**MONITORING REPORT FORM (CDM-MR) ***
**Version 01 - in effect as of: 28/09/2010**

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* as contained within the document entitled "Guidelines for completing the monitoring report form (CDM-MR)" (EB 54 meeting report, annex 34).

**MONITORING REPORT**
**Version number 2, 4/05/2011**

**Fuel Substitution by Hydro Generation in Pasto Bueno**
**Reference number 1986**
**Monitoring period number 1 (25/11/2008 – 30/09/2010)**

## SECTION A. General description of the project activity

### A.1. Brief description of the project activity: >>

>>

The Pasto Bueno hydropower plant started its operation on January 1st, 2009.

1. **Purpose of the project activity**. The purpose of the project activity project is the production of hydroelectric energy in Pasto Bueno to replace the production of electric energy from existing diesel generators. The measures taken to reduce greenhouse gas emissions are the replacement of the production of the diesel fuel-generated energy currently used by a local mining company at the nearby "Huaura" mining compound by hydroelectric production.

2. **Installed technology and equipments**. The installed technology and equipments consist of two Pelton turbines of 450 kW and 150 kW connected to alternators. The energy produced is transmitted through a High Voltage transmission line to the "Huaura" mining compound.

3. **Relevant dates for the project activity**.
   The studies for the rehabilitation of the power plant started on March 12, 2007
   The civil works for the rehabilitation of the power plant started on December 24, 2007
   The commissioning of the power plant took place from November 25 to December 31,2008.
   The continued operation started on January 1st, 2009.

The total emission reductions of the project activity in this monitoring period is 5'696 tons of $CO_2$**.**

### A.2. Project Participants

>>

- Hidroelectrica Pelagatos SAC (participates in the project as the Peruvian branch of Emerging Power Developers Ltd)
- Emerging Power Developers Ltd (participates in the project as a private enterprise)

### A.3. Location of the project activity:

>>

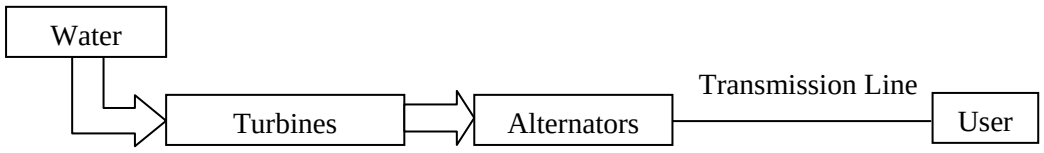
**Location**: Pasto Bueno Plant, Consuzo,
**District** : Pampas District,
**Department** : Ancash,
**Province** : Pallasca
**Country** : Peru.

**Geographical coordinates**:
Latitude 8°10'28 S
Longitude 77°51'8 W

## A.4. Technical description of the project

>>

The turbines transform the hydrodynamic energy (the pressure and velocity of the water) into mechanical energy (the rotation of a shaft). The turbines are connected to electromechanical units (alternators) that transform the mechanical energy into electricity. The energy produced is transmitted by a 22.9 kV transmission line.




Diagram

## A.5. Title, reference and version of the baseline and monitoring methodology applied to the project activity:

>>

Methodology : AMS-I.A. ver. 12

Tools: Combined tool to identify the baseline scenario and demonstrate additionality.

## A.6. Registration date of the project activity:

>>

25/11/2008

## A.7. Crediting period of the project activity and related information (start date and choice of crediting period):

>>

Start date of the project activity: 12/03/2007.

Start date of the first crediting period 25/11/2008

Crediting period: 25/11/2008 – 24/11/2015.

