



Energy and
Environment
Partnership with
Central America

CENTRAL AMERICAN CARBON FINANCE GUIDE

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Ministry Foreign
Affairs
FINLAND

Energy and Environment Partnership with Central America
Central American Carbon Finance Guide
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Because the Ministries of Environment of the Central American countries are aware of the climate change challenge in our age, big efforts are being carried out to combat it, through the use of the abundant renewable resources of the region for energy generation and fossil fuels substitution.

This Carbon Finance Guide will encourage the renewable energy projects execution, permitting to project developers to incorporate in a practical way on their action plans the additional benefits of the Certificates of Emissions Reductions trading

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Foreword

Renewable energy resources are receiving a great deal of attention lately because their use can contribute to solving some of the world's energy and environment challenges. The Bonn Renewables 2004 Conference is one example of this development. Our Energy and Environment Partnership with Central America, launched during the 2002 United Nations World Summit in Johannesburg, helps to make it possible for these energy resources to play a major role in satisfying the energy needs of the Central American region. This, in turn, would advance sustainable development in the region, reduce greenhouse gas emissions and aid in mitigating the negative effects of global climate change.

The Partnership is an initiative of the Ministry for Foreign Affairs of Finland in coordination with the Central American Commission on Environment and Development (CCAD) and the Central American Integration System (SICA). It is actively working in the seven Central American countries—Belize, Costa Rica, El Salvador, Guatemala, Honduras, Nicaragua and Panama—with the main aim of implementing sustainable demonstration projects on the appropriate use of renewable energy sources, that is, bioenergy, hydroelectric, solar, wind and geothermal technologies.

Most of the Partnership's projects will help to reduce greenhouse gas emissions. At the same time, the financial capitalization of this benefit will increase project developers' profitability, thus giving them an additional incentive to implement such projects. One problem though has been the lack of sufficient general information about carbon financing for small and medium-sized projects. Thus, we have decided to fill that gap by providing this Carbon Finance Guide to aid the public and private sector in obtaining financial benefits as a result of their efforts.

The Carbon Finance Guide is a tool to be used during project preparation. It will help to steer developers towards implementing bankable and small-scale renewable energy project proposals that will increase their profitability in the long term. Additionally, the guide will provide information and advice on emerging international carbon markets, the Kyoto project-based Clean Development Mechanism (CDM) and other certificate markets.

GreenStream Network Ltd., a Finnish consulting company, and BUN-CA, a Central American renewable energy and energy efficiency expert network, prepared this document. A participatory process was used which included valuable comments and suggestions from local and international experts, to whom we are most grateful for their help. This publication is available in both English and Spanish.

More information on the Partnership can be found on the Internet in both Spanish and English (www.sgsica.org/energia). This report can also be downloaded from our web site free of charge in both languages. We shall also be updating the web version of this publication as time permits. We welcome any comments and proposals for improvement.

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This Guide is a result of a participatory process involving parties from Central America, Finland and elsewhere. The authors are grateful for all the suggestions and help they have received from many individuals and organisations while writing this guide.

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Among the people who provided comments for the Guide we would like to thank Mr. Mauricio Ayala from the Ministry of Environment of El Salvador, Mr. Leonardo José Matute Valladares from the Honduran Secretary of Natural Resources and Environment, Mr. Giovanni Castillo from the Ministry of Energy and Environment of Costa Rica, Mr. Román José Román-Gutiérrez, Technical Coordinator of Energy Projects in the Nicaraguan National Office for Clean Development, Mr. Jari Väyrynen and Ms. Veronique Bishop from the World Bank's Carbon Finance Unit, Mr. Jari Poikola from Pohjolan Voima Oy and Mr. Kari Hämekoski from the Finnish CDM/JI Pilot Programme.

Carbon Finance and Clean Development Mechanism are new instruments that are constantly evolving. Therefore a lot of the information is outdated already when printed. We have tried to incorporate in this guide the most recent developments in the field to the extent possible. It is our intention to maintain the web version of this guide updated from time to time as the market evolves and new rules and procedures for CDM emerge. Feedback from the users of this Guide is most welcome in this process.

Chapters 2, 3 and 5 were mainly written by GreenStream Network Ltd. and the extensive country information in Chapter 4 was recompiled by BUN-CA. Principal authors of the guide are Mr. Tommi Tynjälä and Ms. Inger-Anne Blindheim from GreenStream Network Ltd. and Mr. Leonel Umaña and José María Blanco from BUN-CA.

External financing for this guide was provided by the Energy and Environment Partnership with Central America and Pohjolan Voima Oy. Both GreenStream Network Ltd. and BUN-CA also contributed considerable resources of their own for the elaboration of the guide.

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Abbreviations

AA	Assigned Amount
AAU	Assigned Amount Unit
AHPPER	Honduran Association of Small Renewable Energy Producers
AMM	Wholesale Market Administrator, Guatemala
ANAM	Nacional Environmental Authority of Panama
ARESEP	Public Services Regulating Authority
BUN-CA	Biomass Users Network – Central America
BEL	Belize Electricity Limited
CABEI	Central American Bank for Economic Integration
CAF	Corporación Andina de Fomento
CCAD	Central American Commission on Environment and Development
CDB	Caribbean Development Bank
CDCF	Community Development Carbon Fund
CDM	Clean Development Mechanism
CDM EB	CDM Executive Board
CEL	Rio Lempa Hydroelectric Executive Commission, El Salvador
CER	Certified Emission Reduction
CHP	Combined Heat and Power
UNFCCC	United Nations Framework Convention on Climate Change
CNDC	National Load Dispatch Center, Nicaragua
CNE	National Energy Commission, Nicaragua and Honduras
CNEE	National Electric Energy Commission, Guatemala
COP	Conference of the Parties to the UNFCCC
COPE	Energy Policy Commission, Panamá
CRIE	Regional Commission on Electric Interconnection
DEE	Electric Energy Direction, El Salvador
DGE	Energy General Direction, Honduras and Guatemala
DNA	Designated National Authority
DOE	Designated Operational Entity
DSE	Energy Sectorial Direction, Costa Rica
EIB	European Investment Bank
ENEE	National Electric Energy Enterprise, Honduras
ENEL	Electricity Enterprise of Nicaragua
ENTRESA	Nicaraguan Transmission Enterprise, S.A.
EPR	Grid Owner Enterprise
ERPA	Emission Reduction Purchase Agreement
ERSP	Public Services Regulating Entity, Panamá
ESMAP	Energy Sector Management and Assistance Program
ET	Emissions Trading
ETESA	Electric Transmission Enterprise, S.A., Panamá
ETESAL	Electric Transmission Enterprise of El Salvador
EU	European Union
EU15	Old EU Member Status until 1 May 2005
EUA	European Emission Allowance
EU ETS	EU Emissions Trading Scheme
FENERCA	Funding for Renewable Energy Enterprise in Central America
FIDIC	International Federation of Consultant Engineers
FOCER	Strengthening of the Renewable Energy Capacity
GESAL	Geothermal of El Salvador (currently called La Geo)
GHG	Greenhouse Gases
GSN	GreenStream Network Ltd.
GWh	Gigawatt-hour

GWP	Global Warming Potencial
HFC	Hydrofluorocarbons
ICE	Costarican Electricity Institute
IDB	Inter.-American Development Bank
IETA	Internacional Emissions Trading Association
IFC	International Finance Corporation
IIC	Inter-American Investment Corporation
INE	Nicaraguan Energy Institute
IRR	Internal Rate of Return
JI	Joint Implementation
kW	Kilowatts
kWh	Kilowatt-hours
LGE	General Electricity Law, El Salvador and Guatemala
LIE	Electric Industry Law, Nicaragua
LULUCF	Land-use, Land-use Change and Forestry
MARENA	Ministry of Environment and Natural Resources, Nicaragua
MARN	Ministry of Environment and Natural Resources, Guatemala y El Salvador
MDL	Clean Development Mechanism
MEM	Ministry of Energy and Mines, Guatemala
MER	Regional Electric Market
MIF	Multilateral Investment Fund
MINAE	Ministry of Environment and Energy, Costa Rica
MM	Wholesale Market
MW	Megawatts
MWh	Megawatt-hours
NDF	Nordic Development Fund
NPV	Net Present Value
OECD	Organisation for Economic Co-operation and Development
PCF	Prototype Carbon Fund
PCN	Project Concept Note
PDD	Project Design Document
PIN	Project Idea Note
PPA	Energy Purchase-Sale Agreement
RMU	Removal Unit
SERNA	Secretary of Natural Resources and Environment, Honduras
SIEPAC	Electric Interconnection System for Central America
SIGET	General Superintendency of Electricity and Telecommunications, El Salvador
SSC-PDD	Small-scale Project Design Document
tCO _{2e}	metric tons of carbon dioxide equivalent
UNCTAD	United Nations Conference on Trade and Development
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
UNIDO	United Nations Industrial Development Organization
UNFCCC	United Nations Framework Convention on Climate Change
VER	Verified Emission Reduction

1 Introduction

1.1 Background

The main objective of the Energy and Environment Partnership between Finland and Central America is to promote the use of renewable energy sources and clean technologies in Central America in a sustainable manner, and to make energy services more accessible to the poor, particularly to those in rural areas. Several of the projects under preparation within the framework of the Partnership will reduce greenhouse gas emissions. The capitalisation of this benefit can in some cases significantly improve the profitability of the projects. This calls for clear guidance on how to include the climate aspect in the project preparation and implementation from the outset.

The international markets for greenhouse gas emission reductions and renewable electricity certificates are fragmented. So far, the market for Kyoto Protocol's Certified Emission Reductions (CERs) has been dominated by few players (e.g. World Bank's Prototype Carbon Fund and the CERUPT Programme of the Government of the Netherlands). New market entrants are rapidly changing the picture, however. Different governmental programs, such as the CDM/JI Pilot Programme of the Finnish Government, as well as growing participation by private companies are making the market more complex and increasingly competitive. Especially the European Emissions Trading Scheme which will start on 1st January 2005 and the proposal of the European Commission to link CDM with the scheme approved by the European Parliament in April 2004 are likely to change the international carbon market significantly. Furthermore, various non-Kyoto systems, such as renewable energy certificate schemes, voluntary initiatives (e.g. Chicago Climate Exchange) and U.S. state-level regimes, make the situation even more complicated. A great deal of knowledge and understanding is required from the project developers if they wish to maximize the carbon benefits for their energy projects.

On the other hand, carbon finance does not convert a bad project into a good one. Carbon finance can improve the profitability of a project that is sound, sustainable and well structured in its own right. Many good ideas are not realised as projects because there is a lack of capacity to develop bankable project proposals. This is especially true when it comes to small-scale renewable energy projects. In an ideal situation, a good concept can be developed into a bankable and solid project proposal and carbon finance is used to further improve the feasibility of the project.

In March 2003, the power company Pohjolan Voima Oy and other Finnish members of the Energy and Environment Partnership expressed a need for a guide on how to ensure that greenhouse gas emission reductions generated by energy projects in Central America fulfil international requirements and can thus be capitalised. Similarly, many Central American project developers have expressed need for such guidance. Many Central American initiatives, including FOCER (Strengthening of the Capacity for Renewable Energy in Central America) and FENERCA (Financing Renewable Energy Enterprises) have already prepared guidebooks on renewable energy projects, calculation of emission reductions and project finance. In addition, The Ministry for Foreign Affairs in Finland and Finpro have recently prepared a general investment guide "Financing Business Opportunities in Latin America and the Caribbean". This Central American Carbon Finance Guide complements the former initiatives by providing specific guidance on the preparation of bankable project proposals and on the use of carbon finance for small-scale renewable energy projects in Central America. It also contains a collection of links to other documents and organisations that are useful for the development of these projects.

1.2 Purpose of the Central American Carbon Finance Guide

This guide is intended to help project developers, financiers, technology suppliers and government officials to understand how to prepare bankable small-scale renewable energy project proposals in Central America, how to benefit from the emerging international carbon markets through CDM or other schemes, and how to manage related risks.

The authors hope that the guide will be a practical reference tool for all parties involved in CDM and other climate-related projects in Central America. For this, we encourage feedback from actual users of the guide in order to improve the possible future versions of it.

It is our wish that this guide will for its part contribute towards an increased number of successful small-scale renewable energy projects utilizing carbon finance in the region and further improve the competitive position of the Central American countries in the international carbon markets vis-à-vis other world regions.

1.3 Structure of the Guide

In the first Chapter (1.4) we give background information on UN Framework Convention on Climate Change (UNFCCC)¹ and the Kyoto Protocol. This is useful for those who want to understand better the underlying policies but not strictly necessary for the project developer. Chapter 2 explains what is meant with CDM and small-scale projects, how the project cycle looks like and what are the related costs. Chapter 3 gives a short introduction to project financing and helps developers to understand typical requirements of financial institutions to participate in projects. Chapter 4 is probably most useful for those readers who come outside of the region. It has a section for each of the seven Central American countries, as well as for the region as a whole, explaining the relevant national circumstances in each country and also giving a list of useful contacts. Chapter 5 gives a brief outlook on the emerging international carbon markets. In the Annexes, contact information for organisations providing technical assistance and financing is provided.

This guide is published in two separate versions in English and Spanish. Apart from the printed version, an electronic version is available in the web at www.sgsica.org/energia

1.4 UNFCCC and the Kyoto Protocol

To mitigate climate change, different international, national and corporate policy frameworks are being developed. In 1992, the world's governments adopted the UNFCCC. The ultimate objective of the Convention is to achieve stabilization of atmospheric concentrations of greenhouse gases (GHGs) at levels that would prevent dangerous anthropogenic (human-induced) interference with the climate system. UNFCCC has a permanent secretariat in Bonn () and its supreme decision-making body is the annual Conference of Parties (COP).

¹UNFCCC was adopted in the United Nations Conference on Environment and Development (UNCED) celebrated in June 1992 in Rio de Janeiro, Brazil (also known as “The Earth Summit” or “The Rio Conference”). The Convention text can be found at www.unfccc.int/resource/docs/convkp/conveng.pdf.

The Convention divides countries into two main groups. Annex I Parties include the relatively wealthy industrialized countries that were members of the Organisation for Economic Co-operation and Development (OECD) in 1992, as well as countries with economies in transition. All other countries that are Parties to the Convention not listed in Annex I – mostly the developing countries – are known as Non-Annex I Parties. The Annex I countries are subject to a specific commitment to adopt climate change policies and measures with the non-legally binding aim that they should have returned their greenhouse gas emissions to 1990 levels by the year 2000. This target has only been achieved by few Annex I countries.² As of May 2004, the UNFCCC has been ratified by 189 countries. See Appendix I for the list of Annex I and non-Annex countries.

In 1997, governments took a further step forwards and adopted the Kyoto Protocol to the UNFCCC that broke new ground with its legally binding constraints on greenhouse gas emissions.³ Kyoto Protocol's innovative flexible mechanisms – Joint Implementation (JI), Clean Development Mechanism (CDM) and Emissions Trading (ET) – aim at cutting the cost of curbing emissions. The greenhouse gases covered by the Kyoto Protocol include the six gases listed in . It is important to note that traditional atmospheric pollutants, e.g. sulphur oxide, are not greenhouse gases and do not fall under the climate change agreements

Table 1. Greenhouse gases (GHG) covered by the Kyoto Protocol. The emissions of the various GHGs can be converted into carbon dioxide equivalent emissions by multiplying them with the GWP. The GWPs in the table are based on the IPCC Second Assessment Report (see Article 5 of the Kyoto Protocol) and can be revised in the future. GWPs are based on the climatic effects of the GHGs over a 100-year time horizon.

Greenhouse Gas	Global Warming Potential (GWP)
Carbon dioxide (CO ₂)	1
Methane (CH ₄)	21
Nitrous oxide (N ₂ O)	310
Hydrofluorocarbons (HFCs)	various gases, different GWPs
Perfluorocarbons (PFCs)	various gases, different GWPs
Sulphur hexafluoride (SF ₆)	23,900

The core of the Kyoto Protocol is a set of legally binding emissions targets for industrialized countries. These amount to a total cut among all Annex I Countries of at least 5% from 1990 levels by 2008-2012 (The Kyoto commitment period). The total cut is shared out so that each Annex I Country has its own individual emissions target. These individual targets, which are listed in the Protocol's Annex B, were decided upon in Kyoto through intense negotiation. Table 2 enlists the targets for the Annex I countries.

Table 2. Greenhouse gas reduction targets in the Annex B of the Kyoto Protocol.

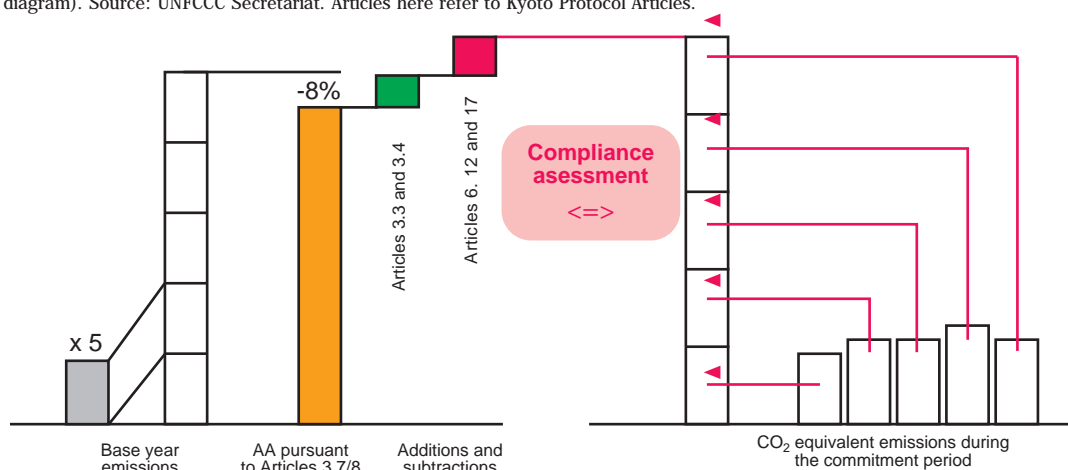
Country	Target
EU-15, Bulgaria, Czech Republic, Estonia, Latvia, Liechtenstein, Lithuania, Monaco, Romania, Slovakia, Slovenia, Switzerland	-8%
US	-7%
Canada, Hungary, Japan, Poland	-6%
Croatia	-5%
New Zealand, Russian Federation, Ukraine	0%
Norway	+ 1 %
Australia	+ 8 %
Iceland	+10%

² E.g. Russia because of the economic restructuration and recession, Germany due to the impacts of the reunification, and the UK that shifted remarkably from coal to gas after 1990.

³ Kyoto Protocol to the Convention on Climate Change was adopted in the 3rd Conference of the Parties to the UNFCCC in Kyoto, Japan, in December 1997. The Protocol text can be found at www.unfccc.int/resource/docs/convkp/kpeng.pdf.

The targets in Table 2 are used to calculate the Assigned Amounts (AAs) for the Annex I countries. These are further adjusted on the basis of the changes in the carbon stocks of each country. Specific Removal Units (RMUs) were calculated in the 7th Conference of Parties in Marrakesh, Morocco in November 2001 to be used in the accounting of the so-called LULUCF activities. RMUs are issued for instance when the forests of a country act as a net carbon sink, i.e. more carbon is tied in the biomass than released during a certain period. Figure 1 gives an idea of the compliance assessment under the Kyoto Protocol.

Figure 1. Compliance assessment under the Kyoto Protocol. According to the Kyoto Protocol, Annex I Parties shall ensure that their greenhouse gas emissions during the five-year Kyoto commitment period 2008-2012 do not exceed their Assigned Amounts (AA), with a view to reducing their overall emissions below 1990 levels in the commitment period. AA is calculated from country's emissions in the base year 1990. Base year emissions multiplied by five (since there are five years in the commitment period) minus the Kyoto Protocol reduction target (see Table 2) is country's Assigned Amount (orange bar). This is further adjusted by Land-use, Land-use Change and Forestry activities (LULUCF, Articles 3.3. and 3.4, green bar). Through Articles 6 (Joint Implementation), 12 (Clean Development Mechanism) and 17 (Emissions Trading) countries can acquire or sell compliance units (pink bar). The sum of the actual emissions during the five years of the commitment period 2008-12 (right-hand side of the diagram) shall be less than or equal to the final amount of compliance units in country's accounts (left-hand side of the diagram). Source: UNFCCC Secretariat. Articles here refer to Kyoto Protocol Articles.



Old EU Member States (EU15) of the European Union will take advantage of a scheme under the Protocol, known as the burden-sharing agreement or the “bubble”, to redistribute their -8% reduction targets among themselves. For instance Finland has a target of 0%, Sweden +4%, Spain +15% and Germany -21% under the EU agreement. New Member States will not be included burden-sharing agreement for Kyoto period 2008-2012. At the moment it seems that new Member States can be included to the burden-sharing agreement earliest at 2013.

As to possible commitments for subsequent periods, the Kyoto Protocol states that these shall be established in amendments to targets in Annex B and the Parties to the Protocol shall initiate the consideration of such commitments at least seven years before the end of the first commitment period (i.e. in 2005 at latest).

To enter into force, Kyoto Protocol needs to be ratified by 55 countries incorporating countries included in Annex I which accounted in total for at least 55% of the total carbon dioxide emissions for 1990 of the countries included in Annex I. As of 2 November 2004, Kyoto Protocol has been ratified by 127 countries representing 44.2% of the Annex I emissions. Its entry into force is now pending on Russia's ratification only. President Vladimir Putin of Russia signed the federal law to ratify the Kyoto Protocol in November 2004. This follows ratification of the Protocol by the State Duma (22 October) and the Federation Council (27 October). The final step in the ratification process will be the deposit of the formal instrument of ratification with the Secretary-General of the United Nations in New York. This is expected to occur in November 2004. The Kyoto Protocol will enter into force 90 days after Russia's instrument of ratification has been received.

2 CDM Projects

This chapter explains the principal characteristics of the CDM project cycle with special emphasis on the small-scale projects. It is intended as a simple guide to understand the CDM requirements and develop high-quality projects that fulfil the small-scale CDM criteria.

2.1 What is CDM?

Clean Development Mechanism (CDM) is defined in the Article 12 of the Kyoto Protocol. The purpose of the CDM is to:

- u Assist non-Annex I Parties (developing countries) in achieving sustainable development and in contributing to the objective of the UNFCCC; and
- u Assist Annex I Parties (industrialised countries) in achieving compliance with their quantified emission limitation and reduction commitments under the Kyoto Protocol.

Renewable energy, energy efficiency and waste management projects are examples of activities that often reduce greenhouse gas (GHG) emissions and thus contribute to the global efforts to mitigate climate change. Clean Development Mechanism makes it possible to certify the reduction of GHG emissions from projects that fulfil certain criteria. The sale of the resulting Certified Emission Reductions (CERs) can provide additional cash flow to the projects and improve their feasibility. CDM projects may be implemented in developing countries that have ratified the Kyoto Protocol.

Industrialised countries can use the resulting Certified Emission Reductions (CERs) for compliance under the Kyoto Protocol. Countries may also authorise private entities to participate in CDM. Several greenhouse gas regimes are emerging, where companies can utilise CERs for compliance purposes. For instance, the European Union is preparing the mechanism to link CERs

to the EU Emissions Trading Scheme. Companies that have obligations under the EU Emissions Trading Scheme could then acquire CERs and use them in the EU ETS for compliance.

The modalities and procedures for CDM projects were approved in 2001 in the 7th Conference of the Parties to the UNFCCC in Marrakesh, Morocco.⁴

Box . Purpose of CDM.

Purpose of CDM
Assist developing countries in achieving sustainable development
Assist industrialised countries in achieving compliance with their Kyoto commitments

2.2 Definition of Small-scale CDM Projects

It is widely recognised that small-scale projects face significant transaction costs, turning them less feasible than larger-scale projects. In order to overcome this problem, specific streamlined modalities and procedures for small-scale CDM projects were approved in 2002 in the 8th Conference of the Parties to the UNFCCC in New Delhi, India.⁵

According to the CDM rules, small-scale projects belong to three categories:

⁴ Decision 17/CP.7 Modalities and procedures for a clean development mechanism as defined in the Article 12 of the Kyoto Protocol. www.unfccc.int

⁵ Decision 21/CP.8 – Annex II. Simplified modalities and procedures for small-scale clean development mechanism project activities. www.unfccc.int

1. Renewable energy project activities with a maximum output capacity equivalent of up to 15 MW (or an appropriate equivalent);
2. Energy efficiency improvement project activities which reduce energy consumption, on the supply and/or demand side, by up to the equivalent of 15 GWh per year; and
3. Other project activities that both reduce anthropogenic emissions by sources, and directly emit less than 15 kilotonnes of carbon dioxide equivalent annually;

“Maximum output capacity” refers to installed/rated capacity, as indicated by the manufacturer of the equipment or plant, disregarding the actual load factor of the plant. For co-generation systems (i.e. Combined Heat and Power, CHP) the sum of all forms of energy output must not exceed 45 MW. E.g., for a biomass based co-generation system the rated capacity of the boiler can not exceed 45 MW_{th}.

Other projects in Category 3 may include for instance agricultural projects, fuel switching, industrial processes and waste management. The emissions after the implementation of the CDM project must be below 15 ktCO₂e.

The three project categories are mutually exclusive. If a small-scale project has components in different categories, each component shall meet the threshold criterion of each applicable category, 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”.

Debundling

Debundling means the fragmentation of a large project activity into smaller parts. A small-scale project activity that is part of a large project activity is not eligible to use the simplified rules for small-scale CDM projects. The full project activity or any component of the full project activity shall follow the regular CDM modalities and procedures.⁶

Box 2. Small-scale CDM Projects.

Small-scale CDM Projects
Small renewable energy projects (< 15 MW)
Small energy efficiency projects (savings < 15 GWh per year)
Other small projects (emissions < 15 ktCO ₂ e per year)

2.3 Participation Requirements for CDM Projects

The country hosting a CDM project must be a Party to the Kyoto Protocol. As of August 2004, the Kyoto Protocol had not entered into force yet and therefore there were no Parties to it.⁷ The CDM Executive Board (CDM EB) has clarified that before entry into force of the Kyoto Protocol, all Parties to the UNFCCC may participate in CDM projects. However, the registration of a CDM project can only take place once the host country has ratified the Kyoto Protocol. All the Central American countries have ratified the Kyoto Protocol and they will automatically become Parties as soon as the Protocol enters into force.

⁶ Exact rules for determining debundling can be found at the official CDM website cdm.unfccc.int.

⁷ Kyoto Protocol enters into force when 55 countries have ratified it (currently 127) and when the ratified Annex I parties represent 55% of their combined 1990 CO₂ emissions (currently 44.2%). In practice, Kyoto Protocol enters into force probably on February 2005, 90 days after of the official deposit at the United Nations of the formal ratification instrument of Russia.

Host country shall also be willing to voluntarily participate in the CDM and it must have a designated national authority for CDM. Table 3

lists the Kyoto Protocol ratification dates and Designated National Authorities (DNA) for the Central American countries.

Table 3. Status of Ratification of the Kyoto Protocol in the Central American Countries. All the countries have ratified the Protocol (Belize has accessed the Protocol because it was not a signatory). Official updated list of Designated National Authorities can be found at <http://cdm.unfccc.int/DNA>.

Country	Signature	Ratification	Designated National Authority
Belize	-	26 September 2003 (Accession)	Ministry of Environment (not yet officially designated)
Costa Rica	27 April 1998	9 August 2002	Oficina Costarricense de Implementación Conjunta, Ministerio de Ambiente y Energía (MINAE)
El Salvador	8 June 1998	30 November 1998	Ministerio del Medio Ambiente y Recursos Naturales (MARN)
Guatemala	10 July 1998	5 October 1999	Ministerio de Medio Ambiente y Recursos Naturales (MARN, not yet officially designated)
Honduras	25 February 1999	19 July 2000	Secretaría de Estado en los Despachos de Recursos Naturales y Ambiente (SERNA)
Nicaragua	7 July 1998	18 November 1999	Oficina Nacional de Desarrollo Limpio y Cambio Climático, Ministerio del Ambiente y Recursos Naturales (MARENA)
Panama	8 June 1998	5 March 1999	Autoridad Nacional del Ambiente (ANAM)

Finland has signed a Memorandum of Understanding regarding CDM projects with El Salvador, Costa Rica and Nicaragua. The MoU may be helpful in promoting potential CDM projects in these countries.

2.4 CDM Project Cycle

All CDM projects must follow a special project cycle. They must be validated and registered before they can generate Certified Emission Reductions (CERs). Validation is the process of independent evaluation of the project by a Designated Operational Entity (DOE). This evaluation is made against the requirements of the CDM on the basis of a Project Design Document (PDD). Registration is the formal acceptance of a validated project as a

CDM project activity by the CDM *Executive Board* (CDM EB).

Once the project has been implemented, it starts to generate emission reductions. The emission reductions must be constantly *monitored* according to a pre-established monitoring plan. The monitored emission reductions are then *verified* and *certified* by a DOE. Based on the certification report of the DOE, the CDM EB instructs the CDM *registry administrator to issue* a quantity of CERs that corresponds to the verified amount of emission

reductions. These CERs, less certain fees that are deducted (see 26.3), are then forwarded to the registry accounts of the project participants according to

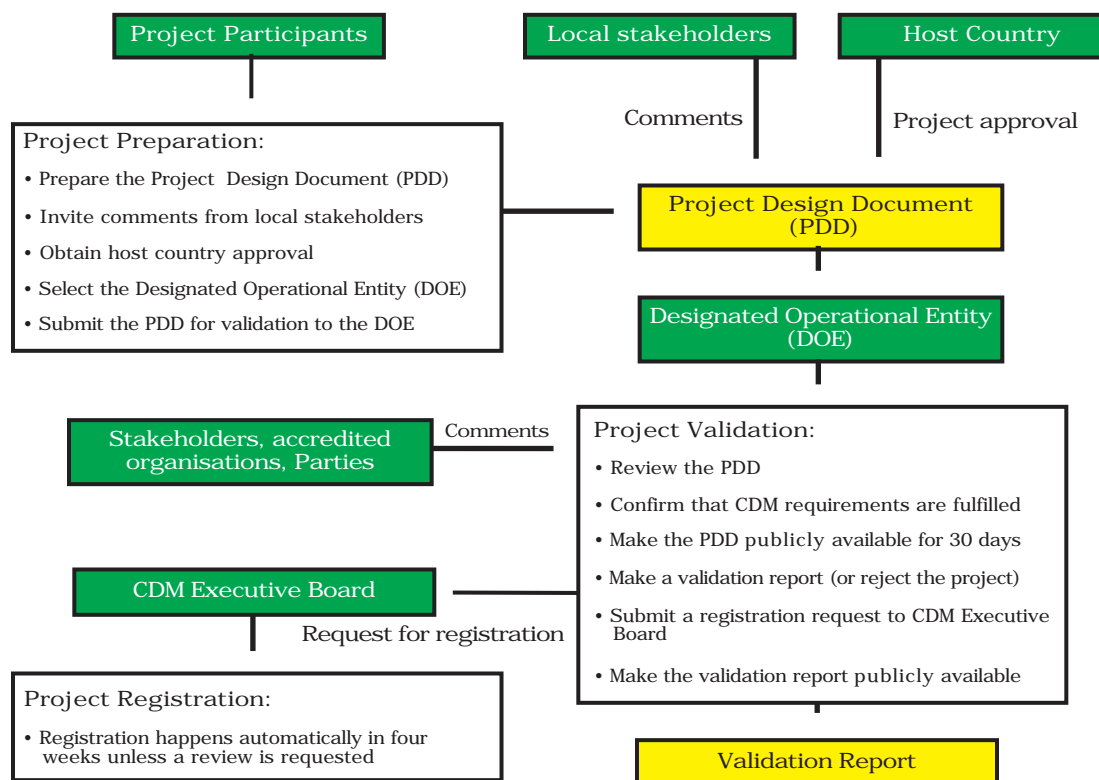
their request.

In the following chapters, the CDM project cycle is explained step-by-step.

