



**Monitoring report form
(Version 05.1)**

Complete this form in accordance with the Attachment "Instructions for filling out the monitoring report form" at the end of this form.

MONITORING REPORT

Title of the project activity	Incomex Hydroelectric Project	
UNFCCC reference number of the project activity	0968	
Version number of the monitoring report	01	
Completion date of the monitoring report	22/06/2016	
Monitoring period number and duration of this monitoring period	8 th Monitoring period (01/01/2013 - 31/01/2015)	
Project participant(s)	Grupo Cassol Energia	
Host Party	Brazil, involved indirectly	
Sectoral scope(s)	Sectoral Scope 1	
Selected methodology(ies)	AMS I.D. - Grid connected renewable electricity generation - Version 13	
Selected standardized baseline(s)	n/a	
Estimated amount of GHG emission reductions or net GHG removals by sinks for this monitoring period in the registered PDD	204,398	
Total amount of GHG emission reductions or net GHG removals by sinks achieved in this monitoring period	GHG emission reductions or net GHG removals by sinks reported up to 31 December 2012	GHG emission reductions or net GHG removals by sinks reported from 1 January 2013 onwards
	0	204,398

SECTION A. Description of project activity

A.1. Purpose and general description of project activity

The Incomex Hydroelectric Project (hereafter, the Project) developed by Grupo Cassol Energia, as proponents and operators of the project, consists of a bundle of three small run-of-river hydroelectric projects. The units are connected to Rondônia-Acre electricity system, which is located in Rondônia State, north region of Brazil. They are located in very remote areas, and bring electricity to develop these areas socially and economically.

All 3 hydro units use Brazilian turbines of the Francis model (Hydraulic reactor turbine in which the flow exits the turbine blades in a radial direction), produced by Hidráulicas S/A – HISA; The Project is a Renewable electricity generation project for a grid (run-of-river hydro power plants). Total installed capacity for 3 energy units is 14.55 MW.

Table 1 - Start of operation dates.

Monte Belo	01 February 2001
Cabixi II	12 August 2002
Rio Branco	31 December 2004

The total GHG emission reductions achieved in this monitoring period is 204,398 tCO₂e

A.2. Location of project activity

Small Hydropower Plant (SHP) Rio Branco – located in the Branco river – 11°54'35"S and 62°10'49"W in the municipality of Alta Floresta d'Oeste, Rondônia State (RO), north region of Brazil.

Small Hydro power Plant (SHP) Monte Belo – located in the Saldanha river – 11°57'08.2"S and 62°10'58.7"W, in the municipality of Alta Floresta d'Oeste, Rondônia State (RO), north region of Brazil.

Small Hydro power Plant (SHP) Cabixi II – located in the Lambari river – 13°01'20.0" S and 60°08'01.7"W, in the municipality of Comodoro, Mato Grosso State (MT), mid-west region of Brazil.

A.3. Parties and project participant(s)

Party involved (host) indicates a host Party)	Private and/or public entity(ies) project participants (as applicable)	Indicate whether the Party involved wishes to be considered as project participant (yes/no)
Brazil (host)	Grupo Cassol Energia (Private entity)	No

A.4. Reference of applied methodology and standardized baseline

AMS I.D. - Grid connected renewable electricity generation - Version 13

"Tool to calculate the emission factor for an electricity system", version 01.1, approved at EB35.

A.5. Crediting period of project activity

Type: Renewable

Starting date: 01/02/2008

Length: 7 years

Crediting period: 01/02/2008 – 31/01/2015

A.6. Contact information of responsible persons/entities

The entity developing this monitoring report and determining CER calculations is a third party consultant from the company **Viden Projetos Ambientais e Sustentabilidade**. Contact:

