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Validation Report

ACR Validation of Monjolinho Energética S/A Hydropower Plant Project (Alzir dos Santos Antunes)

DEVELOPED BY: DNV GL USA AND CANADA SUSTAINABILITY, BUSINESS ASSURANCE

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Client: Embrasca Inc.	Client ref.: Franco Grassi

Summary:
Det Norske Veritas (U.S.A), Inc (DNV GL) has performed the validation of the project activity "Monjolinho Energética S/A Hydropower Plant Project (Alzir dos Santos Antunes)" in Brazil to confirm that the project design, as documented, is sound and reasonable and meets the identified criteria. The validation was performed on the basis of ACR requirements for ACR projects, as well as criteria given to provide for consistent project operations, monitoring and reporting.

The validation was conducted by means of document review, follow-up interviews and site inspection, and the resolution of outstanding issues. The review of the project design documentation and the subsequent follow-up interviews and site inspection have provided DNV GL with sufficient evidence to determine the fulfilment of stated criteria.

In summary, it is DNV GL's opinion that the project activity "Monjolinho Energética S/A Hydropower Plant Project (Alzir dos Santos Antunes)" as described in the GHG Project Plan from October 2014, meets all relevant ACR requirements for ACR projects and correctly applies the CDM methodology ACM0002 "Grid-connected electricity generation from renewable sources", version 15.0. Hence, DNV GL recommends the registration of the project as a ACR project activity.

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American Carbon Registry Validation Report for the Monjolinho Energética S/A Hydropower Plant Project (Alzir dos Santos Antunes)		Emission reductions American Carbon Registry	Market sector: Power generation and distribution

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Table of Contents

List of Tables

ABBREVIATIONS

ACR	American Carbon Registry
AFOLU	Agriculture, Forestry & Land Use
ANEEL	National Agency of Electric Energy
ANSI	American Nationals Standards Institute
CCEE	Brazilian Chamber of Electrical Energy Commercialization
CDM	Clean Development Mechanism
CO_2e	Carbon Dioxide Equivalent
DNA	Designed National Authority
ERTs	Emission Reduction Tons
GHG	Greenhouse Gas
PD	Project Document
SIN	Brazilian National Interconnected System

1. INTRODUCTION

Det Norske Veritas (U.S.A), Inc. (DNV GL) has been contracted by the Embrasca, Inc (Embrasca) to perform a validation of the "Monjolinho Energética S/A Hydropower Plant Project (Alzir dos Santos Antunes)" in Brazil. The validation was completed as required by the American Carbon Registry Standard Version 3.0, February, 2014 (ACR Standard Version 3.0). This report contains the findings from the project validation.

1.1 *Validation Objective*

The purpose of a validation is to have an independent third party assess the project design. In particular, the project's baseline, monitoring plan, and compliance with relevant ACR criteria are validated in order to confirm that the project design, as documented, is sound and reasonable and meets the identified criteria.

The ACR requires accredited third-party validation of all GHG projects, as specified in the ACR Standard Version 3.0[1], and is necessary to provide assurance to stakeholders of the quality of the project and its intended generation of the Emission Reduction Tons (ERTs). DNV GL is an American National Standards Institute (ANSI) accredited verifier (Accreditation Number 0981), and is therefore accredited to conduct third-party validations of ACR projects.

1.2 *Validation Scope and Criteria*

The validation scope is defined as an independent and objective review of the ACR project plan. The ACR project plan is reviewed against the criteria stated in the ACR Standard Version 3.0[1] and the relevant documents and policy announcements made by the ACR, including the CDM methodology ACM0002, version 15.0.[2]

The validation does not include project consulting. However, requests for clarifications and/or corrective actions may have provided input for improvement of the project design.

