CLEAN DEVELOPMENT MECHANISM
PROJECT DESIGN DOCUMENT FORM (CDM-PDD)
Version 02 - in effect as of: 1 July 2004)

SECTION D. Application of a monitoring methodology and plan

D.1. Name and reference of approved monitoring methodology applied to the project activity:

Approved Consolidated Monitoring Methodology (ACM0002): "Consolidated Monitoring Methodology for Zero-Emissions Grid-connected Electricity Generation from Renewable Sources" (ACM0002/Version 6 Sectoral Scope: 1, 19 May 2006).

D.2. Justification of the choice of the methodology and why it is applicable to the project activity:

This monitoring methodology is used in conjunction with the Approved Consolidated Baseline Methodology (ACM0002), which is the baseline methodology chosen for the Project. The ACM0002 monitoring methodology is applicable to electricity capacity additions from run-of-river hydroelectric plants such as El Canadá. Moreover, the geographic and system boundaries of the Guatemalan national electricity grid can be clearly identified, and information on the characteristics of the grid is available from the AMM.

D.2. 1. Option 1: Monitoring of the emissions in the project scenario and the baseline scenario

The key features of the application of this Option are:

- Monitoring of monthly and annual electricity generated by the Project and sold to the grid;
- At the renewal of each crediting period, determination of the OM emission factor (weighted average excluding low-cost/must run sources);
- At the renewal of each crediting period, determination of the BM emission factor (weighted average of the most recently built plants that comprise 20% of the grid generation);
- At the renewal of each crediting period ,determination of the CM;
- Correction of emission factors due to electricity imports and exports, as necessary;
- At the renewal of each crediting period, confirmation that the Project meets applicability requirements, especially with regards to additionality.

D.2.1.1. Data to be collected in order to monitor emissions from the project activity, and how this data will be archived:

ID number *(Please use numbers to ease cross-referencing to D.3)*	Data variable	Source of data	Data unit	Measured (m), calculated (c) or estimated (e)	Recording frequency	Proportion of data to be monitored	How will the data be archived? (electronic/ paper)	Comment

As there are no project emissions, no data needs to be collected.

D.2.1.2. Description of formulae used to estimate project emissions (for each gas, source, formulae/algorithm, emissions units of CO_2 equ.)

As there are no project emissions, no formulae are provided.

D.2.1.3. Relevant data necessary for determining the baseline of anthropogenic emissions by sources of GHGs within the project boundary and how such data will be collected and archived :

ID number (Please use numbers to ease cross-referencing to table D.3)	*Data variable*	*Source of data*	*Data unit*	*Measured (m), calculated (c) or estimated (e)*	*Recording frequency*	*Proportion of data to be monitored*	*How will the data be archived? (electronic/ paper)*	*Comments*
1	Net Electricity supplied to the grid by both El Canada and Montecristo Plants (E1)	GdO	MWh	(m)	monthly	100%	Electronic and paper. Data will be archived during the crediting period and 2 more years.	Official metering data sent monthly to the AMM *. Invoices to the final buyer COMEGSA have to match official metering data to AMM. There is one principal meter and back meter installed in the El Canada substation. The back-up meter readings will be used in case of problems with the main meter and also to cross check with the principal meter readings. The meters are calibrated as per the requirements of the norm ANSI C12.20.

2	Net Electricity supplied to the grid by Montecristo Hydroelectric Plant (E2)	GdO	MWh	(m)	monthly	100%	Electronic and paper. Data will be archived during the crediting period and 2 more years.	Official metering data sent monthly to the AMM *. Invoices to the final buyer COMEGSA have to match official metering data to AMM. There is one principal meter and back meter installed in the Montecristo substation. The back up meter readings will be used in case of problems with the main meter and also for cross checking the principal meter readings. The meters are calibrated as per the requirements of the norm ANSI C12.20.
3	Net Electricity supplied by the project to the grid (EGy)	GdO	MWh	(c)	Monthly	100%	Electronic and paper. Data will be archived during the crediting period and 2 more years.	The net electricity supplied by the project to the grid is calculated based on the difference between the meter readings of E1 and E2. Hence, EGy = E1 – E2*.

*El Canadá Hydroelectric plant is located 2 km upstream from Montecristo plant. The electricity produced by the Montecristo Hydroelectric plant is transformed from 13.8 kV to 69 kV in an own substation and then is delivered to the 69 kV busbar of El Canadá Substation, through a 69 kV line, whose length is of 2.8 km. The reason of the connection of Montecristo power plant to the grid, through El Canadá substation, was to reduce investment costs using the same line to export the electricity from El Canadá substation to the grid and to reduce the environmental impacts.