Thiago Viana

Associate Diretor and Project Manager

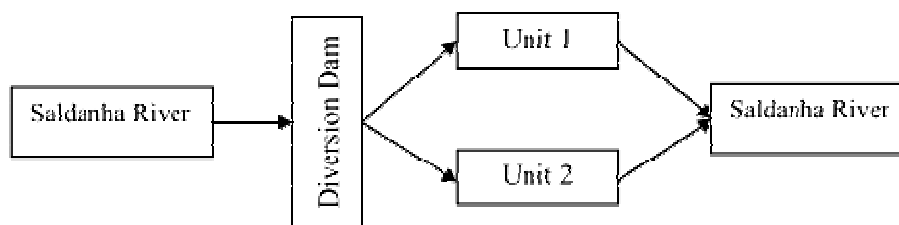
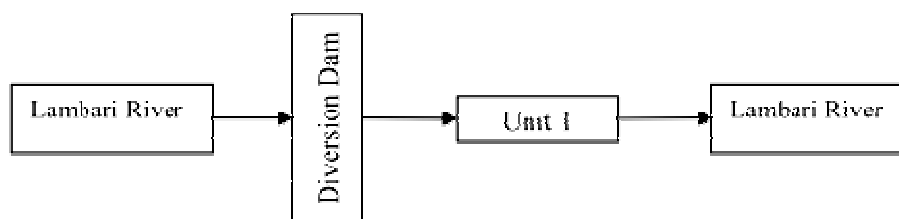
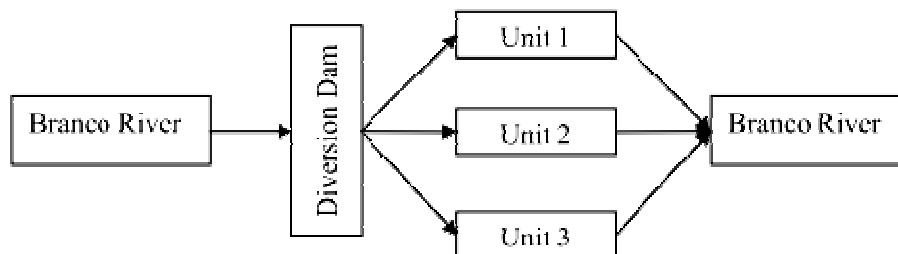
Viden Projetos Ambientais e Sustentabilidade

Rio de Janeiro – Brazil – e-mail: thiago.viana@viden.bio.br**SECTION B. Implementation of project activity****B.1. Description of implemented registered project activity**

It is a Renewable electricity generation project for a grid (run-of-river hydro power plants). Total installed capacity for the three energy units is 14.55 MW. Rio Branco: 7.14MW installed capacity; Monte Belo: 4.6 MW installed capacity and; CABIXI II: 2.81 MW installed capacity.

Small Hydro run-of-river projects consist of the use of water, either from storage in small holding ponds or directly from the river, to generate electricity. The water's gravitational power is used to move the turbine and by doing so generates electric power. It is a clean and renewable source of energy that has minimum impact on the environment.

All 3 hydro units use Brazilian turbines of the Francis model (Hydraulic reactor turbine in which the flow exits the turbine blades in a radial direction), produced by Hidráulicas S/A – HISA; that turbine is widely used among water turbines.

**Figure 1 - Monte Belo layout****Figure 2 - Cabixi II layout****Figure 3 - Rio Branco layout****B.2. Post-registration changes****B.2.1. Temporary deviations from registered monitoring plan, applied methodology or applied standardized baseline**

No temporary deviation was applied during this monitoring period

B.2.2. Corrections

No correction was applied during this monitoring period

B.2.3. Changes to start date of crediting period

There was no post-registration change to the start date of the crediting period

B.2.4. Inclusion of a monitoring plan to the registered PDD that was not included at registration

No monitoring plan was included in the registered PDD.

B.2.5. Permanent changes from registered monitoring plan, applied methodology or applied standardized baseline

No permanent changes from monitoring plan or methodology was requested.

B.2.6. Changes to project design of registered project activity

A "Request for approval of changes from project activity as described in the registered PDD" was submitted on 18 February 2011 and the PDD version 14.1 dated 10/12/2010 approved on 15 July 2011.

B.2.7. Types of changes specific to afforestation or reforestation project activity

The present project activity is not related to afforestation or reforestation.

SECTION C. Description of monitoring system*Data collection procedures*

Data generation: In each of the three power plants (Rio Branco, Cabixi II and Monte Belo) there is a main cumulative meter that records the electricity delivered to the grid. These meters are installed, owned and maintained by CERON (Centrais Elétricas de Rondônia S/A – the grid operator).