According to ACR, the criteria to be applied during this validation include those contained in the following protocols:

- ACR Standard Version 3.0.[1]
- CDM approved baseline and monitoring methodology ACM0002, version 15.0.[2]
- ISO 14064-3:2006 – Greenhouse gases, Part 3. Specification with guidance for the validation and verification of greenhouse gas assertions.[3]

1.3 *Level of Assurance*

During the validation, DNV GL has focused on providing a reasonable level of assurance that;

- The project conforms to the ACR Standard Version 3.0 and CDM approved baseline and monitoring methodology ACM0002, version 15.0. [1, 2]
- The emission reduction calculation methodology used is appropriate and correctly applied.

In addition, DNV GL applies materiality of 5 per cent in accordance with the requirements in ACR Standard Version 3.0.

1.4 *Summary description of the project*

The Monjolinho Project is an hydropower plant located in the municipalities of Faxinalzinho and Nonoai, Rio Grande do Sul state, Brazil, with an installed capacity of 74 MW. Being a renewable electricity project, the project activity will generate greenhouse gas (GHG) emission reductions by avoiding the CO_2 emissions from the electricity generation by fossil fuel power projects.

The project activity basic equipment consists of two Francis turbines of 37.75 MW nominal power and two generators of 41.11 MVA nominal power with a 0.90 capacity factor. The project activity reservoir area is 5.46 km^2.

2. VALIDATION PROCESS

DNV GL has undertaken validation activities and compiled the validation team and tasks based on the complexity of Monjolinho's GHG emission reductions and the underlying data supporting them. The validation team and process are summarized below and in Table 1.

Validation Team	
Felipe Lacerda Antunes	Lead Validator
Gabriel Baines	Validator
Andrea Leiroz (until September 1, 2014)	Senior Internal Reviewer
Weidong Yang (from September 1, 2014)	Senior Internal Reviewer

Table 1: Validation Activities

Task	Activities	Completion Date
1	Validation kick-off meeting	December, 2013.
2	Conflict of Interest form approved by ACR	December 16, 2013
3	Desk review	13 – 29 January, 2014.
4	Site visit	30 January, 2014.

5	Drafting of validation report and review	1 February, 2014 – 17 October, 2014.
6	Quality assurance and corporate review	November 3, 2014
7	Submission of validation report and opinion to Project Developer	November 3, 2014
8	Validation report and opinion submitted to ACR	November 7, 2014

2.1 *Desk Review*

The documents provided by the project developer, including the GHG project plan, emission reductions spreadsheet, and legal documents were assessed.[4,5,6,7,8] Initial risk areas related to the emission reduction estimates were identified through the document review. The site visit agenda was prepared according to items noted during the desk review.

2.2 *Site Visit*

On 30 January, 2014 Gabriel Baines from DNV GL performed a site visit at the project site in Nonoai, RS and the surrounding area. On-site, DNV GL confirmed that the actual implementation of the project corresponded to the description contained in the project plan. [5]

During the site visit, DNV GL was also able to identify and request additional documents to demonstrate compliance with ACR requirements related to the project eligibility and emission reduction estimates.

2.3 *Resolution of any material discrepancy*

The objective of this phase of the validation was to resolve any outstanding issues that needed be clarified prior to DNV GL's positive conclusion on the project design.

A corrective action request (CAR) is issued if one of the following occurs:

- The project participants have made mistakes that will influence the ability of the project activity to achieve real, measurable additional emission reductions.
- The ACR requirements have not been met.
- There is a risk that emission reductions cannot be monitored or calculated.

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

A forward action request (FAR) is raised during validation to highlight issues related to project implementation that require review during the first verification of the project activity. FARs do not relate to the ACR requirements for registration.

Twelve CARs were raised during the ACR validation process, and all of them were closed. No CL nor FAR was raised.

3. VALIDATION FINDINGS

3.1 *Project Eligibility Criteria*

The ACR Standard Version 3.0 establishes that a project must satisfy some eligibility criteria to meet the definition of a GHG reduction project. DNV GL verified that the Monjolinho Project is in conformance with these eligibility criteria. DNV GL's methods for confirming Monjolinho project's eligibility with the criteria are discussed below.

