Appendix A[1] to the simplified modalities and procedures for small-scale CDM project activities

CLEAN DEVELOPMENT MECHANISM
SIMPLIFIED PROJECT DESIGN DOCUMENT
FOR SMALL SCALE PROJECT ACTIVITIES (SSC-PDD)
Version 01 (21 January, 2003)

Introductory Note

1. This document contains the clean development mechanism project design document for small-scale project activities (SSC-PDD). It elaborates on the outline of information in appendix B "Project Design Document" to the CDM modalities and procedures (annex to decision 17/CP.7 contained in document FCCC/CP/2001/13/Add.2) and reflects the simplified modalities and procedures (herewith referred as simplified M&P) for small-scale CDM project activities (annex II to decision 21/CP.8 contained in document FCCC/CP/2002/7/Add.3).

2. The SSC-PDD can be obtained electronically through the UNFCCC CDM web site (http://unfccc.int/cdm/ssc.htm), by e-mail (cdm-info@unfccc.int) or in print from the UNFCCC secretariat (Fax: +49-228-8151999).

3. Explanations for project participants are in italicized font *(e.g. explanation)*.

4. The Executive Board may revise the SSC-PDD if necessary. Revisions shall not affect small-scale CDM project activities validated prior to the date at which a revised version of the SSC-PDD enters into effect. Versions of the SSC-PDD shall be consecutively numbered and dated. The SSC-PDD will be available on the UNFCCC CDM web site in all six official languages of the United Nations.

5. In accordance with the CDM modalities and procedures, the working language of the Board is English. The completed SSC-PDD shall therefore be submitted to the Executive Board in English.

6. Small-scale activities submitted as a bundle, in accordance with paragraphs 9 (a) and 19 of the simplified M&P for small-scale CDM project activities, may complete a single SSC-PDD provided that information regarding A.3 (*Project participants*) and A.4.1 *(Location of the project activity)* is completed for each project activity and that an overall monitoring plan is provided in section D.

[1] This appendix has been developed in accordance with the simplified modalities and procedures for small-scale CDM project activities (contained in annex II to decision 21/CP.8, see document FCCC/CP/2002/7/Add.3) and it constitutes appendix A to that document. For the full text of the annex II to decision 21/CP.8 please see http://unfccc.int/cdm/ssc.htm).

7. A small-scale project activity with different components eligible to be proposed[2] as a small-scale CDM project activity may submit one SSC-PDD, provided that information regarding subsections A.4.2 (*Type and category(ies) and technology of project activity*), and A.4.3 (*brief statement on how anthropogenic emissions of greenhouse gases (GHGs) by sources are to be reduced by the proposed CDM project activity)* and sections B *(Baseline methodology)*, D *(Monitoring methodology and plan)* and E *(Calculation of GHG emission reductions by sources)* is provided separately for each of the components of the project activity.

8. If the project activity does not fit any of the project categories in appendix B of the simplified M&P for small-scale CDM project activities, project proponents may propose additional project categories for consideration by the Executive Board, in accordance to paragraphs 15 and 16 of the simplified M&P for small-scale CDM project activities. The project design document should, however, only be submitted to the Executive Board for consideration after it has amended appendix B as necessary.

9. A glossary of terms may be found on the UNFCCC CDM web site or from the UNFCCC secretariat by e-mail (cdm-info@unfccc.int) or in print (Fax: +49-228-8151999).

[2] In paragraph 7 of simplified M&P for small-scale CDM project activities, on clarifications by the Executive Board on small-scale CDM project activities, the Board agreed that in a project activity with more than one component that will benefit from simplified CDM modalities and procedures, each component shall meet the threshold criterion of each applicable type, e.g. for a project with both a renewable energy and an energy efficiency component, the renewable energy component shall meet the criterion for "renewable energy" and the energy efficiency component that for "energy efficiency".

CONTENTS

A. General description of project activity

A.1 Title of the project activity:

PROJECT FOR THE REFURBISHMENT AND UPGRADING OF DOLEGA HYDROPOWER PLANT (PANAMA).

A.2 Description of the project activity:

Dolega hydropower plant (Panama) entered into service in the year 1937 and since 1 November 1998 has been operated by Empresa de Distribución Eléctrica Chiriquí, S.A. (EDEMET-EDECHI).

The Dolega hydropower harnessing is located in the province of Chiriquí, in the Dolega district, about 30 km from the city of David. Until the year 2000 is operated with four Francis type hydraulic turbines with a total installed power of 2.8 MW. In January 2000 the design phase of the Project for the Refurbishment and Upgrading of Dolega Hydropower Plant began.

Thus the Project for the Refurbishment and Upgrading of Dolega Hydropower Plant consists of the installation of three Francis type hydraulic turbines with a unit capacity of 3.08 m^3/s and a total installed capacity of 3.12 MW. The improvements made to the power plant with this project have been based on the best available technology, achieving the best energy efficiency of the plant.

The refurbished and upgraded power plant came into operation in June 2001.

The new power plant has the following characteristics:

Equipment flow:	9.24 m^3/s
Nominal capacity:	**3.12 MW**
Nominal net head:	39 m
Estimated annual production:	**19.0 GWh/year**
Estimated annual hours of operation:	**6,278 h**

The project thus involves extending the capacity to generate electricity using a renewable energy source, in this case mini-hydropower, thereby contributing to increasing the participation of non-fossil fuels, which do not generate greenhouse gases, in the generation of electricity in Panama. In this way a response

is provided to the increasing electricity demand in this country in a way that **is compatible with the principles of sustainable development and the commitments acquired by Panama to mitigate as far as possible the impacts derived from electricity generation activities with special priority on promoting a less fossil fuel intensive electricity sector**.