Data recording: Readings are taken monthly by both CERON and Cassol (Project participant and operator of the plants). Data aggregation: A monthly reading is taken for invoicing purposes.

Calculation: see section D.2 and section E. Electricity output is the difference between two cumulative values on the power meter. Net electricity supplied to the grid times the baseline emission factor are emission reductions. Regarding emission factor, the Combined Margin is calculated using an ex-ante build margin defined on validation and an ex-post operational margin obtained from official national data published in the Brazilian DNA website.

Reporting: The monthly electricity supplied to grid data is recorded on site log sheets. At the end of each month the monitoring data from each site is transferred to electronic files and reported to EcoSecurities.

Organizational structure, roles and responsibilities

A CDM manager has been appointed and trained who is responsible for the CDM monitoring system. The check of monthly recording of power meters falls under the responsibility of the site manager. The amount of electricity generated in each month is signed off by the two parties, Project Developer and Grid Company. After the sign off the invoice is generated and the receipts are used to cross check monthly recorded power output. Relevant roles and responsibility have been defined to fully implement data collection, archiving and data quality assurance and quality control etc.

Emergency procedures for the monitoring system

The site manager will notify the grid company in case there is doubt about the correct functioning of the meters mentioned in the monitoring plan. In that case, the grid company and the operator will check and where necessary replace the meters. If the problem can be solved quickly, no CERs are claimed for the period during which the meters were not functioning correctly. If the problem

cannot be solved quickly the grid company and the operator estimate the power delivered to the grid using the gross electricity generation readings taken from the equipment panel, by the plant operator, discounting estimated electricity losses

Line diagram

The line diagrams of the plants, with relevant measuring points, are presented in the figures below. The generators are represented by the letter “G” and the turbines by the letter “T”.