3.1.1 Project Start Date

DNV GL verified that Monjolinho began generating electricity on 3 September 2009, when both turbined were operating[6]. Therefore, DNV GL can verify that the project is in conformance with the ACR start date requirements for non-Agriculture, Forestry & Land Use (AFOLU) projects. ACR Standard 3.0 requires that projects whose start date is more than two years prior to the date of listing must provide documentation that GHG mitigation was an objective as of the start date. Considering that the project acitivity was firstly submitted to the CDM for validation on 11 April 2008, this requirement is satisfied.

3.1.2 Minimum Project Term

Not applicable, ACM0002 does not specifies a Minimum Project Term.

3.1.3 Crediting Period

The crediting period starting date is 3 September 2009 and ends on 2 September 2016, with the possibility for renewal.

3.1.4 Real

No *ex-ante* emissions from the project activity will be claimed.

3.1.5 Direct Emissions

ACR Standard 3.0 requires that Monjolinho own, have control or document control over the GHG sources from which the emissions reductions or removals originate. Since emissions will be related to the project electricity generation, DNV GL confirms that the GHG sources are under control of Monjolinho project.

3.1.6 Offset Title

Desenvix Energia Renováveis S/A is the primary project proponent and is the sole investor and developer of the project, since it holds 100% of Monjolinho Energética S/A shares. The Embrasca Inc. is providing project development advisory and technical support to Monjolinho project. In this sense, all offsets will be owned from Monjolinho Energética S/A.

3.1.7 Land Title

DNV GL can confirm that Monjolinho Energética S/A owns the Monjolinho project[8].

3.1.8 Additionality

To qualify as additional, ACR Standard Version 3.0 requires every project to pass either an approved performance standard as defined in the applicable methodology and a regulatory additionality test, or a three-pronged test of additionality in which the project demonstrates that the activity exceeds currently effective regulations, exceeds common practice in the relevant industry sector and geographic region, and faces at least one of three implementation barriers – financial, technological, or institutional.

To confirm that the Monjolinho project meets these requirements, DNV GL completed the following additionality review process:

3.1.8.1 Regulatory surplus test

Considering DNV GL's local technical expertise, DNV GL acknowledges that the implementation of a renewable energy electricity project is not mandated by any Brazilian regulation.

3.1.8.2 Common practice test

According to the *Guidelines on common practice* version 2[9] the common practice analysis is carried out on similar projects which are considered to be in the same region, are of a similar scale, and take place in a comparable environment with respect to regulatory framework, investment climate, access to technology, access to financing, etc.

Following the steps of the *Guidelines on common practice* version 2:

Step 1: Calculate applicable capacity or output range as +/-50% of the total design capacity or output of the proposed project activity

Project participant analysed power plants with an installed capacity from 37 MW and 111 MW, which was correctly calculated as +/- 50% of the installed capacity for Monjolinho project.

Step 2: Identify similar projects (both CDM and non-CDM) which fulfill all of the following conditions:

a) *The projects are located in the applicable geographical area:*
   The geographical scope for common practice analysis was determined by the project proponents to be Southern Brazil, where the project is located, due to differences throughout the country in the climate (climate in Southern Brazil is subtropical humid) and hydrology. The Brazilian territorial extension is of 8 459 417 square kilometres, with over 4 000 km distance in the north-south as well as in the east-west axis and 6 distinct climate regions: humid tropical, semi-arid, equatorial, tropical, highland-tropical and finally sub-tropical, in the region of the project to be implemented. Also due to the wide extension, there are differences in topography, availability of transmissions lines, and taxation on electrical energy (which is different in each state). Therefore, DNV GL considers the choice

of Southern Brazil acceptable, since there are great variations in the environment for each region.

b) *The projects apply the same measure as the proposed project activity:*
The project activity is a "switch of technology with or without change of energy source".