Each power plant has its own electricity meter to read the net electricity supplied to the grid, El Canadá Electricity Meter is located in the 69 kV busbar of El Canadá Substation and the Montecristo Electricity Meter is located in the 69 kV busbar of Montecristo Substation. The 69 kV busbar of El Canadá Substation was chosen as the sale busbar for both plants, but the net electricity supplied to the grid by each plant is commercialized separately and in different way in the electricity market.

The monthly net electricity supplied to the grid will be collected from the commercial energy meter installed in the El Canada Substation (installed on 19 November 2003), which measures the net electricity supplied by both El Canada Hydroelectric Project and Montecristo Hydroelectric Projects and in the Montecristo Substation in the 69 KV bus which measures net electricity supplied to the grid by the Montecristo Hydroelectric Project alone (installed on 14 May 2006 and started supplying to the grid from the same month through El Canada substation meter, evidence for the same submitted to DOE), therefore the net electricity supplied by the El Canadá Hydroelectric Project will be calculated by the difference.

Net Electricity supplied by the project activity to the grid (EGy) = Meter reading at El Canada Hydro 69 kV substation – Meter reading at Montecristo 69 kV substation.

The generation data is reported in a spreadsheet for measuring control and register. The commercial meter data collection of the monitored month takes place during the first week of the following month.

D.2.1.4. Description of formulae used to estimate baseline emissions (for each gas, source, formulae/algorithm, emissions units of CO_2 equ.)

The formulae and the algorithms to be used are the same described in section B.2. of this PDD:

OM is calculated *ex-ante*, using the Simple OM Method of the approved methodology.

BM is calculated *ex-ante*, using the algorithm described in the approved methodology.

CM is equal to the simple average of the OM and the BM, as indicated in the approved methodology.

CM is multiplied by the net annual electricity generation, which yields the new baseline emissions.

D. 2.2. Option 2: Direct monitoring of emission reductions from the project activity (values should be consistent with those in section E).

D.2.2.1. Data to be collected in order to monitor emissions from the project activity, and how this data will be archived:

ID number *(Please use numbers to ease cross-referencing to table D.3)*	Data variable	Source of data	Data unit	Measured (m), calculated (c), estimated (e),	Recording frequency	Proportion of data to be monitored	How will the data be archived? (electronic/ paper)	Comment

D.2.2.2. Description of formulae used to calculate project emissions (for each gas, source, formulae/algorithm, emissions units of CO_2 equ.):

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D.2.3. Treatment of leakage in the monitoring plan

D.2.3.1. If applicable, please describe the data and information that will be collected in order to monitor leakage effects of the project activity

ID number *(Please use numbers to ease cross-referencing to table D.3)*	Data variable	Source of data	Data unit	Measured (m), calculated (c) or estimated (e)	Recording frequency	Proportion of data to be monitored	How will the data be archived? (electronic/ paper)	Comment

Indirect emissions can result from project construction, transportation of materials and fuel and other up-stream activities. In the case of the proposed Project, these emissions are thought to be comparable to the life cycle emissions that would result from the eventual construction and operation of alternative capacity. The life-cycle emissions of alternative power generation plants, in particular of fossil fuel power plants, are typically higher than from hydro power plants when including emissions due to the mining, refining and transportation of fossil fuel. The Project does not claim emission reductions from these activities. Therefore, no significant net leakage from the above activities was identified.

Project emissions in the form of methane can also result from the construction and operation of a water reservoir if biomass is permanently submerged in this process. The Project is a run-of-the-river hydropower plant, therefore it does not have a reservoir that allows biomass emissions and its eventual conversion to methane.

Thus, no sources of emissions were identified, and therefore no data will be collected and archived.

D.2.3.2. Description of formulae used to estimate leakage (for each gas, source, formulae/algorithm, emissions units of CO_2 equ.)

The Project targets only CO_2 emissions and will not claim the reductions of other GHGs included in Annex A of the Kyoto Protocol. Additionally, the Project has not been identified as a source of emissions of any of these GHGs.

D.2.4. Description of formulae used to estimate emission reductions for the project activity (for each gas, source, formulae/algorithm, emissions units of CO_2 equ.)