Thus the main objectives of the project, which are furthermore in accordance with the guiding lines of Panamanian energy policy with regard to the electricity sector (according to the provisions of article 2 of Law 6 of 3/2/1997), are as follows:

- To incorporate additional electricity of a clean, renewable, safe and reliable nature in the Panamanian electricity sector.
- To optimize the use of existing hydraulic resources.
- To contribute to mitigating GHG emissions in Panama.
- To promote self-provisioning, reducing the dependence on imported fuels for electricity generation.

In this context, the Project for the Refurbishment and Upgrading of Dolega Mini-Hydropower Plant, promoted by Unión Fenosa Internacional and presented in this document, has been incorporated by the Panamanian Government in the national portfolio of CDM projects developed within the framework of the National Climate Change Programme of Panama, following an evaluation of the project profile by the National Environment Authority (ANAM). This incorporation recognizes the project's contribution to the attainment of national priorities with regard to climate change policy in the energy sector and its contribution to sustainable development, since in addition to the environmental benefits in terms emission mitigation and the sustainable use of local resources, the project raises the level of employment in the area and assures the permanent improvement of local infrastructure (roads, electricity service, communications, etc.).

Subsequently, during 2001 contacts were made with the National Environment Authority (ANAM) which led to the issuing on 7 February 2002 of a Letter of Endorsement for Dolega Hydropower Plant signed by Mr. Ricardo Anguizola in his capacity as General Administrator of this Authority, in which the Panamanian Government acknowledges that the project will produce a reduction in greenhouse gas emissions and thus may be eligible according to the modalities and procedures of the Clean Development Mechanism.

A.3 Project participants:

UNIÓN FENOSA INTERNACIONAL, S.A.
EMPRESA DE DISTRIBUCIÓN ELÉCTRICA CHIRIQUÍ, S.A.

The contact for the Clean Development Mechanism is:

José Luis Esteban Viejo
President of UF Panama
Address: Albrook, Edif. 812, Av. Diógenes de la Rosa
Phone: 315-7870/315-7696
E-mail: jleviejo@ufpanama.com

As an Annex 1 Country of the Kyoto Protocol (to whom the project activity has been presented for evaluation and, if applicable, issuance of the corresponding Letter of approval and voluntary participation) **SPAIN** is involved in this project activity.

For its part, Spain has in January 2005 signed an **Agreement Memorandum** with **PANAMA** on "**Climate change related initiatives, including Clean Development Mechanism projects**" formalizing cooperation in relation with the Clean Development Mechanism between the two States, both of which are Party to the Kyoto Protocol, and aiming to facilitate the attainment by both Parties of their objectives under the Kyoto Protocol and, in the case of Spain, its compliance with the obligations set out in Directive 2003/87/EC, of 13 October 2003, establishing a regime for the trading of greenhouse gas emission rights in the Community.

The certified emission reductions (CERs) generated by this project activity will be transferred to **UNIÓN FENOSA GENERACIÓN, S.A**, who will establish an agreement with the project promoter and will use these rights to contribute to the fulfilment of emission reduction obligations acquired by virtue of the Kyoto Protocol, acting in the way set out in the Clean Development Mechanism Modalities and Procedures. The electricity generated by the project is classified in the self-provisioning regime (15%) that Law 6, which sets out the "Regulatory and Institutional Framework for the provision of the Public Electricity Service", establishes for distribution companies in Panama.

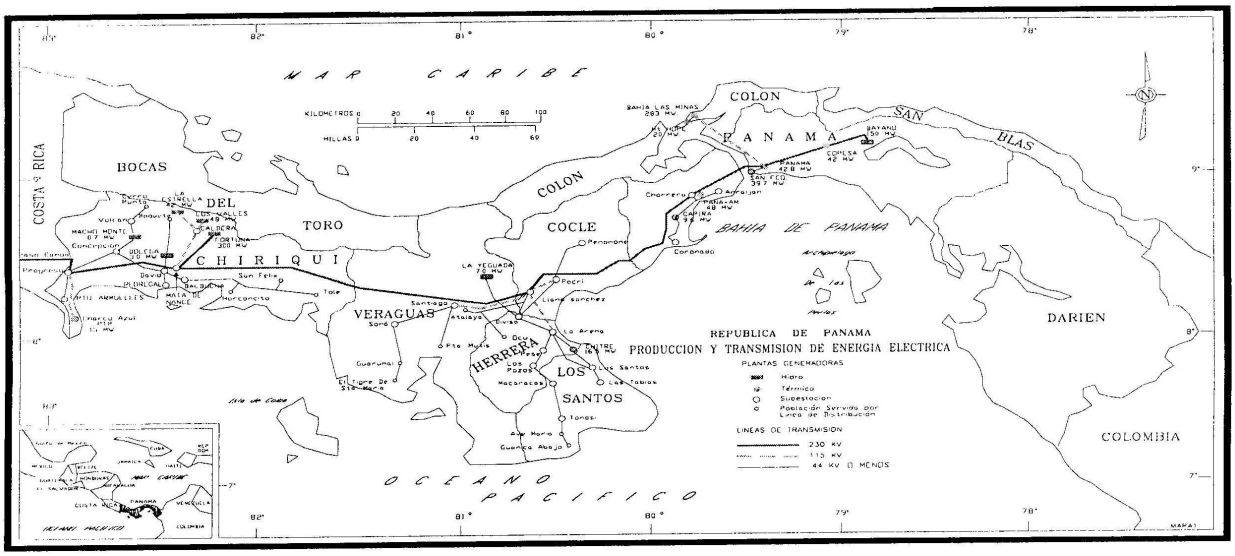
A.4 Technical description of the project activity

A.4.1 Location of the project activity:

A.4.1.1 Host country Party(ies): Panama

A.4.1.2 Region/State/Province etc.: Chiriquí

A.4.1.3 City/Town/Community etc: Dolega



A.4.1.4 Detailed description of the physical location, including information allowing the unique identification of this project activity *(max one page)*:

Dolega mini-hydropower plant is situated in the locality of Dolega, in the province of Chiriquí. The specific coordinates of the power plant site are:

- 8º 36'N
- 82º 25'N
- Altitude 340 m above sea level

The project hydraulic structure consists of a run-of-river diverted flow power plant. It takes water from the river Cochea which is diverted via an open canal to two surge tanks that channel the water through the corresponding confined conduits to the power plant with a gross head of approximately 44 metres. The water is then discharged into the river David.