c) *The projects use the same energy source/fuel and feedstock as the proposed project activity, if a technology switch measure is implemented by the proposed project activity:*
Only hydro power plants are considered in the common practice analysis.

d) *The plants in which the projects are implemented produce goods or services with comparable quality, properties and application areas as the proposed project plant:*
All plants considered produce electrical energy.

e) *The capacity or output of the projects is within the applicable capacity or output range calculated in Step 1:*
Hydro power plants with an installed capacity from 37 MW and 111 MW are considered.

f) *The projects started commercial operation before the project design document (CDM-PDD) is published for global stakeholder consultation or before the start date of proposed project activity, whichever is earlier:*
The earliest date is 3 September 2009, starting date of the project activity. Only project activities that started commercial operation before that date are considered in the analysis.

Step 3: Within the project identified in Step 2, identify those that are neither registered CDM project activities, project activities submitted for registration, nor project activities undergoing validation. Note their number N_{all}.

N_{all} was calculated considering the total hydro power plants in Southern Brazil in September 2009, before the project activity starting date, according to ANEEL database[7]. Four hydro power plants were identified considering the range between 37 MW and 111 MW. Therefore, N_{all} was calculated to be 4. DNV GL cross-checked the results against the ANEEL database and found this information to be accurate, and also confirmed that CDM project activities were excluded.

Step 4: *Within plants identified in Step 3, identify those that apply technologies different that the technology applied in the proposed project activity. Note their number N_{diff}.*

From the four power plants identified, DNV GL could confirm that Canastra is a state-owned power plant, and Canoas II is owned by a Consortium[7]. In this sense, they are not considered to be similar to the project activity. N_{diff} was hence calculated as 2.

Step 5: Calculate factor F=1- N_{diff} /N_{all} representing the share of plants using technology similar to the technology used in the proposed project activity in all plants that deliver the same output or capacity as the proposed project activity.

"Factor F" was calculated as: $F=1-N_{diff}/N_{all} = 1-2/4 = 0.5$ and $N_{all}-N_{diff} = 4-2 = 2$

Outcome: The proposed project activity would be a common practice within a sector in the applicable geographical area if the factor F is greater than 0.2 and N_{all} - N_{diff} is greater than 3.

According to the *Guidelines on common practice* version 2, the proposed project activity is a common practice within a sector in the applicable geographical area if both the conditions are fulfilled, factor F is greater than 0.2 and N_{all} - N_{diff} is greater than 3. As demonstrated and verified above factor F is greater than 0.2, but N_{all}-N_{diff} is lower than 3. Hence, the project does not represent a common practice project in Southern Brazil.

3.1.8.3 Implementation barrier test

DNV GL could confirm that the project activity faces investment barriers, as described below:

Choice of approach

As the project generates financial and economic benefits other than GHG related income through the sales of electricity and the alternative to the project does not involve an investment for the project participants, a benchmark analysis was selected for conducting the investment analysis.

Benchmark selection

The selected benchmark is an equity benchmark calculated based in the Weighted Average Capital Cost (WACC), calculated as 10.82% as follows:

$$WACC = (E/V) \times Re + (D/V) \times Rd \times (1 - Tc)$$

Where:

- (E/V), represents the percentage of equity in the company's structure. This value corresponds to 29.08%, as confirmed in the loan contract[10].
- (D/V), represents the percentage of debt in the company's structure. This value corresponds to 70.92%, as confirmed in the loan contract[10].
- Rd represents the cost of debt of 8.25%, as confirmed in the loan contract[10].
- Tc represents the income tax in Brazil of 34%;
- Re represents the cost of equity and was calculated to be 23.94% as follows:

$$R_e = R_f + ß\ (ERP)$$

Where:

- R_f (risk free rate), represents the sum of standard investment rate available for all investors and the Brazilian risk. Internationally accepted standard for the first component are USA Treasury Bonds. It is based on the average of one year of quotes for the 30 year bonds the USA Treasury Bonds (4.38%), researched from Bloomberg, added by the median of Brazilian risk between 2001 and 2006 (4.23%) and the average adjustment between US and Brazilian inflations from 2004 to 2006 (2.33%)[11]. The final value corresponds to **10.93%**.