2.5 Project Preparation, Validation and Registration

The first phase of the CDM project cycle consists of the project preparation, validation and registration. In preparing the project, the project participants must interact at least with local stakeholders, the host country's DNA and a DOE. As a result of the preparation, a PDD is completed. The PDD is then validated by the DOE. The validated project is finally submitted to the CDM EB for registration. Figure 2 demonstrates the steps in this part of the project cycle.

Figure 2 Necessary steps in the early CDM project cycle (preparation, validation and registration).



2.5.1 Project Preparation and Host Country Approval

Under every CDM project, there is a project idea which may be promoted by a local community, a project developer, a government institution, an equipment vendor and so on. The early steps of a CDM project are not different from any other project. A business plan must be written and a feasibility study prepared, financing

must be organised etc. Chapter 3 discusses some issues related to project financing. Information on preparing business plans and feasibility studies for Central American energy projects can be found for example in FENERCA's website www.fenerca.org.

It is good to take into account the special features of CDM from the very beginning of the project development. Often in the early

principal aspects of the project including a preliminary calculation of the emission reduction. Different versions of PIN exist and models can be found for instance in the Finnish CDM/JI Pilot Programme website global.finland.fi/english/projects/cdm and World Bank's Carbon Finance Unit website www.carbonfinance.org.

Each CDM project must be approved by the host country. This is done through a Letter of Approval issued by the DNA of the host country. According to the rules of the CDM, the Letter of Approval must contain the following information:

- u The DNA approves the voluntary participation of the Host Country in the Project as a CDM project for the purpose of Article 12 of the Kyoto Protocol;
- u Statement that the Project will assist the host country to achieve sustainable development; and
- u The DNA approves the Project as a CDM Project Activity and authorises the participation of the Project Participants in the Project.

Apart of these minimum requirements, in practice it is useful to receive some additional information from the DNA. The following list contains some points that are not required by the CDM rules but are useful for the smooth implementation of the project⁸:

- u The Host Country is a Party to the Kyoto Protocol and is in compliance with its obligations under that agreement;
- u The Project, as proposed, is in compliance with all relevant national laws;

- u interest in an to all of the greenhouse gas emission reductions generated by the Project (and any CERs which are created out of the Project);
- u Any public funding of the Project does not result in a diversion of official development assistance (if public funding is involved); and
- u DNA will cooperate with the Project Participants and the CDM EB to facilitate the CDM process and give assistance, where necessary, for the issuance and transfer of CERs to the Project Participants.

It is still unclear, whether each CDM project also needs an approval from an Annex I Party (an industrialised country). In any case, a Letter of Approval is required from each party that participates in the project. So if an Annex I Party investing in the project or purchasing CERs is listed as a project participant, it must provide a Letter of Approval.

2.5.2 *Project Design Document (PDD)*

The basic official document describing a CDM project is called Project Design Document (PDD). The latest version of the PDD can be found at the UNFCCC CDM site: <http://cdm.unfccc.int/Reference/Documents>. For small-scale CDM projects, there exists a simplified PDD which can be found at the same site.

The parts of the simplified PDD are listed in Bok 3 .

⁸ World Bank 2003: Approval of Clean Development Mechanism Projects by the Host Country. This document is available in the PCF's website www.carbonfinance.org/pcf under legal documents and also contains a model Letter of Approval.

Box 3. CDM Small-scale PDD.

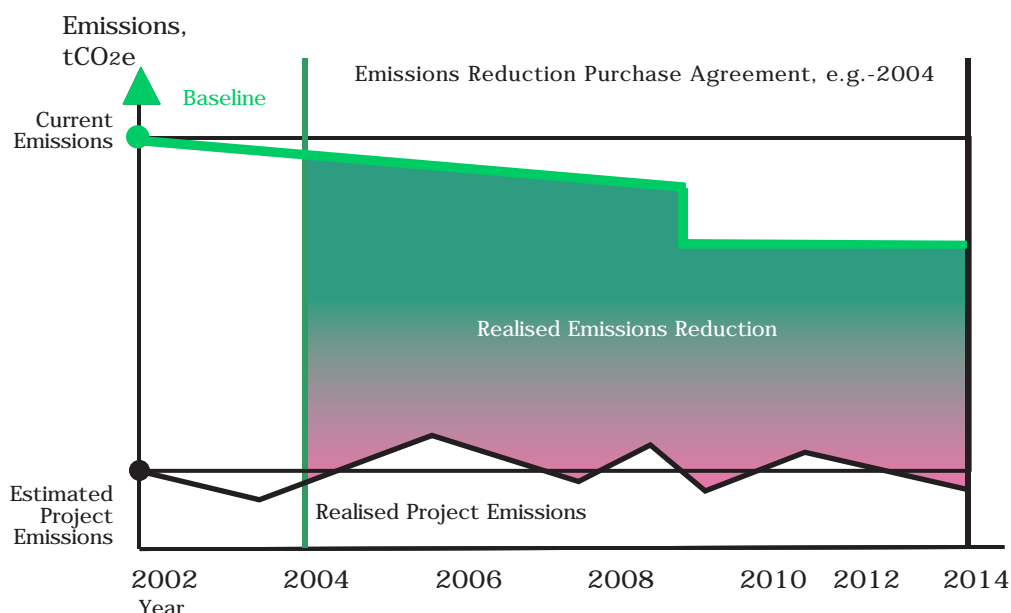
CDM Small-Scale PDD
A. General description of the project
B. Baseline methodology
C. Duration of the project and crediting period
D. Monitoring methodology and plan
E. Calculation of GHG emission reductions
F. Environmental impacts
G. Stakeholder comments
Annex 1: Project Participants
Annex 2: Information on public funding

2.5.3 Baseline Methodology

The most important concept related to CDM projects is the project baseline. The baseline is the scenario that reasonably represents the GHG emissions that would occur in the absence of the proposed CDM project. The baseline is thus an imaginary construction of what would happen in the future if the proposed CDM project were not implemented.

Figure 3 demonstrates the concept of baseline. The actual realized emissions of the project are compared to the baseline which is always set up ex-ante. The emission reduction generated by the project is then the difference of the baseline emissions and the project emissions.

Figure 3 . Concept of Baseline. Baseline is the hypothetical development of the emissions if the project is not realised. It has to take into account probable future developments, like efficiency improvements, planned investments, etc. Once the project is implemented, the realised project emissions are compared to the established baseline. The difference is the emission reduction which can be credited to the project.



For small-scale CDM projects simplified baselines have been established for certain project categories. The categories are listed in Table 4. More simplified baselines may be proposed by the project participants. The small-scale working group that is being established under the CDM EB can also propose new categories for simplified baselines.

Table 4. Categories for the simplified small-scale CDM baselines. Source: Indicative simplified baseline and monitoring methodologies for selected small-scale CDM project activity categories. file:///http://cdm.unfccc.int/EB/Meetings/007/eb7ra06.pdf)

Categories of the simplified baselines for small-scale CDM projects	
TYPE I – RENEWABLE ENERGY PROJECTS	
I.A.	Electricity generation by the user
I.B.	Mechanical energy for the user
I.C.	Thermal energy for the user
I.D.	Renewable electricity generation for a grid
TYPE II – ENERGY EFFICIENCY IMPROVEMENT PROJECTS	
II.A.	Supply side energy efficiency improvements – transmission and distribution
II.B.	Supply side energy efficiency improvements – generation
II.C.	Demand-side energy efficiency programmes for specific technologies
II.D.	Energy efficiency and fuel-switching measures for industrial facilities
II.E.	Energy efficiency and fuel-switching measures for buildings
TYPE III – OTHER PROJECT ACTIVITIES	
III.A.	Agriculture
III.B.	Switching fossil fuels
III.C.	Emission reductions by low-greenhouse gas emitting vehicles
III.D.	Methane recovery
III.E.	Methane avoidance
(A new category “Avoidance of methane production from biomass decay through controlled combustion” was added recently under III.E. and can be found at http://cdm.unfccc.int/EB/Meetings/014/eb14repan02.pdf)	

The simplified baselines can be found in the official CDM website.⁹ As an example, the category I.D.(Renewable electricity generation for a grid) is explained in the following.I.D.

Simplified Baselines for Renewable Electricity Generation for a Grid

This category includes small (<15 MW_e) projects that supply electricity generated by renewable

resources (e.g. hydro, biomass, wind, geothermal, photo-voltaics) to a distribution system. The system must be (or would have been without the CDM project) supplied by at least one fossil fuel or non-renewable biomass fired generating unit.

For a small isolated system where all fossil fuel fired generating units use fuel oil or diesel fuel, the baseline is the annual electricity generated by the renewable project (in kWh) times an emission coefficient for a modern diesel generating unit of the relevant capacity operating at optimal load.

⁹ Indicative simplified baseline and monitoring methodologies for selected small-scale CDM project activity categories. <http://cdm.unfccc.int/EB/Meetings/007/eb7ra06.pdf>

These systems include for instance local mini-grids with diesel

generators. The emission factors to be used are given in Table 5 .

Table 5. Emission factors used in the determination of the baselines in small isolated systems. Source: Indicative simplified baseline and monitoring methodologies for selected small-scale CDM project activity categories. (<http://cdm.unfccc.int/EB/Meetings/007/eb7ra06.pdf>)

Emission factors for small diesel generator systems, kgCO ₂ e/kWh			
Case:	Mini-grid with 24 hour service	Mini-grid with temporary service (4-6 hours/day) Productive applications Water pumps	Mini-grid with storage
Load factor:	25%	50%	100%
< 15kW	2.4	1.4	1.2
15kW and < 35 kW	1.9	1.3	1.1
35 kW and < 135 kW	1.3	1.0	1.0
135 kW and < 200 kW	0.9	0.8	0.8
> 200 kW	0.8	0.8	0.8

For all other systems, including renewable energy projects that supply electricity to the national grid, the baseline is calculated as follows. The baseline is the annual electricity generated by the renewable project (in kWh) multiplied by an emission coefficient (in kgCO₂e/kWh). The emission coefficient is calculated either as:

- u the average of the “approximate operating margin” and the “build margin”; or
- u the “weighted average emissions” of the current generation mix.

The “approximate operating margin” is the weighted average emissions (in tCO₂e/MWh) of all generating sources serving the system, excluding hydro, geothermal, wind, low-cost biomass, nuclear and solar generation. The “build margin” is the weighted average emissions of recent capacity additions to the system, defined as the lower of most

recent 20% of plants built or the 5 most recent plants.

The following examples illustrate the calculation.

Example 1: A small 5 MW hydropower plant will be constructed in a village. The electricity in the village is currently provided by a small 500 kW diesel generator, which runs 24 hours a day. From we see that the load factor corresponding to 24-hour mini-grid is estimated at 25%. The emission factor for the generator is therefore 0.8 kgCO₂e/kWh or 0.8 tCO₂e/MWh (>200kW). Our hydropower plant has an estimated load factor of 68% (6000h at peak load). The annual renewable energy production is therefore 5 MW x 6000 h = 30,000 MWh, and the annual emission reduction is 30,000MWh x 0.8 tCO₂e/MWh = 24,000 tCO₂e.

Example 2: The same 5 MW

hydropower plant will be constructed but this time connected to the national grid. The electricity in the national grid is currently produced as follows:

- 40% hydropower (0 tCO_{2e}/MWh)
- 50% diesel power (0.7 tCO_{2e}/MWh)
- 10% natural gas CC (0.4 tCO_{2e}/MWh)

The weighted average emissions are therefore $50\% \times 0.7 + 10\% \times 0.4 = 0.39$ tCO_{2e}/MWh.

The approximate operating margin is $83\% \times 0.7 + 17\% \times 0.4 = 0.65$ tCO_{2e}/MWh (excluding hydropower which is assumed to be baseload). If the latest plants constructed in the country were all natural gas combined cycle plants (CC), the build margin would be 0.4 CO_{2e}/MWh. The average of the approximate operating margin and build margin would be $(0.65+0.4)/2 = 0.53$ tCO_{2e}/MWh.

If the plant had a load factor of 68% (6000 h a t peak load) as in our earlier example, the emission reductions would be $30,000 \text{ MWh} \times 0.53 \text{ tCO}_2\text{e/MWh} = 15,900 \text{ tCO}_2\text{e/year}$.

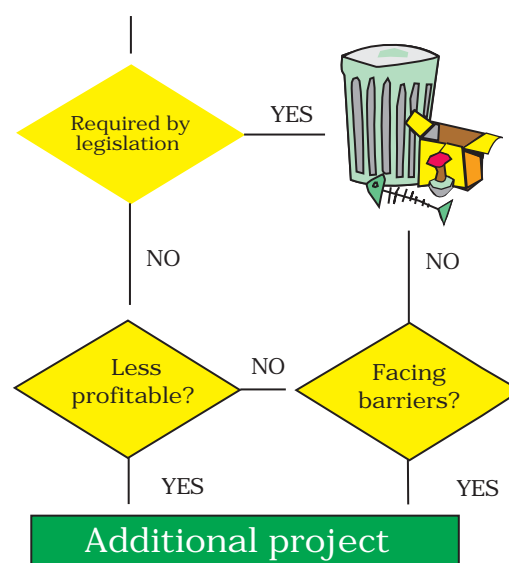
2.5.4 Additionality

CDM projects must be additional. This means that the GHG emissions must be reduced below those that would have occurred in the absence of the registered CDM project. In other words, projects that would have been implemented anyway, even in the absence of the CDM, may not earn emission reductions.

Figure 4 gives a general idea about the additionality requirement. For instance, a project that is required by the national legislation is generally not considered additional. As an example, a typical CDM project would be methane capture from a landfill site. However, if the capture

is required by the host country national legislation, this project would generally not be considered additional, unless the project's performance clearly exceeds the minimum requirements of the legislation. On the other hand, a renewable energy project that is less profitable for the investors than a fossil-fuel-based alternative (when income from the sale of the CERs is not taken into account), would potentially pass the additionality test.¹⁰

Figure 4. Schematic presentation of the additionality requirements.



For the small-scale CDM projects the additionality requirements are somewhat simplified. Small-scale CDM projects are considered additional if the project participants are able to demonstrate that the project activity would have not be implemented in the absence of CDM due to the existence of one or more of the following barriers:

- u Investment barrier: a financially more viable alternative to the CDM project would have led to higher emissions;

¹⁰The CDM Executive Board is currently developing a tool that can be used to test additionality. The draft can be found at <http://cdm.unfccc.int/EB/Meetings/015/eb15repan3.pdf>

- u Technological barrier: a less technologically advanced alternative to the project involves lower risks and would have led to higher emissions;
- u Barrier due to prevailing practice: prevailing practice or existing regulatory requirements would have led to an alternative with higher emissions;
- u Other barriers: institutional barriers, limited information or organizational capacity, restricted financial resources or other reasons identified by the project participants show that the emissions would have been higher without the CDM project.

2.5.5 *Crediting Period and Duration of the Project*

The Kyoto Protocol states that Certified Emission Reductions obtained from the year 2000 onwards can be used for compliance (see Annex I, point 10). The problem resulting from the fact that Kyoto Protocol is not yet in force was resolved in Marrakesh Accords through the so-called early action provisions. This means that the CDM will function under the UNFCCC until the Kyoto Protocol enters into force. It was also decided that CDM projects starting as of the year 2000 might earn CERs if submitted for registration before 31 December 2005. The crediting period (i.e. the period during which the project generates CERs) for these projects may start prior to the registration but not before 1 January 2000. Projects that start after the first registration of a CDM project and projects that are registered after 31 December 2005 may generate CERs only after the date of their registration.¹¹

¹¹The text on the early crediting in the Marrakesh accords was modified in Milan in CoP9 for clarity. The first registration of a CDM project is expected to take place in the end of 2004.

The starting date of a CDM project is the date at which the implementation or construction or real action of a project activity begins. Project activities starting between 1 January 2000 and the first registration of a CDM project by the CDM Executive Board have to provide documentation at the time of registration showing that the starting date fell within this period.

CDM project participants may choose either a 10-year crediting period with no option of renewal, or a seven-year baseline which may be renewed at most two times (3x7 years = 21 years). On each renewal, a DOE must determine that the original baseline is still valid or has been updated taking into account of new data where applicable.

In other words, a 10-year baseline is risk-free, as it is unchangeable once it has been validated. On the other hand, renewable seven-year baseline can produce CERs for a longer period (14 or 21 years), provided that the original baseline remains valid or only changes slightly. There is a risk, however, that after seven years the project has become business-as-usual and the revalidation determines that it is no longer additional.

In our Example 2 in Chapter 2.5.3, the project participants could choose to use the calculated baseline 0.53 tCO₂e/MWh for a 10-year period. Alternatively, they could opt for a 3 x 7 year baseline using 0.53 tCO₂e/MWh for 7 years, after which the baseline has to be recalculated based on the actual situation of the grid at that time.

2.5.6 *Monitoring Plan and Methodology*

When a CDM project is implemented, it must be systematically monitored over the whole crediting period, so that the

actual emission reductions can be calculated. Project participants must include a monitoring plan in the PDD. The monitoring plan tells how data is collected and archived in order to:

- u Estimate the emissions from the project;
Determine the baseline of the project; and
- u Calculate the emission reductions and possible leakage of the project.

Monitoring plan must reflect good monitoring practice and be appropriate to the circumstances of the project. Project participants are responsible for implementing the monitoring plan contained in the PDD. They must archive the relevant monitored data and report it to a DOE.

Leakage means changes in emissions which occur outside the project boundary, are measurable

and caused by the project. For example, if second-hand equipment transferred from another place were used in a CDM project, the emissions could increase in the original site of the equipment and the impact of this leakage must be taken into account. In biomass projects, leakage could mean increased deforestation and this has to be also addressed in the PDD.

Simplified modalities and procedures for small-scale CDM project activities also include simplified monitoring methodologies, including leakage considerations. As an example, in case of renewable energy generation for a grid, monitoring shall consist of metering the electricity generated by the project. In the case of co-firing biomass with fossil fuels, the amount of biomass and its energy content must also be monitored.

The table below specifies the minimum information that must be provided for monitored data and it has to be included in the PDD.

Table 6 . Monitoring information to be provided in the Project Design Document. Two examples of different data types are given.

ID N°	Data type	Data variable	Data unit	Measured, calculated or estimated (M,C,E)	Recording frequency	Proportion of data to be monitored	Archive (electronic/ paper)	How long data is kept?	Comment
1	Quantitative	Electricity to the grid	GWh	M	Monthly	100%	Electronic	Minimum 2 years after last CER issuance	Data measured by grid operator
2	Qualitative	Origin of Biomass	Fuel provider name and location	E	Weekly	100%	Electronic	Minimum 2 years after last CER issuance	The manager fills in the origin of the fuel from the fuel bookkeeping.

2.5.7 Environmental Impacts

One of the two principal objectives of the CDM is to contribute towards

the sustainable development of the host country. Therefore the analysis of the environmental impacts of the CDM projects is important. The host country has the right and the

responsibility to define its sustainable development goals. The project participants must submit to the DOE documentation on the analysis of the environmental impacts of the project, if this is required by the host country e.g. by the national environmental legislation or as part of the CDM endorsement procedure.

2.5.8 *Stakeholder Comments*

Public participation may be considered essential for the social sustainability of a project and it is an important part of the CDM project cycle. Project participants must invite comments by local stakeholders and include in the PDD a summary of the comments received and an explanation of how the comments were taken into account.

Public participation in industrial projects is increasingly incorporated in national and local legislation and regulations; stakeholders' opinions are often asked before granting e.g. construction or environmental permits for a project. In many cases the CDM requirements for stakeholder comments can be integrated in this process. It is important to note, however, that the CDM modalities require comments from local stakeholders independently of any national requisites.

2.5.9 *Project Validation and Registration*

Validation is the independent evaluation of a project by a DOE against the requirements of the CDM. Project participants should select and contract an operational entity to validate their proposed CDM project. As of 13 September 2004, 4 operational entities have been designated. Different DOEs have different sectoral scopes; when writing this only two DOEs were accredited for energy-related

projects.¹² 25 entities have applied for accreditation (so-called applicant entities or AEs). Applicant entities may validate projects during their application process.¹³ The CDM EB maintains a list of all designated operational entities and applicant entities in its website and it is good to check the actual situation at <http://cdm.unfccc.int/DOE/>.

The DOE selected to do the validation (the validator) shall review the PDD and any supporting documentation (e.g. analysis of the environmental impacts, comments from local stakeholders, technical project documentation) and confirm that the CDM requirements have been met. The validator must also receive a written approval of voluntary participation (Letter of Approval, see 2.5.1) from the DNA of the host country. The approval must include confirmation that the project assists the host country in achieving sustainable development.¹⁴

The validator then makes the PDD publicly available for a period of 30 days. During that period Parties to the Kyoto Protocol, stakeholders and organizations that are accredited observers of the UNFCCC can make comments on the PDD. PDDs available for public comments can also be found in the CDM EB website at <http://cdm.unfccc.int/Validation/publicPDD>. By the end of August 2004, 41 PDD had been made available for the public out of which 24 were small-scale projects (see Table 7 for a list of renewable energy related small-scale projects).

¹² Det Norske Veritas Certification Ltd. and TÜV Industrie Service GmbH.

¹³ If the applicant entity later fails to be accredited by the CDM Executive Board, the validation may become invalid. It is important to take this into account when making the contract with the validator.

¹⁴ Written approval is also required from any other country that is Party to the Kyoto Protocol and participates in the project, e.g. an Annex I country that will buy the emission reductions.

The project participants shall clearly mark any confidential information as such in order to avoid its publication. According to the CDM rules, the information used to

determine additionality, to describe the baseline methodology and to support environmental impact assessment may not be considered as confidential.

Table 7 . Renewable energy related small-scale CDM projects publicly available as of mid-September 2004. Source: <http://cdm.unfccc.int/Validation/publicPDD>. Totally 41 PDDs were available, out of which 24 were small-scale projects. From the renewable energy related 20 small-scale projects, 65% were Latin American.

Project Name	Country	Project Participants
Clarion 12 MW (Gross) Renewable Sources Biomass Power Project	India	Clarion Power Corporation Limited
UTE Barreiro S.A. Renewable Project	Brazil	V&M do Brazil S.A., EcoSecurities Ltd.
Iran biomass electricity generation project	Iran	n.a.
Hidroeléctrica Candelaria	Guatemala	Hidroeléctrica Secacao S.A., MGM International, Inc., Electric Power Development Co, Ltd.
Wind Electricity Generation in Tamil Nadu	India	Suzlon Energy Limited, Ecofys
Aquarius Hydroelectric Project	Brazil	CASE, MGM International, Inc., Negawatt, Electric Power Development Co., Ltd.
Bumibiopower Biomass Power Plant Project	Malaysia	Bumibiopower Sdn. Bhd., Mitsubishi Securities
Trojes Hydroelectric Project	Mexico	Impulsora Nacional de Electricidad S.A. de C.V., Corporación Mexicana de Hidroelectricidad S.A. de C.V., Scudder Latin American Power Fund, PCF
Benito Juarez Hydroelectric Project	Mexico	As above
Chilatán Hydroelectric Project	Mexico	Impulsora Nacional de Electricidad S.A. de C.V., Corporación Mexicana de Hidroelectricidad S.A. de C.V., Scudder Latin American Power Fund, PCF
Kunak Bio Energy Project	Malaysia	TSH Bio-Energy Sdn. Bhd., Danish Energy Management A/S
e7 Bhutan Micro Hydro Power CDM Project	Bhutan	n.a.
CECECAPA Small Scale Hydroelectric Project	Honduras	COMGELSA, AHPPER, (Finnish CDM Programme)
Yojoa Small Scale Hydropower Project	Honduras	HIDROYOJOA, AHPPER, (Finnish CDM Programme)
Río Blanco Small Scale Hydroelectric Project	Honduras	SHRB, AHPPER, (Finnish CDM Programme)
Zacapa Mini Hydro Station Project	Honduras	CENIT S.A., AHPPER, (Finnish CDM Pilot Programme)
9 biomass gasifier based power plants totalling 2.25 MW	India	Women for Sustainable Development
La Esperanza Hydroelectric Small-scale Project	Honduras	Consortio de Inversiones S.A., 2E Carbon Access, CDCF
Cortecito and San Carlos Hydroelectric project	Honduras	CABEI, 2E Carbon Access
Cuyamapa Hydroelectric Small-scale project	Honduras	ENETRAN, CABEI, 2E Carbon Access

Registration is the formal acceptance of a validated project by the CDM EB. Registration is a prerequisite for the verification, certification and issuance of CERs related to the project. By early September 2004, two projects were submitted for registration (see <http://cdm.unfccc.int/Projects> for updated list). Registration happens automatically, unless a review is requested by a Party involved in the project or at least three members of the CDM EB. It is expected

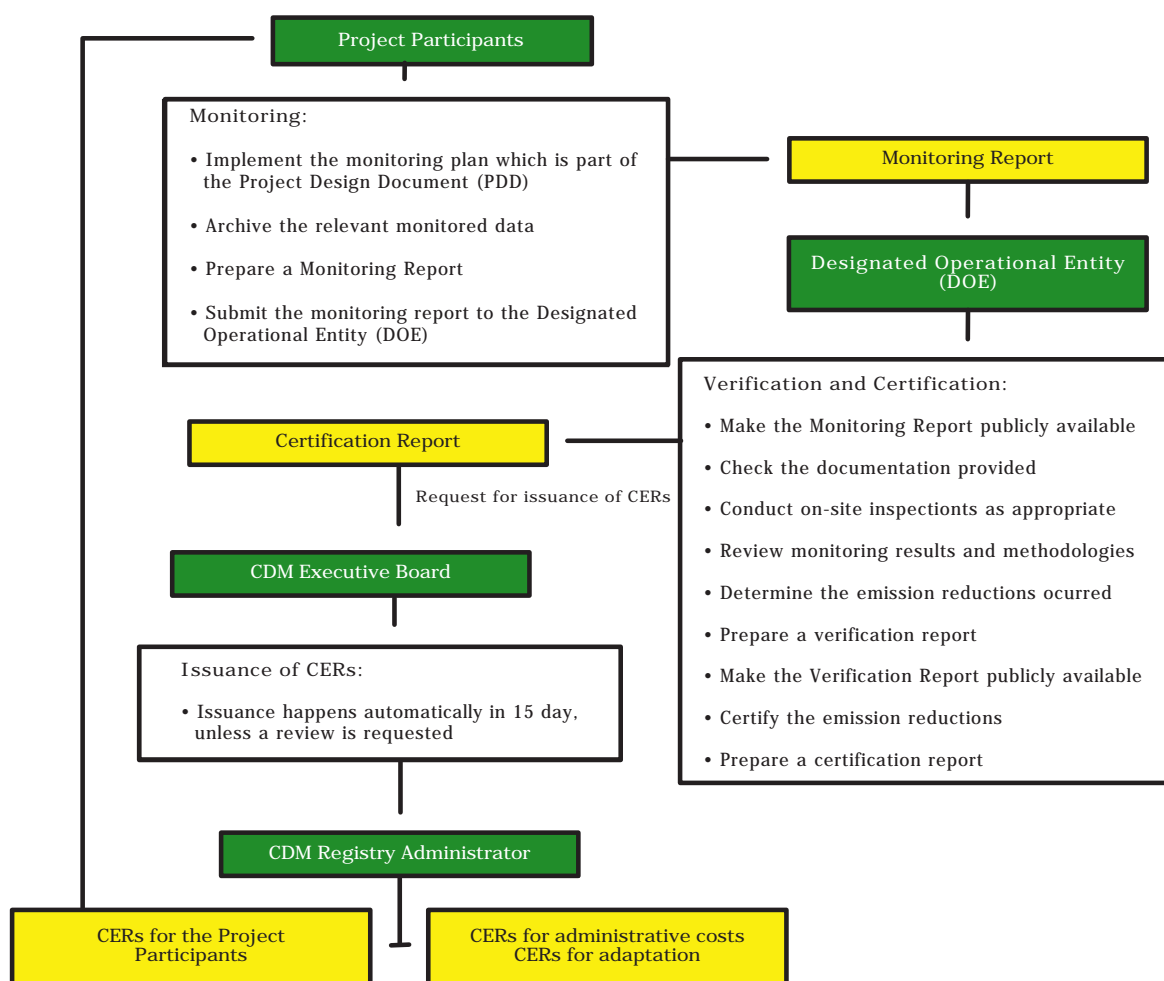
that the first CDM projects will be registered in late 2004. For registration fees, see Table 8.

The procedures for validation and registration are evolving as the CDM EB continues its work. The latest procedures can always be found in internet at <http://cdm.unfccc.int/Reference/Procedures>

2.6 Project Implementation Phase

Once a CDM project has been registered, constructed and commissioned, the project implementation phase begins. The emission reductions generated by the project must be monitored. The monitored emission reductions have to be verified and certified by a DOE. Based on the certification report, the CDM EB will issue the corresponding CERs, which are then forwarded to the project participants according to their instructions. Figure 5 describes the CDM project implementation phase. In the following, each step is shortly explained.

Figure 5. Implementation phase of a CDM project.



2.6.1 *Monitoring*

Monitoring is the systematic surveillance and measurement of the project performance, which makes it possible to measure or calculate the amount of emission reductions that the project generates. Monitoring is the responsibility of the project participants and it must be conducted according to the monitoring plan in the registered PDD (see Chapter).

The most typical monitoring activity in a renewable energy project is the measurement of its energy output. Normally, the baseline in a renewable energy project is defined in terms of tonnes of CO₂ reduced per energy produced. For example, each megawatt-hour (MWh) of electricity generated by a wind turbine could replace other generation capacity in the grid and reduce CO₂ emissions by a certain amount. The actual amount of emission reductions generated is thus directly proportional to the amount of electricity produced by the generator (if the wind does not blow, emissions are not reduced). Therefore it is essential to know the exact amount of electricity produced each year to estimate the emission reductions generated during the same year.

The monitored data must be archived either in paper or electronic format, as described in the monitoring plan. The monitoring report is prepared on the basis of this data and submitted to the DOE. The monitoring report is the fundamental document, in which the following steps of the project cycle are based.

2.6.2 *Verification and Certification*

Verification is the periodic independent review and determination of the monitored

emission reductions that have occurred as a result of a CDM project during the verification period. The verification is done by the DOE. The length of the verification period is not defined in the CDM rules; quite often the verification is performed annually.¹⁵ In small-scale CDM projects it is possible to use the same DOE for validation (see Chapter 2.5.9) and verification; in larger projects different entities must be used.

The DOE performing the verification must:

- u Make the monitoring report publicly available¹⁶;
- u Determine whether the provided documentation is in accordance with the PDD;
- u Conduct on-site inspections as appropriate;
- u Review monitoring results and the application of the methodologies;
- u Determine the amount of emission reductions; and
- u Provide a verification report to the project participants, the Parties involved and the CDM Executive Board.

Certification is a written assurance by the DOE that during a specified time period the CDM project achieved the emission reductions as verified. The DOE prepares the Certification Report based on the Verification Report. The Certification Report is also made publicly available. The Certification Report is submitted to the CDM EB and it is a formal request to issue CERs.

2.6.3 *Issuance of Certified Emission Reductions*

The issuance of the CERs happens automatically 15 days after the CDM EB has received the Certification

¹⁵A less-frequent verification is one way of reducing transaction costs. Often the necessary verification frequency is defined in the ERPA.

¹⁶For confidential information, see Chapter 2.5.9.

Report, unless a review is requested. (A Party involved in the project or at least three members of the CDM EB have the right to request a review.)

The CDM Registry Administrator works under the authority of the Executive Board. If no review is requested, the Registry Administrator will issue the quantity of CERs specified in the Certification Report into an account of the Executive Board in the CDM Registry. From that account:

- u A share of 2% will be forwarded to a special account to assist developing countries particularly vulnerable to climate change impacts in meeting the costs of adaptation;
- u A share yet to be defined will be forwarded to a special account to cover administrative expenses ¹⁷; and
- u The remaining CERs will be forwarded to the accounts of the project Parties and participants according to their request.

The CDM EB and the UNFCCC Secretariat are currently working on the CDM Registry. The first version of the Registry should be operative by the end of November 2004. The Registry will have accounts for all the non-Annex I Parties. Until the international transaction log makes it possible to transfer CERs to national registries of Annex I Parties (expected in June 2005), Annex I Parties will also have temporary accounts in the CDM Registry.