The power plant was constructed in two phases. In the first phase (1937-1947) groups 3 and 4 were installed, consisting of James Leffel brand horizontal shaft Francis type hydraulic turbines of 410 kW nominal power and 900 rpm turning speed. The generators were Westinghouse brand three-phase models of 550 kVA and with a generating voltage of 2.4 kV. The second phase took place in 1964, with the installation of groups 1 and 2, consisting of Voith brand horizontal shaft Francis type hydraulic turbines of 1000 kW nominal power and 720 rpm turning speed. The alternators were Acec brand three-phase models of 2.4 kV and a capacity of 1.45 MVA. In total, the power plant therefore had four Francis type turbines with a combined power of 2.82 MW.

The power plant refurbishment and upgrading project consists of the construction of a new hydropower plant adjacent to the existing one, which will cease to operate following the entry into service of the new facility. The existing machinery room will be extended to house two turbogroups. It is intended to maintain the two old 1 MW units (not in working order) as a museum. Additionally, a new turbine will be installed to replace the two 0.4 MW units. Thus the final installed power will be 3.12 MW.

Furthermore, the final 15 metres of confined conduit must be replaced in order for its adaptation to the geometry of the new machinery, while the water return to the river will be achieved in a similar way to the present setup.

The power plant is connected to the national integrated system via a 34 kV line, including the corresponding 4.16/34.5 kV transformers.

The project activity detailed in this document involves the following tasks for the refurbishment and upgrading of Dolega Hydropower Plant:

- Cleaning of flood debris. The canal has been cleaned of weeds and sediments deposited on its bed, subsequently repairing all existing cracks and holes with mortar, paying special attention to retraction joints in order to reduce the friction forces of the bed and walls.
- The power plant building has been extended lengthways for the installation of two turbogroups and to provide the space necessary for the operation and maintenance of the installations (auxiliary services, protection and command and control boards). The extension has been covered with a metallic structure two-pitch roof adapted to the geometry and conditions of the existing building. A small stretch of discharge canal has been constructed to link up with the existing canal.
- The area surrounding the building has been developed to allow the correct maintenance of the facility and the access of the equipment to be installed in its interior.

A.4.2 Type and category(ies) and technology of project activity

The project activity category, according to the CDM simplified modalities and procedures published by the UNFCCC, corresponds to **TYPE 1D – GENERATION OF ELECTRIC ENERGY FROM RENEWABLE SOURCES CONNECTED TO GRID**. The project is included in this category since:

- The project's nominal capacity does not exceed the limit of 15 MW set by the UNFCCC.
- All the electricity generated by the Dolega plant as a consequence of this upgrading project is exported to the Panamanian electricity distribution system.

Therefore, this is a project that results in a reduction in GHG emissions by the Panamanian energy sector, specifically a "reduction in GHG emissions from sources derived from combustion processes in energy industries", according to the provisions of Annex A of the Kyoto Protocol.

The technology used in the project equipment is relatively simple but modern, guaranteeing its adequate performance and appropriate response to electricity generation needs and with significant levels of resource utilization and energy efficiency.

In this respect, Unión Fenosa Internacional offers its long experience in the design, construction and operation of hydropower plants in different sites in Spain, Latina America and in other countries.

A.4.3 Brief statement on how anthropogenic emissions of greenhouse gases (GHGs) by sources are to be reduced by the proposed CDM project activity:

The project activity, consisting of the generation of electricity with a "zero" emission factor in terms of greenhouse gas emissions, will replace part of the electricity production from existing and/or planned future facilities in the Panamanian electricity system, some of which use fossil fuels (specifically diesel oil, which to date is the only fossil fuel used by electricity generating plants in this country).

Therefore, the contribution of electricity from renewable sources onto the grid will allow this project to help to reduce overall greenhouse gas emissions in the Panamanian system.

The estimated reduction in emissions due to the entering into operation of the refurbished Dolega Hydropower Plant, estimating an annual production of 19 GWh and applying the simplified baseline methodology envisaged by the UNFCCC for small-scale electricity generating projects using renewable sources, will be as follows:

Annual emission reductions:

- ***ERs Dolega (ton CO_2) = 800 ton CO_2/GWh * 19 GWh = 15,200 ton CO_2***

Emission reductions over crediting period (21 years):

- ***ERs Dolega (ton CO_2) =21*(800 ton CO_2/GWh * 19 GWh) = 319,200 ton CO_2***

While the associated emission factor for diesel groups is 800 ton CO_2/GWh, according to the simplified baseline methodology for small-scale projects approved by the UNFCCC (see Table I.D.1 of the methodology).

A.4.4 Public funding of the project activity:

Public funding has not been provided for this project.

A.4.5 Confirmation that the small-scale project activity is not a debundled component of a larger project activity:

According to the provisions of Annex C of the Simplified Modalities and Procedures for CDM, this project is not a debundled component of a larger project activity since none of the project participants have registered or are in the process of registering or implementing any other project in the region around the Dolega Hydropower Plant project.