- ERP (Equity risk premium in Brazil) researched from the renowned registry of Damodaran as **7.79%.**
- □ (adjusted industry beta) is considered to be **1.67** for the year of 2009, based on the covariance of the daily return of bonds of companies from the USA Electrical Energy Sector. Beta is first found for companies in the USA (which is the unlevered beta), and then relevered.
- Thus, with these data, it is possible to calculate R_e:

Re = 10.93% + 1.67 * 7.79% = **23.94%**

DNV GL confirmed this approach is correct with independent financial expert Frederico Rosas. The calculation of the benchmark is based on official sources, specific literature and legislation.

Hence, DNV GL concludes that the benchmark calculated for the proposed project is reasonable.

Input parameters

Total Investment:

The total investment is estimated to be BRL 280 970 800. DNV GL could confirm this value by checking the company cash flow for 2009 [12]. This value corresponds to an estimate specific cost of BRL 3 797/kW and were compared by DNV GL with registered Brazilian hydroelectric power plant projects below:

Table 2: Rate costs for Brazilian hydroelectric power plants registered CDM projects

UNFCCC Ref. N°	Name of Project	Date of Registration	Capacity (MW)	Total Investment (BRL/kW)
1526	Saldanha Small Hydroelectric Project	16 March 2009	5.00	5 668.04
2500	CDM Project of Moinho and Barracão Small Hydropower Plant (Moinho Plant)	11 January 2010	7.30	9 594.52
2500	CDM Project of Moinho and Barracão Small Hydropower Plant (Barracão Plant)	11 January 2010	6.00	10 200.00
2793	Santana I SHP CDM Project	11 January 2010	14.76	2 825.37
3002	São Domingos II Hydroelectric Project	20 April 2010	24.30	5 119.88
3669	Rodeio Bonito Small Hydro Power Project	20 May 2011	14.64	3 924.67

It is possible to conclude that the total investment values used in the estimates presented by the project participant are within the range of 2 825.37 and 10 200.00 BRL/kW found in recent registered CDM Brazilian hydroelectric power plant projects listed in Table 2.

DNV GL concludes that the total investments for the proposed project are reasonable for a hydroelectric power plant.

Loan costs:

(D/V), represents the percentage of debt in the company's structure. This value corresponds to 70.92%, as confirmed in the loan contract[10].

O&M costs:

The operation and maintenance yearly costs were estimated as BRL 5 679 000, considering all costs and taxes[13]. This value corresponds to 2.0% of total investment. Comparing with hydropower projects presented in the book from the Brazilian Ministry

of Environment "*Renewable Sources of Energy in Brazil*"[14], which considered values of O&M ranging from 1% to 4%, DNV GL considers that the O&M cost for the proposed project are reasonable.

Taxes and depreciation:

DNV GL also confirmed that the company is eligible for the real profit regime, in accordance to the Brazilian national fiscal legislation with the support of an independent financial expert[15]. Tax values of 1.65% for the PIS tax and 7.6% for the COFINS tax were applied in the calculations.

Income tax values were applied as 9% CSLL, 15% income tax and 10% additional income tax (for profits over BRL 240 000/year). DNV GL confirmed that these values are in accordance with the Brazilian national regulation.

Plant Load Factor:

The project power plant has 74 MW of installed capacity. It is expected that the assured energy corresponds to 43.80 MW, which corresponds to a plant load factor of 59.19%, based on the ANEEL document[16].

Energy Price:

The energy price was established as BRL 122.63/MWh in the ANEEL auction[17].