2.7 Sale of the Emission Reductions

From the project developer's point of view, the purpose of the CDM is to improve the feasibility of the project

by providing additional revenues. The proceeds from the sale of the emission reductions can be seen as internalizing the global environmental benefits the project is generating. The project reduces greenhouse gas emissions either directly or indirectly, and this benefit can be given a price through emerging international carbon markets.¹⁸

The project may benefit from the sale of the CERs in several ways. Typically, the cash flow of the project is improved through the sale of the CERs by means of a long-term Emission Reduction Purchase Agreement (ERPA). ERPAs are often based on a payment-on-delivery principle, i.e. the buyer pays for the CERs over the crediting time of the project when it receives them. The International Emissions Trading Association (IETA) has recently prepared a model CDM ERPA. This useful document can be found at IETA's website www.ieta.org.

Signing an ERPA in hard currency terms with a creditworthy international investor can also facilitate the negotiations with the lenders and thus make the financial closing of the project easier. Sometimes the buyer of the CERs is willing to provide an upfront payment, as well. Naturally a discount rate is applied when upfront money is made available; often a guarantee is also required for upfront payments, which may result costly.

2.7.1 Prices and Risks

Projects may sell emission reductions that are certified or not. Reductions that are expected to be Kyoto-compliant are more expensive than those that are not. Non-Kyoto emission reductions can be used e.g.

¹⁷See Chapter 2.8 for more information.

¹⁸For more information on international carbon markets, see Chapter 5.

to voluntary offset emissions or in non-Kyoto compliance systems (see Chapter 5 for description of non-Kyoto carbon markets). The distribution of risks between the seller and the buyer has also impacts on the price of the emission reductions. The higher risks the seller is assuming, the higher price it can expect to get from the CERs (see Figure 6).

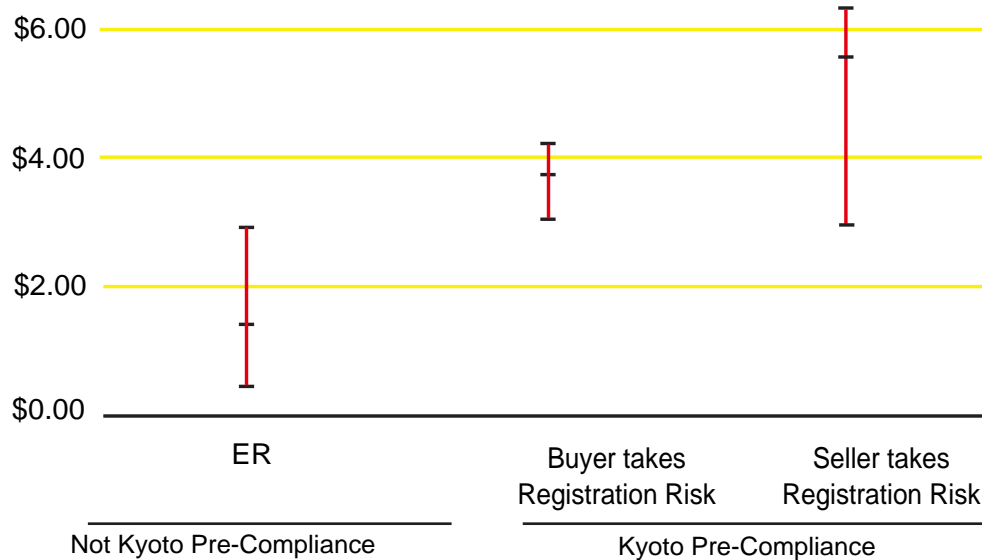
Based on World Bank's experience, other key determinants of price are¹⁹:

- u Creditworthiness and experience of the project sponsor and the viability of the project;
- u Confidence in the quality of the ongoing carbon asset management and hence delivery of ERs over the life of the project;

- u Structure of the contract (e.g., spot vs. forward contracts as well as amount of upfront payment, applied discount rate in case of upfront payment), including liabilities the seller is willing to undertake in case it fails to deliver upon contract commitments;
- u ER vintage, since only some vintages are eligible to meet compliance obligations;
- u Cost of validation and potential certification;
- u Host country support and willingness to cooperate, and
- u Additional environmental and social benefits.

¹⁹World Bank: State and Trends of the Carbon Market 2004. www.carbonfinance.org

Figure 6. Impact of Kyoto compliance and the risk distribution on the price of project-based emission reductions in 2003-04 (US\$ per tCO₂e). Source: World Bank: State and Trends of the Carbon Market 2004. www.carbonfinance.org



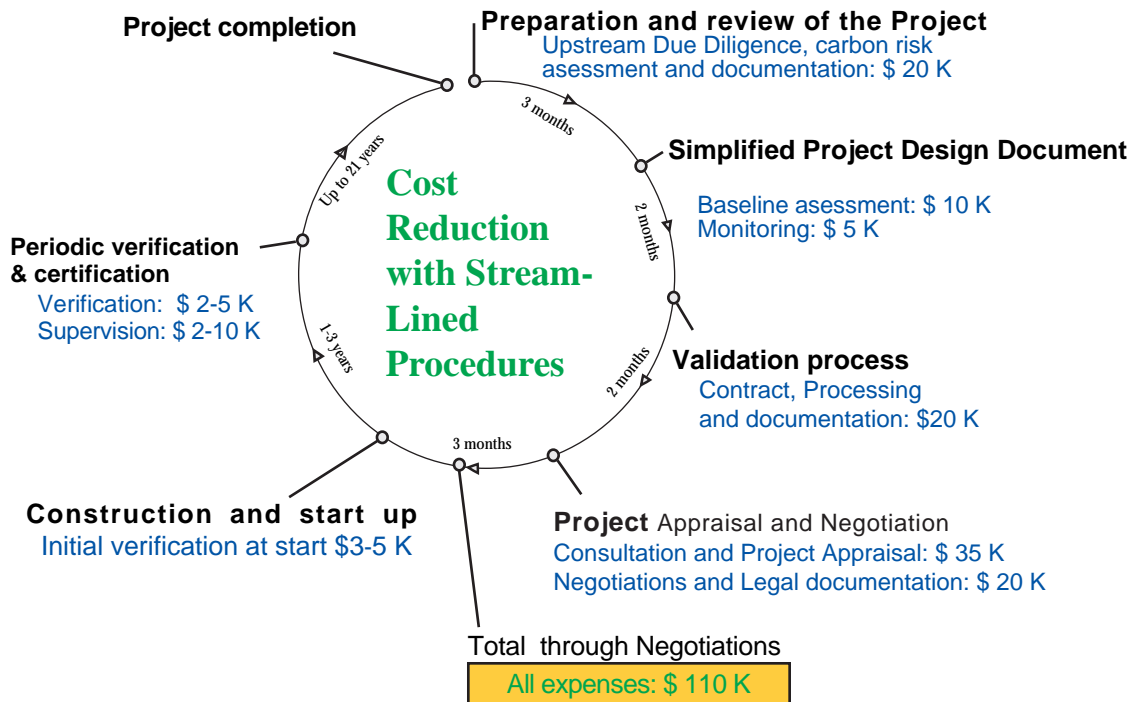
2.8 Costs Related to the CDM Project Cycle

Getting a project through from the CDM cycle implies additional costs. The costs vary greatly depending on the complexity of the project, use of external consultants, etc. The costs of the validation are based on the agreement negotiated between the

project participants and the operational entity and they depend on the complexity of the project, geographical location, etc. Indicative validation costs vary between USD 5,000 – 25,000. The World Bank experience with larger projects has shown project preparation costs in the range of USD 110,000 – 260,000. (See Figure 7).

Central American Carbon Finance Guide

Figure 7. World Bank estimate for the CDM project cycle costs for small-scale projects. Source: World Bank. Small-scale CDM Projects, An Overview. www.carbonfinance.org/cdcf.



There is still little experience on the small-scale project cycle costs and some experts estimate that these costs may be overestimated. It is also worth noting that sometimes the transaction costs can be shared between the seller and the buyer.

The percentage of CERs that will be withdrawn for administrative purposes is not yet defined (see Chapter 2.6.3). However, it has already been decided that as a part of the administrative fees the Executive Board will charge a registration fee in cash. The registration fee depends on the size of the project (see Table 8).

Table 8. Registration fee for CDM projects.

Average annual emission reduction, tCO ₂ e	Registration fee, US\$
15,000	5,000
> 15,000 and 50,000	10,000
> 50,000 and 100,000	15,000
> 100,000 and 200,000	20,000
> 200,000	30,000

3 FINANCING SMALL-SCALE RENEWABLE ENERGY PROJECTS

This section provides a general overview on how to develop a bankable project proposal and what are the main concerns that the financing institutions have when considering the financing of an energy project.

3.1 Introduction

Few other project developers than larger companies have the necessary resources to finance their project ideas from out of the pocket. In most cases, external debt or equity is needed. This chapter outlines the overall procedure for financial structuring of renewable energy projects. It is impossible to provide here a complete handbook of project financing; we rather try to give a basic idea for the developer. Many banks and other financing institutions have plenty of material on this issue. One source of information specific to Central America is FENERCA (www.fenerca.org), which has manuals on preparation of business plans, etc. The steps described here seek to meet in general terms most financing institutions' information requirements. However, each financing institution has its own guidelines for approval of finance. The project developer should establish and maintain a good dialogue with the relevant representative at each financing institution and always follow each financing institutions specific guidelines when submitting an application.

3.2 Impacts of Carbon Finance to Project Financing

It is important to bear in mind that carbon finance is only a small part of the total financing of the project. According to some estimates, carbon finance can generally improve the financial rate of return of a project by 1-5 percentage points, depending on the type of the project and other

conditions. Furthermore, most of the carbon contracts are payment on delivery, so even if significant cash flow resulted from the sale of the emission reductions, it would not solve the problem of initially financing the project.

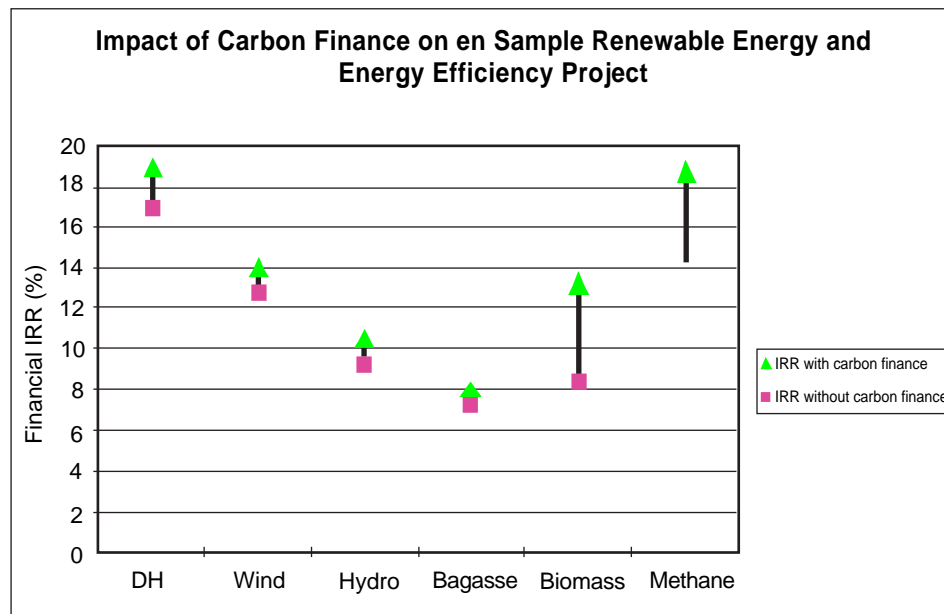
Figure 8 shows World Bank's estimates on carbon finance's impact on project financing. It can be seen that with biomass projects and methane capture the impact is most significant due to the high GWP of methane.

Carbon finance does not turn a bad project into a good-one. On the other hand, it may significantly improve the probability for good project ideas to be realised as projects. Some of the impacts that carbon finance may have on the project's viability are:

- u Carbon finance improves the IRR on equity and may thus get new investors on board, who otherwise would not be interested in the investment;
- u The ERPA with a creditworthy counterpart gives the project a cash flow in hard currency, which may facilitate the negotiations with the lenders; and
- u Parties interested in purchasing the emission reductions may bring additional resources, technical expertise and know-how to the project.

In order to be able to benefit from carbon finance through CDM or other mechanisms, the underlying financial structure of the project must be solid. The following chapters aim at giving some insight into the traditional project financing.

Figure 8 . Impact of Carbon Finance on the IRR of selected projects. (DH=District Heating). Source: World Bank.



3.3 Project Financing

Traditionally, commercial banks lend money against fixed assets and the total amount of the loan must be guaranteed by the borrower. In project financing, the creditors provide financing to a project solely based on the merits of the project itself, with limited or no recourse to the companies sponsoring the project. (i.e. non-recourse or limited recourse financing). Typically a separate project company (sometimes called special purpose company or special purpose vehicle) is established by the project sponsors to implement the project. The benefits of such arrangement for the sponsors include:

- u It allows the sponsors to borrow funds to finance a project without increasing their liabilities beyond their investment in the project. On the sponsor's balance sheet, their exposure to the project is the amount of their equity contribution and nothing more.
- u Lenders to the project (e.g. commercial or development banks) assume part of the project

risks, since they are lending without full recourse and primarily on the basis of project assets.

On the other hand, establishing a special project company incurs transaction costs which may be significant in a small project. Also, non-recourse financing is more expensive than traditional lending against guarantees because of the higher risks for the lender. Many banks are also unfamiliar with project financing and unwilling to lend based on the merits of the project without full guarantees. If the project sponsor has sufficient financial capacity to implement the project without a special purpose company, this may be an option in a small project.

Independently of whether the project will be financed using conventional full-recourse financing or project financing, the CDM investors or buyers of emission reductions are most interested in the financial soundness of the project. Therefore, a properly made business plan and a feasibility study are always required.

3.4 Types of Capital

To implement a project, capital (or financing) is needed. There are basically three types of capital available for all projects:

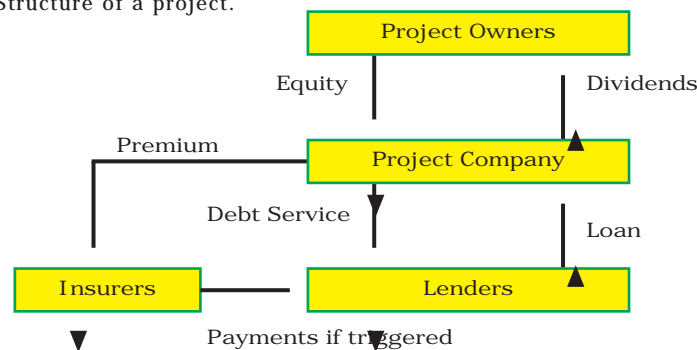
- u Equity;
- u Debt; and
- u Mezzanine capital.

Every type of capital plays a special role in project financing and it is important to understand the characteristics of each of them. The

challenge of financial structuring is to set up a combination of debt, equity and mezzanine financing that optimizes the use of various financial sources. A typical project may involve e.g. 20-40% of equity provided by the project sponsors and 60-80% of debt provided by commercial banks, international financial institutions and/or bilateral government lenders.

Figure 9 shows a typical financial structure of a project.

Figure 9. Financial Structure of a project.



3.4.1 Equity Capital

Equity represents the funds injected by the owners of the project and it is the lowest ranking capital of all in terms of its claims on the assets of the project. Normally all the other obligations must be satisfied before any dividends to the project owners can be paid. Equity investors therefore bear the highest risk in the project. If the project fails, the equity investors will most probably lose a significant part of their equity investment. On the other hand, if the project is successful, the equity investors can also make the biggest gains. After all the other obligations are met, everything that remains belongs to the equity investors.

3.4.2 Debt capital

In contrast to equity capital, debt has the highest ranking of all capital. Senior debt has first claim over all the assets of a project and must be repaid first, normally according to a

predetermined schedule. Therefore the debt bears the lowest risk of all capital and correspondingly the returns on debt are usually limited to the interest payments, irrespective of how successful the project may be.

Lenders would usually prefer a low debt-equity ratio passing majority of the risks to the equity investors. A high debt-equity ratio reduces equity investors' exposure to the project risks and increase their potential returns when the project is successful. On the other hand, high leverage increases the risk of default which would result in equity investors losing all their investment. Normally the higher the project risks, the lower the debt-equity ratio.

Projects exposed to market risks tend to have 60-65% debt leverage, whereas an energy project with firm take-or-pay power purchase agreement could reach 70-80% leverage. As lenders become more familiar with carbon finance, a

long-term ERPA with a creditworthy counterparty can also help raise project's leverage.

3.4.3 Mezzanine Capital

Mezzanine capital has characteristics from both equity and debt and it is therefore a more flexible instrument than either pure equity or debt capital. Structurally it is subordinated in priority of payment to senior debt, but it is senior to common stock or equity.

Examples of mezzanine financing are subordinated loans, preferred shares and convertible bonds. For instance subordinated loans have characteristics of debt in that regular payments of interest are involved. However, payments are subordinated to senior debt and need only be made when project funds are available. For bearing greater risks than senior loans, mezzanine capital requires higher returns. This is

achieved either through higher interest rates or partial participation in the project's profits.²⁰

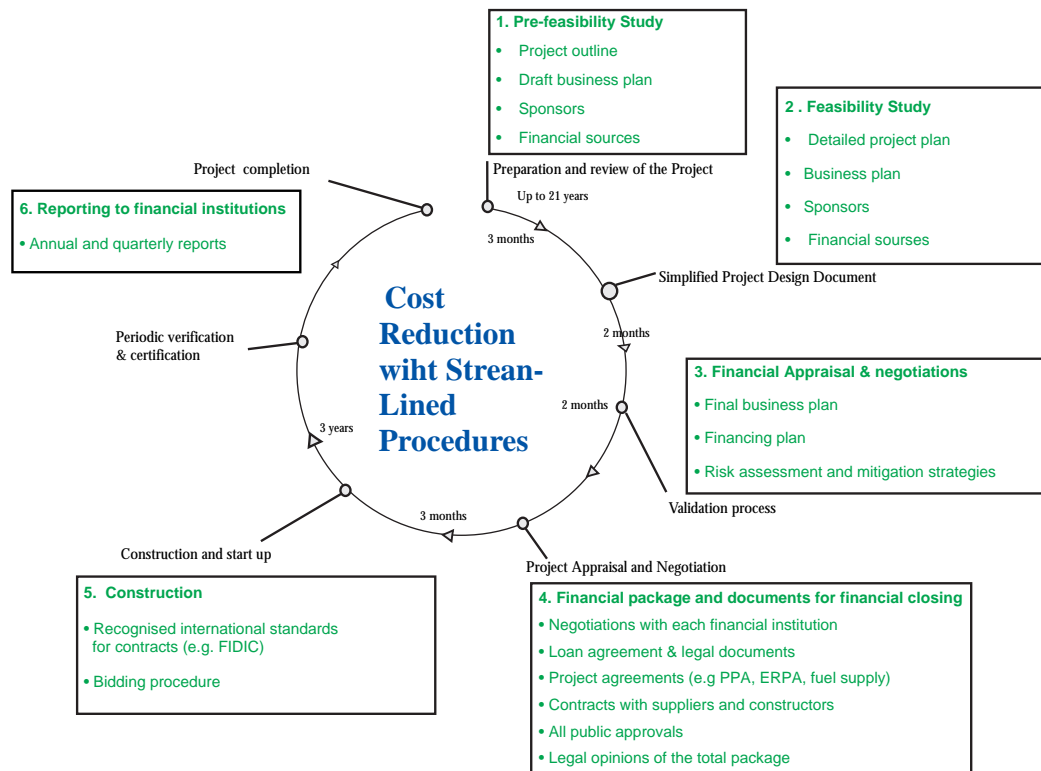
3.5 Financial project cycle

This chapter adds the financial project cycle to the CDM project cycle presented earlier in Figure 7.

Although there are several ways of moving forward, most projects follow to some extent the steps presented in Figure 10. Generally there is first a pre-feasibility phase followed by the preparation of a more detailed feasibility study and business plan. When external finance is needed (either loans or equity capital or both), a package of documentation has to be prepared for the potential financiers. In the following chapters the steps needed until the financial closing of the project are briefly explained.

²⁰UNIDO. BOT Guidelines. Vienna 1996.

Figure 10. CDM project cycle and parallel project financing steps. Source: World Bank.



3.5.1 *Pre-feasibility Studies*

The purpose of the pre-feasibility stage is to investigate the project outline and screen the opportunities without spending major resources on extensive studies of the entire project. It is also an important stage in order to gain interest from co-investors and potential financing institutions and authorities, and achieve non-binding Letters of Interest for the project development. During the pre-feasibility stage, it is also important to receive early input from financial institutions for optimal project design. The pre-feasibility phase of the financial project cycle corresponds time-wise to the preparation of the PIN in a CDM project cycle.

Often the first questions relate to the organisation of the project. Is there a group of people, companies or other organisations who are willing to invest in, or to be part of the project? If the project is implemented by an existing company, does it have the sufficient resources to do it on its own or are other equity investors or lenders needed? Does the project merit the formation of a special project company (see Chapter 3.3). Most financial institutions emphasize the sponsor's financial strengths and proven capabilities to implement the project. Thus, any project development should be started by identification of key owners and receiving letters of interest from these before contacting financial institutions.

Besides organisation, the first questions are also related to money. Who is going to give the seed money for the development of the project? There are different sources that provide grants for pre-feasibility studies or business development (see Annex III) but generally the project developers have to be prepared to invest some of their own resources

(time, work and money), as well.

The principal objective of the pre-feasibility study is to determine whether:²¹

- u All possible project alternatives have been examined;
- u The project concept justifies a detailed analysis by a feasibility study;
- u Any aspects of the project are critical to its feasibility and need in-depth investigation; and
- u The project idea, on the basis of the available information, should be considered either non-viable or attractive enough for a particular investor.

The pre-feasibility study should look at the project from economic, market-related, technical, financial and managerial point of view.

Normally, the PIN (as discussed in Chapter 2.5.1) would also cover much of the basic information requirements for pre-feasibility studies. However, the PIN concentrates on emission reductions, whereas the emphasis in the pre-feasibility study is on the financial viability of the project.

Different project alternatives should be assessed in the pre-feasibility phase, so that in later stages the most viable alternative can be selected as the basis for the project. The project developers may have fixed ideas or be blind to some flaws of the project concept; therefore it is important to involve impartial outsiders in the preparation and/or revision of the feasibility study.

Most financing institutions have a two-step approval procedure with an initial review and final approval. The pre-feasibility study should be used in the initial phase to open the

²¹ UNIDO. Manual for the Preparation of Industrial Feasibility Studies. Vienna 1991.

dialogue with the financing institutions. It is recommended to have meetings, in person or by telephone conference, with key contacts from each potential source of finance before submitting an initial written application for finance. The representatives from financial institutions could contribute by valuable advice and input to the project. Often the initial approval from the financing institutions is a precondition for the later approval of the full finance of the project.

The host country authorities for approval of the potential CDM project should also be contacted already at this stage, and the pre-feasibility study should be accompanied, if possible, by a Letter of Interest from the authorities in the host country.

3.5.2 *Feasibility Study and Business Plan*

Feasibility study and business plan differ both in scope and in detail. The feasibility study gives an overview of different possibilities comparing various project alternatives, technology options etc., while business plan gives the details of a specific selected activity. Whereas feasibility study concentrates on such issues as electricity tariffs, competition, taxation and fuel availability, the business plan focuses on business structure, management plans, specific business targets, staffing and so on. The feasibility study and business plan together should provide potential lenders or equity investors with sufficient information to undertake a decision on investments or lending. This phase of the financial project cycle corresponds to the PCN/PDD phase of the carbon finance cycle.

When the potential investors or lenders are assessing the feasibility study and business plan, they

normally focus on such key factors as:²²

- u The company/sponsor can demonstrate that it operates its current businesses profitably, can its debt, and has the know-how and capacity to operate the proposed project;
- u A business plan indicates that the project can be developed and operated in a manner that will enable it to provide a reasonable return to investors while servicing debt;
- u Summary of the projects technical outline demonstrates documented efficient and proven technology. A detailed technical project plan should be made available upon request or be enclosed as appendix;
- u The project has a credible customer base – or in the case of independent power or heat producers, an off taker – with the financial capacity to purchase the project's output during the debt repayment period; and
- u The sponsors and the project company have sufficient financial strength so that neither the sponsors nor the project have liabilities that would undermine the ability of the project to achieve and maintain profitability.

Feasibility Study

The feasibility study includes basically the same information as the pre-feasibility study but in a much more detailed level. It addresses supply and demand characteristics in the specific market of the project. Prices and pricing trends for project inputs (e.g. fuels) and outputs (e.g. electricity) and their sensitivities are discussed. The feasibility study should answer such questions as: Can you get into the market? Can you secure all necessary contracts? Are your financial projections realistic? What are the worst-case and the best-case

²²<http://carbonfinance.org>. Document Library. PCF Implementation Note #7: Financial Risk Assessment and Mitigation: Risk-based Structuring and Pricing, Annex 6.

scenario?

Depending on the size and other characteristics of the project, the feasibility study would typically include:

- u Executive Summary;
- u Project background and history, including presentation of project sponsors' financial strength and past experiences in project implementation;
- u Market analysis and marketing concept;
- u Description of the project location, site and environment;
- u Description of the project technology and engineering issues, including examples where the technology has been successfully utilised in other similar projects;
- u Project organisation and overhead costs;
- u Required human resources and their availability;
- u Project implementation schedule;
- u Total investment costs and project financing (proposed capital structure indicating which parties are expected to provide the project's financing);
- u Financial evaluation (payback

period, IRR and NPV calculations, sensitivity analyses and presentation of main assumptions); and

- u Description of project's environmental and social impacts or other special requirements of the financiers.

In small projects, a properly done pre-feasibility study together with the business plan can be sufficient without a full-scale feasibility study, if it essentially answers the questions above.

Business Plan

The business plan offers a different point of view from the global perspective of the feasibility study. It provides details about the operation, the market, project management and the project organisation's financials. It also addresses how to create a profitable income stream for the project's investors.

The business plan should be a well-structured document of maximum 25 pages plus appendices. The business plan should be fact-based and focus on the presentation of facts and numbers.

An example of an outline for a business plan is presented in Table 9.

Table 9. Business Plan outline for projects. Source: World Bank 2002.

Proposed Business Plan Outline	
1.	Executive Summary
1.1.	Description of project and business history, current status, customer, beneficiaries, size of program, expectations for future project
1.2.	Target markets, expected sales and expected emission reductions (ER) volumes
1.3.	Project marketing and outreach Strategy
1.4.	Budget and financial projections; expected contributions
2.	Mission
2.1.	Sponsor: Current scope of activities and responsibilities (utilize existing information e.g. from annual reports)
2.2.	Project: Brief explanation of project's fit with sponsor's mission
3.	Project Strategy
3.1.	Business concept
3.2.	Marketing strategy – sales estimates and prices by product/customer class
3.3.	Cost structure and supplier analysis
3.4.	Competition -- capability of other companies to provide similar services
4.	Management Structure and Capabilities
4.1.	Sponsor(s)
4.1.1.	Directors and managers
4.1.2.	Budget, including sources of financing
4.1.3.	Structure, capabilities and experience: similar projects that sponsor has closed (number, financing provided, current status)
4.2.	Project management plan
4.2.1.	Legal authority (i.e. permits)
4.2.2.	Structure
4.2.3.	Roles and responsibilities of each position
4.2.4.	Names and backgrounds of critical personnel (sponsor staff, technical assistance, consultants, advisory board, if applicable)
5.	Technology & procurement
5.1.	Proposed technology concept
5.2.	Potential suppliers
5.3.	Reference projects or documentation for mature technology
5.4.	Proposed purchase procedures
5.5.	Proposed contract structures
6.	Project Risk Management
6.1.	Risk identification
6.2.	Proposed strategies for mitigating risks (including long term off take contracts)
7.	Project Budget and Financial Projections
7.1.	Estimated requirements for construction period
7.2.	Estimated requirements for first 3 years of` operation
7.3.	Budget for full operation
7.4.	Financing Plan
7.5.	Sensitivity analysis of key assumptions: power sales, ERPA, main costs etc.

3.5.3 Financial plan

An important part of the business plan is the financial plan of the project. There are four key elements where the financial plan should focus at: project costs, financial structure (equity, debt), return on investment and risks. The financial plan should be based on a continued dialogue with the financing institutions since the pre-feasibility stage. It should result in a structure of the capital that would be sufficient for providing the project with liquid funds for the project implementation and start up. At the same time, the financial structure should be adapted to the risk profile of the project and make sure that the project manages to repay the capital expenditures even in the worst-case scenario.

Project Costs

Since reliable cost estimates are fundamental to the appraisal of a project, it is necessary to check carefully all cost items that could have a significant impact on the financial feasibility of the project. The costs can generally be divided in three phases: development (pre-investment) costs, project implementation (investment) costs and operating costs. Pre-investment costs include for instance the preparation of the pre-feasibility and feasibility studies and business plan, related travelling etc. The project implementation costs include costs related to insurances, land acquisition, taxes, legal expenses, necessary permits, site preparation,

engineering, procurement and construction, interests during the construction period, trial runs, start-up and commissioning costs etc. Operating costs may consist of such items as fuel, salaries and social benefits, rent, water, power, gas, taxes, office supplies, maintenance, marketing, administration, depreciation and financial costs.

Operating costs are supposed to be financed from the revenues generated by the project. However, there may be significant operating expenses before the project starts to generate sufficient income. An important part of the investment costs, which is often neglected, is the initial working capital. In the analysis of the investment costs it should therefore be carefully checked whether the initial working capital requirements are properly considered in the cost estimates. This helps to avoid unexpected shortage of finance during start-up of project operations.

Table 10 shows the project development and implementation cost table from the World Bank's PCN. It divides the costs into development costs, installed costs (sum of capital costs and installation costs) and other costs (e.g. legal costs, start-up costs, initial working capital). These are the total project costs that must be financed through a combination of debt and equity. The table also includes a brief description of the commercial strategy of the project.

Table 10. Project costs and commercial strategy.

Estimate of Total Project Costs (pre-investment and investment phase)	
Development costs	US\$ / ¢ and a brief clarification
Installed costs	US\$ / ¢ and a brief clarification
Other costs	US\$ / ¢ and a brief clarification
Total project costs	US\$ / ¢ and a brief clarification
Commercial strategy	A brief description of the commercial strategy of the project

Financial Structure

The financial plan should suggest the financial structure to cover all the costs presented in Table 10. It should include names of sources of debt and equity to be sought or already identified, contribution of each, and status of commitment. Any letters of intent or any other evidence of interest from financiers should be attached as enclosures to the

financing plan. Table 11 presents a model to describe the financial structure of a project. For typical division between equity and debt, see Chapter 34. Annex IV list some potential sources of debt and equity for projects in Central America.²³

²³More information can be found in “Financing Business Opportunities in Latin America and the Caribbean” published by the Finnish Ministry for Foreign Affairs. It can be found in Finpro’s website at www.finpro.fi.

Table 11. Proposed financial structure – sources of finance identified.

Source	US\$ (M)	%	Status of Commitment	Terms for finance (interest rate, repayment time, tenor, insurance requirements)
EQUITY				
Sponsor 1				
Sponsor 2				
Other Shareholders				
Other Shareholders				
Total Equity				
DEBT				
Foreign bank loan				
Export credit				
Local bank (local currency) loan				
Total Debt				
Total Financing				
Financing Gap (Project cost minus total financing)				

On a regular basis, OECD undertakes a global country-risk classification, classifying all countries in the world into 7 risk classes (see Table 12). Financing institutions consider the foreign investment risk in country risk category 1 as low, and most commercial OECD based financing institutions are closed for investments in OECD country category 6 and 7 without guarantees in terms of sovereign counter guarantees, export credit guarantee or other guarantee.

However, if the proposed project is financially strong and profitable, the project developer may search for risk mitigation strategies and counter guarantees, such as export guarantees, to attract foreign credits even though the country risk is rated as high (see Chapter for more information on export guarantees).

Table 12. OECD risk classification of Central American countries as of June 2004. Source: <http://www.oecd.org/dataoecd/35/2/32366062.pdf>.