## A.8. Name of responsible person(s)/entity(ies):

>>

Person(s)/entity(ies) responsible for completing the monitoring report form (CDM-MR).

| | |
|---|---|
| Organization: | Emerging Power Developers Ltd |
| Street/P.O.Box: | Case Postale 80 |
| Building: | |
| City: | Renens |
| State/Region: | Vaud |
| Postfix/ZIP: | 1020 |
| Country: | Switzerland |
| Telephone: | +41 79 668 57 71 |
| FAX: | +41 21 637 15 08 |
| E-Mail: | infos@powerdev.ch |
| URL: | www.powerdev.ch |
| Represented by: | |
| Title: | Chairman of the Board |
| Salutation: | Mr. |
| Last Name: | Dubas |
| Middle Name: | |

| | |
|---|---|
| First Name: | Antoine |
| Department: | |
| Mobile: | |
| Direct FAX: | +41 21 637 15 08 |
| Direct tel: | +41 21 637 15 08 |
| Personal E-Mail: | dubas@powerdev.ch |

## SECTION B. Implementation of the project activity

### B.1. Implementation status of the project activity

>>

1. Starting date of operation of the project: 01/01/2009.
2. Information regarding the actual operation of the project activity during this monitoring period:
   Special events:
   - no overhaul times,
   - downtimes of equipment: 880 hours from: 25/11/2008 to 31/12/2009. The value for 2010 is not yet known as this data was not supposed to be monitored and is only aggregated for internal purposes in the annual report.
   - no exchange of equipment.
3. There were no events or situations that occurred during the monitoring period, which have impacted the applicability of the methodology.

### B.2. Revision of the monitoring plan

>>

The monitoring plan has not been revised.

### B.3. Request for deviation applied to this monitoring period

>>

No deviation applied to this monitoring period.

### B.4. Notification or request of approval of changes

>>

There was no notification or request of approval of changes from the project activity as described in the registered CDM-PDD.

## SECTION C. Description of the monitoring system

>>

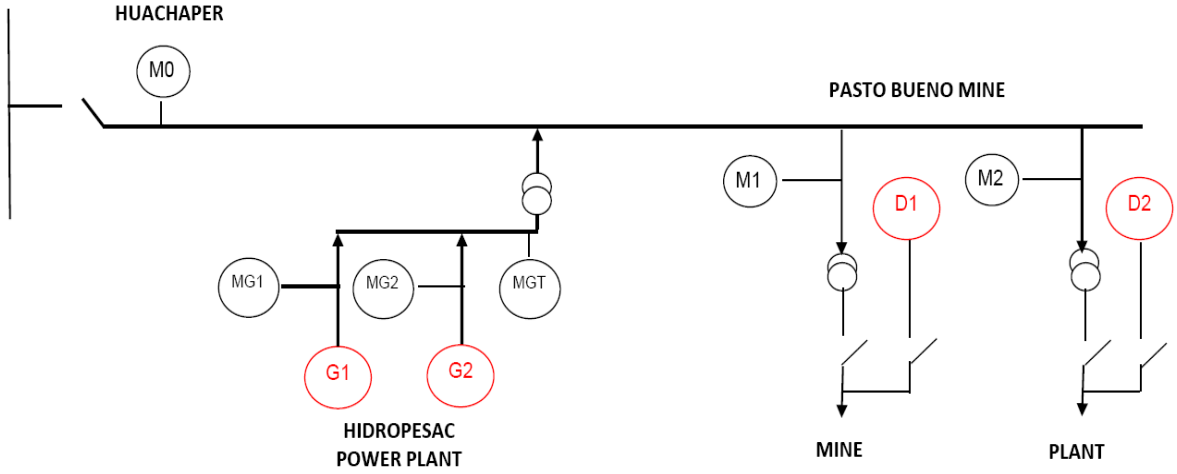
The monitoring system consist of automatic electronic meters recording the quantity of electricity supplied to the Huaura mining compound.

The meters are located at the following locations:

- Substation “Pasto Bueno hydropower power plant” (MGT)
  Measuring point for Emission calculations
- Genarator 1 (MG1) used for internal controlling
- Generator 2 (MG2) used for internal controlling

- Substation Huachaper (M0) used for controlling
- Substation “level 12”, Huaura mining compound (M1) used for controlling
- Substation “Treatment plant”, Huaura mining compound (M2) used for controlling

## LINE DIAGRAM AS BUILT




The monitored data (the electricity quantity generated) are recorded automatically every 15 minutes. The data are processed on a monthly basis for the purpose of invoicing, under the responsibility of the director of the Pasto Bueno hydropower power plant.