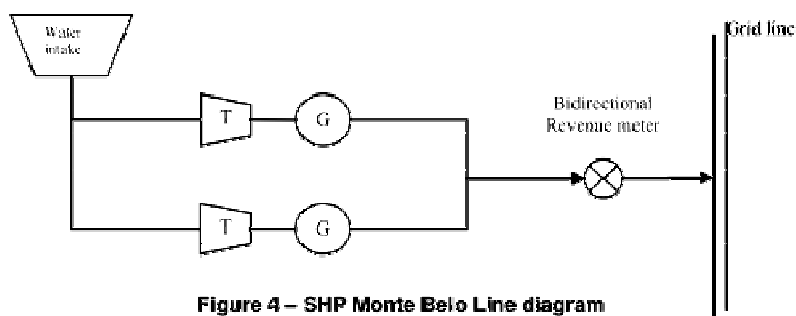


Figure 4 – SHP Monte Belo Line diagram

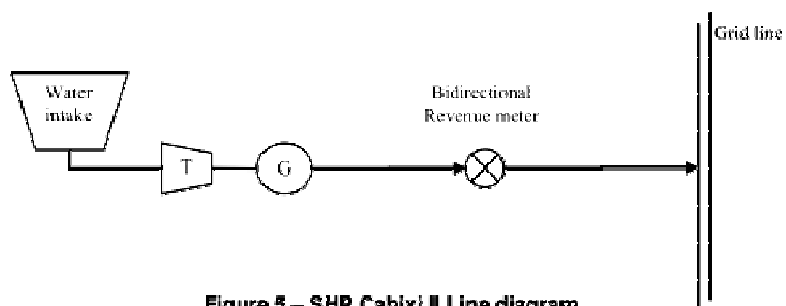


Figure 5 – SHP Cabixi II Line diagram

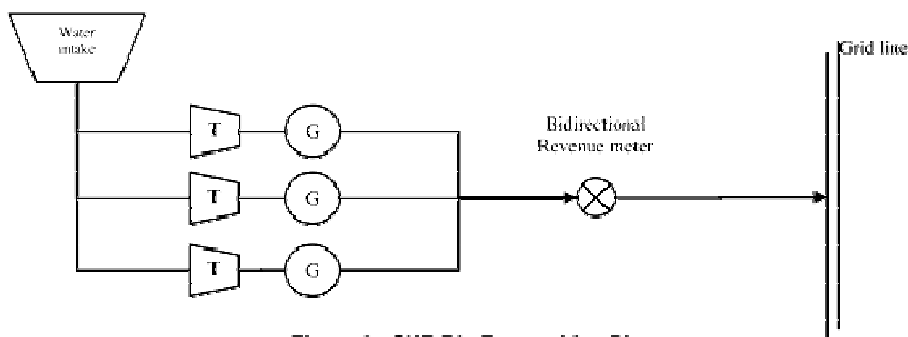


Figure 6 – SHP Rio Branco Line Diagram

SECTION D. Data and parameters

D.1. Data and parameters fixed ex ante or at renewal of crediting period

Data/parameter:	$EF_{Grid,BM,y}$
Unit	tCO ₂ /MWh
Description	Build Margin emission factor
Source of data	Calculated according to the procedure outlined in B.6.1 of the registered PDD

Value(s) applied)	1.0479
Choice of data or measurement methods and procedures	Value defined ex-ante in the PDD
Purpose of data	Baseline
Additional comments	This parameter is defined ex-ante and is not monitored throughout the crediting period.

Data/parameter:	w_{BM}
Unit	%
Description	Weighting of build margin emissions factor
Source of data	"Tool to calculate the emission factor for an electricity system" ver. 01.1
Value(s) applied)	0.75
Choice of data or measurement methods and procedures	Value defined ex-ante in the PDD
Purpose of data	Baseline
Additional comments	-

Data/parameter:	w_{OM}
Unit	%
Description	Weighting of operation margin emissions factor
Source of data	"Tool to calculate the emission factor for an electricity system" ver. 01.1
Value(s) applied)	0.25
Choice of data or measurement methods and procedures	Value defined ex-ante in the PDD
Purpose of data	Baseline
Additional comments	-

Data/parameter:	Installed Capacity
Unit	MW
Description	The installed Capacity
Source of data	Nameplates of the installed turbines
Value(s) applied)	14.55
Choice of data or measurement methods and procedures	Value defined ex-ante in the PDD
Purpose of data	The data are not used for emissions calculations.
Additional comments	This data refers to the total installed capacity of the three SHP units installed as a result of this project activity: Rio Branco, Monte Belo and Cabixi II.

Data/parameter:	$FC_{i,m,y}$
Unit	Tonnes
Description	Amount of fossil fuel type i consumed by power plant / unit m in year y
Source of data	Annex 3 of the registered PDD v14.1.
Value(s) applied)	Depend on the fuel. Please see Annex 3 of the registered PDD v14.1
Choice of data or measurement methods and procedures	All values were provided by governmental agencies. Those agencies are responsible for the control of the electric system.

Purpose of data	The data are not used for emissions calculations. This information is used to calculate the $EF_{Grid,BM,y}$ defined ex-ante.
Additional comments	-

Data/parameter:	$NCV_{i,y}$
Unit	GJ/tonnes
Description	Net calorific value (energy content) of fossil fuel type i in year y
Source of data	Annex 3 of the registered PDD v14.1.
Value(s) applied)	Depend on the fuel. Please see Annex 3 of the registered PDD v14.1
Choice of data or measurement methods and procedures	All values were provided by governmental agencies. Those agencies are responsible for the control of the electric system.
Purpose of data	The data are not used for emissions calculations. This information is used to calculate the $EF_{Grid,BM,y}$ defined ex-ante.
Additional comments	-

Data/parameter:	$EG_{m,y}$
Unit	MWh
Description	Net electricity generated and delivered to the grid by power plant / unit m in year y
Source of data	Annex 3 of the registered PDD v14.1.
Value(s) applied)	Depend on the year. Please see Annex 3 of the registered PDD v14.1
Choice of data or measurement methods and procedures	All values were provided by governmental agencies. Those agencies are responsible for the control of the electric system.
Purpose of data	The data are not used for emissions calculations. This information is used to calculate the $EF_{Grid,BM,y}$ defined ex-ante.
Additional comments	-