Country	OECD risk category
Belize	6
Costa Rica	3
El Salvador	4
Guatemala	6
Honduras	7
Nicaragua	7
Panama	4

The OECD risk classifications of the various Central American countries imply that different financing strategies should be developed for projects in e.g. Honduras and Nicaragua, than for Costa Rica and El Salvador. The latter may attract more commercially oriented financing at the current stage.

The international credit rating agencies (S&P, Moody’s, Fitch) also give ratings

for countries, as well as for companies. Their ratings for the host country and the project sponsors are important indicators for investors and financing

institutions. Therefore, ratings should be collected whenever possible and presented as part of the financing plan (see Table 13).

Table 13. Credit ratings of host country and company. See www.moodys.com, www.standardandpoors.com, www.fitchibca.com and www.oecd.org for ratings. Sites may require registration.

Rating Agency*	Country	Company
S&P		
Moody's		
Fitch		
OECD		NA

Financial Analysis

An important part of the financial plan is the financial analysis. It should be able to demonstrate that the project is profitable, able to generate sufficient return for the investors and service its debt. Financial forecasts provide insight into the risks, important issues and burden sharing within the project; they are not an objective in themselves. Forecasts should not be “Too Good To Be True”.

Most financing institutions prefer to receive cash flow projections for the project along with the financial analysis both in paper copies and in electronic form (Excel files or similar). An Excel template for making a simple analysis can be found at <http://carbonfinance.org/docs/PINFinancialAnalysis.xls>. Some of the key results of the financial analysis are listed in Table 14.

Table 14. Key results of financial analysis.

	2004	05	06	07	08	09	10	11	12	13
Cash flow (before CERs)										
Cash flow (after CERs)										
Net Present Value NPV (before CERs)										
Net Present Value NPV (after CERs)										
Estimated financial internal rate of return FIRR (before CERs)										
Estimated financial internal rate of return FIRR (after CERs)										
Debt Service Coverage Ratio (before CERs)										
Debt Service Coverage Ratio (after CERs)										

The critical assumptions should be highlighted and their values explained in the financial plan. Sensitivity tests should be carried out for critical factors such as:

- u Power or heat sales
- u Emission reduction sales
- u Resources, e.g. wind resources, availability and price of biomass or hydrological data
- u Interest rate levels
- u Exchange rate levels
- u Production costs

The sensitivity test should result in a base case financial projection, a worst case scenario and a break-even scenario to illustrate the security margins in the project.

The financial plan should also include a proposal for key financial covenants. A covenant is a promise in the debt agreement that certain activities will or will not be carried out. The purpose of a covenant is to give the lender more security. Covenants can cover everything from minimum dividend payments to levels that must be maintained in working capital. Typical covenants could relate for instance to:

- u Equity ratio (recommended level of 35 – 50% in developing countries).
- u Ratio of Net Debt to EBITDA (Earnings before Interests, Taxation, Depreciation and Amortisation) to illustrate the debt service capabilities of the project cash flow.

Financial risk assessment and mitigations

The key financial risks should be highlighted:

Market/price risk – power or others ales
Financing institutions prefer long term contracts with financially sound power company. Otherwise, the tariff structure and expected tariff development should be evaluated in detail. Sensitivity analysis

should be carried out to investigate the break-even level of power tariff (or price of other products sold) for the project.

Financial risk

Financial risks could be mitigated by an appropriate financial structure; the higher the risk, the higher the share of equity in the project that is required to raise finance. The level of foreign debt should to certain extent match the level of hard currency income, e.g. from the ERPA, combined with the cash-flow of the project in relation to the recent years inflation and development of the exchange rate of the local currency. The debt-repayment structure should be adapted to the cash-flow generation of the project. The project risks could be split into the following factors and a mitigation plan should be developed for each:

Construction risk and performance risk

These risks can be mitigated by sufficient pre-investigations, planning and use of well-known engineering and construction companies. This should be combined with an appropriate contract structure, e.g. FIDIC (Federación Internacional de Ingenieros Consultores). The FIDIC contract model regulates the exact responsibilities of each contracting party and defines financial punishment for delays and non-fulfilment of contracts.

Counterparty risks

Counterparties here could refer to fuel suppliers, power or heat offtakers or any other parties outside the project, whose fulfilment of contractual obligations is important for the success of the project. The counterparty risks should be mitigated by evaluation of the financial strength and performance records of the counterparty coupled with appropriate contract structure.

Contract risk

Contract risk should be mitigated by

appropriate legal advisors and legal opinions.

Environmental and social risk

These risks should be evaluated in the pre-feasibility study, and the projects should be appropriately designed to handle these issues, e.g. through an environmental and social management plan prepared as part of the environmental and social assessment..

Country risk

Foreign investors and foreign financing institutions may search to cover the risk associated with investments in the host country either through export guarantee agencies or private political risk insurance companies. As an alternative, the political risks could be split in main items and evaluated individually. Naturally, foreign investments would be attracted to host countries with positive valuation of the following factors:

- u Is the investment climate stable for

foreign investors?

- u Is there low risk for depreciation of the local currency?
- u Is there a reliable legal framework and efficient court system?

As previously mentioned, the host country's OECD rating coupled with the foreign investors' evaluation of the investment climate may exclude some commercial bank financing options and other financing strategies should be identified.

3.5.4 *Financial appraisal and negotiations*

Financial appraisal is a method used to evaluate the viability of a proposed project by assessing the value of net cash flows that result from its implementation. Due diligence is part of the appraisal process and it serves to confirm all material facts in regards to the lenders or investors participation in the project. During the financial due diligence process, most financing institutions would examine to some extent the items presented in Table 15.

Table 15. Financial due diligence.

Objective	Evidence
Sound sponsor/company	Audited financials for at least 3 years [and auditor's management letter] demonstrating sound financial performance and management. Ratio analysis including: margin analysis, debt service coverage ratio, operating ratios, debt/equity ratio, self-financing ratio
Sound Project Business	A business plan that shows a clear strategy, an understanding of the market, socio-political, financial, and technical challenges the project faces, and financial projections (covering at least five years of operations after project completion) demonstrating the financial viability of the project (including project capital cost estimates, project financing plans, income statements, balance sheets and cash-flow statements). Ratio analysis as above.
Sound offtaker / credible market for output	Business plan should also include market analysis – especially analysis of demand – indicating historical and projected trends in sales volumes both in physical and monetary terms, customers, tariffs. (a) In the case of an independent power and/or heat producer: an affidavit indicating a sound purchase agreement (for contracted sales) or viable market (for merchant sales). Ideally: take-or-pay PPA with viable offtaker and automatic indexation of tariffs. (b) In the case of an integrated utility or other company with numerous customers: a market assessment describing the customer base and growth trends, and potential threats from substitutes or competitors; indicating sufficient demand for the product at projected prices to enable the project to operate profitably.
Limited debt and liability exposure	A statement summarizing potentially large debts and liabilities, required only to the extent that they are not revealed in the audited financial statements
Technology, procurement procedures and construction	<ol style="list-style-type: none"> 1. Approved technical concept 2. Solid project management during implementation 3. Adequate contract structure to protect the project developers towards delays in delivery and costs overruns 4. Plan for appointing recognized construction companies only

Before the appraisal, the project developer should have had a detailed examination of the project with the contact person at the financing institution in order to make sure the project is adapted to the financing institutions requirements and guidelines to the extent possible.

The appraisal and commitment for one financing institution may often be conditional upon approvals from other financing institutions in order to ensure the banks commitment to only fully financed projects. After appraisal, the financing institutions often present additional assumptions in order to reduce the risk profile in the project. This often strengthens the project and reasonable requirements should be met. However, most financing institutions would also accept reasonable arguments and a constructive negotiations process would result in a satisfying result for all parties.

3.5.5 *Financial package and documents for financial closing*

Preparation of the loan agreements normally build on the standard loan agreements from the financing institutions, unless several financing institutions would share the same loan agreement either through syndicated loan agreements (for the largest projects) or club-deals with 2 – 4 banks.

In addition to the loan agreements with lending institutions, the following documentation should be ready before financial closing.

Financial documentation checklist:²⁴

For each sponsor and the project company the following documents should be available (where applicable):

- u Experience statement, including all the projects the firm has closed, their current status, and additional details on projects similar to the CDM project
- u Any ratings and reports from D&B, S&P, Fitch, OECD (country only).
- u Public filings, if any.
- u Audited financial statements for most recent three years.
- u Company By-Laws/Articles of Association.
- u List of Directors and Managers of the Company.
- u Shareholders Agreement.
- u List of Company Subsidiaries, if not included in financial statements.
- u List of Company Debts (maturities, interest rates, security) if not included in financial statements.
- u Paper and electronic copies of company financial projections including assumptions, balance sheet, income statement, cash flow; include proposed projects and other planned investments.

Before appraisal, the following documents should be ready to submit to the financing institutions upon requests:

- u Major project contracts (e.g. engineering, procurement and construction).
- u Purchase contracts (e.g. power).
- u Concessions, licenses and permits.
- u Financing agreements, letters of intent or similar from banks, equity providers, carbon finance sources, etc.
- u Technical assistance agreements, if applicable.

²⁴<http://carbonfinance.org>. Document Library. PCF Implementation Note #7: Financial Risk Assessment and Mitigation: Risk-based Structuring and Pricing, Annex 1

- u Laws governing project operations (e.g. build, operate, transfer laws, and government decrees).
- u Sources of major procurements.
- u Paper and electronic copies of project financial projections including assumptions, per unit (e.g. USD/MWh, USD/ton) product costs and prices (tariffs), income statement, and cash flow.

3.5.6 *Financing sources for small scale renewable energy sources*

A brief presentation of potential sources of finance for small-scale energy projects in Central America is given in the annexes. The annexes list institutions' types of financial contribution and their main criteria for finance/support and links to make it easier for the reader to screen the possibilities and be able to contact the respective sources for more detailed information about their conditions for contributing to the project. Often, the contact persons from these organisations and financial institutions can also advise on interested sponsors and local sources for finance of project development and financing of the projects.

The Annexes are:

- u Sources for general support for project preparation and technical assistance (Annex III)
- u Sources for equity, grants and loans (Annex IV)
- u Carbon finance sources (Annex V)

More complete information can also be found in the book *"Financing Business Opportunities in Latin America and the Caribbean"*, which is available from the Finnish Ministry for Foreign Affairs and from the Finpro website www.finpro.fi.

Export Finance of Equipment for Projects

Export credit and guarantee agencies may have a possible role in risk mitigation for small-scale energy projects for the imported part of the equipment. In some countries, such as the USA, the US-Exim Bank is responsible for both the export credits and the export guarantee. In other countries, such as in Finland, Finnvera will issue the export-guarantees, while commercial banks and the exportbank, FIDE – The Finnish Export Finance Development, will be responsible for the export credit. The export guarantee institutes and export credit banks can normally advice on contact persons in their sister organisation (see Table 16).

Export credits may be applied to finance part of a CDM project, for instance:

- u supply of equipment for e.g. wind turbines, biomass boilers, photovoltaics or hydropower plants or turn-key projects
- u supply of specific consulting services, e.g. wind-mapping or hydrology and power design studies

The main terms and conditions for export credits are regulated by OECD, and the maximum credit time for power stations is 12 years.

It is normally the supplier of the equipment that would facilitate the contact to the export credit agency and the export guarantee agency until approval of the finance, where after these agencies will contact the CDM project developer and if applicable, the counter guarantee institute, for preparing the documentation for the project.

Export guarantees may come in various forms²⁵:

- u Credit Risk Guarantees
- u Buyer Credit Guarantees

²⁵Ministry of Foreign Affairs of Finland: Financing Business Opportunities in Latin America and the Caribbean

- u Letter of Credit Guarantees
 - u Investment Guarantees
 - u Bond Guarantees
 - u Finance Guarantees
 - u Raw Material Guarantees
- A traditional export credit arrangement
- consist of a contracted amount, whereof minimum 15% should be paid up-front by the local partner/project company and up to 85% of the contract could be financed by an export credit. Of the export credit, the OECD export guarantee institutes may cover up to 90% of the commercial risk and 100% of the political risk. The remaining risk must be carried by the supplier of the equipment or the supplier's bank.

Table 16. Examples of national and commercial export credit and guarantee institutions.

Examples of export credits & guarantee institutes ²⁶	Links to guidelines
CESCE (Spain)	www.cesce.es
Compagnie Francaise d'Assurance (COFACE)	www.coface.com
Eksportkreditfonden i Danmark (EKF) (Denmark)	www.ekf.dk
Eksportkreditnämnden i Sverige (EKN) (Sweden)	www.ekn.se
ERG (Switzerland)	www.swiss-erg.com
Export Credit Guarantee Department (ECGD) (UK)	www.ecgd.gov.uk/
Finnvera (Finland)	www.finnvera.fi
HERMES (Germany)	www.hermes-kredit.com
MIGA (World Bank Group)	www.miga.org
Atradius (Switzerland, Germany, Spain)	www.atradius.com
US EXIMBANK (United States)	www.exim.gov

²⁶ Source: www.giek.no

4 Country Information

This section provides a general overview on Central America and relevant information on each of the seven Central American countries.

4.1 Central American Regional Context

4.1.1 General Indicators

The Central American countries have since 2002, a population of almost 38 million inhabitants and a total GDP (at constant 1995 prices) of more than US\$61 billion, which demonstrate an ample regional market, with possibilities of having access to foreign investment, as can be noted on Table 17.



Table 17. Social and economic indicators of Central America.

Country	Area (km ²)	Population (persons)	Population Density (pers/km ²)	GDP 2002 (US\$) *	GDPper capita (US\$) *
Belize	22,800	235,587	10.33	660,000	2,750
Costa Rica	51,100	4,200,000	82.19	15,027,100	3,654
El Salvador	20,749	6,518,000	314.14	11,237,300	1,757
Guatemala	108,889	11,995,000	110.16	18,208,500	1,558
Honduras	112,492	6,828,000	60.70	4,719,800	709
Nicaragua	131,812	5,347,000	40.57	2,562,500	492
Panamá	77,082	2,942,000	38.17	9,484,200	3,272
TOTAL	524,924	38,065,587	-	61,899,400	-

* At constant 1995 prices. Source: recompilation by BUN-CA, 2003.

As of 2002, the total installed capacity in the region was approximately 7,427 MW, out of which hydropower represented 48.0%, other renewable sources such as geothermal, biomass and wind represent 10.3% and fossil fuels represent 41.7%, according to Table 18.

Table 18. Installed capacity in Central America, 2003.

Country	Hydropower	Geothermal & Biomass	Wind	Thermal	Total (in MW)
Belize	25	0	0	25	50
Costa Rica	1,271	145	63	318	1,797
El Salvador	422	213	0	501	1,136
Guatemala	512	207	0	940	1,659
Honduras	466	21	0	561	1,048
Nicaragua	104	77	0	477	658
Panamá	754	0	0	325	1,079
Region	3,554	663	63	3,147	7,427

Sources: recompilation by BUN-CA, 2003

* Not included energy imports

On the other hand, the regional general reached a total of 29,100 GWh in 2002. Hydropower represented the largest contribution with a total of 13,830 (47.8%), followed by thermal generation with 12,578 GWh (43.2%), geothermal generation reached 2,435 GWh (8.4%), and finally wind power generated 259 GWh (0.9%), according to Table 19. In view of the continued economic growth forecast for the region, it is likely that the demand for electricity will maintain the same growth tendency with an expected aggregated demand for the region in the order of 35,948 GWh for the year 2005 and some 58,600 GWh for the year 2014.

In comparison with the year 2001, the growth in demand for the year 2005 will be 28% (an annual rate of growth close to 7%) and for the year 2014, with respect to 2001, will be of 109% (an annual growth rate close to 8.3%).²⁷

Table 19. Power generation in Central America, 2002.

Country	Hydro	Geothermal/ biomass	Wind	Thermal	Total (in GWh)
Belize	88	19	0	251	358
Costa Rica	5,970	1,121	259	134	7,484
El Salvador	1,206	907	0	1,863	3,976
Guatemala	2,264	194	0	3,314	5,772
Honduras ^a	1,611	5	0	2,465	4,081
Nicaragua	190	189	0	1,908	2,287
Panama	2,501	0	0	2,643	5,144
Region	13,830	2,435	259	12,578	29,102

a) Includes the total public and private power generation of Belize, with imports from Mexico

b) Includes the total importation of 415.15 GWh to SIN (404.9 for Costa Rica, 7.13 for Panama and 3.06 for El Salvador).

Source: recompilation by BUN-CA with data from CEPAL, Statistics for the Electric Sub sector, and information from political authorities, 2003.

According to the data from the Economic Commission for Latin America and the Caribbean (ECLAC), close to 35% of the population in Central America lacks access to electricity, and continues using mostly wood lumber and other traditional fuels for heat and cooking purposes²⁸. The potential market for the supply of energy, be it through the extension of the electricity network or with autonomous systems, is ample, given that more than nine million Central Americans, representing an amount close to 2 million homes, do not have access to this service, according to Table 20.

Most of the homes that don't have access to electricity are located in rural areas where investment in electricity infrastructure is high, given the quantity of inhabitants and the dispersion of homes. The investment if rural electrification with renewable energy sources are important for rural development, however, the governments are faced with a dilemma between investing in basic infrastructure for development, such as access to drinking water, road construction, or investing in electricity coverage, mainly with conventional extension conventional of the network. This dilemma is reason for permanent discussion in terms of budget availability of the governments.

²⁷Oscar Coto. Estudio del Mercado del Sector Eléctrico en América Central. FENERCA, Marzo, 2003

²⁸Conference: La energía como catalizador del desarrollo económico-social en América Latina. Conferencia Regional: Alianza Global de Energía Comunal Latino América y El Caribe (GVEP-LAC), Santa Cruz, Bolivia, 23-25 de julio 2003..

Central American Carbon Finance Guide

Table 20. Estimates of the number of homes without electricity in Central America.

Country	Population	Population without access to electricity	Population without access to electricity	Number of homes without electricity
Belize	235,587	20%	47,117	9,423
Costa Rica	4,023,000	2%	80,460	16,092
El Salvador	6,276,000	20%	1,255,200	251,040
Guatemala	11,237,196	15%	1,685,579	337,116
Honduras	6,485,000	40%	2,594,000	518,800
Nicaragua	5,074,000	53%	2,689,220	537,844
Panama	2,856,000	15%	428,400	85,680
Total	36,186,783		8,779,977	1,755,995

Sources: BUN-CA statistics, based on data from 2002, assuming an average number of 5 inhabitants per home.

According to data recompiled by BUN-CA, there is in Central America a high potential for carrying out energy projects with renewable energy sources, estimated at 19,000 MW, as demonstrated in Table 21.

Table 21. Technical potential estimated for renewable energy sources (in MW).

Country	Hydro	Geothermal	Wind	Co-generation with bagasse	Total
Belize	27	0	20	20	67
Guatemala	5,000	1,000	200	250	6,450
Honduras	1,667	35	60	110	1,822
El Salvador	575	100	30	33	738
Nicaragua	1,760	1,000	200	100	3,060
Costa Rica	3,052	900	60	24	4,036
Panama	2,215	120	300	20	2,655
Total	14,296	3,155	870	557	18,828

Source: Recompilation by BUN-CA, based on data from the energy authorities, 2003

4.1.2 Regional Electricity Markets

As a result of the changes generated by the privatization processes and the new legislation in the countries of the region, numerous foreign investors have started to focus on Central America's energy industry, despite that the market in each country seen individually, is small. However, the region's governments are working for the unification of a regional energy market involving six of the seven Central American countries.

El Salvador, Panama, Costa Rica, Guatemala, Nicaragua and Honduras signed in 1996 a treaty expressing their will to create a unified competitive market in the region. In order to build a Regional Electricity Market (MER), the

Central American countries approved and ratified the Framework Treaty of the Central American Electricity Market²⁹, which entered into force on January 1999, and which provides the necessary regional judicial framework. On the basis of the guidelines stipulated in the Framework Treaty, the governments approved a general design of MER in 2002, which consists of a seventh market in coexistence with the six markets or national power systems, with its own independent rules, and in contact through

²⁹The Framework Treaty of the Central American Electricity Market was signed by 6 countries of the region on 30th December 1996; it does not include Belize.

points in the Regional Transmission Network (RTR).

The Framework Treaty also created the Regional Interconnection Commission (CRIE), as the regulatory body of MER, which will have the responsibility of making sure that the principles in the Framework Treaty and its following regulations are respected by the participants. As the regulating authority, CRIE has the maximum authority of MER and will exercise its activities in close coordination with the regulators in each country, which are its natural counterparts at the country level. The Regional Operating Entity (EOR) is also established, an organism created as part of the regional integration process, as the one responsible for the technical operation at the regional level of the interconnection system and of the functions of the regional market.

On the other hand, the governments are planning to construct a regional network called “The Central American Electricity Interconnection System (SIEPAC)”, which consists of the development of the first regional transmission system and the creation and start-up of the Central American wholesale power market.

In 1985 the Central American Electricity Council (CEAC) initiated as a regional cooperation and integration organism, whose main finality is achieve the best use of the energy resources of the member States.

Associated with the activities of the Central American regional electric system, it is necessary to mention the Central American Integration System (SICA) as an international organism created in 1991 by the Tegucigalpa Protocol to the Organization of Central American States (ODECA), with the mission, amongst other things, of executing and coordinating the mandate from the Central American Presidential Summits and the decisions of the Council of Foreign Relations Ministers.

4.2 Belize



4.2.1 *Description of the Energy Sector*

General Information

Belize maintains its electric structure based on Electricity Law N°13 of 1992 which privatized the state-owned electricity company. This Act was amended by the Electricity (Amendment) Act N°40 of 1999, and the Public Utilities Act No39 of 1999 which established the Public Utilities Commission (PUC) as the regulator of the energy sector.

These acts cover all aspects of electrical service in Belize. The electricity market is liberalized and regulated, although limited vertical integration is currently permitted.

The old state owned electricity monopoly in generation, transmission and distribution has been transformed into a privately owned transmission and distribution agency purchasing generation from Independent Power Producers (IPPs) in a competition-for-generation market environment.

In 2002, the installed (grid-connected) capacity in Belize was approximately 75 MW, including 25 MW hydroelectric, 25 MW diesel generation; and 25 MW purchased from Mexico.

There are presently two sources of independent supply: Belize Electric Company Limited (BECOL) which owns and operates the Mollejon hydro facility, and Commission Federal de Electricidad (CFE) of Mexico.

The demand for energy in Belize grows at an average rate of 8.6% annually. Belize Electricity Limited (BEL) estimates that it will require an additional capacity of 67.5 MW (from BEL 2001 Generation Planning Report) in order to satisfy the estimated demand for the year 2010.

Generation: the total public and private generation in Belize for 2002 was 360,879 MWh. 88,243 MWh corresponded to generation by BECOL's hydroelectric plant and 46,491 MWh from BEL's thermal plants. A total of 18,831 MWh were privately generated using renewable energy sources, such as solar and biomass. Finally, 51% of the generation (180,510 MWh) corresponded to imports from Mexico.

Transmission: The transmission system is operated by BEL. There is an interconnection to the electricity system of Mexico, which is extremely important for Mexican imports of energy.

Distribution: BEL is in charge of the electric distribution, which currently serves more than 60,000 end-users in total of the whole population of the country.

Legal framework focused on renewable energy

The main legislation related to the Belizean energy sector is the following:

Law of 1950: Creation of the Belize Electricity Board (BEB). In 1950 the law of the electricity act was revised to provide for the establishing of the Belize Electricity Board. This government institution was charged with the responsibility to generate electric energy transmit and distribute to the general public.

Law N°13 of 1992: Establishment of Belize Electricity Limited (BEL). In 1992 the Electricity Act of 1950 was amended to provide for the privatization of the electricity sector and BEB became Belize Electricity Limited (BEL) a private company owned by its shareholders with the government retaining 51% of the voting stock. In 1999 the government of Belize further divested itself of its holding in BEL and so Fortis Inc. became BEL's majority shareholder.

Law N°39 of 1999: The Public Utilities Act created the Public Utilities Commission to regulate the public utilities, promote competition and protect the interests of the customers.

Law N°40 of 1999: The Electricity Act of 1992 was amended by this Act which, along with the Public Utilities Act, established a new regulatory framework for the privatised industry.

The electricity market

The electricity market in Belize is liberalized and regulated, with competition in generation. Currently, BEL sells and distributes 100% of the electricity; however, there are several private small entities that generate electricity for their own consumption.

Currently, the weighted average electricity tariff is 19 USc/KWh. In Belize the purchase tariffs are determined by the PUC.

Main actions in rural electrification

With regards to rural electrification, according to data of BEL, currently 85% of the rural population has electricity supply. The majority of the population who lack this supply are rural populations, located mainly in the Toledo district, in the southern part of the country.

The Government of Belize has had a rural electrification program, which has been implemented by BEL through grid expansion.

4.2.2 *National CDM Policy*

Ratification of the UNFCCC
Date signed: June 13, 1992
Ratification Date: October 31, 1994

Kyoto Protocolo
Adhesion date: September 26, 2003

Belize doesn't have proven petroleum, gas or carbon reserves. The petroleum utilized to generate electricity is imported.

Belize plans to satisfy future demand with:

- u A series of hydroelectric plants that are in their initial phase and are awaiting the environmental permits.
- u Improvements to existing diesel plants.

Currently the country has no Climate Change nor Clean Development Mechanism (CDM) Office established, although Belize is host to the Caribbean Community Climate Change Centre (CCCCC).

In January 2000, under the direction of the Ministry of Natural Resources and the Ministry of Public Utilities, Energy and Communications, the First National Communication on Climate Change was elaborated.

The national focal point on climate change is Mr. Carlos Fuller of the National Meteorology Service.

4.2.3 *Examples of Renewable Energy Projects*

To this date, Belize hasn't had any local project under the CDM or Joint Implementation modalities that has been approved. The current projects at the regional level are managed in coordination with the Department of Environment.

4.2.4 *Relevant Organisations*

Public Utilities Commission - PUC. The Public Utilities Commission is an autonomous body, created in 1999 by Law N°39, and is charged with the responsibility to regulate all public utilities in Belize. The PUC issues licenses and sets the retail price for the sale of electricity to the general public.

The objective of the commission is to regulate everything related with the supply of the public utilities in Belize, such as electricity, water, and telecommunications. The PUC is also spearheading an initiative to create a National Energy Policy.

More information with:

- u Dr. Gilbert Canton
Tel: +501 227-1185
E-mail: puc@btl.net

- u Ismael Fabro
Tel: +501 822-2816 / 2542
Fax: +501 822-2862
E-mail: envirodept@btl.net

Belize Electricity Limited – BEL. Belize Electricity Limited (BEL) is a public limited liability company, incorporated in 1992, and is the sole electricity distributor in Belize. BEL has an exclusive license for 15 years (starting in 1993) to provide electricity in Belize. It is majority owned by Fortis Inc. of Canada since 1999. It has offices in all the districts of Belize along with a 115kv national grid that is connected to a 25MW hydro plant and to the Mexican national grid. Presently they hold a 25MW power purchase agreement with Mexico.

More information with:

- u Michael Polonio
Tel: +501 227-0954
E-mail: mpolonio@bel.com.bz

Ministry of Natural Resources

More information with:

4.2.5 *List of Contacts, Consultants and Suppliers*

Table 22. Selected contacts, consultants and suppliers in Belize.

Name	Enterprise	Type of Information	Telephone	E-mail
Dr. Gilbert Canton	Public Utilities Commission	Policy, regulation	+501 227-1185	puc@btl.net
Ismael Fabro	Department of Environment, Ministry of Natural Resources	Policy, Climate Change, CDM	+501 822-2816 / 2542	envirodept@btl.net
Michael Polonio	Belize Electricity Limited	Policy, projects	+501 227-0954	mpolonio@bel.com.bz
Ademek Claus	Tropicales Limited	Supplier of Solar Panels	+501 882-0078	tropicales@btl.net
Ambrose Tillett	Renewable Energy Consultant	Technologies	+501 274-555	bsnmail@btl.net
Dylan Vernon	UNDP	Projects, CDM	+501 822-2688	dylan.vernon@undp.org
Shaun Finnetty	UNDP	Projects, CDM	+501 822-2688	shaun.finnetty@undp.org
José García	TUNICH NAH Consultants	Projects, CDM	+501 225-2036	tnce2036@yahoo.com
Kevin Denny	Kelosha Corporation Belize Ltd	Projects, CDM	+501 422-3666	mamanoots@btl.net
Luis Aké	Renewable Energy Consultant	Technologies, suppliers	+501 225-2084	lrake@btl.net / Belice@bun-ca.org
Robert Nicolait	Robert Nicolait & Assocs.	Supplier of PV Solar Panels	+501 523 3551	

NOTE: This list is introductory and is subject to updates. If any interested party wishes to be added, please send a note to GSN: info@greenstream.net.

4.3 Costa Rica



4.3.1 *Description of the Energy Sector*

General Information

Costa Rica presents an electricity market characterized by the presence of a state enterprise that dominates the market (ICE) which is vertically integrated and generates, transmits and distributes electricity. However, there are 32 private generators which sell the energy produced to ICE, coexist. In the distribution phase, there are 8 enterprises, 2 municipal, 4 cooperatives of rural electrification and one anonymous society whose equity, in its majority, belongs to ICE. Likewise, according to current legislation, the generation on behalf of private investors cannot be more than 15% of the total installed capacity of the country. There is also a regulating entity of the electric sector, the Public Utilities Regulating Authority (ARESEP) that has participation in determining the tariffs of public utilities, such as electricity, water, telecommunications, and fuel, among others.

Installed capacity: For the year 2002, Costa Rica's installed capacity was approximately 1,796 MW, which includes 1,023 MW from hydroelectric plants, 115 MW from geothermal, 20 MW from the

wind park in Tejona and 305 MW from thermal plants, all of the above property of ICE. Additionally, there was also private participation, other electric enterprises and rural electrification cooperatives with 247 MW of hydropower; 30 MW of geothermal and biomass plants, and 42 MW of wind parks. There was no private participation in thermal plants.

The demand has grown an average of 5.7% per year during the last 20 years. According to the National Electricity Generation Expansion Plan, for the period of 2000-2010, around 1000 MW of generation capacity need to be installed, out of which it is considered that between 80 and 90% should proceed from renewable sources and the 10-20% remaining should consist of the installation of complementary thermal plants.

Generation: The generation in Costa Rica in the hands of 7 companies³⁰ for the year 2002, was composed of a total of 7,484.5 GWh. A total of 5,970.4 GWh corresponded to generation with hydropower, 1,121.0 GWh were generated with geothermal plants and biomass, 258.9 GWh of wind generation and 134.3 GWh from thermal plants.

Transmission: The transmission system is operated by ICE. Currently there are 1,672 km of connection lines (706 km at 138 kV and 966 km at 230 kV), through which a total of 1,128,821 clients are served.

Costa Rica has important regional interconnection projects such as the participation in the SIEPAC Project (interconnection at 230 Kv from Panama to Guatemala). There is also the Atlantic Interconnection Project with Panama

³⁰These are ICE, la Compañía Nacional de Fuerza y Luz-CNFL, la Junta Administrativa del Servicio Eléctrico de Cartago-JASEC, la Empresa de Servicios Públicos de Heredia-ESPH, COOPELESCA, el Proyecto BOT Miravalles and private companies.

through the *Anillo de la Amistad* (in Costa Rica it would be a tri-phase transmission line of a circuit operating at 230 kV with a longitude of 50 Kms and in Panama it would be two transmission lines of 20 kms and 120 kms each one).

A project for the improvement of the quality of electricity through Optic Fiber is in ICE's improvement plans in order to give continuity to the service (energy not serviced), as is the quality of the wave (depressions in voltage) and eliminating failures and other abnormal

conditions in a reliable and speedy manner

Distribution: The distribution of energy in Costa Rica is in the hands of 8 companies. Out of these, 4 companies have the distribution in the Greater Metropolitan Area where the majority of clients are found, and additionally 4 rural electrification cooperatives that distribute energy in this sector of the population. Currently, according to data from the Energy Sector Direction, 98% of the Costa Rican population has access to electricity.