Calculation and conclusion

The equity IRR calculations were provided in a spreadsheet[8] and verified by DNV GL. The assumptions and calculations were verified and found to be correct by DNV GL with the support of an independent financial expert. The project IRR without carbon revenues is 8.62%. This confirms that the project in the absence of carbon benefits and compared to the benchmark of 10.92% is not financially attractive.

Sensitivity analysis

A sensitivity analysis was carried to check the robustness of the investment analysis. Parameters contributing more than 20% to the revenues or costs were considered to be the investment, electricity generation, electricity tariff and O&M costs. The sensitivity analysis demonstrates the following:

Investment: If the capital expenditures decrease by 18%, the project-IRR will reach the benchmark. However, DNV GL confirmed that all commodities and raw materials required for construction of the project have increased their prices since 2009[18]. Hence, a 18% decrease is not likely.

Electricity generation: If Monjolinho generates 21% more than estimated the project IRR will reach the benchmark. However, that would correspond to a plant load factor of 71.03%, which is considerably high for hydropower plants in Brazil. Therefore, such an increase is not likely.

Electricity tariff: If the electricity tariff increases by 21% the project IRR will reach the benchmark. However, the electricity tariff in fixed in the ANEEL's auction[17]. In this sense, such an increase in the electricity tariff is not likely.

O&M costs: If the O&M costs decrease by 78%, the project-IRR will reach the benchmark.Hence, such a high decrease is not likely.

DNV GL's additionality review can confirm that the Monjolinho project meets the additionality standards of ACR Standard Version 3.0. [1]

3.1.9 Permanent

The project offsets do not face any risk of reversal because the emission reductions will occurs at the electricity generation moment and cannot be reversed.

3.1.10 Net of leakage

According to ACM0002, version 15.0[2], no leakage needs to be taken into account for hydropower projects.

3.1.11 Independently validated and verified

The ACR requires accredited third-party validation of all GHG projects, as specified in the ACR Standard Version 3.0, and is necessary to provide assurance to stakeholders of the quality of the project and its intended generation of the Emission Reduction Tons (ERTs). DNV GL is an American National Standards Institute (ANSI) accredited verifier (Accreditation Number 0981), and is therefore accredited to conduct third-party validations of ACR projects.

3.1.12 Community and environmental impacts

According to Brazilian environmental law, the sponsor of any project that involves construction, installation, expansion or operation of any polluting or potentially polluting activity or any other capable to cause environmental degradation is obliged to secure a series of permits from the relevant environmental agency. The project obtained all licenses required (Operation Licence)[19], demonstrating that they have followed all steps that guarantee that the environmental regulations were respected. The potential significant environmental impacts of the project have been sufficiently identified, and negative impacts were mitigated by Environmental Programs.

55 families were displaced due to the implementation of the project activity. DNV GL confirmed this by checking the report "technical assistance to HPP Monjolinho relocated population report", which includes detailed report for each family, including checklists and photographs. This report was submitted to the local State environmental agency, and DNV GL could confirm this by checking the protocol[19].

Since four indigenous lands could suffer influence from the project implementation, the company signed a Commitment Term with the Brazilian National Indigenous Foundation in which it compromises of financial contribution, education and agricultural equipment for these indigenous people. The Environmental Operational License requires that each 3 months the company submits an Environmental/Social Management Report to the

local State environmental agency. DNV GL checked all related documents and the protocol of the report submitted on 12 December 2013.[19]

Local stakeholders were also invited to comment on the project. No negative comments were received.

3.2 *Baseline*

3.2.1 Project Baseline Scenario

The baseline is in accordance with ACM0002, version 15.0.[2]: the electricity generated by the proposed project activity times the emission coefficient of the grid calculated as per the "Tool to calculate the emission factor for an electricity system" [20]. In the absence of proposed project activity, the same amount of electricity would have been generated by power plants connected to the SIN electricity system.