B. Baseline methodology

B.1 Title and reference of the project category applicable to the project activity:

SIMPLIFIED BASELINE METHODOLOGIES FOR SELECTED SMALL-SCALE CDM PROJECT ACTIVITY CATEGORIES.

In this case the simplified baseline methodology corresponds to **TYPE 1D – GENERATION OF ELECTRIC ENERGY FROM RENEWABLE SOURCES CONNECTED TO GRID**.

B.2 Project category applicable to the project activity:

The project corresponds to **TYPE 1D – GENERATION OF ELECTRIC ENERGY FROM RENEWABLE SOURCES CONNECTED TO GRID**, since:

- The projects nominal capacity does not exceed the limit of 15 MW set by the UNFCCC.
- All the electricity generated by the Dolega plant as a consequence of this upgrading project is exported to the Panamanian electricity distribution system.

B.3 Description of how the anthropogenic GHG emissions by sources are reduced below those that would have occurred in the absence of the proposed CDM project activity *(i.e. explanation of how and why this project is additional and therefore not identical with the baseline scenario)*

Under the following headings a description is made of the reduction in greenhouse gas (GHG) emissions derived from the project activity and its additional character compared with the situation in the absence of the project:

- **EXPLANATION OF THE REDUCTION IN GHG EMISSIONS BY THE PROJECT ACTIVITY.**
- **JUSTIFICATION OF THE ADDITIONALITY OF THE PROJECT ACCORDING TO THE ADDITIONALITY TOOL APPROVED BY THE UNFCCC.**

The conclusions obtained in this respect are as follows:

I. EXPLANATION OF THE REDUCTION IN GHG EMISSIONS BY THE PROJECT ACTIVITY

According to the simplified baseline methodology approved by the UNFCCC, and more specifically that corresponding to Type 1D – Generation of electric energy from renewable sources connected to grid, in those cases in which all fossil fuel fired electricity generating sources only use fuel oil or diesel oil, the baseline may be calculated by comparing the basic or reference emission factor with the equivalent corresponding to a modern diesel fired electricity generating group in operation in the electricity system in which the project is planned.

In the specific case of Panama, according to data provided by the Energy Policy Commission (COPE), all of the thermal generation capacity in Panama uses the following fuels:

- Bunker C
- Light diesel
- Marine diesel

For which reason this simplified baseline methodology is applicable.

According to the standard emission factors envisaged for these cases by the methodology (Table I.D.1 of the simplified methodology), and in particular for the case in hand, the emission factor to be used would be **800 ton CO_2e/GWh** (considering a conversion factor of 3.2 kg CO_2/kg diesel according to IPPC 1996).

The estimated reduction in emissions derived from the entry into operation of the Dolega Hydropower Plant project, estimating an annual production of 19.0 GWh, would therefore be as follows:

Annual emission reductions:

- ***ERs Dolega (ton CO_2) = 800 ton CO_2/GWh * 19 GWh = 15,200 ton CO_2***

Emission reductions over crediting period (21 years):

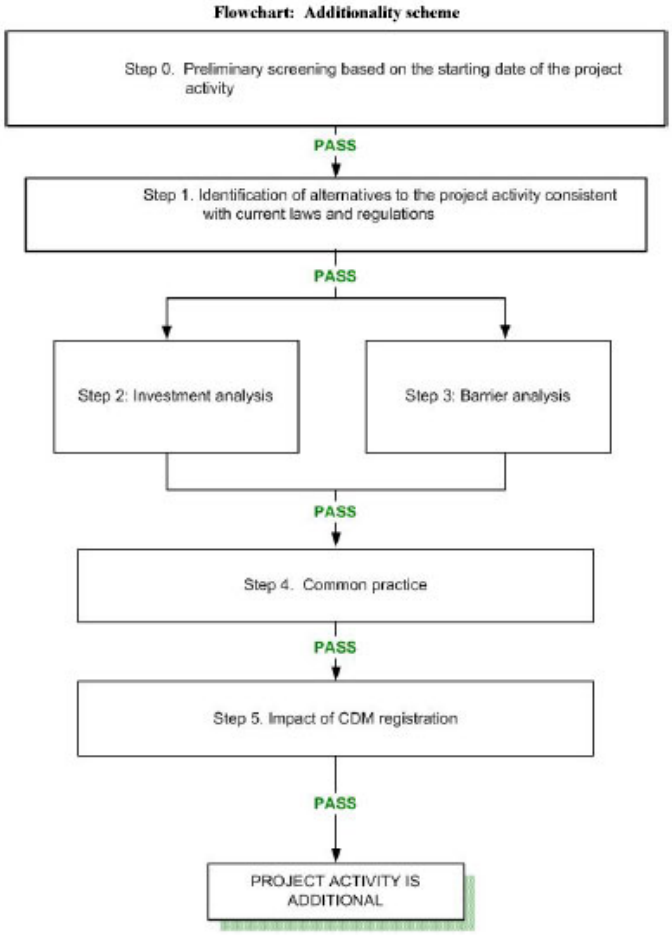
- ***ERs Dolega (ton CO_2) =21*(800 ton CO_2/GWh * 19 GWh) = 319,200 ton CO_2***

II. JUSTIFICATION OF THE ADDITIONALITY OF THE PROJECT ACCORDING TO THE ADDITIONALITY TOOL APPROVED BY THE UNFCCC

In order to assess and demonstrate the additionality of the project in conformity with the requirements of the Clean Development Mechanism modalities and procedures, **the Additionality Tool approved by the**

UNFCCC has been applied to the project for the refurbishment and upgrading of Dolega mini-hydropower plant.