Table 23. Distribution of electricity in Costa Rica.

Company	Nº Clients (in millions)	% Clients	Sales (GWh)	% Sales
ICE	475	42.1	2,661.7	38.6
CNFL	416	36.9	2,951.4	42.8
JASEC	62	5.5	406.8	5.9
ESPH	51	4.5	358.5	5.2
Coopesesca	50	4.4	220.7	3.2
Coopéguanacaste	41	3.6	193.1	2.8
Coopesantos	28	2.5	82.8	1.2
Coopéalvaro	6	0.5	20.7	0.3
Total	1.128	100.0	6,895.7	100.0

Source: ICE, 2002.

Legal framework focused on renewable energy

The main Costa Rican legislation related with renewable energy, is:

- u Law N°449 of April 8, 1949, law creating the Costa Rican Electricity Institute (ICE).
- u Law N°7200 of October 18, 1990: The participation in the private electric system was started with the promulgation of law 7200 in 1990. This Law authorized the Autonomous or Parallel Electricity Generation. Declared of public interest the purchase of electricity on behalf of ICE to cooperatives and to private companies in which at least 35% of equity belong to Costa Ricans that establish limited capacity electricity centrals. Such law authorized the installation of

up to 15% of the total capacity in the SNI. With support from this Law, there is a total of 189.85 MW generated for SIN, representing a total of 10.2% of the total installed in Costa Rica and grouped in a total of 31 plants.

- u This Law was modified by Law N°7508 of May 31, 1995. It modifies the percentage of Costa Rican capital, it modifies the concession time frame, a second chapter is added on competition regime for projects with a maximum capacity of 50 MW and up to 15% additional of the installed capacity; and it includes a section on transitory dispositions referring to the subscription of agreements of electricity interconnection with other Central American national electricity service companies. This law authorizes the installation of 15% additionally to that in Law 7200.

Under the guidance of this new Law, 27.5 MW is generated from the Geothermal Plant Miravalles III, which represents 1.5% of the country's installed capacity. There are also two hydroelectric projects under execution, contracted under this legal framework.

- w Law N°8345: Participation of the Rural Electrification Cooperatives and Municipal Public Utilities Enterprises in the National Development: With this law, MINAE is authorized to give water concessions for production of

hydropower. The law permits a more active participation of these companies in the generation phase.

The electricity market

In Costa Rica, the electricity market is dominated by ICE, as long as it has full water concession rights for the generation of hydropower, authorized by law. The electricity prices for generation as well as for the sale to consumers are established by ARESEP.

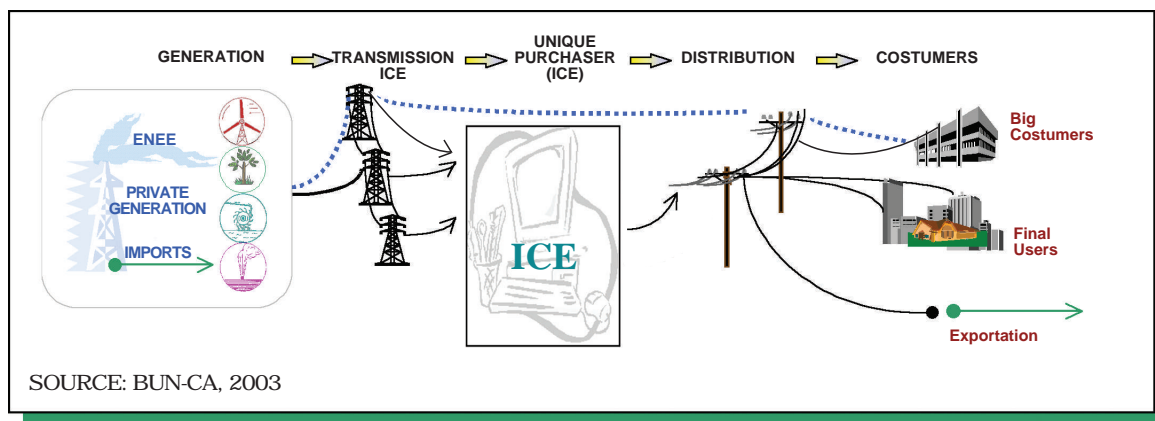


Figure 11. Electricity market scheme in Costa Rica.

Main actions in rural electrification

The electricity distributing companies that function in Costa Rica have made important efforts in order to provide electricity throughout the country, thus permitting to increase the national coverage from 47.3% in 1970 to 94.6%³¹ National Electricity Planning Center (CENPE), Costa Rican Electric Institute. in 2000 (920,000 homes with energy). However, the rest 5.4% of Costa Ricans that don't have access to electricity (51,123 families) are inhabitants of rural areas. Today, those families satisfy their basic lighting needs mainly using kerosene, dry batteries and paraffin candles, besides wood and liquid gas for cooking purposes. Also, diesel, gasoline,

and LPG are used for satisfying domestic needs as well as productive activities.

Currently, Costa Rica, through the National Energy conservation Commission, has presented a project to the Global Environment Facility (GEF) through UNDP, for the execution of a national project called: "*National Off-Grid Electrification Programme based on Renewable Energy Sources*". The general objective of the project is to reduce greenhouse gas emissions (GHG) by promoting the use of decentralized systems of renewable energy in remote areas of the national interconnection system (SNI) of Costa Rica. The project will help to remove existing barriers that limit the use of renewable energy sources in remote rural areas that are inaccessible

³¹National Electricity Planning Center (CENPE), Costa Rican Electric Institute.

through the conventional extension of the grid.

As a result of the whole process, it is expected that 329 communities will receive electricity through the mini-hydraulic or photovoltaic systems, reducing emissions of CO₂ by an estimated 210 thousand tons during the execution of the project.

4.3.2 *National CDM Policy*

Ratification of the UNFCCC
Date signed: June 13, 1992
Ratification Date: June 13, 1994

Kyoto Protocol
Date signed: April 27, 1998
Ratification date: August 9, 2002

Costa Rica has recognized, on the basis of equality and according to its own common responsibilities but differentiated the need to voluntarily contribute to the mitigation of climate change.

Costa Rica has a National Climate Change Program in which investigations regarding inventories, vulnerability studies, ozone layer and national communications are carried out, funded primarily through external entities.

In November 2000, the Ministry of Environment and Energy (MINAE) presented the First National Climate Change Communication which presents the state of the country with respect to emissions, possible impacts of climate change, and possible mitigation measures. According to the results of the First National Communication, the greenhouse gas emissions for 1996 had a net value equivalent to 4.912 million tons. From this total, the energy sector contributed with 4.287 million (including 2.756 million for transportation and 1.531 million in other types of energy); other sectors that contributed were industrial processes 0.431 million, agriculture 0.152

million, and waste 0.041 million. Los cambios en el uso del suelo tuvieron una contribución neta CO₂ de 0.865 millones de toneladas.

Between 1990 and 1996, the emissions per capita reduced due to stabilization in the deforestation rate, as well as absorption in secondary forests and tree plantations, which compensated the growth in emissions from the rest of the sectors.

To this date, Costa Rica has no specific legislation with respect to carbon transactions. There is a forestry law, which incorporates the concept of Payment for Environmental Services (P_{SA}) to private owners of forests and tree plantations, in compensation to the conservation and forest management or reforestation, which is financed through a tax on hydrocarbon consumption.

In 1994 the Regulation for the control of gas and particle emissions produced by motor vehicles, in order to regulate and control the contaminating and greenhouse gases, was approved; likewise, it sets limits to motor vehicle transport, in the emission of nitrous oxides, non-methane hydrocarbons, carbon monoxide, and smog, for which a technical vehicle inspection is obligatory.

The Official Plan for the Electricity Generation Extension in Costa Rica (2001-2016) forecasts a 5.4% increase in low demand and a 5.7% in high demand. This Plan summarizes the development strategies of electricity generation to satisfy the future demand considering several available technology options. It includes 10 potential hydroelectric projects that could contribute approximately 875 MW. For Geothermal energy, additionally to the 27.5 MW from the Miravalles project, it includes two additional projects of 75 MW. Also, it includes the Tejona project (funded by GEF), a wind energy project of 20 MW, which is already functioning. The alternatives in regards to thermal energy

include gas turbines with diesel fuel, bunker motors to medium speed and vapor turbines in combined cycle.

The Costa Rican Joint Implementation Office (OCIC), established in 1995, today the Costa Rican Association of Joint implementation (ASOCIC), is the national authority that enables the attraction of investments, provides general guidelines, evaluates projects, oversees the monitoring of projects, reports to the UNFCCC Secretariat and represents the Costa Rican Government in the negotiations at the Convention and other multilateral and bilateral organisms.

Costa Rica, in the joint implementation pilot phase, has received cooperation from several countries such as Norway, Switzerland, Finland, Holland and the United States. Currently, Costa Rica has 9 AIC projects approved by the UNFCCC Secretariat, 4 renewable energy projects (1 hydroelectric and 3 wind), 4 forestry and one of residual water treatment in a coffee beneficiary. All the energy projects are in operation and produce approximately 6.4% of the energy consumed by the country; two forestry projects have already obtained financing, meaning that through AIC an investment of US\$ 140 million in the country was achieved.

The Focal Point for CDM in Costa Rica is

- u Mr. Pablo Manso, Manager of OCIC. Contact information:

e-mail: crocic@racsa.co.cr,
ocicgm@racsa.co.cr;
tel: (506) 222-4290 / 222-7426, or

- u Mr. Mario Alvarado, President of ASOCIC,
Contact Information:
e-mail: alyvisa@racsa.co.cr;
tel: (506) 258-4141.

4.3.3 *Examples of Renewable Energy Projects*

Costa Rica, in the joint implementation pilot phase, received cooperation from several countries, such as Norway, Switzerland, Finland, Holland and the United States.

Currently, Costa Rica has 9 AIC projects approved by the UNFCCC Secretariat, 4 renewable energy projects (1 hydroelectric and 3 wind), 4 forestry and one of residual water treatment in a coffee beneficiary. All the energy projects are in operation and produce approximately 6.4% of the energy consumed by the country; two forestry projects have already obtained financing, meaning that through AIC an investment of US\$ 140 million in the country was achieved. The following table shows a summary of the projects being executed under joint implementation in the energy sector in Costa Rica.

Table 24. Joint implementation projects in the energy sector, Costa Rica.

Project	Type	Installed Capacity (MW)	Generation (GWh/year)	Total cost US\$ millions	Emissions Reductions (tm C)
<i>Doña Julia</i>	<i>Hydroelectric</i>	16	85	27.0	562,020
<i>Plantas eólicas</i>	<i>Wind</i>	20	98	30.4	506,720
<i>Tierras Morenas</i>	<i>Wind</i>	20	90	27.0	562,020
<i>Aeroenergía</i>	<i>Wind</i>	6.4	30	8.9	146,000
<i>Total</i>		62.4	303	93.3	1,776,760

Source: Instituto Meteorológico Nacional, 2000

4.3.4 *Relevant Organisations*

Ministry of Environment and Energy–MINAE. Policies related to the energy sector are under the responsibility of this Ministry, as is the protection of the country's natural resources.

More information:

- u Carlos Manuel Rodríguez, Ministro
Tel: +506 257-1417 / 223-2124
Fax: +506 257-0697
E-mail: cmrodriguez@minae.go.cr
Web: www.minae.go.cr

Energy Sector Direction -DSE. This direction is subscribed to MINAE. The DSE was established with the purpose of uniting efforts for: a) developing, implementing and consolidating the formulation, execution, and control of the permanent energy planning system; b) obtaining the necessary elements for the correct decision making at a qualitative and quantitative level in relation to the specific energy options; c) developing an integral planning model for the energy sector; and d) investigating substitute sources of renewable energy. It was created by a decree subscribed on February 15, 1984, between ICE, the Costa Rican Petroleum Refinery (RECOPE), ARESEP, and MINAE.

More information:

- u Gloria Villa
Tel: +506 257-3662
Fax: +506 257-2434
E-mail: gvilla@dse.go.cr
www.dse.go.cr

Public Utilities Regulating Authority -ARESEP. The Law creating ARESEP, which transformed the previous National Electricity Service (SNE), created by Law N°77 of July 31, 1928, and its reforms, in section a) of article 5°, chapter III of the Law, referring to the functions and attributions of ARESEP, indicates that among the public utilities defined in this article, the Regulating Authority will fix prices and rates; it will also oversee the

fulfillment of the quality, quantity, reliability, continuity, opportunity and optimum performance norms, according to article 25 of this Law. The public utilities referred to before are the generation, transmission, distribution and commercialization of the electricity supply.

More information:

- u Adolfo Lobo, Dirección de Energía
Tel: +506 220-0102
Fax: +506 290-2010
E-mail: den@aresep.go.cr
www.aresep.go.cr

Costa Rican Electricity Institute – ICE. ICE was created by Special Law N°449 of April 8, 1949³² as an autonomous institution in charge of the development of energy producing sources in the country. One of ICE's functions consists of rationally developing the energy producing sources found in Costa Rica, particularly hydraulic resources, and stimulating the use of electricity for industrial development and its own population. Since 1963, ICE assumed the responsibility of establishing and operating the telecommunication services of the country. Currently, the ICE Group is made up by the National Power and Light Company, S.A. (CNFL), Costa Rica Radiographic, S.A. (RACSA) and the ICE-Electricity and ICE-Telecommunications.

More information:

- u Misael Mora
Tel: +506 220-6363
E-mail: mmora@ice.go.cr
www.ice.go.cr

National Power and Light Company, S.A.-CNFL. Founded April 8, 1941 as an anonymous society where ICE

³²This Law which gave origin to ICE has been modified by the following laws: N°2749 of May 24, 1961, N°3003 of July 11, 1962, N°3154 of July 31, 1963 and N°5507 of April 19, 1974.

possesses the majority of stock. It has the mission of contributing to the economic and social development of the country through the supply of a competitive electricity service in the market. The CNFL constituted as energy distributing and commercializing company dominant in the Costa Rica, services close to 2% of the national territory, covering an area of 903 km² of the Greater Metropolitan Area, including the capital city, San José. The CNFL has a generation potential of 55.5 MW of installed capacity, in seven hydroelectric plants which for 1997, generated 10,2% of the commercialized energy.

More information:

- u Henry Chinchilla, Departamento Conservación de Energía
Tel: +506 257-8647
E-mail: hchinchilla@cnfl.go.cr
www.cnfl.go.cr

Public Utilities Enterprise of Heredia-ESPH. In Law N°767 of October 25, 1949, was created under the name of Administrative Board of the Municipal Electrical Service of Heredia, and in Law N°5889 of April 1, 1976, as a response to the changes of the time, the currently named Public Utilities Enterprise of Heredia (ESPH) was created. The ESPH has to, besides the distribution of electricity in the Heredia Province, attends other three basic services, potable water, public lighting, and sewage services, for the population.

More information:

- u Francisco Hidalgo, Energía Eléctrica
Tel/fax: +506 260-0833
E-mail: jherrerav@esph-sa.com
www.esph-sa.com

Administrative Board of the Electricity Service of Cartago-JASEC. It was created by Law N°3300 of July 23, 1964. JASEC is a public utilities company that supplies electricity to five regions in the Cartago Province. Its main function consists in

administering in an exclusive manner the electricity company of the Cartago Region Municipality.

More information:

- u Oscar Meneses, Gerente General
Tel: +506 592-2828
Fax: +506 551-4529
E-mail: omeneses@jasec.co.cr or jaseccr2@racsa.co.cr

Costa Rican Association of Energy Production -ACOPE. ACOPE was created in 1989, and currently represents more than 40 hydroelectric, wind, biomass units, privately owned that generate in the country and translates into a production capacity of more than 135 MW in total. It is important to point out that the private generation has had an important surge in the last few years, despite the fact that the majority of the companies and cooperatives are limited to generating energy to sell to ICE or to the Power and Light National Company (CNFL). The private generation in Costa Rica is backed by Laws N° 7200 and 7508, which authorizes the Autonomous or Parallel Electricity Generation.

More information:

- u Mario Alvarado, Director Ejecutivo
Tel: +506 258-4141
Fax: +506 258-4136
E-mail: acopecr@racsa.co.cr

COOPESANTOS, R.L. Was constituted in January 1965, with the objective of supplying the electricity in the Santos and Carraigres region, which comprises the regions of Dota, Tarrazú, León Cortés, Acosta and partially the Southern and Western parts of the region of El Guarco, Cartago, Desamparados, Aserri and Mora. This Cooperative covers a territory of 1.500 km², with some 1.200 km of distribution lines, servicing 125 communities and more than 100.000 people benefiting directly from it.

More information:

- u Elías Calderón, Gerente
Tel: +506 546-2525

Fax: +506 546-6173

E-mail: cosantos@racsa.co.cr

COOPEGUANACASTE, R.L. Was constituted in January 1965, with the objective of bringing electric service to society. This cooperative covers a territory of 1500-2000 km², with some 2000 km of distribution lines, servicing the Guardia, Santa Cruz, Liberia, Hojanca, Carmona (Jicaral, Lepanto, Paquera) Puntarenas regions, where some 33.200 associates benefit directly.

During the last years, this Cooperative has achieved the installation of 150 photovoltaic panels, thus benefiting some 153 families of scarce resources.

More information:

- u Harry Gutiérrez, Gerente General
Tel: +506 680-2121
Fax: +506 680-0606
E-mail: harry.gutierrez@coopeguanacaste.com or
coopegua@racsa.co.cr
www.coopeguanacaste.com

COOPE ALFARO RUIZ, R.L. Was constituted in November 1972, with the objective of bringing electrical service to society. This cooperative covers a territory with some 250 km of distribution lines, servicing Alfaro Ruiz, Naranjo, Valverde Vega and San Ramón regions, where some 5000 people benefit directly.

More information:

- u Erick Rojas, Gerente General
Tel/fax: +506 463-3273
E-mail: coopalfa@racsa.co.cr

COOPELESCA, R.L. Was constituted in January 1965, with the objective of bringing electricity service to society. This cooperative covers a territory of 4.956 km², with some 2200 km distribution lines, servicing the Sarapiquí, San Carlos, San Ramón, Alajuela, los Chiles regions and some districts of Grecia, where some 32.500 associates benefit directly. Coopelesca has some 47.000 counters in service.

More information:

- u Juan Vicente Muñoz,
Gerente General
Tel: +506 460-0666
Fax: +506 460-5755
E-mail: coopelesca@racsa.co.cr

CONELÉCTRICAS, R.L. The four rural electrification cooperatives in Costa Rica, mentioned before, formed on June 26, 1989, a new cooperative, the National Consortium of Electrification Companies of Costa Rica, R.L., known as Coneléctricas, R.L. One of the main objectives of this union is to develop hydroelectric generation projects. The four cooperatives provide in conjunction electrical service to a population close to 500 thousand in an area of 11500 km², being approximately 22% of the national territory.

More information:

- u Carlos Rodríguez, Gerente General
Tel: +506 460-0044
Fax: +506 460-6363
E-mail: conelect@racsa.co.cr

Costa Rican Office of Joint Implementation -OCIC. OCIC is the National Designated Authority of Costa Rica.

More information:

- u Pablo Manso, Gerente de OCIC
Tel. +506 222-4290
E-mail: crocic@racsa.co.cr

Financial Sector. There is a great variety of financial institutions in Costa Rica, from 3 public banks to more than 10 private banks. Likewise, there is in the country a representation of Development Banks, such as the Central American Integration Bank (CABEI), Inter-American Development Bank (IADB) and the World Bank (WB). There is also presence of financial institutions related to financing renewable energy projects in Central America, such as E+Co Investment Company and the Inter-American Investment Corporation (a branch of IADB).

4.3.5 List of Contacts, Consultants and Suppliers

Table 25. List of renewable energy contacts in Costa Rica.

Contact	Company	Specialization	Telephone (506)	E-mail
Gloria Villa	Dirección Sectorial de Energía	Policies	257-3662	gvilla@dse.go.cr
Giovanni Castillo	Dirección Sectorial de Energía	National Coordinator of the Partnership	257-3662	gcastillo@dse.go.cr
Misael Mora	Instituto Costarricense de Electricidad	Policies and Projects	220-6363	mmora@ice.go.cr
Henry Chinchilla	Compañía Nacional de Fuerza y Luz	Energy Efficiency	257-8647	hchinchilla@cnfl.go.cr
Pablo Manso	Oficina Costarricense de Implementación Conjunta (OCIC)	CDM Policy	222-4290 222-7426	croci@racsa.co.cr ocicgm@racsa.co.cr
Adolfo Lobo	Dirección de Energía; Autoridad Reguladora de Servicios Públicos	Policies, rates	220-0102 (ext. 251)	den@aresep.go.cr www.aresep.go.cr
Alonso Lara	Inalámbrica	Suppliers	280-8860 280-8861	alonso@inalambrica.net
Carlos Meneses	Consultécnica	Consultants	257-6444	consul@racsa.co.cr
Carlos Rodríguez Chaves	Coneléctricas, R.L.	Projects Developers	460-0044	conelect@racsa.co.cr
Douglas Soto	TechnoServe	Consultants	256-1334	dsoto@racsa.co.cr
Oscar Coto	Consultor	Renewable Energy CDM	271-3210	ocoto@amnet.co.cr
Dennis Sánchez Acuña	BCIE	Financial Information	253-9394	dsanchez@bcie.org
Fernando Alvarado	E+CO	Financial Information	296-3532	eycolac@amnet.co.cr
Gustavo Romero	Corporación Interamericana de Inversiones	Financial Information	233-2543	gustavorc@iadb.org
Fernando Quirós	Sistemas de Potencia de C. A.	Suppliers	286-1010	sistpot@racsa.co.cr
Freddy Hernández	Fuentes Alternas de Energía	Consultants	442-9042 443-2315	ersarefr@racsa.co.cr
Gerardo Porras	ALUNASA	Suppliers	635-5522	alunasaesp@racsa.co.cr
Gustavo Jiménez	Jiménez y Asociados	Consultants	385-2365	jimenez@racsa.co.cr
Hans Neurohr	Nissho Iwai (NIDECSA)	Financial, Suppliers	221-9026 222-6917	hneurohr@racsa.co.cr
Jan Borchgrevink	Nordteco, S. A.	Wind equipments	231-3628 290-8605	nordteco@racsa.co.cr
Luis Fernando Chanto	CIRE	Consultants	240-2090	lfchanto@racsa.co.cr
Mario Alvarado	ACOPE	Suppliers, Developers, Financial	258-4141	acopecr@racsa.co.cr
Milton Esquivel	Sol Electro Heredia	Projects Developers	237-1217 386-6559	solelect@racsa.co.cr
Reto Rechsteiner	Swissol, S. A.	Solar Energy Suppliers,	438-1130	proecorr@intercentro.com
José María Blanco	BUN-CA	Project Developers, Policies, Financial	283-8835	jblanco@bun-ca.org www.bun-ca.org
Leonel Umaña	BUN-CA	Project Developers, Policies, Financial	283-8835	lumana@bun-ca.org www.bun-ca.org
Leyda Mercado	PNUD (SURF-Latinoamérica)	Project Developers, Policies, Financial	296-1544	leyda.mercado@undp.org
Kasper Koefoed	PNUD	Project Developers	296-1544	kasper.koefoed@undp.org

NOTE: The previous list is introductory and is subject to updates. If some interested party wishes to integrate, please send a note to GSN: info@greenstream.net.

4.4 El Salvador



4.4.1 Description of the Energy Sector

General Information

El Salvador approved the General Electricity Law in 1996. This law promotes free competition in the generation, transmission, and distribution, as well as the restructuring of the national electricity company, the Executive Hydroelectric Rio Lempa Commission (CEL). This law led to the privatization of the distribution system in 1998, the sale of 276 MW of generation plants in 1999 and the privatization of the transmission system in 2000. The law also established the regulating entity, the General Electricity and Telecommunications Superintendence (SIGET) and a Wholesale Market Operator, the Transactions Unit (UT).

The Salvadorean Government decided to restructure the electricity sector by establishing an attenuated vertical disintegration model (separate accounting by activity and neutrality of the transmission system), free access to third parties to the transmission and distribution grid in such manner as to guarantee free entry on an objective and non discriminatory basis. It created several generation companies, and it separated the coordination from the generation, the maintenance, and expansion of the transmission system. Additionally, it created 4 regional electricity distribution companies. The following figure demonstrates the structural change of the electricity sector in El Salvador

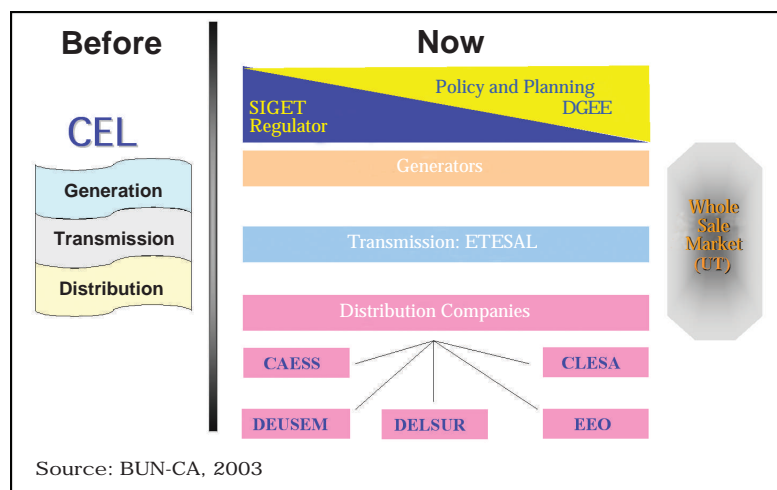


Figure 12. Structural change of the electricity sector in El Salvador.

Generation: In 2002, El Salvador had an installed capacity greater than 1,136 MW. Out of these, 422 MW correspond to generation through hydroelectric plants, 161 MW correspond to geothermal plants, 52 MW to generators that use biomass, and 501 MW are thermal based plants.

The annual growth of the power demand of El Salvador is between 6% and 7%, which indicates the necessity to add to the system an additional capacity of around 50 MW every year, nevertheless, the production capacity have not been increased in this same proportion, reason why to satisfy the internal demand it resorts to importing energy³³.

During the year 2002, CEL, the main hydroelectric generator of El Salvador, which is state owned, continued with the process of rehabilitation and engine power upgrade of Hydroelectric Power station *5 de Noviembre*, initiate the previous year. Due to this, this generating plant expanded by 15 MW its installed capacity, going from 84.4 MW to 99.4 MW. Also at present time, CEL carries out a program of expansion of the installed capacity in the Hydroelectric Power station *Cerrón Grande*, by which means it can increase the power installed from 135.0 MW to 171.0 MW. Within the perspective of growth of the market, CEL has within their projections, the engine power upgrade of their hydroelectric power stations (81 MW in the short term) and the construction of new plants (305 MW, project Lempa River).

On the other hand, Duke Energy Company, which is a great generator, initiated in 2002 a process of retirement of generating units and modernization of the Thermal Power Stations of San Miguel and Soyapango. Altogether Duke Energy reduced its capacity installed by

88.4 MW, going from 383.5 MW in 2001 to 295.1 MW in 2002.

Transmission: The transmission system is operated by and responsibility of the Electrical Transmission Company of El Salvador (ETESAL), a company controlled by CEL. An interconnection of the electrical system with Guatemala and Honduras exists (the denominated *Triangulo del Norte*), which is extremely important to El Salvador, since it imports between 10% and 20% of its energy.

Distribution: This sector has been privatized completely in El Salvador and is divided into 5 companies that have distributed amongst themselves the urban and rural areas. The distributors are CAESS (Company of Electrical Lighting System of San Salvador), CLESA (Company of Electrical Light of Santa Ana), EEO (Eastern Electrical Company) and DEUSEM (Electrical Distributor of Usulután), that are property of North American AES Corporation and which approximately serve 75% of the market; whereas the other distributor DELSUR (Southern Distributor), property of Global PPL, is in charge of the distribution to the rest of the users.

Recently the participation of Excelergy Distributor has arisen, who, according to data recently published indicate that this company has received new requests for subscription from about 5.000 residential users who previously bought the service to CAESS³⁴.

Legal framework focused on renewable energy

The main legislation related to renewable energy in El Salvador includes:

- w *Decree N° 843* from October 10, 1996, General Law of Electricity and its Regulation N°70 Agreement, from July 25, 1997;

³³"Asking for changes in the energy fund", www.elsalvador.com August 15, 2003.

³⁴Magazine La Semana by E&N, N° 101 from August 22, 2003.

- ♦ *Decree N°354* from July 10, 1998, Law of the National Investment Fund of Electricity and Telecommunications.
- ♦ *Agreement SIGET N°E-13-99*, from July 19, 1999, Regulation of Operations of the Transmission System and the Wholesale Market;
- ♦ *Agreement N° 27*, from January 11, 2001 of the Executive Economic Agency, establishment of the Direction of Electrical Energy;
- ♦ *Agreement SIGET N° 59-E-2001*, from August 14, 2001, Norms applicable to the licitation procedures for the granting of concessions of geothermal and hydraulic resources with aims of electrical generation;
- ♦ *Decree N°1216*, from April 10, 2003, Reforms to the General Law of Electricity

The electrical market

In El Salvador, the Wholesale Market is made up of the Market of Contracts (MC)

and the System's Regulating Market (MRS), which is administered and operated by Unidad de Transacciones S.A. of C. V. (UT). The UT operates the System's Regulating Market and uses the Contract Market for their programmed dispatch. The structure of participation during the first months of 2003 was of 40% of the MC and 60% of MRS; in the 2002 it was of 80% of the MC and 20% of MRS.

The generators, distributors, retailers and the great consumers with capacities greater to 5 MW can participate in the UT. The scheme of electrical generation is highly dependant on seasonal rains, since the hydroelectric plants provide around 40% of the total generating capacity of the country.

The norms of operation of the Transmission System and the wholesale market will have to be contained in the Regulation of Operations that the Unit of Transactions emits for these cases. The participants in the Salvadoran electrical market, up until December of 2002, are shown in the following table.

Table 26. Participants in the wholesale market of El Salvador, 2002

Generators	Distributors	Retailers
u CEL	u CAESS	u CONEC-ES
u GESAL (ahora La Geo)	u DELSUR	u Mercados Eléctricos
u Duke Energy El Salvador	u AES-CLESA y Cía.	u CEC
u Nejapa Power Company	u EEO	u Excelergy
u CESSA	u DEUSEM	u Cartotécnica

Source: Bulletin for Electricity Statistics N°4, 2002, SIGET

Although the Regulation of Operation of MM does not allow the entrance of producers with an inferior capacity to 5 MW, the Regulation of Retailers approved in November of the 2000 incorporates other mechanisms that would make their participation possible in it like an "indirect agent of the market", that operates through the distribution grids of its respective zone.

Like an alternative to strengthen the participation of small producers, within the present legal/institutional frame, the possibility of creating a retailer that reunites them and that has the capacity to handle the activity's risk, which could be state or mixed with participation of the private sector, is being analyzed.

At the moment DEE is looking for funds for the constitution of the retailer for projects smaller than 5 MW. One hopes

that the participation of this retailer will facilitate the development of small renewable energy projects through financial instruments that reduce the risk of recovering the initial capital require

by these projects. Figure 13 schematically shows the type of electrical market that is used in El Salvador, as well as some of its participants.

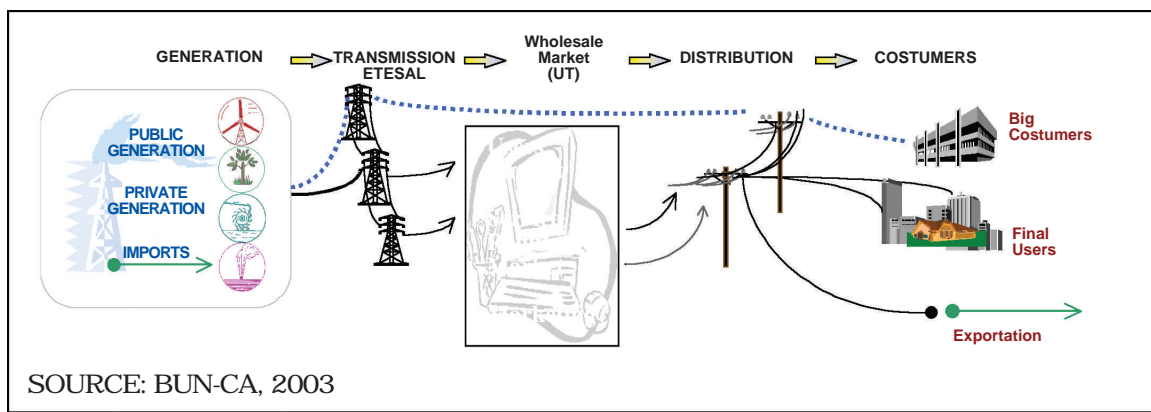


Figure 13. Electrical Market Scheme used in El Salvador.