Data/parameter:	$EF_{CO2,i,y}$
Unit	tCO ₂ /GJ
Description	CO ₂ emission factor of fossil fuel type i in year y
Source of data	Annex 3 of the registered PDD v14.1.
Value(s) applied)	Depend on the year and on the fuel. Please see Annex 3 of the registered PDD v14.1
Choice of data or measurement methods and procedures	All values were provided by governmental agencies. Those agencies are responsible for the control of the electric system.
Purpose of data	The data are not used for emissions calculations. This information is used to calculate the $EF_{Grid,BM,y}$ defined ex-ante.
Additional comments	-

D.2. Data and parameters monitored

Data/parameter:	EG_y
Unit	MWh/year
Description	Annual net electricity supplied to the grid, per plant
Measured/calculated/default	Measured
Source of data	Power meters. Measured jointly by CERON and project developer

Value(s) of monitored parameter	Year	2013	2014	2015	Total
	SHP Cabixi II	18,098.02	18,063.36	1,569.93	37,731.31
	SHP Monte Belo	33,272.50	37,512.34	3,485.63	74,270.46
	SHP Rio Branco	49,991.00	51,845.65	5,327.88	107,164.52
	Total	101,361.52	107,421.34	10,383.44	219,166.30
Monitoring equipment	See Table below for detailed information about the meters. The calibration frequency of the electricity meters is determined as 2 years based on the National Standard "Procedimentos de Rede" by the Grid Operator – <i>Operador Nacional do Sistema</i> (ONS). Since the isolated grid has been interconnected, the National Standard is followed.				
Measuring/reading/recording frequency:	Continuous measurement, monthly recording.				
Calculation method (if applicable):	N/A				
QA/QC procedures:	The accuracy of the meters is assured by the grid operator (i.e. CERON), as the meters were installed by them and remain their property.				
Purpose of data:	Baseline emissions				
Additional comments:	Data will be archived at least for two years after crediting period or the last issuance of CERs, whichever occurs later.				

Location	Meter Type, Class	Serial Number	Calibration	Validity	Installation Date
SHP Cabixi II	ELSTER A3RBR Plus, Class 0.2%	5074761	30/05/2011	29/05/2013	-
	Schneider ION 8600, Class 0.2% (Main)	PT-1102A809-01	15/04/2013 08/04/2015	14/04/2015 07/04/2017	03/04/2013*
	Schneider ION 8600, Class 0.2% (Backup)	PT-1102A805-01	15/04/2013 08/04/2015	14/04/2015 07/04/2017	03/04/2013*
SHP Monte Belo	ELSTER A3RBR Plus, Class 0.2%	5074763	30/05/2011	29/05/2013	-
	Schneider ION 8600, Class 0.2% (Main)	PT-1102A793-01	17/04/2013 07/04/2015	16/04/2015 06/04/2017	30/10/2013
	Schneider ION 8600, Class 0.2% (Backup)	PT-1102A791-01	17/04/2013 07/04/2015	16/04/2015 06/04/2017	30/10/2013
SHP Rio Branco	ELSTER A3RBR Plus, Class 0.2%	5074762	30/05/2011	29/05/2013	-
	Schneider ION 8600, Class 0.2% (Main)	PT-1105A415-01	16/04/2013 07/04/2015	15/04/2015 06/04/2017	30/10/2013
	Schneider ION 8600, Class 0.2% (Backup)	PT-1105A416-01	16/04/2013 07/04/2015	15/04/2015 06/04/2017	30/10/2013

* These meters were installed and no valid calibration certificate was provided. Therefore, since the calibration certificate of the meters occurred only 12 days after installation, the project developer applied the maximum error of the meter for the full month of monitoring data for conservativeness.

Data/parameter:	EF _{grid,CM,y}		
Unit	tCO ₂ /MWh		
Description	Baseline Emission Factor		
Measured/calculated/default	Calculated		
Source of data	Calculated ex post as the average of EF _{grid,OM,y} (determined ex post) and EF _{grid,BM,y} (determined ex ante)		
Value(s) of monitored parameter	2013	2014	2015
	0.9342	0.9318	0.9254
Monitoring equipment	Not applicable, as this data is calculated based on OM and BM.		
Measuring/reading/recording frequency:	Calculated yearly with the most recent data available for the Operating Margin.		