The UNFCCC Additionality Tool is based on the following scheme to determine the additionality of a CDM candidate project:



The results of applying each step of the UNFCCC Additionality Tool to the Dolega Hydropower Plant project are shown below.

Step 0.- PRELIMINARY SCREENING BASED ON THE STARTING DATE OF THE PROJECT ACTIVITY

The project activity relating to the refurbishment and upgrading of Dolega Hydropower Plant started in June 2001, for which reason it is requested that the crediting period for the obtainment of emission reduction units be considered to start on 1/7/2001. In this way it is intended that the crediting period will start prior to the project registration date in the Clean Development Mechanism. In accordance with the Additionality Tool, this document provides evidence that:

- The date of entry into operation of the refurbished and upgraded power plant was June 2001.
- The incentive derived from the potential obtainment of emission reduction units in the Clean Development Mechanism was taken into consideration in the project activity design phase, as can be deduced from:

    - The contacts with the National Environment Authority (ANAM) resulting in the issuing of a **Letter of Endorsement** (dated February 2002).

- Participation on 12/9/2001 in the "**First National Training Workshop for the Preparation of Climate Change Mitigation Projects through the Clean Development Mechanism: Towards a National Portfolio of CDM Projects"**.
- Participation on 11/12/2001 in the "**Second National Training Workshop for the Preparation of Climate Change Mitigation Projects through the Clean Development Mechanism: Towards a National Portfolio of CDM Projects"**, in which the National Portfolio began to acquire consistency and the Dolega plant was considered as a candidate project.
- Finally, the inclusion of this project in the **Panamanian National Portfolio of CDM Projects**, acknowledging that this project is compatible with the national priorities of Panama in relation with climate change policy and sustainable development.

Step 1.- IDENTIFICATION OF ALTERNATIVES TO THE PROJECT ACTIVITY CONSISTENT WITH CURRENT LAWS AND REGULATIONS

In this respect it is noted that the approach under this heading needs to take into account the particular nature of the Dolega project, in the sense that it is not a newly created project activity but the refurbishment and upgrading of an existing project resulting in a more modern and efficient mini-hydropower plant with a greater capacity.

Accordingly, the possible alternative to the project scenario consists of **closure of the mini-hydropower plant installations** which had been operating since 1937 with a capacity of around 2 MW and an electricity production profile of around 10 GWh per year in the period 1937-2000, according to historic production records. In fact, **the closure of the power plant was envisaged for the year 2004, at most, in the event that the refurbishment and upgrading project were not carried out**, since this year would be the end of the service life of the existing turbogroups.

Choice between Step 2.- INVESTMENT ANALYSIS or Step 3.- BARRIER ANALYSIS

The Refurbishment and Upgrading of Dolega Hydropower Plant has had to overcome a series of barriers, fundamentally related with aspects of the common practice in the country, as a result of which it may be concluded that in the absence of the initiative created through the Clean Development Mechanism the project would not have been the most attractive scenario, and therefore the project is ADDITIONAL **from the point of view of the existence of barriers to its implementation.**

Step 3.- BARRIER ANALYSIS

a) BARRIERS RELATED WITH COMMON PRACTICE IN THE COUNTRY

At the time of the project's design, a series of barriers to its implementation existed, namely:

- The absence of clear plans and targets on the part of the Panamanian Government in relation with the implementation of small-scale renewable energy projects, which did not exist at the time of the design and implementation of the project, although they have recently been developed.
- The lack of appropriate fiscal policies and support mechanisms for electricity generating projects using renewable sources, which did not exist at the time of the design and implementation of the project, although they are currently being developed.

The barriers existing at that time did not encourage the development of projects harnessing renewable energies, especially small-scale projects with greater associated risks and economic and financial uncertainties. Thus, in Panama the scenario of electricity generation has to date been based on the installation of thermoelectric generating groups (diesel fired units) and large hydropower plants. In fact, there are only four mini-hydropower plants in operation (Hidro Panamá, La Yeguada, Macho de Monte

and Dolega), which in total represent approximately 0.9% of all the electricity placed on the Panamanian grid (figure corresponding to year 2001 according to the Energy Statistics Compendium 1970-2003).

The Panamanian electricity scenario, based on thermoelectric generation and hydroelectric generation in large hydropower plants, in combination with the barriers resulting from the institutional and regulatory framework, demonstrate that the Project for the Refurbishment and Upgrading of Dolega Hydropower Plant is ADDITIONAL and does not correspond to the base scenario. The existence of these barriers can be confirmed by analysing the most recent additions of electricity generating capacity, which in the last five cases have consisted of four diesel units and one large capacity hydroelectric power plant.

For the moment, the Dolega refurbishment project is the only project of its type to be undertaken in Panama.

b) ENVIRONMENTAL ASPECTS

The project for the refurbishment and upgrading of Dolega mini-hydropower plant is **ADDITIONAL from the environmental viewpoint** insofar as the alternative scenario would mean a scenario of greater greenhouse gas emissions.

Thus, the alternative of closure of the plant would mean accepting the generation of the corresponding electricity in one of the following ways:

- **Way 1: Search for a new site and construction of a new installation.**
- **Way 2: The quota of electricity generation is assumed by an existing installation**.