Main actions in rural electrification

The most recent data indicate that approximately 84% of the total population of El Salvador have access to electrical services. Data from the Ministry of Economy indicate that in the rural areas, approximately 63% of the population have on access to these services.

The fundamental role, with regard to the formulation of policies of rural electrification, is in the hands of DEE. According to data of DEE, investment in rural electrification was more than US\$50 million from 1999 to December 2003. This investment has been specifically in the construction of lines in approximately 3,000 kilometres, thus benefiting about 390,000 Salvadorans in rural areas. It is estimates that to December 2003 there was 84% coverage and the goal is to reach 90% of national electrification (70% of rural electrification) to the year 2006.

El Salvador is at the moment elaborating a national plan for rural electrification. The National Investment Fund in Electricity and Telecommunications (FINET) is a fund directed to the promotion of rural development of the

electrical and telecommunications infrastructure; however, FINET lacks its own administrative structure with self-sufficiency characteristics. The FINET regulations are being reviewed at the moment and there are plans to incorporate it under a more general fund for national development, in the denominated Social Investment Fund for Local Development (FISDL).

The FISDL, on the other hand, has resources to generically finance infrastructure works, including those of electrical infrastructure, and it was constituted like an independent institution assigned to the Ministry of Planning and Coordination of the Economic and Social Development.

4.4.2 National CDM Policy

Ratification of the UNFCCC
Date Signed: June 13, 1992
Ratification Date: June 13, 1995

Kyoto Protocol
Date Signed: June 8, 1998
Ratification Date: November 30, 1998

When signing and ratifying the United Nations Framework Convention on Climate Change (UNFCCC) and the Kyoto Protocol, El Salvador has recognized that human activities affect the emissions of greenhouse gases (GHG) and it has committed with the world-wide efforts against the climate change.

The Ministry of the Environment and Natural Resources (MARN) contracted the Central American University Jose Simeón Canes (UCA) so that it would prepare the national inventory of GHG. The national inventory of El Salvador uses 1994 as base year and includes the emissions of three gases: carbon dioxide (CO₂), methane (CH₄) and nitrous oxide (N₂O). Also it includes carbon monoxide (CO) and nitrogen oxide (NO_x) like indirect contributors to the greenhouse effect. A total level of 1.6 tons of CO₂ emissions by inhabitant was considered, based on the national inventory information and the population of El Salvador in 1994.

It is calculated that El Salvador had a net total of emissions of CO₂ of 8,644.94 Gg in 1994 (Gg means Giga grams - 10⁹ grams in other words, 1000 metric tons.) The power sector produced 4,224.18 Gg (49%), in that year the industrial sector with 490.12 Gg (6%) and the forest and change of land use sector with 3,930.64 Gg (45%) are the sources that have contributed more to emissions of carbon to the atmosphere.

Recently the MARN finalized, with the support of the World Bank's Carbon Fund, the Baseline Study for the Electricity Sector of El Salvador, in which it determined that for small scale projects (equal or smaller to 15 MW of capacity), and new small scale energy efficiency projects (smaller or equal to 15 GWh per year in savings), the emission factor was made on the basis of the methodology "Combined Margin", recommended by the Executive Board of the CDM, obtaining as a result, for the case of El Salvador, a factor of emission of 0,725

tons of CO₂ by MWh.³⁵

Institutionality of the clean development mechanism in El Salvador

In April of 2002, before the Secretariat of the Climate Change Convention the Ministry of Environment and Natural Resources (MARN) was named the Designated National Authority, for the Clean Development Mechanism (CDM) in El Salvador; with the objective of supporting and developing activities oriented towards the implementation of the CDM in the country.

Within the Organizational structure of the MARN, the subject of the CDM is operatively handled within the framework of the Climate Change Program, specifically within the component of greenhouse gas mitigation; the Climate Change Program depends on the Unit of Agreements and Protocols follow-up, which depends as well on the Direction of Environmental Management (see Figure 14). Within its main functions are:

- ◆ To facilitate the participation of the different sectors in the Clean Development Mechanism;
- ◆ To identify projects with potential to participate in the CDM;
- ◆ To offer technical assistance in the process of project formulation;
- ◆ To create national capacity in the CDM project cycle;
- ◆ To manage financial resources to cover the costs of transactions in the formulation and validation phase;
- ◆ To facilitate the sale of certified emission reductions (CERs) of greenhouse gases with different initiatives, governments and private companies of developed countries; and

³⁵MARN, Carbon Fund. Baseline Study for the electricity sector of El Salvador. Pg. 1. San Salvador, 2003

- ◆ To evaluate and approve projects on the basis of the eligibility criteria of the Kyoto Protocol.

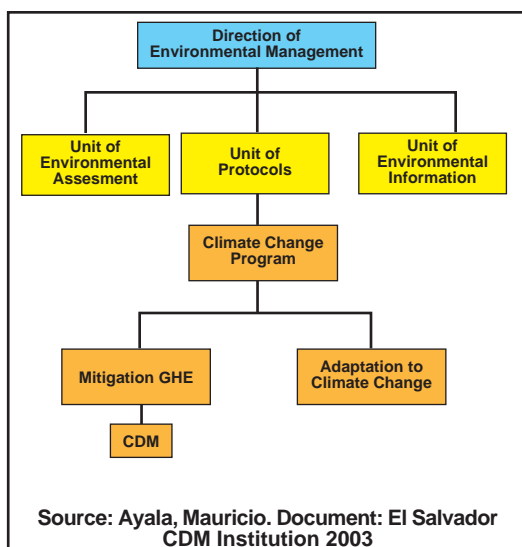


Figure 14. Organizational structure of the CDM in El Salvador.

Procedure of evaluation and endorsement of CDM projects

Preparation of the project idea (PIN): The holder of the project will have to prepare a project idea on the basis of the format required by the organization or initiative to which the project will be presented, such as: World Bank's Carbon Fund, Holland's Program on purchase of emissions reduction certificates, CDM Program of Finland, among others. When the holder of the project requires it, he can ask technical support from the CDM Focal Point, in the elaboration phase of the PIN.

Request of the letter of no objection: Once the PIN is formulated, a letter of no objection of the project must be solicited from MARN, since it is a demanded requirement by the interested initiatives in the purchase of reduction of greenhouse gases emissions.

Revision of the PIN: The CDM Focal Point technically reviews the PIN on the basis of certain criteria, such as:

environmental additionality, baseline methodology used, calculation of the CO₂ tons that will be avoided by the project, contribution to sustainable development. In the case of small scale renewable energy projects (smaller than 15 MW) and of energy efficiency (smaller than 15 GWh) the holder of the project will be able to use the baseline study elaborated by the MARN, where a factor of standard emission has been calculated (ton/CO₂ x MWh).

Approval and awarding of the letter of no objection: Once the PIN is reviewed and approved by the CDM Focal Point, a memorandum is internally sent with the technical opinion, asking for the no objection from the Direction of Environmental Management and the Legal Department; once the no objection is awarded by these two instances, the signature of the letter of no objection of the project is solicited from the Minister. In the case of projects that still do not count on the Environmental Permit, but which already presented the Environmental Impact Assessment to the MARN, a letter of no objection conditional to the approval of the Environmental Permit will be granted.

Elaboration of the Project Document: Once the PIN is approved by the initiative with which the greenhouse gas emission reduction certificates are being negotiated, it will proceed to formulate the project document (PDD) on the basis of the guide published in the Web site of the climate change convention³⁶.

Approval and emission of the letter of Endorsement: Once the Project Document is formulated (PDD), the letter of endorsement of the project will be solicited from the MARN and the same procedure established for

³⁶ <http://cdm.unfccc.int/Referente/Documents>

granting the letter of no objection will be followed.

The CDM Focal Point inside the MARN is:

- ◆ Lic. Mauricio Ayala
E-mail: ayalam@marn.gob.sv
Tel: (503) 223-0444
http://www.marn.gob.sv/cambio_climatico.htm

4.4.3 *Relevant Organisations*

Ministry of Environment and Natural Resources -MARN. The MARN is the national authority designated for Climate Change and the CDM in El Salvador. This Ministry is closely bound to the need of coordinating efforts for the execution of actions for environment protection and the sustainable management of the natural resources of the country, reason why it ties its work with all the sectors of the society.

More information with:

- ◆ Mauricio Ayala
Tel: (503) 223-0444
E-mail: ayalam@marn.gob.sv
www.marn.gob.sv

Direction of Electricity-DEE. It is a special administrative unit of technical character assigned to the Ministry of Economy, created by the Agreement N°27 of January 11, 2001, with the purpose of assisting the Ministry in regards to being the governing body of policies of the electrical sector of El Salvador. Amongst its main objectives are:

- ◆ To perfect the process of transformation and modernization of the electrical sector, by means of monitoring and analysis of the functioning of the Electricity Market;
- ◆ To prompt the regional electric integration, favoring the

strengthening of the regional agencies of the sector, as well as the sanction of not discriminatory, transparent, and objective rules destined to regulate the operation of a regional electric market;

- ◆ To define and to implement a strategy of Rural Electrification (ER);
- ◆ To determine a policy and viable strategy of rural electrification in the medium term, in coordination with the different companies involved (FINET, SETEFE, DISTRIBUIDORAS);
- ◆ To promote the renewable sources and the efficient use of the energy.

More information with:

- ◆ Jorge Rovira, General Director
Tel: + 503 281-1122
E-MAIL: jrovira@minec.gob.sv

General Superintendence of Electricity and Telecommunications SIGET. It was created in 1996 by means of the Law of Creation of SIGET. This is an autonomous institution whose maximum authority is the General Superintendent named by the President of the Republic. This company is responsible for assuring the fulfillment of all the applicable laws and regulations related to the electricity and telecommunications sectors in El Salvador. The responsibilities of the SIGET include: to watch for the quality of the services, to approve the rates established by the Distributors in their own areas of distribution, to make sure the regulatory requirements in the electricity sector are fulfilled, to penalize for the breach of said regulation, to resolve conflicts among users and to coordinate with the environmental authorities.

More information with:

- ◆ Giovanni Hernández
Tel: + 503 288-0066
E-MAIL: gbernandez@siget.gob.sv

Transactions Unit -UT. The General Law of Electricity assigns the function of Market Administrator and Independent Operator of the Transmissions System to the Transactions Unit society (UT), in which all the users and end users connected to the transmissions system have stock participation. The UT handles the power system of El Salvador, watching for the quality and reliability of the supply of electricity and the commercial operation of the markets established by the General Law of Electricity; in other words, the Market of Contracts and the Regulating Market of the System (MRS).

More information with:

- ◆ Roberto González, General Manager
Tel: + 503 247-7300
Fax: + 503 247-7301
E-mail: gerente@ut.com.sv
<http://216.184.107.61/utweb/index.htm>

Hydroelectric Executive Commission of the Rio Lempa-CEL. It was created by means of the Executive Decree of the Creation of CEL on October 3, 1945, published in the Official Newspaper N°139 of October 8, the same year. Since its creation, the CEL has been the only company in El Salvador responsible for all the activities of the electric sector. In 1996, with the approval of the General Law of Electricity, the CEL separated its main activities, to organize independent companies and thus promote the greatest possible competition in the sector. In 1998 the distribution of electricity was privatized, the activities of CEL were separated and the companies GESAL (Salvadorian Geothermal, 1999 – at present The Geo) and ETESAL (Salvadorian Transmitting Company, 1999) were formed. In 1999 Duke Energy bought the installations of thermal generation. According to the Law, CEL has been transformed into an electric power generation company that takes advantage of and takes care of the

water resources of the country and which competes in the market along with other energy generators.

More information with:

- ◆ Orlando Martínez,
Unit of Special Projects
Tel: + 503 211-6175, 211-6178
Fax: + 503 211-6237
E-mail:
Orlando_Martinez@cel.gob.sv
http://www.cel.gob.sv/marco_cel.htm

Transmitting Company of El Salvador, S.A.-ETESAL. It initiated operations the 1° of October of 1999. This business is a result of the transformation of the Transmissions Division of the CEL because of the modernization of the system that initiated in 1996. Its main function is to maintain the national electric transmissions system available.

More information with:

- ◆ José Ernesto Orellana, General Manager
Tel: + 503 211-6600
Fax: + 503 511-6663
E-mail: egalvez@etesal.com.sv

Geothermal Salvadorian, S. A. -The Geo. It initiated as an independent generator on the 1° of November of 1999, known as GESAL, with the geothermal units of Ahuachapán of 95 MW and Berlin of 65 MW, also as result of the transformation process of the Geothermal Division of CEL.

More information with:

- ◆ Rodolfo Blacksmith
Tel: + 503 211-6700
E-mail: rherrera@gesal.com.sv
www.gesal.com.sv

Energy Distribution Company. In El Salvador there are 5 main companies authorized to develop energy distribution activities, these they are: Company of Electric Lighting of San Salvador (CAESS), Company of Electric Light of

Santa Ana (CLESA), Electricity Distributor of the South (DELSUR), Electric Company of the East (EEO), and Electric Power Distributor of Usulután (DEUSEM). The distributors are regulated by the system of El Salvador, and they do not have concession areas, neither do they have obligation to serve more than is established in their contracts. To carry out sales to end users they must be registered as retailers.

National Investment Fund in Electricity and Telecommunications -FINET. Inside the regulatory

framework in force in El Salvador, the decision to expand the electric grid is totally in the opinion of the Transmitter or Distributor. With the objective to facilitate the development of electric supply, particularly to the rural areas, the National Investment Fund in Electricity and Telecommunications (FINET) has been created. By means of this fund the electricity services to the rural and smaller incomes sectors, where the Distributors or Transmitters, based on their criteria of economic feasibility, would not perform expansions to their grid, will be financed.

4.4.4 *Examples of Renewable Energy Projects*

At present the Government of El Salvador, through the Ministry of Environment and Natural Resources (MARN), is negotiating before the Global Environment Fund, through UNDP, a national project called: Electrification based on renewable energy resources. This project has as global objective the reduction of greenhouse gases (GHG) emissions product of the electricity generation in El Salvador. This reduction of emissions will be achieved through the removal of barriers and at the same time creating sustainable markets for technologies of renewable energy in uses where they provide the most profitable solutions, satisfying the increasing needs for electricity.³⁷

³⁷More information about this Project with: Carolina Dreikorn, Environmental Officer UNDP, carolina.dreikorn@undp.org or with Mauricio Ayala: ayalam@marn.gob.sv

4.4.5 List of Contacts, Consultants and Suppliers

Table 27. List of renewable energy contacts in El Salvador.

Name	Company	Specialty	Telephone (503)	E-mail
Mauricio Ayala	Ministerio del Ambiente y Recursos Naturales, Oficina MDL	Policy, CDM National Coordinator Partnership	223-0444	ayalam@marn.gob.sv
Oscar Alcides Castillo	Secretaría Técnica Presidencia de la República	Electricity Sector Policy	271-1888	acastillo@cpmsp.gob.sv
Giovanni Hernández	SIGET	Electricity Sector Policy	288-0066	ghernandez@siget.gob.sv
Jorge Rovira	Dirección de Energía Eléctrica	Electricity Sector Policy	281-1122	jrovira@minec.gob.sv
Orlando Martínez	Comisión Ejecutiva Hidroeléctrica del Río Lempa	Hydroelectric	211-6000	Orlando_Martinez@cel.gob.sv
Rodrigo Guerra y Guerra	Servicios Técnicos de Ingeniería	Consultant	264-4713 279-2077	aguerra@gbm.net
José Mario Vásquez	JV Consultores SA	Consultant	448-0749	jvconsultores@navegante.com.sv
Luis Boigues	SABES	Project Development PCH	275 9864	sabes.@esal.net
Carlos Araujo	Empresa Eléctrica del Norte	Electrical Energy		electricadelnorteca@navegante.com
Eric Roshardt	TEXMA	Renewable Energy	278-4188	texma@es.com.sv
Ana María González	Desarrollo de proyectos en energía y eficiencia energética	Consultant	894-7088	amglez@telemovil.net
Juan Carlos Sol	Servicios Solar	Renewable Energy	298-2706	jcsol@servicios-solar.com.sv
Arturo Solano	Tecnosolar	Supplier	260 2448	tecnosolar@navegante.com.sv
Carlos Soriano Ruiz	Sistemas de Energía Solar	Supplier	227 8025	alberto.secs@sal.net
Tomás Campos	Ormat Inc	Geothermal	223 0969	tcamposv@cyt.net
Rodolfo Herrera	LA GEO	Geothermal	211-6700	rherrera@gesal.com.sv
Mauricio Alfonso Arévalo	Central Hidroeléctrica Sensunapán	Hydroelectric	453 0168	iemsa@sal.net
Ernesto Cano	Generadora Mirazalcos	Hydroelectric	264 0562	gecano@esal.net
César Catani	Dematheu & Cia	Hydroelectric	210-6995	iemsa@sal.net
José Hermes Landaverde	Generadora Papaloate	Hydroelectric	273 6243	hlandaverde@navegante.com.sv
Kenia Moreno Alvarez	Generadora Cucumacayán	Hydroelectric	451 7140	
Axel Söderberg	Dematheu & Cia	Hydroelectric	210-6995	iemsa@sal.net
José María Vides	Generadora Cucumacayán	Hydroelectric	451 7140	vides@navegante.com.sv
Alberto J. Valdivieso	Hacienda Chaparral	Silviculture	229 3751 278-3426	ecochaparral@hotmail.com
César Villalta	UCA	Investigation on Photovoltaic Systems	210-6662	cvillalt@ing.uca.edu.sv
Ismael Sánchez	Advisor of the Energy and Environment Partnership with Central America BUN-CA El Salvador	Project Development, Policies, CDM	210-6662 885-6667	elsalvador@bun-ca.org isanchez@ing.uca.edu.sv
Carolina Dreikorn	UNDP	Project Development	263-3504 263-0066	carolina.dreikorn@undp.org
Marco González	Central American Commission on Environment and Development - CCAD	Project Development, Policies, Funding	248-8800	magonzalez@sgsica.org
Otto García	Energy and Environment Partnership with Central America	Project Development, Policies, Funding	248-8854	ogarcia@sgsica.org
María Eugenia Salaverría	Energy and Environment Partnership with Central America	Project Development, Policies, Funding	248-8855	msalaverria@sgsica.org

NOTE: The previous list is introductory and is subject to updates. If some interested party wishes to integrate, please send a note to GSN: info@greenstream.net.

4.5 Guatemala



4.5.1 Description of the Energy Sector

General Information

Guatemala initiated the reform process of the electric subsector with the promulgation of the General Law of Electricity (LGE) in 1996. This law norms the development of activities of generation, transportation, distribution

and retail of electricity, according to principles and statements that are applicable to all the individual or legal persons, with private, mixed or state participation, independently of its degree of autonomy and constitution regime.

Before the reform, two state electric companies excelled in the electric subsector: the National Institute of Electrification (INDE) and the Electric Enterprise of Guatemala, S.A. (EEGSA).

In 1997, the generation plants owned by the EEGSA were acquired by means of a bidding process by the Generating Group of Guatemala (GGG); the INDE sold the rural distribution of which it was responsible for, and to this date still retains the ownership of its 641 MW of the generation plants. Subsequently, 80% of the stock of the distribution enterprises of INDE and of EEGSA, were acquired by Union FENOSA and by the Consortium Iberdrola Energy INC., T. P. S. de Ultramar - Electricity of Portugal, S.A., respectively. Figure 15 shows the transition of the Guatemalan electric market.

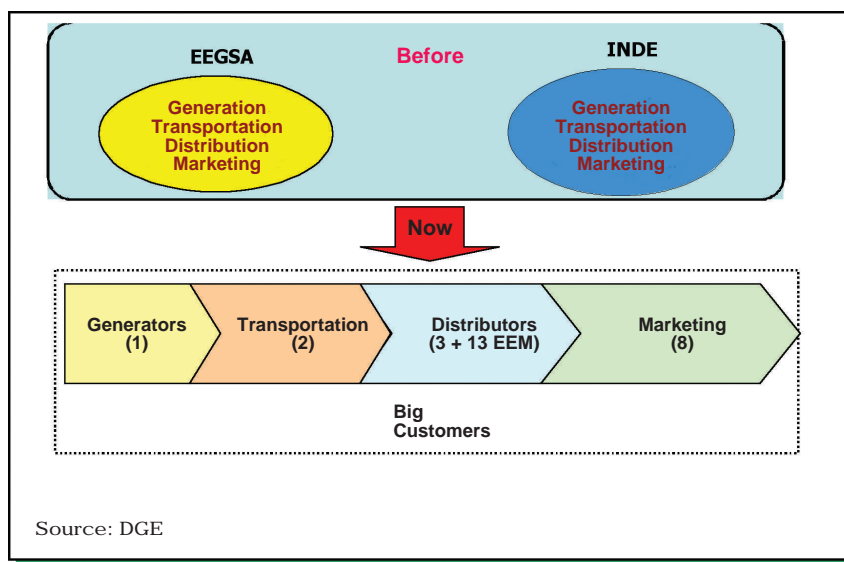


Figure 15. Structural change of the electric sector in Guatemala.

Generation: Guatemala had up until December of 2002 an installed capacity of 1,736 MW. Of this capacity, 560 MW

correspond to generation with hydroelectric plants, 29 MW correspond to geothermal plants, 183 MW to

generators that utilize cane bagasse and 964 MW that utilize derivatives from petroleum and mineral coal.

The potency demand has grown in recent years to an average of 7.7% and the energy to 8.0% and it is estimated that for the next years it will reach a constant average growth of 5.0% to the year 2010.

In the present generation, thermal plants dominate since its period of construction is short, the initial investment is smaller, and therefore the return of initial capital is given in a shorter time. According to data from MEM, the declared capacity in Guatemala increased in the period of 1991-junio2003 by 991 MW, of which only 103 MW correspond to hydroelectric and geothermal. To December 2002, 46.2% of the production stemmed from renewable energy sources and 53.8% corresponded to thermoelectric plants.

Transportation: In the transportation system there is a main system and a secondary system. The main system, shared by all the generators, is at present property of the INDE and operated by the Transportation and Control of Electric Power Enterprise (ETCEE); this system also includes the interconnection Guatemala - El Salvador - Honduras. The secondary system is conformed by the electric infrastructure different to the main system and the distribution grids by exclusion are operated by the Central American Electric Transporters Enterprise, INC. (TRELEC).

Distribution: In 1998 the companies Union Fenosa and Iberdrola acquired the distribution in Guatemala. Iberdrola supplies the electric power service in the central zone of Guatemala (Electric Enterprise of Guatemala, S.A, EEGSA); while the western zone of the country is serviced by the Western Electricity Distributor, S.A. (DEOCSA), and the oriental zone is serviced by the Eastern

Electricity Distributor, S.A. (DEORSA), and both are property of Union FENOSA. Aside from these businesses, there are others that lend distribution services such as the 13 municipal electric enterprises (EEM) and some private distribution enterprises in remote systems, adding up to a total of 16 distribution enterprises in the country.

At present, the remaining 8.26% of the stock that are in the hands of the INDE as part of DEORSA, are being offered to the international market through the Stock Exchange. The funds originating from this sale will be destined to INDE's Administration Trust Fund, which has been executing the electrification projects outlined in the Rural Electrification Plan³⁸.

Retailing: 16 electricity retailing companies exist, one of which is COMEGSA (Electric Retailer of Guatemala, S. A.), created by Electric Enterprise of Guatemala EEGSA. COMEGSA does not have the load of commitments of Energy Buying-Selling Contracts and can buy in the Wholesale Market to prices less than the ones that EEGSA must pay due to its established commitments in the purchase contracts signed before 1998 which were renegotiated in order to adapt them to the General Law of Electricity. Therefore, it has managed to attract many of the large consumers that previously were supplied by EEGSA.

Legal framework focused towards renewable energy

Among the most prominent legislation related to renewable energy in Guatemala, these can be mentioned:

- w *Political Constitution* of the Republic of Guatemala;
- w *Decree N°93-96*, of November 13, 1996 , General Law of Electricity;

³⁸Bolsa de Valores Global, LAFISE. Prospecto descriptivo de la oferta publica en el Mercado secundario de las acciones de DEORSE propiedad de INDE. 2003.

- ◆ *Governmental Agreement N° 256-97*, of March 21, 1997, Regulation to the General Law of Electricity;
- ◆ *Governmental Agreement N°299-98*, of May 25, 1998, Regulation of the Wholesale Market Administrator;
- ◆ *Norms of Operating and Commercial Coordination* of the Wholesale Market Administrator;
- ◆ *Decree N°52-2003*, of October 28, 2003. Law of Incentives for the development of renewable energy projects

The electric market

The electric wholesale market of Guatemala is structured in 2 ways: the potency market and the energy market.

The Potency Market seeks to promote the private investment in Guatemala. This market has a contracting obligation figure for the greater demand consumers of at least a year of maximum net projected power, plus a reserve charge of (3%), plus total losses of the transmissions system (+4.5%). The offering is based on the generator's 1 year record, since these are not available 100% all year round. The hydraulic generation problem is for those that do not have a reservoir, since they cannot guarantee energy in the peak hours (4 hours a day), reason why this type of contract does not have time restrictions, nor minimums nor maximums.

In this market, identification and transparency for the fixed costs (CF) and the variable costs (CV) is sought, and there are market mechanisms, as economic signs, to compensate both types of costs. For it, the Energy and Power products and the quality and reliability services, as well as the toll service, are identified. These products and services are bought and sold among Agents through specific markets. On the other hand, the market should guarantee a surplus of power (for

example, according to information offered by the AMM, for the year 2002, the constant demand was 1.200 MW, while the constant offering was 1.400 MW). In the event that some generators do not comply with their contracts, the missing energy potency can be bought in the occasional market (spot) and the potency as potency bypasses, to a price of US \$8.9 kW/month. According to data of the AMM, the Constant Offering to June of 2003 reached 1.658 MW, while the Constant Demand was approximately 1.198 MW.

What the Energy Market seeks is to guarantee the demand and the exchange of energy among the participants. In this market the costs per "machine" are determined by 4 ways:

- ◆ The Variable Costs of generation for the thermal companies (fuel and non fuel);
- ◆ The Value of Water for Hydro companies: The value of the water is given by the generator according to a methodology established by it and revised quarterly;
- ◆ The contracts' energy prices are negotiated freely among the parts;
- ◆ Imported Energy Offering.

Some of the main features that define the participation in the wholesale market, established by RAMM (article 5), include:

- ◆ The generators should have a maximum potency greater than 10 MW;
- ◆ The distributors should have more than 20,000 users;
- ◆ The transmitters should have a firm connected potency greater than 10 MW;
- ◆ The retailers (including importers and exporting) should buy or sell in blocks greater than 10 MW;

- ◆ The large users should have a demand equal or greater than 100 kW.

The LGE establishes the creation of the operating framework for the electric transactions of the Wholesale Market Administrator (AMM), which entered into operation in 1998. Their functions include carrying out the dispatch or programming of the operation, the

coordination of the National Interconnected System's (SIN) operation within the requirements of quality and security of the service, and the post-dispatch and the administration of the commercial transactions of the Wholesale Market. Figure 16 schematically shows the conformation of the Guatemalan electric market.

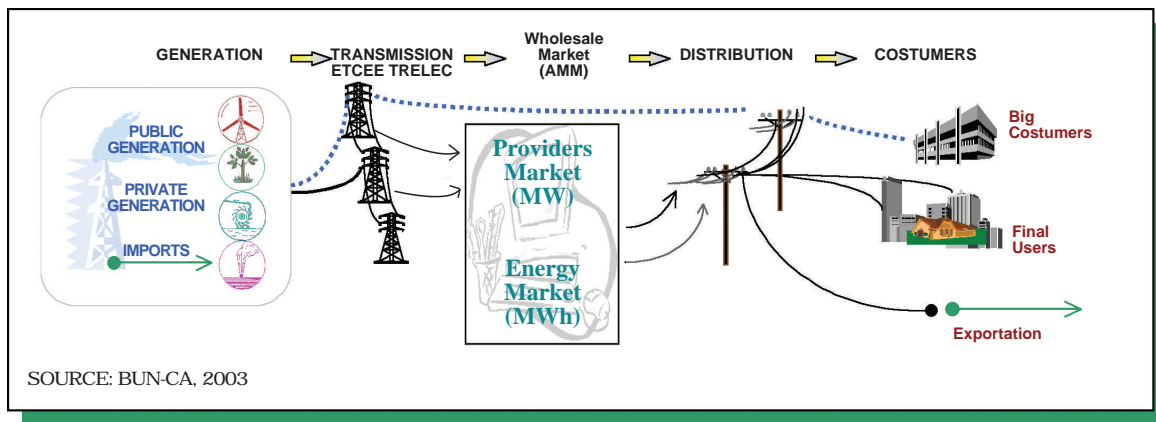


Figure 16. Electricity Market Scheme in Guatemala.

Main actions in rural electrification

Recent figures of the Direction of Energy of the Ministry of Energy and Mines, indicate that nearly 84% of the population in Guatemala have access to electricity (in the year 1995 only a little more than the 50% of the population had access). In the rural areas, it is estimated that 60% of the population has access, but it is not possible to include 20% of this population in the traditional rural electrification plans (extension of grids, but with alternative energy sources). Likewise, of the energy usage, 46% of the population still utilizes firewood as fuel for cooking food.

Among the goals of the National Policy at the rural level, there is an emphasis on the use of native energy resources, on electrification as the motor for sustainable development, on the use of clean technologies, including improved stoves, on the incorporation of the rural

area to the national life through communications and on the improvement of health, education and agriculture services.

Just as it was mentioned previously, towards the end of 1998, INDE sold its distribution company, divided into two areas. With the sale of these businesses, Treasury Notes of the Ministry of Public Finances and the sale of stocks to employees and citizens, INDE created the Rural Electrification Trust, with a fund of US\$333 million, with the commitment to promote rural development. These funds are administered by the Technical Committee of the Trust formed by: a representative of MEM, one of INDE and one of DEOCSA-DEORSA Distributors of Union Fenosa³⁹.

Through this Trust, the Rural Electrification Program is currently being

³⁹Ibid 14

executed in Guatemala. The trust contract is the most important program of rural electrification that has been formulated from the electric coverage as well as the financial point of view, since it considers connecting 280,639 new users benefiting 1,571,000 Guatemalans. The estimated investment is US\$333.6 millions, of which approximately 45% will be utilized for strengthening the transportation grid and the remainder for the construction of secondary infrastructure in the rural area.

4.5.2 *National CDM Policy*

Ratification of the UNFCCC
Date signed: June 13, 1992
Ratification Date: December 15, 1995

Kyoto Protocol
Date signed: July 10, 1998
Ratification date: October 5, 1999

Guatemala does not have specific legislation on carbon transactions. Nevertheless, it has signed and ratified the Kyoto Protocol and the United Nations Framework Convention on Climate Change (UNFCCC). By ratifying the UNFCCC, Guatemala has committed to prepare a national GHG inventory, creating and executing a national and regional program to mitigate climate change, and to promote conservation, scientific investigation and education programs. Guatemala, through the Climate Change Office of the National Commission of Environment (CONAMA), at present the Ministry of Environment, is at present preparing the GHG inventory as the first step of its action plan to undertake climate change.

In 1996, the Guatemalan Joint Implementation Office (OGIC) was created to promote conservation and to execute the Guatemalan program of Joint Implementation. This office has a Board of Directors comprising the Ministry of Agriculture (MAGA), the Ministry of

Energy and Mines (MEM), and the National Committee on Climate Change, which represent the governmental sector. The Board also includes representatives from Universities (academic sector), ASOREMA as the representative of the NGO sector, and the Guatemalan Foundation for Development (FUNDESA), representing the private sector.

