factor | •Conservative estimations of emission reductions in 2008 are ensured | No uncertainties or errors regarding calculation parameters were observed in the course of verification.<br>Human mistakes in misuse of data are unlikely.<br>**FAR 03** was issued to mitigate the risks. |

| V Calculation methods | | | | |
|---|---|---|---|---|
| • Calculation approach<br>• Applied formulae<br>• Implemented IT Systems<br>• Data storage<br>• Consistency in following the monitoring plan<br>• Control of electronic data | • Validated methodology and electronic tool for calculation of emission reduction<br>• Use of standard software<br>• Implementation of data traceability<br>• Check of transfer of formulas and algorithms into excel<br>• A detail review of excel spreadsheet<br>• Appropriate IT and archiving system<br>• An experienced lead economist is appointed for processing of operational data and calculation of emission reductions | • The use of the electronic calculation tool requires permanent assessment<br>• Manual data transfer mistakes can only be minimized<br>• The danger of miscalculation can only be minimized<br>• Uncontrolled copies of spreadsheets can be mixed with the controlled ones | • Conservative estimations of emission reductions are ensured<br>• On-site discussions with the user of the electronic tool<br>• On-site assessment of control of calculation spreadsheets<br>• Off-site check of all equation and algorithms used in spreadsheets<br>• Random-wise electronic recalculations | No uncertainties or errors regarding calculation methods were observed in the course of verification.<br>Human mistakes in misuse of electronic tool are unlikely. |

| VI Monitoring reporting | | | | |
|---|---|---|---|---|
| • Data transfer to/by the | • An experienced leading | • The danger of the | • Cross checking of the | No uncertainties or errors |

| | | | | |
|---|---|---|---|---|
| author of the monitoring report<br>• Issuance of the monitoring report<br>• Verification and validation of the monitoring report | specialist is appointed for preparation of the 1st MR.<br>• Report is checked for adequacy<br>• Monitoring report is verified and validated<br>• Use of predefined structure of and tabular forms in the monitoring report so that interfaces are minimized<br>• Signs of control are in evidence | manual data transfer can only be minimized | information of the monitoring report and the original data was made available at the project visit. | regarding the monitoring reporting were observed in the course of verification. |

| **VII Management system** | | | | |
|---|---|---|---|---|
| • Inadequacy of management system<br>• Flaws of management system | • Regulation contains main elements of management system<br>• Personnel shows competence and commitments | • Lack of structured internal audits and reviews of JI project operation may lead to deviation from the Regulation and flaws in monitoring and reporting | • Personal is skilled and committed | **CAR 01** was issued to strengthen the management system for GHG monitoring.<br>No uncertainties or errors regarding the maintenance of the monitoring system (Regulation) were observed in the course of verification. |

## APPENDIX C: RESOLUTION OF CORRECTIVE AND FORWARD ACTION REQUESTS

**Initial Verification Protocol (INV) and First Periodic Verification Protocols (FPV)**

**Table 1: Resolution of Corrective Action and Forward Action Requests**

| Corrective Action and Forward Action Requests by verification team | Ref. to checklist question in INV and FPV | Summary of project owner response | Verifacation team conclusion |
|---|---|---|---|
| **CAR 01.** The project has no approval of the Host Party. | Determination Report Table 1 Item 1 | | Pending. |
| **CAR 01**. Please develop and implement procedure of independent internal audit and management review of the 1st monitoring process. | INV 7.7 | The procedure of independent internal audit and management review of the 1st monitoring process was developed and implemented. Report was sent to the verification team | CAR is closed based on due corrective action made. |
| **CAR 02.** Please include the process flow scheme in the MR. | FPV C.2 | The process flow scheme was included in MR. | CAR is closed based on due amendment made to MR. |
| **FAR 01.** According to MR Section B.1, the monitoring report is to be prepared by JSC NCSF whereas according to the company Regulation, this is the responsibility of Lead Economist from IE Department for Analysis and Assessment. This discrepancy should be eliminated. | INV 3.10 | It will be considered in the next MR. | Pending.<br>FAR should be implemented before the next MR. |

| | | | |
|---|---|---|---|
| **FAR 02**. Please develop a procedure, which provides emergency concepts in case of unexpected problems with data access and/or data quality. | INV 7.4 | It will be considered in the next MR. | Pending.<br>FAR should be implemented before the next MR. |

## Appendix B: Verification Team's CV's

**Mr. Leonid Yaskin, PhD (thermal engineering)**
Climate change Lead Verifier.
Bureau Veritas Certification Rus General Director, Climate Change Local Manager, Lead Auditor, IRCA Lead Tutor, Lead Verifier

He has over 30 years of experience in heat and power R&D, engineering, and management, environmental science and investment analysis of projects. He worked in Krrzhizhanovsky Power Engineering Institute, All-Russian Teploelectroproject Institute, JSC Energoperspectiva. He worked for 8 years on behalf of European Commission as a monitor of Technical Assistance Projects. He is a Lead auditor of Bureau Veritas Certification for Quality Management Systems (IRCA registered), Environmental Management System (IRCA registered), Occupational Health and Safety Management System (IRCA registered). He performed over 250 audits since 2002. Also he is a Lead Tutor of the IRCA registered ISO 14000 EMS Lead Auditor Training Course, and a Lead Tutor of the IRCA registered OHSAS 18001 Lead Auditor Training Course. He is an Assuror of Social Reports. He has undergone intensive training on Clean Development Mechanism /Joint Implementation and was/is involved in the determination of over 50 JI projects.

**Ivan G. Sokolov, Dr. Sci. (biology, microbiology)**
Climate Change Lead Verifier, Internal Technical Reviewer, Bureau Veritas Certification Holding SAS Local Climate Change Product Manager for Ukraine.

He has over 25 years of experience in Research Institute in the field of biochemistry, biotechnology, and microbiology. He is a Lead auditor of Bureau Veritas Certification for Environment Management System (IRCA registered), Quality Management System (IRCA registered), Occupational Health and Safety Management System, and Food Safety Management System. He performed over 140 audits since 1999. Also he is Lead Tutor of the IRCA registered ISO 14000 EMS Lead Auditor Training Course, and Lead Tutor of the IRCA registered ISO 9000 QMS Lead Auditor Training Course. He has undergone intensive training on Clean Development Mechanism /Joint Implementation and he is involved in the determination/verification of over 40 JI projects.