In either case, the environmental impact would be equal to or greater than that resulting from implementing the Dolega project, in terms of both environmental impacts during the construction phase and environmental impacts derived from the activity of electricity generation, and in the case of greenhouse gas emissions this is translated into two possible scenarios:

- **Way 1: Search for a new site and construction of a new installation**.
  - *Most favourable case*: the new installation generates electricity from renewable sources ("zero" emission of CO_2). The most feasible scenario in the case of Panama would be a large capacity hydroelectric power plant, which while not being a source of CO_2 emissions would nevertheless involve CH_4 emissions, since the impounded water in this type of installation is an important generator of methane. This fact is worsened in the case of Panama since this is an area with abundant tropical vegetation, and river basins with very important nutrient loads, etc., which in anaerobic conditions such as those that occur in the deep impounded water in reservoirs leads to significant emissions, as has been reported by the World Commission on Large Dams. Furthermore, it would also be necessary to take into consideration the environmental and above all the social impact resulting from the construction of the power plant.
  - *Most unfavourable case*: the new power plant would use fossil fuels (diesel oil, in this case) to generate electricity, contributing to increasing greenhouse gas emissions attributable to the Panamanian electricity sector in proportion with the aforementioned emission factor (0.8 ton CO_2e/MWh). Besides, it would also be necessary to take into account the environmental impact derived from the new power plant construction project.

- **Way 2: The quota of electricity generation is assumed by an existing installation.**
  - *Most favourable case*: the electricity is generated using renewable sources ("zero" emission of CO_2). In this case the environmental impact would not be different to the scenario of the Dolega project with regard to emissions.
  - *Most unfavourable case*: the electricity is generated using fossil fuels (diesel oil), contributing to increasing greenhouse gas emissions in proportion to the aforementioned emission factor (0.8 ton CO_2e/MWh).

Whichever of the above ways were to be chosen, it would also be necessary to take into consideration the impact derived from abandoning the current plant, not only in environmental and social terms but also in terms of the cost of the opportunity lost by not taking advantage of the existing installation.

Step 4.- COMMON PRACTICE

In order to analyse whether the project for the refurbishment and upgrading of Dolega hydropower plant is a common practice in the Panamanian electricity sector, other activities similar to this project have been identified and studied. Accordingly, on the basis of the information available on the current electricity scenario in Panama it may be concluded that:

- The operation of high capacity hydroelectric power plants, and the upgrading of some of these plants to extend their capacity, has been, is, and is forecast to continue to be a common practice in Panama. Five large hydroelectric power plants have been operating for a number of years (Fortuna, Bayano, La Estrella, Los Valles, ACP), Bayano I has been refurbished in 2003 and its capacity increased from 75 MW to 80 MW, and another future extension is envisaged, etc.
- The construction of new high capacity hydroelectric power plants is envisaged in the Expansion Plan of 1999 published by ETESA, such as the construction of the Esti project in November 2003 (120 MW) and the Bonyc project (30 MW) located in Bocas del Toro and scheduled to enter into operation in the year 2006, etc., with which this may also be considered to be a common practice; especially in

the light of the new Panamanian regulation Law no. 45 of 4/8/2004 establishing a regime of initiatives to promote hydroelectric generation systems and other new, renewable and clean sources for electricity generation.

- However, in the case of mini-hydropower plants (capacity of less than 10 MW), both ETESA sources and the Energy Policy Commission (COPE) reveal that only four mini-hydropower installations (Hidro Panamá, La Yeguada, Dolega and Dolega) with relevant annual production data are in operation, in total representing approximately 0.9% of all the electricity placed on the Panamanian grid (figure corresponding to year 2001 according to the Energy Statistics Compendium 1970-2003). Therefore it is not possible to speak of a common practice in the country in this respect. With the aforementioned Law no. 45, in force since August 2004, the installation of new mini-hydropower generating installations will nevertheless be promoted.
- Furthermore, it is underlined that the project presented in this document is for the refurbishment and upgrading of an existing mini-hydropower plant, a practice that has not been observed in any of the available information on other similar cases, except in the case of Macho de Monte Power Plant, also owned by UNIÓN FENOSA INTERNACIONAL - EMPRESA DE DISTRIBUCIÓN ELÉCTRICA CHIRIQUÍ, S.A. and, as in the case of the present project, presented as an eligible project according to the Clean Development Mechanism modalities and procedures.

In short, from the analysis of similar activities it is concluded that the project cannot be considered a common practice, justifying that this is not a 'business as usual' scenario.

Step 5.- IMPACT OF CDM REGISTRATION

Finally, in accordance with the conclusions obtained by applying the UNFCCC Additionality Tool, it may be stated that the most important impacts of registering the Dolega Hydropower Plant project as a CDM project will be as follows:

- The reduction in the greenhouse gas emissions attributable to the Panamanian electricity sector.
- The obtainment of a benefit derived from monetarization of the certified emission reductions derived from the project activity.

The application of the UNFCCC Additionality Tool thus allows it to be concluded that **the Project for the Refurbishment and Upgrading of Dolega Mini-Hydropower Plant is ADDITIONAL according to the CDM Modalities and Procedures**.

B.4 Description of the project boundary for the project activity:

The project boundary is defined from the study of how the construction and operation phases of the project for the refurbishment and upgrading of Dolega Hydropower Plant contribute to GHG emissions, excluding emission sources that cannot be controlled or influenced by the project activity. In this case the activities included in the project framework cover **the upgrading work and the generation of electricity in the plant and the connection and evacuation of the electricity generated to the grid**.

B.5 Details of the baseline and its development:

B.5.1 Specify the baseline for the proposed project activity using a methodology specified in the applicable project category for small-scale CDM project activities contained in appendix B of the simplified M&P for small-scale CDM project activities:

According to the specifications of the simplified baseline methodology approved by the UNFCCC for Projects of Type 1D – Generation of electrical energy from renewable sources connected to grid, the baseline has been calculated in accordance with **Section 28** (cases in which all fossil fuel fired electricity generating sources use fuel oil or diesel oil).

B.5.2 Date of completing the final draft of this baseline section *(DD/MM/YYYY)*:

15/1/2005.