The role of OGIC is to promote the investment projects in joint implementation and through the clean development mechanism in Guatemala, by means of establishing the required financial, technical, political, and legal conditions. Also, it is responsible for the evaluation and approval of projects proposed by the private sectors and NGOs, and for extending the governmental permission for the execution of such projects. The main objective of the OGIC is to tie the environment with sustainable development and therefore, this office is responsible for sharing the information related to the joint implementation and to the clean development mechanism.

In 1989, before activities of joint implementation of the UNFCCC were executed, Guatemala initiated a pioneering program to compensate the emissions of CO₂ generated by the thermoelectric projects. With technical aid from the World Resources Institute and other participants as the Peace Corps (entity linked to the United States' government), the General Forest Department of Guatemala and local cooperatives, this US\$10 million program approved various pilot projects.

The CDM Focal Point is:

- ♦ Ing. Jorge Luis Galindo,
Director of Energy,
Ministry of Energy and Mines
E-mail: diredge@mem.gob.gt
Tel: (502) 2477-0746 / 2477-0747

The CC Focal Point in Guatemala is:

- ♦ Lic. Carlos Mansilla,

Direction of Climatic Change, MARN
E-mail: eyamansi@concyt.gob.gt
Tel: (502) 2423 0500

4.5.3 *Examples of Renewable Energy Projects*

With the purpose of complying with the legal basis to promote renewable energies, the MEM, in carrying out the strategies of its work Plan, is executing different projects in this sector:

- ◆ In January of 2000 the “Renewable Energies Information and Promotion Center”, which officially was created in October of 2002, initiated operations. This Center has established a sustainable service for collecting and supplying dependable, consistent, and systematic information on the potential of renewable energies, which contributes to the investors so they can have access to basic information in order to carry out their feasibility studies.
- ◆ The feasibility to create a “Renewable Energy Project Financing Fund”, whose objective would be the creation of operating mechanisms and procedures of more acceptable functioning required for encouraging the investment in renewable energy projects, partially financing the electric generation infrastructure without considering preferential treatment, nor price subsidies to electricity being produced with renewable resources, is being studied.
- ◆ Operation of the “Regulation of Distributed Generation”, which is currently under preparation and expected to enter into force in the last quarter of the 2003. This regulation has as its objective to norm the use of energy resources located in dispersed form in all the Guatemalan territory, and that have an equal or smaller capacity than 5,000 kilowatts of power, and can be interconnected to

the average or low tension grid for its subsequent use in the distribution systems or its eventual placement in the wholesale market. The energy sources can be solar, wind, hydraulic, thermal or another renewable source feasible for the production of electric power, in every moment the environment and the legislation in force or required for the acceptable practices in this matter will be respected.

- ◆ Consolidation of a “Bioenergy Program” with 3 components: i) Bio-Diesel, utilizing the seeds of higüerillo (*recinus comunis*); ii) Bi-ethanol: alcohol with waste fruits; and iii) energy Forests: to make coal in briquettes to feed kettles that utilize bunker.

4.5.4 *Relevant Organisations*

Ministry of Energy and Mines-MEM. It is the State office responsible for formulating and coordinating the policies, state plans, and indicative programs relative to the electric sector and for the application of the General Law of Electricity and its regulation⁴⁰. Thus, it is also responsible for giving authorizations for the installation of generation units, transportation and final distribution services of electricity, and the constitution of indefinite rights of way for public and private domain goods; for elaborating the socioeconomic evaluation reports in order to give resources for sponsoring totally or partly the investment in rural electrification projects, of social benefit or of public utility.

More information in: www.mem.gob.gt

General Direction of Energy-DGE: Is the dependence of the Ministry of Energy and Mines, that has as its main purpose, to formulate and to coordinate the policies, State plans, indicative Programs

⁴⁰General Law of Electricity, Art. 3.

promoting the employment of renewable energies and the efficient use of the energy resources, in order to improve the quality of life of the Guatemalan population. The Department of Electricity is responsible for providing the terms of reference and giving the authorizations that allow the project developers to use public domain goods.

More information:

- ◆ Ing. Jorge Luis Galindo,
Director of Energy,
Ministry of Energy and Mines
E-MAIL: diredge@mem.gob.gt
tel: (502) 2477-0746 / 2477-0747
www.mem.gob.gt/energia/index.htm

Ministry of Environment and Natural Resources -MARN. It is the office of State to which corresponds the formulation and execution of policies relating to enforcement and enforcing the regime concerning to the conservation, protection, sustainability and improvement of the environment and natural resources in the country, and to the human rights to an ecologically stable and healthy environment, thus preventing the contamination of the environment, diminishing the environmental deterioration and the loss of patrimony. With respect to the development of renewable energy projects, the MARN has among its functions: *“to Control the environmental quality, to approve the environmental impact evaluations–EIA-, to practice them in case of environmental risk and to oversee its enforcement, and to impose sanctions for their breach”*⁴¹

More information with:

- ◆ Carlos Mansilla,
Climate Change Direction
Tel: (502) 2423 0500
E-MAIL: eyamansi@concyt.gob.gt
www.marn.gob.gt

National Commission of Electric Power - CNEE. It is a technical office

of the Ministry of Energy and Mines, with functional independence for the exercise of its attributions and is in charge, among others, of the following functions⁴²:

- ◆ To comply with and to make abide by the General Law of Electricity and its Regulation, in the matter of its competence, and to impose the sanctions to the offenders.
- ◆ To oversee the fulfillment of the obligations of the grantee and concessionary, to protect the rights of the users and to prevent criminal conducts against free competition, as well as abusive or discriminatory practices.
- ◆ To define the rates of transmission and distribution, subject to regulation according to the General Law of Electricity, as well as the methodology for their calculation.

More information with:

- ◆ Luis Enrique Garcia Pinot, President
Tel: + 502 2366-4214
E-MAIL: cnee@gold.guate.net
www.cnee.gob.gt

Wholesale Market Administrator - AMM. The wholesale market was established in 1998, as a body responsible for the operations of buying and selling blocks of energy and potency, that are carried out in the short and long-term among market agents. Their operation is regulated by the General Law of Electricity, its Regulation and the Regulation of the Wholesale Market Administrator (Governmental Agreement N°299-98). A not-for-profit private entity is in charge of the administration of the wholesale market, called Wholesale Market Administrator –AMM. Among the main functions of the AMM are: a) to coordinate the operation of the generating units, the international interconnections and the lines of transportation at minimum cost for the

⁴¹Law for the Creation of the Ministry of Environment, Art. 3.”

⁴²General Law of Electricity, Art. 4

operations as a whole of the wholesale market, b) to establish short term market prices for the transfers of potency and energy among generators, retailers, distributors, importers and exporters, when they don't correspond to long-term contracts freely negotiated, c) to guarantee the security and the provision of electric power.

More information with:

- ◆ Luis Herrera, General Manager
Tel: + 502 2332-7901
E-mail: Luis.herrera@amm.org.gt
www.amm.org.gt

National Institute of Electrification INDE. It was established in 1959, according to Decree N°1287, as a semiautonomous company and decentralized from the State. The INDE had the monopoly in regards to providing the electric service and functioned like the rector of the sector.

At present it participates in the electric market, as a transportation agent through the Transportation and Control Enterprise of Electric Energy -ETCEE- giving service to all the agents of the National Interconnected System -SNI-, and to the exporters and importers. The Electric Energy Generation Enterprise -EGEE- also belongs to the Group INDE. In 1994 they initiated the reforms to the sector with the elimination of the monopoly and rector role of INDE, and in 1997 due to the change in the normative framework of the sector, the INDE decided to restructure the company, carrying out processes of segregation of operations.

More information with:

- ◆ Jorge Jorge Juárez Pedroza,
General Manager
Tel: + 502 2334-5706
Fax: + 502 2334-5811
E-MAIL:
gerencia.general@inde.gob.gt
www.inde.gob.gt

Private Generators: Since 1992, when the government permitted private

participation in the electricity generation, several generating plants have been built by means of contracts of exclusive supply to EEGSA and to INDE. Up to the year 2000, the private generation of electric power represented around 52.5% of the total energy produced in the country ⁴³. A notable fact was the contract subscribed in 1993 between ENRON and EEGSA for a plant of 110 MW in Port Quetzal. After liberalizing the electric market in 1996, the private sector's participation in the generation has been expanded.

Municipal Electric Enterprises - EEMS. At present there are 13 Municipal Electric Enterprises in Guatemala, which mainly distribute the electric power service in their municipalities. Of the 13 Municipal Electric Enterprises, only 4 of them have capacity of electric generation: The Municipal Electric Enterprise of Quetzaltenango with the hydroelectric plant Zunil with a nominal generation capacity of 1 MW; The Municipal Electric Enterprise of San Marcos with the small hydroelectric power station La Castalia with a nominal capacity of 268 kW, the Municipal Electric Enterprise of Retalhuleu with the Ocosito Plant with a nominal capacity of 1.473 MW, of which 693 kW is hydroelectric energy and 780 kW is thermal energy, and the Municipal Electric Enterprise of San Eulalia in the Department of Huehuetenango with a small hydroelectric power station with nominal capacity of 80 kW. Nevertheless, the data of nominal capacity that are here provided are from 1994, thus it's very probable that the generation capacity of the plants mentioned previously have reduced considerably.

Electric Enterprise of Guatemala S.A.-EEGSA. This enterprise offers the distribution service in the departments of Guatemala, Escuintla and Sacatepéquez; reason why it is one of the Large Users of

⁴³Statistics Report 2000, Wholesale Market of Guatemala

the Electric Market. At present it is property of the consortium Iberdrola –TPS- Electricity of Portugal. In 1884 the production and distribution of electric power was in the hands of EEGSA, of the State and of the municipalities. Since 1959, EEGSA along with INDE formed the SEN and were the base of the electric sector development. The EEGSA offered the electric service in the departments of Guatemala, Escuintla and Sacatepéquez, as it currently does.

Distribution Enterprises -DEOCSA and DEORSA. In 1998, the Spanish company Union FENOSA bought from INDE 80% of the stock of the Eastern Region Electric Power Distribution Enterprise (DEORSA) and of the

Western Region Electric Power Distribution Enterprise (DEOCSA). These two businesses have national level coverage, except in the area of EEGSA, of the Municipal Electric Enterprises and where isolated energy systems are utilized: diesel generators and/or renewable energy.

Administration Trust INDE - western and eastern rural works: This trust consists basically in the construction of lines and distribution grids, substations and lines of transmission, in order to provide electric service to about 280,000 new users distributed in 2,634 communities inside the service area of the Distribution Enterprise of INDE. With this, it is expected that 1,610,000 inhabitants will be benefited

4.5.5 List of Contacts, Consultants and Suppliers

Table 28: List of contacts in renewable energy in Guatemala

Name	Company	Specialty	Telephone (502 2)	E-mail
Jorge Luis Galindo	Dirección General de Energía	Policies	477-0743	diredge@mem.gob.gt
Luis Enrique García Pinot	Comisión Nacional de Energía Eléctrica	Policies, tariffs	366-4214	cnee@gold.guate.net
Luis Herrera	Administrador del Mercado Mayorista	Policies, markets	2332-7901-7	Luis.herrera@amm.org.gt
Carlos Mansilla	Dirección de Cambio Climático, MARN	Policies CC	423 0500	eyamansi@concyt.gob.gt
Jorge Juárez	INDE	Policies	334-5711-16	gerencia.general@inde.gob.gt
Eduardo Álvarez	Oficina Guatemalteca de Implementación Conjunta	Policies, CDM	364-0336 al 40	ealvarez@uvg.edu.gt
Iván Azurdia	Fundación Solar	Projects	360-1172	fun solar@intelnet.net.gt
Hugo Arriaza	NRECA	Projects	368-1782	harriaza@intelnet.net.gt
Roberto Arimany	DINTERSA	Supplier	332-3807 206-5324	dintersa@microq.com.gt
Lou Ingram	LUEX	Supplier	220-3133 502-2047	luex@infovia.com.gt
Pedro Tres	SADEESA	Supplier	417-8757 440-4203	sadeesa@guate.net
Edgar Estrada	Asociación Pro Agua del Pueblo	Supplier	761-3095 761-3094	aguapueblo@c.net.gt
Carlos Watemberg	Hidro Consult	Supplier	333-8908	cwatemberg@hotmail.com
Marco Antonio Santizo	SELMECA	Supplier	254-1072-75-77	selmeca@inco.com.gt selmeca@hotmail.com
Mynor Maldonado	BUN-CA Guatemala	Project Developers, Policies, financing	337-0086 219-8560 216-0540	guatemala@bun-ca.org mynorm@funrural.org
Nina Saalismaa	UNDP	Project Developers	384-3100	nina.saalismaa@undp.org

NOTE: The previous list is introductory and is subject to updates. If some interested party wishes to integrate, please send a note to GSN: info@greenstream.net.

4.6 Honduras



4.6.1 *Description of the Energy Sector*

General information

The present development of the electric subsector in Honduras is supported by the National Electric Power Enterprise (ENEE), the National Commission of Energy (CNE) and the Secretary of Natural Resources and Environment (SERNA), through the Energy Direction, who have specific functions of the system's operation; regulation and establishment of norms, and promotion of the electric subsector, respectively.

Currently, a Commission for the Modernization of the State, adhered to the Presidency of the Republic, is in function and has under analysis a new Regulatory Framework of the Honduran Electric Subsector, as a continued action in fulfillment of the Framework Law of the Electric Subsector, approved in 1994; maintaining the segmentation of the ENEE (National Electric Energy Enterprise: in generation, in transmission and in distribution) and promoting the generation with renewable sources.

Generation: The installed electric generation capacity in Honduras for 2002 was 1,047.6 MW. Of this total, 44% (465.7 MW) was made up by the hydroelectric plants property of ENEE, 6% (68 MW) were thermal plants property of ENEE, also 2% (21 MW) in biomass and the remainder 47% (492.9 MW) were private thermal plants, which until May 31, 2003 had consumed 695,880 barrels of diesel and 1,145,223 barrels of fuel oil⁴⁴. The electric system of Honduras, at present, has five hydroelectric plants and seven thermal plants property of the ENEE. The hydroelectric power station Francisco Morazán (El Cajon), with an installed capacity of 300 MW and representing approximately 40% of the total generating capacity of the country, is very relevant.

Additionally to the plants of the ENEE, in 2002 there were three private thermal

⁴⁴"Energía eléctrica demasiado cara en Honduras", La Tribuna Newspaper, August 18, 2003, Antonio Martín, columnist

generation companies operating in Honduras ⁴⁵:

- ◆ ELCOSA, with diesel plants of average velocity with a total power of 80 MW;
- ◆ EMCE with 55 MW of power in diesel plants of average velocity, and with 86 MW in diesel plants of average velocity, property of the ENEE, but operated by EMCE; and
- ◆ LUFUSSA with 80 MW in diesel plants of average velocity and 39.5 MW in gas turbines.
- ◆ CEMCOL AND LAEISZ have leasing contracts for 65 and 60 MW respectively ⁴⁶.

Transmission: The transmission system is operated by the National Electric Energy Enterprise (ENEE), a state business. The transmission system is interconnected with the electric systems of Guatemala and El Salvador, making up the so-called “northern triangle”. Honduras also is interconnected with Nicaragua, Costa Rica and Panama by means of a transmission line of 230 kV.

The National Interconnected System (SIN) coordinates its operation through the National Dispatch Center of the ENEE. The Dispatch Center is the responsible for determining the quantity of energy to be generated by the plants, especially the energy to be generated by El Cajon. Additionally, the Dispatch Center coordinates the generation of the national thermal park and the energy exchanges with the other countries (Nicaragua, Costa Rica, Panama and El Salvador) through the line of interconnection.

Distribution: By the nature of vertical monopolistic integration of the Honduran electric system, the ENEE is in charge of the electric distribution, which at present covers 60% of the total population of Honduras.

Legal framework focused towards renewable energy

In the legislation that promotes renewable energy in Honduras, the Framework Law of the Electric Subsector of 1994 (Decree N°158-94, published in the Official Newspaper The Gazette of November 26, 1994, Framework Law of the Electric Subsector and its Regulation, Agreement N°934-97, published in The Gazette of April 4, 1998), which regulates the generation, transmission, distribution and retailing activities of electric energy in Honduras is highlighted. This Law is considered an important step towards the promotion of private investment which permits, for the first time in Honduras, the participation of the private sector in the generation and transmission of energy. Subsequently, on behalf of the National Congress of Honduras the following adjustments to that first effort of the year 1994 have been emitted, promoting the generation with renewable sources:

- ◆ *Decree N°85-98*, of April 1998, Law of Incentives for Renewable Energy, published in the Official Newspaper the Gazette April 29, 1998;
- ◆ *Decree N°131-98*, published in The Gazette May 20, 1998;
- ◆ *Decree N°89-98*, published in The Gazette October 22, 1998;
- ◆ *Decree N°267-98*, published in the Gazette December 5, 1998, which contains a series of reforms to the Law of Incentives for Renewable Energy;
- ◆ *Decree N°176-99*, published in The Gazette February 23, 2000;
- ◆ *Decree N°45-2000*, published in The Gazette July 4, 2000;
- ◆ *Decree N°9-2001*, published in The Gazette May 21, 2001;
- ◆ *Decree N°103-2003*, published in The Gazette October 14, 2003

⁴⁵ <http://www.enee.hn/sin1.htm>

⁴⁶ <http://www.enee.hn/sin1.htm>

The electric market

During the last three years, Honduras has been very proactive in the promotion of its renewable energy resources. At present, it offers one of the most attractive incentive packages of Central America, offering long-term “standardized” energy purchase contracts that include tax exemptions, an additional payment to the electricity generated with renewable resources and a dispatch guarantee. According to data of the ENEE, some 10 renewable energy projects that have presented its requests to finalize the energy buying and selling contracts exist for a total of about 110-115 MW, itemized in the following way: 39 MW hidro, 11-15 MW biomass, 60 MW wind and 30MW in geothermal. These contracts are additional to the 23 that are already signed, with biomass and hydroelectric projects.

The electric market of Honduras is a vertically integrated market. Every project interconnected to the electric grid must negotiate the sale of its energy with the ENEE, which is the only one authorized by Law to buy the energy from private developers. According to statements of the ENEE, the negotiation of the contract at present is agile since it is based on an already existing model.

The problem with the contracts is that they have to be judged by several offices, including the legal counsel and internal audit of the ENEE, as well as CNE, for their signature and subsequent delivery for their ratification in the Congress of the Republic. This procedure is carried out in a period that can go from a couple of months to approximately a year. Nevertheless, the Framework Law of the Electric Subsector permits to private generators to sell directly to large consumers, as long as the transmission's toll costs are paid.

The base price that is paid in the energy buying and selling contracts, can be a maximum price equal to CMCP, this remains fixed during the enforcement period of the contract that can be up to

15 years, with an annual increase of 1.5% by a maximum time limit of 11 years.

According to the Framework Law the production of energy is permitted by means of the construction or leasing of generating centrals or units or by any means. Likewise the private enterprises or mixed generators of electric power that utilize sustainable and renewable resources to sell their product will have the following options:

- ◆ To Sell directly to a consumer or to a distribution enterprise in which case it should build the necessary lines to be connected to the national grid property of the National Enterprise of Electric Energy (ENEE); and,
- ◆ If the sale is a private or mixed enterprise's initiative, the ENEE will pay a maximum price equal to the short term limit marginal cost, calculated by ENEE and approved by the National Energy Commission (CNE), plus a ten percent incentive (10%). The dispatch of this energy is priority over that generated by thermal plants that utilize fossil fuel or petroleum derived.

The following figure shows a sketch of the present electric market in Honduras.

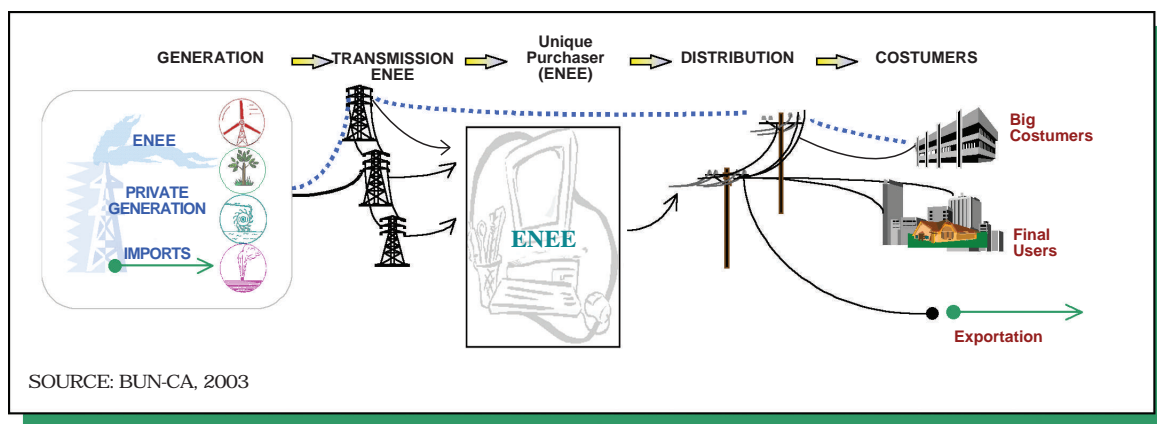


Figure 17. Electric market scheme in Honduras.

Main actions in rural electrification

Main actions in rural electrification according to data of the DGE indicate that only 60% of the Honduran population has access to electricity. In some rural areas, the index of electrification is 30%. The rural electrification in Honduras is also responsibility of the ENEE.

The Social Fund of Rural Electrification (FOSODE) provides limited financing to ENEE for rural electrification projects. The plans to face the demand of rural electrification are in their initial phases and they are directed mainly to extensions of the grid.

According to the national electrification strategic plan of the ENEE, it is intended to accelerate the rhythm of electrification of the country, increasing the present coverage index from 60% to 75% for the year 2008.

4.6.2 National CDM Policy

Ratification of the UNFCCC
Date signed: June 13, 1992
Ratification Date: October 19, 1995

Kyoto Protocol
Date signed: February 25, 1999
Ratification date: July 19, 2000

The actions of Honduras related to the CDM for energy are in charge of the General Direction of Energy (DGE) of the Office of the Secretary of Natural Resources and Environment (SERNA). Previously, in 1999, the Joint Implementation Office of Honduras (OICH) had been established, however it stopped functioning in the beginning of 2002. The DGE is in charge of identifying energy projects that could be eligible for joint implementation or the clean development mechanism of the Kyoto Protocol.

The country has also developed a national inventory of GHG that uses 1995 as base year to calculate emissions reductions. The sectors considered in the inventory are energy, industrial processes, agriculture, land use change and waste management.

The total emissions of GHG in 1995 were approximately 5,433.23 giga-grams (Gg) or 5,433,230.00 metric tons of carbon dioxide (CO₂), which is translated

into 0.97 metric tons per capita. Also 385.49 Gg of methane (CH₄) were counted; 5.18 Gg of nitrous oxide (N₂O); 63.80 Gg of other nitrogen oxides (NO_x); 1,528.59 Gg of carbon monoxide (CO) and 85.51 Gg of organic volatile components different to methane (COVDM). The majority of the emissions of GHG of Honduras

stem from the energy, the agriculture and the land use change sectors.

To date, there are no certificated projects under the clean development mechanism. Nevertheless, some projects exist that have the possibility of qualifying for this mechanism, as follows.

Table 29. List of private renewable energy projects with CER potential under CDM in Honduras.

Name of the Project	Type	Maximum Potency (kW)	Start of Operations	Average Energy (MWh)/year	CO ₂ e Emissions reduced ton/year
<i>Aguan</i>	<i>BMPA</i>	<i>1,700</i>	<i>2002</i>	<i>5,100</i>	<i>3,818</i>
<i>Babilonia</i>	<i>HAFA</i>	<i>3,000</i>	<i>2003</i>	<i>19,710</i>	<i>14,755</i>
<i>Cangrejal</i>	<i>HERD</i>	<i>40,000</i>	<i>2005</i>	<i>140,160</i>	<i>104,925</i>
<i>Coronado</i>	<i>HAFA</i>	<i>3,000</i>	<i>2005</i>	<i>20,500</i>	<i>15,346</i>
<i>Cuyamel</i>	<i>HAFA</i>	<i>7,800</i>	<i>2005</i>	<i>33,700</i>	<i>25,228</i>
<i>La Esperanza 1</i>	<i>HERD</i>	<i>1,233</i>	<i>2003</i>	<i>5,079</i>	<i>3,802</i>
<i>La Esperanza 2</i>	<i>HERD</i>	<i>11,528</i>	<i>2005</i>	<i>51,631</i>	<i>38,651</i>
<i>La Gloria</i>	<i>HAFA</i>	<i>4,700</i>	<i>2005</i>	<i>27,200</i>	<i>20,362</i>
<i>La Nieve</i>	<i>HAFA</i>	<i>480</i>	<i>2002</i>	<i>3,400</i>	<i>2,545</i>
<i>Lean</i>	<i>BMPA</i>	<i>1,700</i>	<i>2002</i>	<i>5,100</i>	<i>3,818</i>
<i>Yojoa</i>	<i>HAFA</i>	<i>630</i>	<i>2003</i>	<i>2,759</i>	<i>2,066</i>
<i>La Boquita</i>	<i>HAFA</i>	<i>173</i>	<i>2004</i>	<i>1,020</i>	<i>764</i>
<i>El Cisne</i>	<i>HAFA</i>	<i>713</i>	<i>2004</i>	<i>3,760</i>	<i>2,815</i>
<i>San Carlos</i>	<i>HAFA</i>	<i>3,300</i>	<i>2004</i>	<i>21,265</i>	<i>15,919</i>
<i>Ceccapa I</i>	<i>HAFA</i>	<i>2,855</i>	<i>2004</i>	<i>14,915</i>	<i>11,166</i>
<i>Cortecito</i>	<i>HAFA</i>	<i>5,300</i>	<i>2004</i>	<i>29,365</i>	<i>21,983</i>
<i>Río Blanco</i>	<i>HAFA</i>	<i>5,000</i>	<i>2003</i>	<i>32,200</i>	<i>24,105</i>
<i>Suyapa</i>	<i>HAFA</i>	<i>8,500</i>	<i>2004</i>	<i>61,000</i>	<i>45,665</i>
<i>Cuyamapa</i>	<i>HERD</i>	<i>10,500</i>	<i>2004</i>	<i>35,000</i>	<i>26,201</i>
<i>Tres Valles</i>	<i>HERD</i>	<i>15,000</i>	<i>2006</i>	<i>60,000</i>	<i>44,917</i>
<i>Tres Valles BM</i>	<i>BMBC</i>	<i>7,800</i>	<i>2003</i>	<i>N.D.</i>	<i>N.D.</i>
<i>La Grecia</i>	<i>BMBC</i>	<i>12,000</i>	<i>2003</i>	<i>35,000</i>	<i>26,201</i>
<i>Proyecto Utila</i>	<i>HTE</i>	<i>3,540</i>		<i>N.D.</i>	<i>N.D.</i>
Total		150,452		607,864	455,054

Legend

BMPA: Thermal Plant based on biomass from African palm

HAFA: Hydroelectric Plant on the verge of water

HERD: Hydroelectric Plant with daily reservoir regulation

BMBC: Thermal Plant based on biomass from sugar cane

HTE: Hybrid Thermal Wind

Source: DGE, 2003

- ◆ Ing. Leonardo Matute, Director of Energy, SERNA
E-mail: dgeper@yahoo.com
Tel: (504) 232-6227 / 239-6686

4.6.3 Examples of Renewable Energy Projects

The Honduran Association of Small Producers of Renewable Energy (AHPPER), jointly with the Direction of Energy of the SERNA, they presented in April of the 2003, a terna of 5 hydroelectric projects al Government of Finland for the purchase of the CERs under the MDL, these projects they are presented in Table 30.

Table 30. Projects presented by Honduras to the Finnish Government under CDM in the energy sector.

Project	Type	Installed Capacity (MW)	Generation (MWh/year)	Total Cost US\$ millions	Emissiones Reductcions (tm C)
Yojoa	Hydroelectric	0.63	118	0.7	1,135
Rio Blanco	Hydroelectric	5.00	2,225	N.D.	17,800
Ceocapa I	Hydroelectric	2.80	254	3.5	2,029
Cuyamapa	Hydroelectric	10.50	2,924	N.D.	23,392
Zacapa	Hydroelectric	0.52	276	0.9	1,092
TOTAL		19.45	5,797	13.2	45,448

Source: AHPPER, DGE/SERNA

4.6.4 Relevant Organisations

Secretary of Natural Resources and Environment-SERNA. It was created by means of Decree N°218-96 dated December 17, 1996 , published in the official newspaper The Gazette N°28148 of December 30, 1996, having the following competences:

- ◆ All that concerning to the formulation, coordination, execution and evaluation of the policies related to the protection and use of the water resources, the new and renewable sources of energy;
- ◆ All that relating to the generation and transmission of hydroelectric and geothermal energy, as well as the mining activity already in exploration and the exploitation of hydrocarbons;
- ◆ All that concerning the coordination and evaluation of the policies related to the environment, the ecosystems, the national system of natural protected areas and national parks and the protection of the flora and the fauna, as well as the investigation

services and control of contamination in all its forms. More information with:

- ◆ Patrician Panting, Secretary of State
Tel: + 504 235-7833
Fax: + 504 232-6250
E-MAIL: sdespacho@serna.gob.hn
- ◆ Leonardo Matute,
General Director of Energy
Tel: 504+232-6227 / 239-6686
E-MAIL: dgeper@yahoo.com
- ◆ Gerardo Antonio Salgado Ochoa
National Appointed Authority
Tel: + 504 231-1918
E-MAIL: osalgado@serna.gob.hn

National Electric Energy Enterprise -ENEE. It was created by Decree N°48 of February 20, 1957. It's an autonomous public utility agency and has the responsibility of production, transmission and distribution of the electric power in Honduras. At present the ENEE administers the National Interconnected System, being he main generator, and the only actor in the transmission and distribution. The ENEE is subdivided into the Planning and Development Direction, the Total Quality Executive Direction, the

Technical Subdirection, the Administrative and Financial Subdirection, and the Geographical Subdirection: North-Western, South-Central and Atlantic.

More information with:

- ◆ Glenda Castillo, Department of Planning and Development
Tel: + 504 220-0470 / 220-0471
Fax: + 504 220-0470
E-MAIL: subdinve2@enee.hn

National Commission of Energy-CNE. It was created by means of Decree N°131-98 of The Law of Stimulus to Production, Competitiveness and Support to Human Development, in replacement of the National Electric Energy Commission (CNEE), and of the National Public Utilities Supervisor Commission (CNSSP). It has as its objective the regulation of the generation, transmission, distribution and retailing activities of electric power that take place inside the national territory.

More information with:

- ◆ Angel Baide, President
Tel: + 504 233-2025
Fax: + 504 233-0025
E-mail: cne@david.intertel.hn or ABaide@aol.com

Private Electric Businesses: at present in the country there are nearly twenty enterprises in operation dedicated to the

development of energy projects through renewable sources, especially hydroelectric projects. Nevertheless, except CENIT which operates the small hydroelectric power station Zacapa, all the other projects are in the study or construction phase. Likewise, four enterprises dedicated to the distribution and installation of solar panels exist, promoting the use of photovoltaic solar energy. Finally, there are the companies dedicated to energy generation through fossil fuels.

Honduran Association of Small Renewable Energy Producers - AHPPER. The AHPPER is a private association constituted in the year 2001 as a no-for-profit institution, created with the sole purpose of promoting the economic development of the country through the search of economic, social and environmentally viable solutions to the different problems faced by the energy sector of the country.

More information with:

- ◆ Eda Zapata, Executive Director
Tel/Fax: + 504 235-8533
E-mail: ahpper@multivisionhn.net
- ◆ Elsia Paz, President
Tel: + 504 985-4037
E-mail: elsiapaz@direcway.com
www.ahpper.hn

4.6.5 *List of Consultants and Suppliers*

Table 31. List of renewable energy contacts in Honduras.