Data recording and archiving: The data are recorded automatically on site on the meters recording equipment. The data are recovered monthly from the recording equipment, stored in electronic form in *.xls (MS Excel) format and printed on paper under the responsibility of the director of the Pasto Bueno hydropower power plant. Hard copies and CD containing the monthly *.xls files are archived at the Pasto Bueno hydropower power plant under the responsibility of the chief engineer of the Pasto Bueno hydropower power plant. Backup copies of the *.xls files are archived in Switzerland on the servers of Emerging Power Developers, under the responsibility of the Chairman of the Board.

Emergency procedures: the records concerning maintenance and shutdowns of the hydropower plant are stored at the power plant under the responsibility of the director of the Pasto Bueno hydropower power plant to ensure the consistency of the data from the metering equipment.

## SECTION D. Data and parameters

According to AMS-I.A methodology (Indicative simplified baseline and monitoring methodologies for selected small-scale CDM project activity categories, I.A./Version 12; Sectoral Scope: 01; EB 33) : “*A default value 0.8 KgCO2e/kWh which is derived from diesel generation units, may be used for option 7(a) and 7(b)*”. The Emission coefficient was therefore set a 0.8 $KgCO_2e/kWh$ during certification.

| **Data / Parameter:** | |
|---|---|
| Data unit: | $KgCO_2e/kWh$ |
| Description: | Emission coefficient |
| Source of data used: | AMS I. A |
| Value applied: | 0.8 |
| Justification of the choice of data or description of measurement methods and | According to AMS-I.A methodology (Indicative simplified baseline and monitoring methodologies for selected small-scale CDM project activity categories, I.A./Version 12; Sectoral Scope: 01; EB 33) : “*A default value* |

| | |
|---|---|
| procedures actually applied : | *0.8 KgCO2e/kWh which is derived from diesel generation units, may be used for option 7(a) and 7(b)*" |
| Any comment: | |

**D.1. Data and parameters determined at registration and not monitored during the monitoring period, including default values and factors**

Apart from the Emission coefficient, there is no other data that is determined only once for the crediting period but are used after registration of the project activity

**D.2. Data and parameters monitored**

| **Data / Parameter:** | **Electricity quantity generated** |
|---|---|
| Data unit: | MWh |
| Description: | Electricity generated by the project fed to the Huaura mining compound after ancillary consumption (hydropower plant operation). |
| Measured /Calculated /Default: | Measured |
| Source of data: | Automatic electricity metering equipment |
| Value(s) of monitored parameter: | 7'120.103 MWh |
| Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations) | Baseline emission calculations |
| Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity) | Type: A1RL<br>Accuracy class: 0.04<br>Serial number, 4482<br>Calibration frequency: n/a<br>Date of last calibration: 19/03/2007<br>Validity: 19/03/2017 |
| Measuring/ Reading/ Recording frequency: | 15 minutes |
| Calculation method (if applicable): | The calculation method is the Emission coefficient (0.8) multiplied by the Data monitored |
| QA/QC procedures applied: | The meters verification and calibration will be carried out by independent certified companies, in conformity with the National laws and regulations and ISO 9001 procedures. |

**SECTION E. Emission reductions calculation**

**E.1. Baseline emissions calculation**

>>

Taking into account a default value of 0.8 KgCO2/kWh for the emission factor, as specified under point 10 in the methodology AMS-I.A, the emission baseline is therefore for the entire monitoring period:

$$E_B = 7'120'103 \text{ kWh} * 0.8 \text{ KgCO}_2 \text{ e/kWh} = \mathbf{5'696'080\ KgCO_2}$$