B.5.3 Name of person/entity determining the baseline:

Unión Fenosa Internacional (project participant, see contact information in Annex 1).

C. Duration of the project activity and crediting period

C.1 Duration of the project activity:

C.1.1 Starting date of the project activity:

(For a definition of the term "starting date", please refer to the UNFCCC CDM web site).

2001.

C.1.2 Expected operational lifetime of the project activity: *(in years and months, e.g. two years and four months would be shown as: 2y-4m.)*

30 y.

C.2 Choice of the crediting period and related information:

C.2.1 Renewable crediting period *(at most seven (7) years per crediting period)*

C.2.1.1 Starting date of the first crediting period *(DD/MM/YYYY)*:

1/7/2001.

C.2.1.2 Length of the first crediting period *(in years and months, e.g. two years and four months would be shown as: 2y-4m.)*:

7y.

C.2.2 Fixed crediting period *(at most ten (10) years)*:

C.2.2.1 Starting date *(DD/MM/YYYY)*:

C.2.2.2 Length (max 10 years): *(in years and months, e.g. two years and four months would be shown as: 2y-4m.)*

D. Monitoring methodology and plan

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

According to the simplified modalities and procedures for small-scale project activities in category 1D, the monitoring methodology used is that of **DIRECT MEASUREMENT OF THE ELECTRICITY GENERATED BY THE POWER PLANT.**

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

Since this is a "zero emission" project, the key item to be monitored according to the established monitoring methodology will in all cases be the number of production units generated, i.e. the electricity exported to the grid (expressed in GWh/year), so that this data can be used to estimate the emissions avoided and thus to justify the obtainment and certification of CERs derived from the project activity. This monitoring does not therefore make it necessary to obtain additional data besides that which is recorded in the ordinary monitoring of projects in the electricity sector, in which the electricity generated and the electricity exported to the network are reliably monitored at all times.

D.3 Data to be monitored:

ID number	Data type	Data variable	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)	For how long is archived data to be kept?	Comment
1	Quantitative	Generation of electricity exported to grid	GWh	m	Daily	100%	Electronic and/or paper format	Up to two years after end of crediting period applicable to obtainment of CERs for this project activity, according to UNFCCC provisions.	Monthly records, in either electronic or paper format, must be available for external inspections in the framework of the CDM Modalities and Procedures envisaged by the UNFCCC.

The project activity will be supervised throughout the crediting period using measuring devices that will provide official measurements of flow, energy and power in accordance with the provisions set out by the Panamanian authorities. These measurements will be used to calculate the Power Availability Payments and Energy Payments. The energy and power measuring equipment will be located at the point of delivery (electricity substation).

The energy measuring equipment at the point of delivery will be capable of instantaneously measuring and recording at fifteen minute intervals at least the following parameters: active energy delivered (kWh), active energy consumed (kWh), active power delivered (kW), reactive power delivered (kVAR), reactive power consumed (kVAR). The measurement records will be stored in a format that allows their use in an electronic spreadsheet.

In order to be provided with the information required for the monitoring of the project during the crediting period, fundamentally for the tasks of verification of the generated emission reduction units, an annual Project Monitoring Report-Record will be prepared which will include at least the following aspects of relevance for the evaluation of the generation of emission reductions over this period:

- Year.
- Electricity production: monthly data, annual data (in GWh).
- Baseline emission factor: ton CO_2/GWh, as set out in the baseline study.
- Calculation of emission reductions: Annual ERs (in tons of CO_2/year) achieved by the project activity.

Furthermore, the annual Plant Operation Reports will be taken as a reference and will be available in all the inspections to be performed during the crediting period. These Plant Operation Reports will include consideration of at least the following aspects:

- Annual electricity production with a monthly breakdown. These figures will be incorporated in the plant's Historic Record, which will include all production data for real and reactive power.
- Annual plant factor and monthly breakdown.
- Annual maximum demand and monthly breakdown.
- Annual load factor and monthly breakdown.
- Annual turbine consumption and monthly breakdown.
- Relevant events occurring during the annual period.

In order to guarantee that the achieved emission reduction calculations respond to reliable and verifiable electricity production data, the project incorporates an operating system that will include the necessary data measuring and recording protocols to provide a response to these objectives of information traceability and verifiability of the electricity exported to the grid and liable to generate CERs of the project activity.

D.4 Name of person/entity determining the monitoring methodology:

Unión Fenosa Internacional (project participant, see contact information in Annex 1).

E. Calculation of GHG emission reductions by sources

E.1 Formulae used:

E.1.1 Selected formulae as provided in appendix B:

N/A.

E.1.2 Description of formulae when not provided in appendix B:

E.1.2.1 Describe the formulae used to estimate anthropogenic emissions by sources of GHGs due to the project activity within the project boundary:

N/A ("zero" emission project).

E.1.2.2 Describe the formulae used to estimate leakage due to the project activity, where required, for the applicable project category in appendix B of the simplified modalities and procedures for small-scale CDM project activities

N/A ("zero" emission project).

E.1.2.3 The sum of E.1.2.1 and E.1.2.2 represents the project activity emissions:

N/A ("zero" emission project).

E.1.2.4 Describe the formulae used to estimate the anthropogenic emissions by sources of GHG's in the baseline using the baseline methodology for the applicable project category in appendix B of the simplified modalities and procedures for small-scale CDM project activities: *(for each gas, source, formulae/algorithm, emissions in units of CO_2 equivalent)*

Baseline CO_2 emission factor: 800 ton CO_2/GWh.

E.1.2.5 Difference between E.1.2.4 and E.1.2.3 represents the emission reductions due to the project activity during a given period:

Project total emissions: 0 ton CO_2/GWh.
Baseline CO_2 emission factor: 800 ton CO_2/GWh.