Calculation method (if applicable):	The Baseline Emission Factor calculation consists of the combination of operating margin (OM) and build margin (BM) according to the procedures prescribed in the "Tool to calculate the emission factor for an electricity system" ver. 01.1 and AMS-I.D ver. 13.
QA/QC procedures:	Not applicable, as this data is calculated based on OM and BM.
Purpose of data:	Baseline emissions
Additional comments:	-

Data/parameter:	EF_{grid,OM,y}		
Unit	tCO ₂ /MWh		
Description	Operating Margin Emission Factor		
Measured/calculated/default	Calculated		
Source of data	Calculated ex post using official data provided by the Brazilian DNA.		
Value(s) of monitored parameter	2013	2014	2015
	0.5931	0.5836	0.5580
Monitoring equipment	The Operating Margin Factor calculation was performed by the Brazilian DNA, according to the "Tool to calculate the emission factor for an electricity system". Please see the link below for more details. http://www.mct.gov.br/index.php/content/view/307492.html The website was accessed on 22/06/2016.		
Measuring/reading/recording frequency:	Data are acquired by governmental companies that control the electricity grid and the emission factor calculation is performed by the Brazilian DNA.		
Calculation method (if applicable):	The Operating Margin Factor calculation was performed by the Brazilian DNA, according to the "Tool to calculate the emission factor for an electricity system" version 01.1.		
QA/QC procedures:	The governmental companies responsible for the collection of data and calculation of the emission factor are also responsible for guaranteeing the quality of data.		
Purpose of data:	Baseline emissions		
Additional comments:	This data was calculated ex-post using the most recent year of data available. The Rondônia-Acre electricity system has been connected to the Brazilian Interconnected Grid (SIN) on 23/10/2009, therefore the data for the SIN was used to calculate the Operation Margin for this crediting period as it best represents the Project baseline. The other monitored parameters FC_{i,m,y} , NCV_{i,y} , EG_{m,y} , EF_{CO2,i,y} are also under the responsibility of the Brazilian DNA. Only the calculated emission factors are made public by this entity. Please see the link below for more details. http://www.mct.gov.br/index.php/content/view/307492.html		

D.3. Implementation of sampling plan

No sampling needed.

SECTION E. Calculation of emission reductions or GHG removals by sinks

E.1. Calculation of baseline emissions or baseline net GHG removals by sinks

Calculation of baseline emissions	Symbol	Amount	Unit	Formula
Total net electricity supplied to the grid	EG _y	219,166	MWh	N/A
Baseline Emission factor (average)*	EF _{grid,CM,y}	0.9305	tCO ₂ e/MWh	Please see the formula provided in the workbook
Total baseline emissions	BE _y	204,398	tCO ₂ e	BE _y = EF _{grid,CM,y} * EG _y

* Please see monitored parameter **EF_{grid,CM,y}** in the page above (section D.2) for yearly Baseline Emission Factor.

E.2. Calculation of project emissions or actual net GHG removals by sinks

According to the registered PDD and methodology, Project emission calculations are not applicable to the Project Activity.

E.3. Calculation of leakage

According to the registered PDD and methodology, leakage emission calculations are not applicable to the Project Activity.

E.4. Summary of calculation of emission reductions or net GHG removals by sinks

Item	Baseline emissions or baseline net GHG removals by sinks (t CO ₂ e)	Project emissions or actual net GHG removals by sinks (t CO ₂ e)	Leakage (t CO ₂ e)	GHG emission reductions or net GHG removals by sinks (t CO ₂ e) achieved in the monitoring period		
				Up to 31/12/2012	From 01/01/2013	Total amount
Total	204,398	0	0	0	204,398	204,398

E.5. Comparison of actual emission reductions or net GHG removals by sinks with estimates in registered PDD

Item	Values estimated in ex ante calculation of registered PDD	Actual values achieved during this monitoring period
Emission reductions or GHG removals by sinks (t CO ₂ e)	191,178	204,398

E.6. Remarks on difference from estimated value in registered PDD

As shown in the tables above, there is a minor increase of around 6.9% from the ex-ante calculation of the registered CDM-PDD during this monitoring period.

This is due to the average load factor in this monitoring period being higher than the estimated in the registered PDD, which was defined based on historical data and project expectations.