Monthly data

| day | day | kWh | tons of CO2 |
|---|---|---|---|
| 25/11/2008 | 30/11/2008 | 0 | 0.00 |
| 01/12/2008 | 31/12/2008 | 0 | 0.00 |
| 01/01/2009 | 31/01/2009 | 294'292 | 235.43 |
| 01/02/2009 | 28/02/2009 | 268'427 | 214.74 |
| 01/03/2009 | 31/03/2009 | 169'412 | 135.53 |
| 01/04/2009 | 30/04/2009 | 279'975 | 223.98 |
| 01/05/2009 | 31/05/2009 | 291'598 | 233.28 |
| 01/06/2009 | 30/06/2009 | 353'323 | 282.66 |
| 01/07/2009 | 31/07/2009 | 373'580 | 298.86 |
| 01/08/2009 | 31/08/2009 | 379'424 | 303.54 |
| 01/09/2009 | 30/09/2009 | 366'188 | 292.95 |
| 01/10/2009 | 31/10/2009 | 376'895 | 301.52 |
| 01/11/2009 | 30/11/2009 | 373'893 | 299.11 |
| 01/12/2009 | 31/12/2009 | 380'772 | 304.62 |
| 01/01/2010 | 31/01/2010 | 360'359 | 288.29 |
| 01/02/2010 | 28/02/2010 | 313'355 | 250.68 |
| 01/03/2010 | 31/03/2010 | 378'696 | 302.96 |
| 01/04/2010 | 30/04/2010 | 362'233 | 289.79 |
| 01/05/2010 | 31/05/2010 | 365'084 | 292.07 |
| 01/06/2010 | 30/06/2010 | 364'186 | 291.35 |
| 01/07/2010 | 31/07/2010 | 361'209 | 288.97 |
| 01/08/2010 | 31/08/2010 | 375'394 | 300.31 |
| 01/09/2010 | 30/09/2010 | 331'807 | 265.45 |
| | TOTAL = | **7'120'103** | **5'696.08** |

The value of data monitored is 7’120’103 kWh for the period between 25/11/2008 and 30/09/2010.

The formula used to calculate the baseline emissions is as per point 10 of the AMS-I.A methodology:

Emission in $KgCO_2$ = (Electricity quantity generated) kWh * 0.8 $KgCO_2$ e/kWh

## E.2. Project emissions calculation

>>

Since the project is a mini hydroelectric power plant, the new unit for the production of electrical energy produce no emissions.

## E.3. Leakage calculation

>>

There are no emissions due to project activity or leaks

## E.4. Emission reductions calculation / table

>>

Total baseline emissions: 5‘326 tCO2 e / year ex-ante (expected in PDD)
Total project emissions: 0
Total leakage: 0
Total emission reductions: 5'696.08 $tCO_2$ during the period 25/11/2008 to 30/09/2010.

The Total Emission Reduction achieved during the monitoring period is therefore

7’120’103 kWh * 0.8 $KgCO_2$ e/kWh = **5'696'080 $KgCO_2$**

or **5'696 tons of $CO_2$**

## E.5. Comparison of actual emission reductions with estimates in the CDM-PDD

>>

| Item | Values applied in ex-ante calculation of the registered CDM-PDD | Actual values reached during the monitoring period |
|---|---|---|
| **Emission reductions ($tCO_2e$) per year** | **5’326 tCO2 e / year** | **3126.22 tCO2 e / year 01/01/2009 to 31/12/2009** |
| **Emission reductions ($tCO_2e$) per MR period** | ex-ante calculated for 22.16 months **9’831 tCO2 e** | **(25/11/2008 – 30/09/2010) 5'696 tCO2 e** |

## E.6. Remarks on difference from estimated value in the PDD

>>

There is no **increase** in the actual emission reductions achieved during the current monitoring period.

The actual achieved values are lower than expected because of:

- Delayed commissioning
- 880 hours of shut down due to problems in electronic control system
- Less installed power of the generators as planed in the PDD

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**History of the document**

| Version | Date | Nature of revision |
|---|---|---|
| 01 | EB 54, Annex 34<br>28 May 2010 | Initial adoption. |
| **Decision Class**: Regulatory<br>**Document Type**: Guideline, Form<br>**Business Function**: Issuance | | |