E.2 Table providing values obtained when applying formulae above:

Annual emission reductions:

- ***ERs Dolega (ton CO_2) = 800 ton CO_2/GWh * 19 GWh = 15,200 ton CO_2***

Emission reductions over crediting period (21 years):

- ***ERs Dolega (ton CO_2) =21*(800 ton CO_2/GWh * 19 GWh) = 319,200 ton CO_2***

Therefore, over the entire crediting period (21 years) it is estimated that the Dolega Hydropower Plant project will avoid the emission of ***319,200 ton CO_2***.

F. Environmental impacts

F.1 If required by the host Party, documentation on the analysis of the environmental impacts of the project activity:

According to the environmental legislation in force at the time of the project design, the Dolega hydropower plant project was not subject to the performance of an Environmental Impact Assessment or Site Environmental Assessment procedure, and thus no Environmental Impact Study was required. Nevertheless, since this project involves the refurbishment and upgrading of an existing mini-hydropower plant, the impacts on the environment are considered to be of little significance.

Furthermore, the operation of the Dolega hydropower plant is governed by an Environmental Adaptation and Management Programme (PAMA) prepared in February 2000 and approved by the National Environment Authority (ANAM), focused on guaranteeing constant supervision so that the normal operation of the power plant does not cause any significant impact on the environment, controlling at all times all its effects on the biotic and abiotic environment and managing the wastes generated in an environmentally appropriate way according to a Waste Management Plan. On the other hand, the plant also has an Environmental Contingency Plan to detect any possible environmental impacts that may arise and to effectively implement appropriate preventive and corrective measures.

In addition to this, and as has already been noted above, the project for the refurbishment and upgrading of Dolega mini-hydropower plant is **ADDITIONAL from the environmental point of view** since the possible alternative scenarios would suppose a situation of greater greenhouse gas emissions. The Panamanian electricity sector, based on thermoelectric generation and hydroelectric generation in large hydropower plants, along with the existence of barriers derived from the institutional and regulatory framework and the absence of incentives for investment in small-scale renewable energy projects, demonstrate that this Project for the Refurbishment and Upgrading of Dolega Hydropower Plant does not correspond to the baseline scenario or the common practice in the country.

This environmental additionality, in terms of contributing to reducing greenhouse gas emissions compared with the baseline scenario in the country, is further reinforced by the dual environmental benefit of the fact that the project has a practically nil environmental impact and moreover allows the **mitigation of environmental impacts**, since in the absence of this project the Dolega hydropower plant would be abandoned and its closure would mean the need to compensate the corresponding electricity generation either through the construction of a new electricity generating installation or diverting the corresponding electricity generation quota to an existing installation. In either of these alternative scenarios the environmental impact would be equal to or greater than that of undertaking the Dolega project, both in terms of environmental impacts in the construction phase of an alternative installation and the environmental impacts of the activity of electricity generation.

G. Stakeholders comments

G.1 Brief description of the process by which comments by local stakeholders have been invited and compiled:

According to the environmental legislation in force at the time of the project design, the performance of a public participation process was not mandatory, although the local authorities and the environmental administration were kept constantly informed about the project right from its design phase. It is important to remember that this is a project for the refurbishment and upgrading of an existing mini-hydropower plant which has resulted in benefits for the affected local actors not only in terms of improved quality in the supply of electricity but also from the viewpoint of environmental and social benefits derived from the project.

Although stakeholder's consultation was not mandatory, a public consultation with municipal authorities was done on April 22nd of 2005. In this meeting technicians of UNION FENOSA EDEMET-EDECHI explained the Project and asked for their opinions in relation with the development of the Project. A visit to the installations was done with the local authorities

G.2 Summary of the comments received:

Local authorities expressed their satisfaction for the Project development and no objections in relation with its environmental managing. Local authorities also made these observations:

- Ask for the maintenance of the adornment of the area of the Dolega Hydropower Plant channel and to allow public recreation in the area
- To take better advantage of the material obtained in the maintenance works of the Hydropower Plant
- Ask to Union Fenosa to fulfill their obligations in respect with local taxes
- Ask for the cooperation of UNION FENOSA EDEMET-EDECHI to improve the wastes management
- Improvement of public lighting in the local communities of Dolega

G.3 Report on how due account was taken of any comments received:

In relation with the local authorities observations, UNION FENOSA EDEMET-EDECHI took these initiatives:

- UNION FENOSA EDEMET-EDECHI reiterated it compromise with getting social benefits to the community and the adornment of the area of the Dolega Hydropower Plant channel. There is no objections for the recreational use of the area, only limited when needed by safety reasons
- UNION FENOSA EDEMET-EDECHI is agree in supply the materials obtained in the maintenance works to improve the tracks and roads of the District. UNION FENOSA EDEMET-EDECHI can assume the cost of extraction and the Local Authorities the transport of materials
- Ask the Municipality for the notes related with local taxes to pay and cancel all the possible debts as soon as possible
- UNION FENOSA EDEMET-EDECHI will donate in July 2005 some units (containers) for solid waste recollection
- Verify the fulfillment of the official Plan for public lighting, according the Plan prepared by the Ente Regulador de los Servicios Públicos, and if necessary to bring forward the works in the Dolega district

Annex 1

CONTACT INFORMATION FOR PARTICIPANTS IN THE PROJECT ACTIVITY

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Annex 2

INFORMATION REGARDING PUBLIC FUNDING

N/A.

Annex 3

LETTER OF ENDORSEMENT FOR DOLEGA HYDROPOWER PLANT ISSUED BY THE NATIONAL ENVIRONMENT AUTHORITY (ANAM) OF THE REPUBLIC OF PANAMA