DNV GL could confirm that ACM0002 is applicable to the project activity, since: i) the project is a new hydro power plant with installation capacity of 74 MW, which was verified by DNV GL by visual inspection during the site visit and through the ANEEL[6]; ii) the electricity generated by this project is supplied to SIN that is dominated by fossil fuel power plants, as confirmed by DNA webpage[21]; iii) The project activity results in new reservoirs and the power density of the power plant is greater than 4 W/m^2 [6].

The approved baseline methodology has been correctly applied to identify a complete list of realistic and credible baseline scenarios, and the identified baseline scenario most reasonably represents what would occur in the absence of the proposed CDM project activity.

All the assumption and data used by the project participants are listed in the project document and/or supporting documents. All documentation relevant for establishing the baseline scenario and correctly quoted are interpreted in the project document. Assumptions and data used in the identification of the baseline scenario are justified appropriately, supported by evidence and can be deemed reasonable. Relevant national and/or sectoral policies and circumstances are considered and listed in the project document.

3.2.2 The GHG Assessment Boundary

The GHG assessment boundary for the project includes the Monjolinho power plant and all power plants physically connected to the SIN electricity system, as shown in Table 3.

Table 3: GHG Sources Associated with the Project

GHG Source	Comments
CO_2 emissions from the operation of SIN connected power plants	Calculated as baseline emissions

3.3 *Quantification of GHG Emission Reductions and Removals*

The project involves hydropower generation, which partly displaces fossil fuel based power from the SIN grid in Brazil.

There are no emissions from the project activity, since the project is a 74 MW hydroelectric power plant with a reservoir with 5.46 km^2, resulting on a power density of 13.55 W/m^2 [6].

Baseline emissions are calculated as the electricity delivered to the grid times an emission factor for the SIN grid. For the *ex-ante* estimation of emissions reduction, the electricity generated is estimated to be 373 877 MWh; for the combined margin grid emission factor for the SIN grid, real values were used for the period 2009 – 2013, and for 2014 - 2016 it is estimated to be 0.2860 tCO_2/MWh, considering the average from 2009 to 2013 [21].

The grid emission factor is calculated according to "Tool to calculate the emission factor for an electricity system" version 4.0 [20]. Both operating margin and build margin emission factors will be calculated *ex-post*, considering the weighting is set to be 50% and 50% respectively, which are the default values stipulated by "Tool to calculate the emission factor for an electricity system" version 4.0.

Based on the calculations and results presented in the sections above the implementation of the project activity will result in an average *ex-ante* estimation of emission reduction conservatively calculated to be 112 527 tCO_2e per year for the selected crediting period.

All assumptions and data used by the project participants are listed in the project plan and/or supporting documents, including their references and sources. All documentation used by the project participants as the basis for assumptions and source of data is correctly quoted and interpreted in the project plan. All values used in the project plan are considered reasonable in the context of the proposed ACR project activity. The baseline methodology has been applied correctly to calculate project emissions, baseline emissions, leakage and emission reductions. All estimates of the baseline, project and leakage emissions can be replicated using the data and parameter values provided in the project plan.

3.4 *Monitoring Plan*

Monitoring Data

All the necessary data needed to estimate ERTs are included in the Project Plan and Emission Reduction Files, as shown in Table 4.[5]

Table 4: Monitoring Data

Parameter	Measuring Method	Frequency
Quantity of net electricity generation supplied by the project plant/unit to the grid in year y.	Electricity meter, calibrated each two years. Data will be crosschecked against records of sold electricity.	Continuous.
Combined margin CO_2 emission factor for grid connected power plant in year y.	Brazilian Desinged National Authority official database.	Yearly.
Installed capacity of the hydro power plant after the implementation of the project activity.	ANEEL official data.	Yearly.
Area of the single or multiple reservoirs measured in the surface of water, after the implementation of the project activity, when the reservoir is full.	ANEEL official data.	Yearly.

The project monitoring plan is in compliance with the monitoring methodology ACM0002 version 15.0.[2] The monitoring plan will give opportunity for real measurements of achieved emission reductions.

It is DNV GL's opinion, that the project participant is able to implement the monitoring plan.