The Project is a hydropower project; it does not give rise to direct GHG emissions. Therefore, no formulae for calculation of direct emissions are provided here.

D.3. Quality control (QC) and quality assurance (QA) procedures are being undertaken for data monitored

Data (Indicate table and ID number e.g. 3.-1.; 3.2.)	*Uncertainty level of data (High/Medium/Low)*	*Explain QA/QC procedures planned for these data, or why such procedures are not necessary.*
D.3.1. Net Electricity supplied to the grid by El Canada and Montecristo Plants	Low	There is one principal and backup meter. The Serial number of the principal meter - PT-0511A048-0; For the back-up meters: Serial Number is 85 762 983. The meters are calibrated yearly to fulfill the requirements of the norm ANSI C12.20. Official metering data will be sent monthly to the AMM. Invoices to the final buyer COMEGSA will have to match the official metering data to AMM.
D.3.2. Net Electricity supplied to the grid by Montecristo Hydroelectric Plant	Low	There is one principal and backup meter. The Serial number of the principal meter - PT-0511A045-000; For the back-up meters: Serial Number is 85 762 982. The meters are calibrated yearly to fulfill the requirements of the norm ANSI C12.20. Official metering data will be sent monthly to the AMM. Invoices to the final buyer COMEGSA will have to match the official metering data to AMM
D.3.3 Net Electricity supplied by the project to the grid (EGy)	Low	Calculated based on the readings of meters installed for parameters D3.1 and D3.2.

According to the NCC-14 clause 14.12 "Periodic Verifications" the principal and supporting meters need to be checked every year for the fulfillment of the requirement of the Administrador del Mercado Mayorista, AMM (Wholesale Market Administrator) or of the manufacturer. Generadora de Occidente, Ltda. Every as per the requirements of the norm ANSI C12.20. The meters are certified by a company that is approved by the AMM.´

Also Generadora Montecristo, S.A. as same of Generadora de Occidente, Ltda. every year proceed to the calibration of the meters of energy, the principal meter and the support meter; in order to verify that the meters fulfill the requirements of the norm ANSI C12.20. The meters were certified by a company that is approved by the AMM.

D.4 Please describe the operational and management structure that the project operator will implement in order to monitor emission reductions and any leakage effects, generated by the project activity

The management and operation of the Project are the responsibility of GdO. For calculating the ERs, GdO relies on data issued by the AMM based on the actual operation of the NIS. Independent verifiers will periodically audit the operational and management systems to ensure credibility and transparency of the reported ERs and other performance indicators of the Project.

Components of the operational and management structure implemented by GdO are:

- A transparent system for the collection, computation and storage of data, including adequate record keeping and data monitoring systems;
- Clear procedures and protocols for collection and entry of data, use of workbooks and spreadsheets and any assumptions made, so that compliance with requirements can be assessed by a third party. Paper-based systems are also used as back-ups in the event of electronic system failures;
- A competent Project Manager, who is in charge of, and accountable for, the generation of data, monitoring, record keeping, and computation of ERs, and of audits and verification. He officially signs all worksheets;
- Regular reporting to the PCF via copies of completed worksheets, semi-annual ER statements, and brief annual ER reports, as set forth in the Emission Reductions Purchase Agreement (ERPA), while maintaining originals on file;
- Internal training to staff to enable them to undertake the tasks required by the MP.

In El Canada Substation, the Plant Manager is responsible to collect electronically and monthly the electricity supplied to the grid data from the commercial energy meter installed in the El Canada Substation, which measures the energy supplied to the grid by both El Canada Hydroelectric Project and Montecristo Hydroelectric Project. In the Montecristo Substation, again the plant manager of the Montecristo plant is responsible to collect the electricity supplied to the grid by the Montecristo Hydroelectric Project in the 69 KV bus , therefore the electricity supplied to the grid by the El Canadá Hydroelectric Project can be calculated by difference of two substation meter readings.

In both substations, the generation data is reported in a spreadsheet for measuring control and register. The commercial meter data collection of the monitored month takes place during the first week of the following month.

Calibration certificates for both the meters are available.

D.5 Name of person/entity determining the monitoring methodology:

Prototype Carbon Fund
Contact: Johannes Heister (jheister@worldbank.org)/ Fernando Cubillos (fcubillos@worldbank.org)

Generadora de Occidente, Ltda.
Contact: Juan Carlos Mendez (jc.mendez@latinamerica.enel.it)