The average Load Factor (LF) used for all plants involved in this project was 70% when the electricity generation was estimated for the registered PDD. However, during the present monitoring period, the monitored average LF was around 81%. This can be explained mainly due to three reasons:

- 1) The particular conditions of the plant and of the environment allowed a more efficient operation of the plant;
- 2) The Project developer is now, since the interconnection of the grid, allowed to negotiate the excess electricity generation in the Brazilian Free electricity market. Therefore, they are not bound anymore exclusively to the local grid operator, and does not have a maximum electricity value that can be purchased. Thus, there is an incentive for the company to generate more electricity;
- 3) The years of 2013 and particularly 2014 presented a high incidence of precipitation in the region, resulting in much more availability of water in rivers. This information can be referenced by the report "Status of water resources in Brazil"¹, developed by the Brazilian National Water Agency (ANA).

¹ This report can be accessed at: http://www3.snirh.gov.br/portal/snirh/centrais-de-conteudos/conjuntura-dos-recursos-hidricos/conjuntura_informe_2015.pdf.

Appendix 1. Contact information of project participants and responsible persons/entities

Project participant and/or responsible person/ entity	<input checked="" type="checkbox"/> Project participant <input type="checkbox"/> Person/entity responsible for completing the CDM-MR-FORM
Organization name	Grupo Cassol Energia
Street/P.O. Box	Avenida Norte Sul 3175 - Boa Esperança
Building	-
City	Rolim de Moura
State/region	Rondônia
Postcode	78987-000
Country	Brazil
Telephone	
Fax	
E-mail	contato@grupocassolenergia.com.br
Website	http://www.grupocassolenergia.com.br
Contact person	
Title	Director
Salutation	Mr.
Last name	Cassol
Middle name	-
First name	Reditário
Department	-
Mobile	-
Direct fax	-
Direct tel.	+ 55 (69) 3442.6019
Personal e-mail	-

Project participant and/or responsible person/ entity	<input type="checkbox"/> Project participant <input checked="" type="checkbox"/> Person/entity responsible for completing the CDM-MR-FORM
Organization name	Viden Projetos Ambientais e Sustentabilidade
Street/P.O. Box	Av. Almirante Ary Parreiras 110/102, Bl. C, Icaraí
Building	-
City	Niterói
State/region	Rio de Janeiro
Postcode	24.230-322
Country	Brazil
Telephone	+55 (21) 982.586.486
Fax	-
E-mail	-
Website	www.viden.bio.br
Contact person	-
Title	Associate Director
Salutation	Mr.
Last name	Viana

Middle name	-
First name	Thiago
Department	-
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Direct fax	-
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Document information

<i>Version</i>	<i>Date</i>	<i>Description</i>
05.1	4 May 2015	Editorial revision to correct version numbering.
05.0	1 April 2015	Revisions to: <ul style="list-style-type: none"> • Include provisions related to delayed submission of a monitoring plan; • Provisions related to the Host Party; • Remove reference to programme of activities; • Overall editorial improvement.
04.0	25 June 2014	Revisions to: <ul style="list-style-type: none"> • Include the Attachment: Instructions for filling out the monitoring report form (these instructions supersede the "Guideline: Completing the monitoring report form" (Version 04.0)); • Include provisions related to standardized baselines; • Add contact information on a responsible person(s)/ entity(ies) for completing the CDM-MR-FORM in A.6 and Appendix 1; • Change the reference number from <i>F-CDM-MR</i> to <i>CDM-MR-FORM</i>; • Editorial improvement.
03.2	5 November 2013	Editorial revision to correct table in page 1.
03.1	2 January 2013	Editorial revision to correct table in section E.5.
03.0	3 December 2012	Revision required to introduce a provision on reporting actual emission reductions or net GHG removals by sinks for the period up to 31 December 2012 and the period from 1 January 2013 onwards (EB70, Annex 11).
02.0	13 March 2012	Revision required to ensure consistency with the "Guidelines for completing the monitoring report form" (EB 66, Annex 20).
01	28 May 2010	EB 54, Annex 34. Initial adoption.
Decision Class: Regulatory Document Type: Form Business Function: Issuance Keywords: monitoring report		