QA/QC Procedures

All of the necessary QA/QC procedures to ensure the correct measurement, calculation and reporting of emissions reductions are properly defined. These include:

1. Organization and responsibility.
2. Data management and record keeping.
3. Operations and maintenance.
4. Environmental compliance and violation.

3.5 *Prior application*

Monjolinho was a former CDM project that was rejected twice by the Executive Board. The first rejection was due to the following:

"Monjolinho Energética S/A's CDM Project (2362)" submitted for registration by the DOE (BVC) could not be registered because the PDD submitted for validation and the project design have undergone major changes without the DOE issuing Corrective Actions Request, and therefore a recommencement of the validation is required".

After a second submission, the CDM Executive Board requested the following review:

"1. The DOE is requested to explain how it has validated the investment analysis and input values as appropriate, in particular (a) as the investment was based on only 67 MW installed capacity and net energy supply of 43.1 MW; and (b) the sensitivity analysis, varying the tariff for only the first 3 years and why the variations in electricity output or plant load factor were not considered.

2. The DOE is requested to confirm (a) the number of similar hydropower plants above 30 MW that are not built by state-owned entities and (b) the essential distinction between them and the project activity.

3. The DOE is requested to confirm that the grid emission factor was based on data available at the time of validation; otherwise, the emission factor and emission reductions must be recalculated accordingly."

After the DOE's response, the Executive Board decided to reject the CDM project activity. DNV GL acknowledges that the above issues raised were considered and corrected in the project activity

1) All input values from the investment analysis are described in detail in the previous section 3.1.8.3. The revised investment analysis was now elaborated for the actual project scenario – 74 MW installed capacity and 43.8 MW net energy supply. The sensitivity analysis now presents the likelihood of each parameter variation cause the IRR to reach the benchmark, including parameters electricity output / plant load factor;

2) The revised common practice analysis now applies the Guidelines on Common Practice, version 2.0. The assessment is described in detail in the previous section 3.1.8.2;

3) The grid emission factor was updated to the most recent data available at the time of validation, as described in the previous section 3.3.

4. VALIDATION OPINION

DNV GL Climate Change Services AS (DNV GL) has performed a validation of the project activity "*Monjolinho Energética S/A Hydropower Plant Project (Alzir dos Santos Antunes)*" in Brazil. The validation was performed on the basis of ACR criteria for ACR projects as well as criteria given to provide for consistent project operations, monitoring and reporting.

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

The project correctly applies the CDM approved baseline and monitoring methodology ACM0002, version 15.0.

The project activity consists of an hydroelectric power plant with total 74 MW of installed capacity. By generating electricity from hydro power and displacing electricity from the grid that is partly generated from fossil fuels, the project results in reductions of CO_2 emissions which are real, measurable and give long-term benefits to the mitigation of climate change. It is demonstrated that the project is not a likely baseline scenario. Emission reductions attributable to the project are hence additional to any that would occur in the absence of the project activity.

The total emission reductions from the project are estimated to be on the average 112 527 tCO_2e per year over the selected 7 year renewable crediting period. The emission reduction forecast has been checked and it is deemed likely that the stated amount is achieved given that the underlying assumptions do not change.

The monitoring plan provides for the monitoring of the project's emission reductions. The monitoring arrangements described in the monitoring plan are feasible within the project design and it is DNV GL's opinion that the project participants are able to implement the monitoring plan.

In summary, it is DNV GL's opinion that the project activity "Monjolinho Energética S/A Hydropower Plant Project (Alzir dos Santos Antunes)" as described in the GHG Project Plan from October 2014, meets all relevant ACR requirements for ACR projects and correctly applies the CDM methodology ACM0002 "Grid-connected electricity generation from renewable sources", version 15.0. Hence, DNV GL recommends the registration of the project as a ACR project activity.

 Lead Validator Signature	17 October 2014 Date
 Approver Signature	3rd November 2014 Date

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