Name	Company	Specialty	Telephone (504)	E-mail
Patricia Panting	Secretaría de Recursos Naturales y Ambiente	Policies	235-7833	sdespacho@serna.gob.hn
Leonardo Matute	Dirección de Energía	Renewable Energy Policies, Energy Efficiency	232-6227 239-6686	dgeper@yahoo.com
Angel Baide	Comisión Nacional de Energía	Policies	233-2025 - 2026	ABaide@aol.com cne@david.intertel.hn
José Morán	Comisión Presidencial de Modernización del Estado	Policies	235-9370	jmoran@cpme.gob.hn
Eda Zapata	AHPPER	Projects	235-7395	ahpper@multivisionhn.net
Elsia Paz	AHPPER Proyecto Hidroeléctrico La Esperanza	Policies, financing, projects	985-4037	elsiapaz@direcway.com
Leyda Alonso	SOLUZ	Project Development, financing	557-5127 557-5270	soluzdir@netsys.hn
Manuel Ma-Tay	Proyecto Hidroeléctrico Hidro Yojoa	Project Development	224-0703	mmatay@edured.net
Mauro del Oro	Proyecto Hidroeléctrico La Nieve	Project Development	566-0430	lanieve@123.hn hydroprogetti@hn2.com
Jorge Reyes	Proyecto Hidroeléctrico La Cascada	Project Development	996-2903	cascada41@hotmail.com
Roberto Núñez	EMCE	Project Development	236-8788 236-9116	rmunez@terra.hn
Oscar Aguilar	Servicios y Mantenimientos Tecnológicos	Consultant	239-2157	oaguilar@cybertel.hn
Glenda Castillo	ENEE	Renewable Energy Policies/ Energy Finances	220-0470 220-0471	subdinve1@enee.hn subdinve2@enee.hn www.enee.hn
Juan Ramón Medrano	ADESOL	Solar Energy	239-5691	adesol@sdnhon.org.hn
Jorge R. Méndez	Consultant	Policies, projects	227-0335 390-9240	jfriveram@hotmail.com
Gracia M. Barahona	BCIE/ CABEI	Financing	240-2243	gbarahon@bcie.org www.bcie.org
Julio Cárcamo	PNUD/ UNDP	Project Development	220-1100 231-0102	julio.carcamo@undp.org

NOTE: The previous list is introductory and is subject to updates. If some interested party wishes to integrate, please send a note to GSN: info@greenstream.net.

4.7 Nicaragua

4.7.1 Description of the Energy Sector

General information

The Government of Nicaragua, through the Program of Reforms to the Public Utility Enterprises, initiated a series of transformations in the Energy Sector from a functional and institutional point of view. Based on this, the Law of the Electric Industry was promulgated (LIE), Law N°272 April 23, 1998, and in June of that same year its Regulation, (Decree N°42-98). This Law divides the vertical integration of the Nicaraguan Electricity Enterprise (ENEL) with a horizontal separation of the generation, transmission and distribution activities, and allows the participation of the private sector in the generation and distribution.



By means of the Presidential Agreement N°116-99, (published in The Gazette N°67 of April 13, 1999), the ENEL was divided into seven companies: one of transmission, two of distribution and four of generation. The following Graphic shows the institutional change of the Nicaraguan electric sector from 1998.

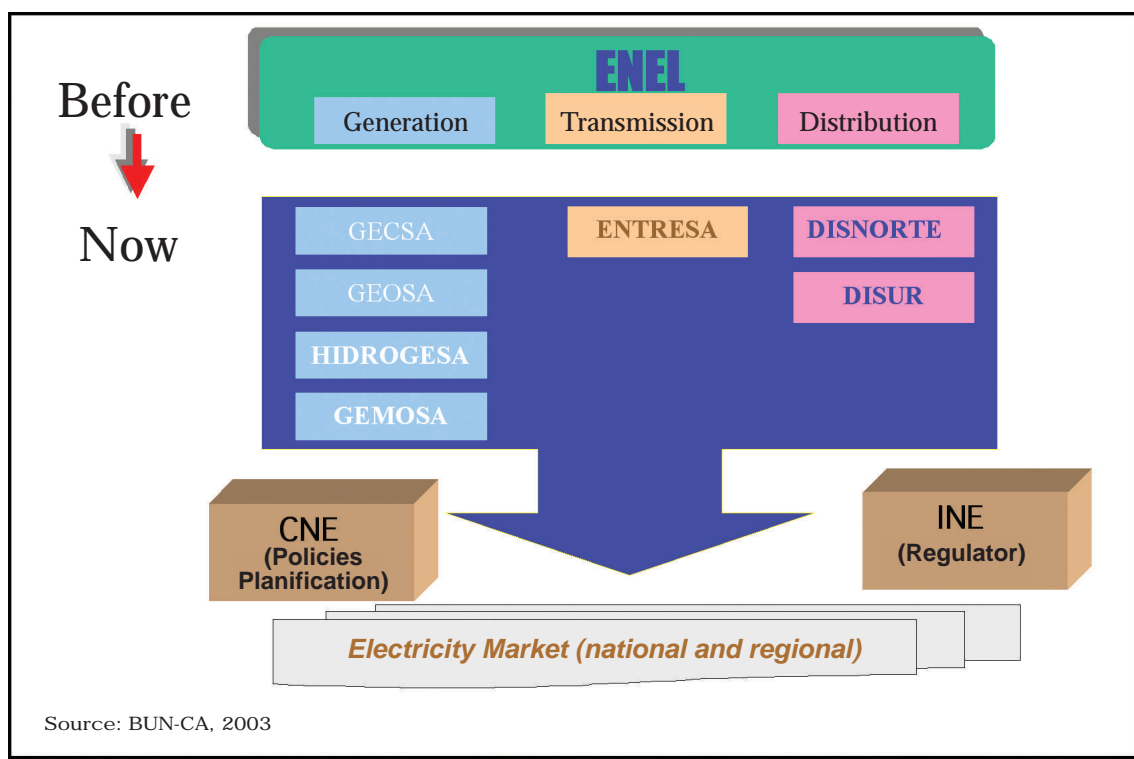


Figure 18. Structural change of the electric sector of Nicaragua

The four generation companies are two thermal, one hydraulic and one geothermal: Central Electric Generator INC. (GECSA), Western Electric Generator INC. (GEOSA), Hydroelectric Generator INC. (HIDROGESA), Generating Momotombo INC. (GEMOSA). The National Electric Transmission Enterprise INC. (ENTRESA) was created for carrying out the electric power transportation activities. This company, according to the LIE will be of state character. The two distribution companies created were the North Electricity Distribution Enterprise (DISNORTE) and the Southern Electricity Distribution Enterprise (DISSUR), both privatized in the month of October of 2000, with a sale value of US \$115 million, both property of Union FENOSA.

The main actors in the Nicaraguan state electric sector are: the Nicaraguan Electricity Enterprise (ENEL), the National Energy Commission (CNE), the Nicaraguan Energy Institute (INE) and the National Load Dispatch Center (CNDC), whose function is to regulate the wholesale market. ENEL was separated of the INE in 1995 and assigned the responsibility of generation, transmission, distribution and retail, while INE conserved the responsibility of planning and regulating.

Generation: Nicaragua, to the year 2002, had an installed capacity of approximately 658 MW. This capacity is composed of hydroelectric (104 MW), geothermal (77 MW), and a biomass plant (41 MW), but mainly by fossil fuels plants (436 MW). The future economic development, the expansion of the electric grid and the rehabilitation of the existing equipment (great part of the existing plants have been in operation between 20 and 30 years), will create the need to add around 800 MW in the next 5 years. The energy average demand has grown relatively slow in recent years, but a greater growth rate is expected –up to 6%

annually – for the next 20 years. As part of the incentives to private investment in the electricity industry, Article 130 of LIE offers exoneration for three years on all the obligations, the importing of machinery, equipment and supplies destined exclusively to the generation, transmission, distribution and retail of the supply and delivery of electric power for public use. Likewise, Article 131 of LIE exonerates in an indefinite way any tax on the fuels utilized for the electric generation.

Transmission: The LIE establishes that transmission continues being property of the State, except what is called secondary transmission which builds a Market Agent in order to connect to the National Interconnected System (SIN). The state enterprise known as the National Transmission Enterprise, INC. (ENTRESA), transports the energy in its lines and substations according to the toll approved by the regulating entity (INE). The Nicaraguan transmission grid is connected to that of Honduras, Costa Rica and Panama by an interconnection line of 230 kV.

Distribution: Northern Distributor (Disnorte) and Southern Distribution (Dissur), property of Union FENOSA, jointly service around 440,000 users. According to publications of the press media, to July of 2003 liquidity problems on behalf of these two distributors have been presented, representing an estimated debt of US\$6 million with at least four of the ten electricity generating plants that operate in the country ⁴⁷.

Legal framework focused towards renewable energy

Among the prominent legislation surrounding renewable energy in Nicaragua, the following ones can be mentioned:

⁴⁷ “Chocan firmas electricas en Nicaragua”
La Nacion, August 18, 2003.

- ◆ *Executive Decree N°45-94* of October 28, 1994, Regulation for Permit and Evaluation of Environmental Impact.
- ◆ *Law N°272* of April 23, 1998, Law of the Electric Industry (LIE) and its Regulation published in The Gazette N°116 of June 23, 1998 (Decreets N°24-98, N°42-98).
- ◆ *Presidential Agreement N°1-2001* January 2, 2001, establishment of the Fund for the Development of the Electric Industry of Nicaragua (FODIEN).
- ◆ *Law N°467*, of August 29, 2003, Law of Promotion of the Hydroelectric Subsector, published in The Gazette N°169 of September 5, 2003.
- ◆ *Decree N°12-04*, of February 25, 2004, Specific Policy in Support of the Development of Wind and Hydroelectric Resources, published in The Gazette N°45 of March 4, 2004
- ◆ *Decree N°13-04*, of March 2, 2004, Establishment of the National Energy Policy, published in The Gazette N°45 of March 4, 2004.

The electric market

The LIE establishes the creation of an Electric Wholesale Market with specific regulations whose fulfillment corresponds to all the economic agents that are dedicated to the activities of the electric industry (Generation, Transmission and Distribution) and regulated by the INE. This institution must set the rates, including the requests for distribution.

The CNDC operated by the State, acts as the intermediary between the distributors and the generators and performs the dispatch based on the smaller marginal cost. Likewise, it is its responsibility to calculate the energy purchase costs, power and transportation, on the basis of the Operation and Transportation Regulations, respectively.

An Economic Agent or Great Consumer will be able to participate in the Wholesale Market of Nicaragua as long as it complies with the requirements and definite obligations of the Operations Regulation. LIE indicates that the economic agents dedicated to the energy generation activity will be able to subscribe electric power buying and selling contracts with distributors and large consumers; likewise it authorizes them to sell total or partly its production in the market of occasion and also to export the electric power.

Some characteristics of the Nicaraguan electric wholesale market are:

- ◆ The products that are bought and sold in the wholesale market are: energy and potency.
- ◆ The Wholesale Market is constituted by: Bilateral Contracts among Market Agents; and by the Market of Occasion (-spot- market of surpluses and shortages).
- ◆ In the commercial transactions the services that are paid are: Service of Transmission; and Service of Operation, Dispatch, and Market Administration.
- ◆ The commercial transactions include the Auxiliary Services required to maintain the quality criteria and security of the electric system (rolling reserve, voltage control and supply of reactive potency).

In the Electric Wholesale Contracts Market following types are present:

- ◆ PPA type Internal Contracts that agree to the buying and selling of energy and/or power with private companies, preexisting to the privatization of the distribution activity.
- ◆ Supply and Generation Contracts, subscribed with State generation enterprises, and Supply Contracts among private companies (Private Generator with Great Consumer functioning).

In Nicaragua each distributor has the obligation to contracting the purchase of electric power with generators located in the national territory or generators located in another country through importing contracts, which cover a percentage of its predicted demand (80% of the maximum demand for the following year through contracts and 60% for 24 months); the remainder can be bought, or the surplus sold in the spot market or in international markets (although the Law requires the contracts, the PPAs – with sovereign risk - are no longer utilized).

All the contracts are strictly commercial, that is to say that they do not affect the economic dispatch of the generation units, except the PPAs that are dispatched according to the price of the energy reflected in the contract and not to the cost of production.

On the other hand, the Electric

Wholesale Market of Occasion functions in Nicaragua since October of 2000 and is composed by the energy sellers and buyers that have surpluses or shortages in their schedules, after seeing to their contractual commitments. It is a market of costs where the product (kWh) is offered according to the costs of production of each generating agent.

According to data of the CNE, in the Market of Occasion at present there are between 40 and 50 MW (essentially thermal) negotiated. Only the Ingenio Monterrosa is co-generating and selling the surplus in the market of occasion during the sugar cane harvest period (some 5 months each year). The Ingenio San Antonio also is co-generating, but sells its energy through a contract. The average selling price has stayed under \$0.05/kWh. The Figure 19 shows the present scheme of the electric market in Nicaragua.

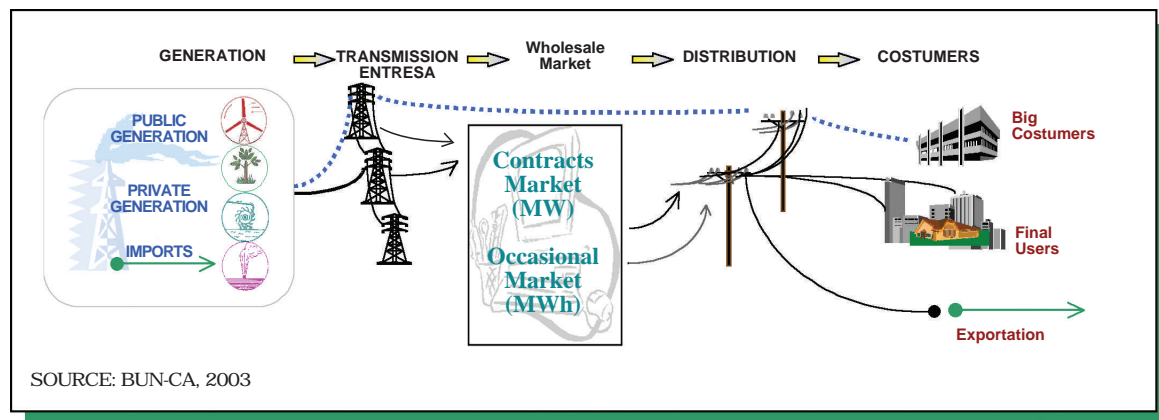


Figure 19. Scheme of the electric market in Nicaragua.

Main actions in rural electrification

The most recent data of the CNE indicate that in Nicaragua, 47% of the population has access to electricity services. In the rural areas it is estimated that only 20 to 25% of the population has such access. The CNE has the responsibility to develop electrification in the rural area and in the smaller populations where the economic agents that are dedicated to the electric industry

have no interest to participate. For it, it must assign available resources through the competent agencies for the development of rural electrification. With this end, the CNE in February of the 2003 devised a new Rural Electrification Policy proposal.

To the date the National Rural Electrification Plan in Concession Areas (PLANERAC), is being executed

contemplating a short-term electrification program, with definite projects inside the area of concession of the private distribution companies, which will allow an increase in the present coverage index to 65-70% in the 2005. This short time objective is framed inside the goals of the Government to increase the coverage of rural electrification of the country by means of the extension of the existing distribution grid. With this project some 32.000 inhabitants in 114 rural communities have been benefited, between the years 2000-2003.

Likewise, with the support of the Inter-American Development Bank (IADB), a Strategy for Rural Electrification in not Concessioned Zones was formulated. This strategy includes the implementation of at least two projects of rural electrification utilizing renewable energies sources.

On the other hand, in January of 2001, the Fund for the Development of the Electric Industry of Nicaragua (FODIEN) directed to the promotion of rural electrification was created. Doubts with respect to the operation of the FODIEN exist, especially regarding the application of its funds, with relation to the level of promotion of the competence and to the incorporation of the private sector. At present with the project PERZA – CNE - World Bank, a study for the operation of the FODIEN will be carried out.

4.7.2 *National CDM Policy*

Ratification of the UNFCCC
Date Signed: June 13, 1992
Ratification Date: October 31, 1995

Kyoto Protocol
Date Signed: July 7, 1998
Ratification Date: November 18, 1999

From 1990, the Government of Nicaragua initiated a process of energy reform to assure the efficient and dependable supply of energy, to promote the economic efficiency in the energy sector and to attract the necessary resources for the expansion of the electric infrastructure. This process culminated in April of 1998, with the approval of Law N°272 “Law of Electric Industry” (LIE), where a new focus to the regulation of generation, transmission, distribution and retailing of electricity is given.

By signing and ratifying the Kyoto Protocol and the United Nations Framework Convention on Climate Change, Nicaragua has agreed to prepare a national inventory of GHG, which must comply with the following:

- ◆ To identify the processes that release and extract the GHG;
- ◆ To identify the actors in the economy that produce these emissions and the quantities produced;
- ◆ To prepare and present the basic tables required by the agreement; and,
- ◆ To acquire know-how and complementary information related to climate change, the economy, the measurement methods, etc.

With support from the Global Environment Fund (GEF) through the United Nations Program for Development (UNDP), Nicaragua has completed its first national inventory of GHG using the guidelines established by the IPCC. This instrument reflects the situation of emissions, as well as the capacity of absorption of GHG in the country, utilizing 1994 as base year. The most impressive result of the study has been that the forest sector and of land use change represents the greatest source of carbon dioxide emissions and at the same time represents the greatest capacity of absorption of GHG in the country; therefore it establishes that Nicaragua is a “carbon absorbing country” mainly due

to the natural regeneration of the vegetation. The inventory was published in March of 2001 and contains the baseline information required.

In the last five years the Government of Nicaragua, through the Ministry of the Environment and the Natural Resources (MARENA), has been fortifying and developing capacities to face the climate change paradigm as well as to take advantage of the economic opportunities that arise in the emissions reductions certificates' market with the Clean Development Mechanism (CDM) of the Kyoto Protocol. The "Carbon Market" has awoken the interest of environmental enterprises in Nicaragua, by its economic attraction and its resource potential for generating sustainable investments mainly for the private sector.

For the purpose of facilitating the entrance of Nicaragua in this new business market, MARENA with the support of the Global Environment Fund (GEF) and of UNDP through the Project "Formation of Capacities in Priority Areas of Climate Change, PNUD-NIC/98/G31-MARENA", has elaborated a "Methodology Guide for the Formulation, Verification and Monitoring of Greenhouse Gas Mitigation Projects", with the purpose of advancing the dissemination of the business opportunity and of facilitating the design of this type of project that represents an additional financial flow independent from the traditional business. This guide can be accessed in:

<http://www.ondl.gob.ni/> or
http://www.marena.gob.ni/cambio_climatico/guia_proyectos_mitigacion.htm

Among other activities related to climate change, there are several studies and publications on the impacts of climate change, which can be found at:

<http://www.ondl.gob.ni/> or
http://www.marena.gob.ni/cambio_climatico

Potential of Renewable and Clean Energy

Nicaragua has a great potential of renewable and clean energy resources. Among these resources there are: Hydroenergy, Geothermal, Biomass, Wind and Solar Power.

The hydroelectric potential of projects greater than 15MW is estimated in 5,582 MW based on a portfolio of 78 projects, out of which approximately 30% are the most economically attractive. These make a total of 1,767 MW defined in 13 projects. The medium hydroelectric power stations estimated potential (plants of up to 15MW) is close to 200 MW. 30 places with hydraulic potential for small scale generation of electric power have been identified for a total of 11,510 KW.

The CNE developed the Geothermal Master Plan in the year 2001 (GeothermEx Inc. of Richmond, California, US.), with a theoretic exploitable geothermal potential being estimated as 900 to 1000 MW, with the fields being concentrated along the volcanic zone of the Pacific Coast.

At present the potential of the wind resources of the country can not be accurately quantified. The CNE is carrying out actions before cooperation agencies in order to be able to define the potential of the natural wind resources that can be taken advantage of as options or complements for the production of electric power in Nicaragua. In the 90's, measurements were done in certain localities of the Nicaraguan territory. The South-Western part of Nicaragua in the departments of Rivas, Managua and Granada, present the greatest velocities of wind. The Nicaraguan Energy Institute, regulating and fiscal agency of the energy sector in the country, has offered several Provisional Exploration Licenses for this resource, in order to initiate the feasibility studies.

As part of the Modernization Program of the Energy Sector of Nicaragua, the CNE

has concluded the “Study of Bioelectricity – Recolection of Biomass Data as Bioenergy Source, in the Pacific Region of Nicaragua, October, 2001”. From this study, it can be concluded that there exists 11 regions that have potential as a source for organic matter. Of the potential places, 3 were located in the Central zone and 8 in the Pacific area, giving as a result 1,184,456 Ton/Year of organic matter selected from trash, industrial waste, etc.

After various years of investigation and studies on behalf of the Central American University (UCA) and the Nicaraguan Energy Institute (INE) in the 90's decade, the solar radiation data has permitted to devise the Solar Map of Nicaragua. According to the available information, the average measured value of sun shine is of 2,500 hours/year and receives an annual solar global radiation that varies between 1.4 and 2.0 Mega-watts-hour/m² year according to the zone of the country. Likewise, the average value of potency per hour was 1.8 Mwh/m² -year of global radiation.

National Office of Clean Development and Climate Change

With the support of UNDP/NICARAGUA, the National Office of Climate Change and Clean Development (ONDL) was created in February of 2002, like an entity concentrated on climatic change matter adhered to the Ministry of the Environment and Natural Resources (MARENA). This entity is governed by a Board of Directors, where the public sector as well as civil society participates.

This Office was accredited like the Designated National Entity for the Clean Development Mechanism and is in charge of giving the governmental endorsement required by the CDM projects.

One of the priority objectives of this Office is to facilitate the entrance of Nicaragua into carbon market. At

present it offers technical aid to project developers and promotes the creation of national capacities for utilizing this new instrument for financing climatic change mitigation projects. The entity facilitates the negotiations between local sellers and international buyers.

Nicaragua has signed a Memorandum of Understanding to facilitate the transaction of carbon bonds with the Kingdom of the Netherlands, Finland, Canada and Denmark.

The Office has developed a fast and simple process to offer the governmental endorsement required by the CDM projects. This process develops in two parts. With the project idea (PIN), a no objection initial letter is obtained which is signed by the Director of the Office after doing an analysis of this document. The final endorsement requires the approval of the Board of Directors of the office which is obtained after presenting the Project Document (PDD) and after it has passed through a local public consultation. This process is detailed in the ONDL website:

<http://www.ondl.gob.ni/>

Additionally, there is the National Climate Change Counsel, multisectorial body where diverse institutions and organizations of the public sector, civil society and academia participate. This Counsel serves as a consultation body in the matter.

The CDM and CC Focal Point in Nicaragua is:

- ♦ Lic. Marine Stadtaghen,
Coordinator of CDM and CC
MARENA
Tel: (505) 263-2596 / 233-1868
E-mail: marinas@ibw.com.ni
<http://www.ondl.gob.ni/>
- ♦ Ing. Román José Román Gutiérrez
Energy Projects Coordinator
ONDL/MARENA
E-MAIL: rjromans@turbonett.com
Tel: (505) 263-2596 / 233-1868

4.7.3 *Examples of Renewable Energy Projects*

Recently, the CNE, with financial support of the Global Environment Fund (GEF) through the UNDP, has initiated a national project called: "Development of small scale Hydroelectricity for productive uses in out of grid zones". The objective of the project is the reduction of Greenhouse Gas (GHG) emissions originated by the use of fossil fuels in the electric generation for productive uses in the rural areas not integrated to the National Interconnection System (SIN), by removing the barriers and reducing the cost of implementation and dissemination of the Small hydroelectric power stations (PCH) in Nicaragua; in order to promote the productive development in the rural areas outside of the SIN.

On the other hand, in union with the previous efforts, the CNE supported by the World Bank is carrying out the project called "Rural electrification with renewable energy resources project for the development of remote zones - PERZA".

Both projects will be combining efforts to support the CNE in the design and put into practice of an efficient and rational strategy of rural electrification. In turn, the World Bank will offer support with its experience, knowledge and aid in the rural electrification context with an emphasis on renewable energy technologies; the project of UNDP/GEF will be centered on a subcomponent related specifically with the test and put into practice of micro-hydraulics plants with the objective of developing productive activities.

Initially, of the 40 MW identified in the country, 30 places with sufficient potential to develop 30 PCH (9 MW) associated to productive uses have been pre-selected. It is foreseen to have the 30 PCH functioning in an estimated

time limit of 10 years, equivalent to 25 GWh of energy, besides avoiding emissions by a total of 312,000 metric tons of CO₂.⁴⁸

Additionally, there are several renewable energy projects in different phases of development, to which the ONDL offers support and technical assistance. There are three Biomass projects with a potential of more than 30MW in the process of development and with support of this Office, a methane collecting project with a potential of 2.5MW, two wind power projects with a capacity of 35MW, a geothermal project with a capacity of 60MW, and two hydroelectric rural electrification projects with a capacity of 2.5MW.

4.7.4 *Relevant Organisations*

National Energy Commission -CNE. The CNE is an interinstitutional body responsible for proposing the sectorial policies, strategies and general guidelines of the entire energy sector to the Executive Power, and for carrying out the indicative planning and strategy development of the energy sector including the promotion of the rural electrification.

More information with:

- ◆ Raúl Solórzano, President
Tel: + 505 222-5576
Fax: + 505 222-4629
E-mail: asistente1@cne.gob.ni
www.cne.gob.ni
- ◆ Ernesto Espinoza, Executive Secretary
Tel: + 505 222-5576
Fax: + 505 222-4629
E-mail: Sec_Eje@cne.gob.ni
www.cne.gob.ni

⁴⁸ More information on the project: Leoni Arguello, Project Officer UNDP, leoni.arguello@undp.org or Miguel Barrios, rebrasil@ibw.com.ni

Nicaraguan institute of Energy-INE. By means of the Law N°271, the Reforms to the Organic Law of the INE as an autonomous agency of the State responsible for the regulation, supervision and overseeing of the energy sector was disseminated. It offers, it defers, it declares the expiration or cancels the licenses for the generation and transmission of energy, and for the concessions of distribution. The Nicaraguan Energy Institute (INE), is responsible for the regulation, supervision and overseeing of the energy sector. It offers the licenses, permits and concessions, as well as stipulates the sanctions and fines.

More information with:

- ◆ Octavio Salinas
Tel: + 505 228-2057 / 228-2058
Fax: + 505 222-7052
E-mail: dcd@ine.gob.ni
www.ine.gob.ni

Nicaraguan Electricity Enterprise-ENEL. The ENEL is responsible for the administration of the isolated systems of the country.

More information with:

- ◆ Fran J. Kelly Towers, Executive President
Tel: + 505 278-5830, 270-1044, 270-1066
Fax: + 505 267-4377
E-mail: ocastillo@entresa.com.ni

Ministry of the Environment and Natural Resources -MARENA. The MARENA is the entity that dictates the policies and norms in the environmental sector. It gives the environmental permits based on the environmental impact assessments carried out for each activity under the Law of Environment. Inside this Ministry is the Direction of Clean Development, which is the national appointed authority to this respect.

More information with:

- ◆ Marina Stadtighen,
Organizer of MDL and CC
Tel: + 505 263-2596 / 233-1868

Fax: + 505 263-2596

E-mail: marinas@ibw.com.ni
www.marena.gob.ni/cambio_climatico

National Electric Transmission Enterprise S.A.-ENTRESA, is the one in charge of the transmission grid and according to the Law, this activity will remain being of the Nicaraguan State.

Inside ENTRESA is the National Center of Load Dispatch (CNDC) that is responsible for the operation, administration and the security of the interconnected system and to summarize the exits and entrances to the system on behalf of the agents.

More information with:

- ◆ Humberto Salvo, General Manager
Tel: 505 + 277-4159
E-mail: hsalvo@entresa.com.ni

Public Generating Enterprise: Central Electric Generator Enterprise INC. (GECSA), are thermal plants formed by the Managua Centrals (45MW) and Las Brisas (65MW). There is also the Western Electric Generating Enterprise S.A. (GEOSA), which are thermal plants made up by the Nicaragua (100MW) and Chinandega (15MW) Centrals. The Hydroelectric Generating Enterprise INC (HIDROGESA), which is in the year 2002 was in process of being privatized, is made up by the Central American (50MW) and Santa Barbara (50MW) Centrals. Geothermal Generating Enterprise Momotombo, SA (GEMOSA), formed by the central geothermal Momotombo (70MW), is now under concession to ORMAT enterprise for 15 years.

Remote generators: Under this concept, the following can be mentioned: Association of Electric Light La Pita del Carmen (ASOLPIC) has a Distribution Concession and operates a hydroelectric plant of 30kw, located in the Village of La Pita del Carmen Central in the municipality Cuá-Bocay, department of Jinotega. Association

Pro-Development of the Electric Service Bocay (APRODELBO) has a Distribution Concession and operates a hydroelectric plant of 230kw, located in the settlement San José of Bocay in the municipality Cuá-Bocay, department of Jinotega. Association of Rural-BL Development Workers (ATDER-BL) has a Distribution Concession to operate a hydroelectric plant of 155kw, located in the Comarca el Bote, municipality Cuá-Bocay, department of Jinotega. It promotes Hydraulic Micro-Turbines with an energy capacity of 0.7Kw (largest) and 0.014kw (smallest). These have been promoted in the Cuá-Bocay zone, and they continue being used in homes and for the coffee-growers. Association for the Promotion of Dendroenergy of Nicaragua (PROLEÑA) is negotiating the development of 3 projects for electricity generation from biomass (peanut cover, rice and forest residues).

Union FENOSA is a private enterprise of Spanish capital, responsible for the

electric distribution, divided into DISNORTE (formed by the Central-Western department of Managua plus the North-Western region of the country) and DISSUR (formed by the North-Eastern department of Managua plus the South-Oriental region of the country).

Nicaraguan Association of Renewable Energy Developers and Producers -ANPPER. The ANPPER was constituted in the year 2002, with the objective to unite the efforts of the private generators and as a common front for negotiation before the governmental authorities in order to promote the development of the renewable sources of energy.

More information with:

- ♦ Carlos Fonseca, President
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Fax: + 505 254-535
E-mail: anpper@intelnett.com

4.7.5 List of Contacts, Consultants and Suppliers

Table 32. List of renewable energy contacts in Nicaragua.

Name	Enterprise	Specialty	Telephone (505)	E-mail
Marina Stadtaghen	Ministerio de Recursos Naturales, Oficina Nacional de Desarrollo Limpio	Policies, CDM	233-1868 263-2596	marinas@ibw.com.ni
Raúl Solórzano	Comisión Nacional de Energía	Policies	222-5576	asistente1@cne.gob.ni www.cne.gob.ni
Octavio Salinas	Instituto Nicaragüense de Energía	Policies	228-2057 228-2058	dcd@ine.gob.ni www.ine.gob.ni
Fran J. Kelly Torres	Empresa Nicaragüense de Electricidad	Policies	278-5830	ocastillo@entresa.com.ni
Humberto Salvo	Empresa Nicaragüense de Electricidad	Policies	277-4159	hsalvo@entresa.com.ni
Rodolfo López	Centro Nacional de Despacho	Policies	276-0533 276-0501	gerencia@cndc.org.ni
Sergio Narváez Sampson	Instituto de Desarrollo Rural	Policies	270-3412 270-3672	direjecutivo@idr.gob.ni
Vladimir Delagneu	Tecnosol	Supplier	249-9871	
Luis Lacayo Lacayo	Ecami	Supplier	276-0925 276-0252	ecami@ibw.com.ni
Jurgen Kulke	Altertec	Supplier	265-0693	altertec@ibw.com.ni www.altertec.com
José Luis Bustamante	Sunisolar	Supplier	278-2630	sunisolar_2000@yahoo.com sunisolar@datatex.com.ni
Leonardo Mayorga	Proleña	Project Developer	249-0116 278-7252	prolena@sdnnic.org.ni prolena.renovable@sdnnic.org.ni
Roberto Vargas Mantica	Industria GEMINA, S.A	Project Developer	249-1129	gemina@gemina.com.ni
Rebeca Leaf	Atder-BL	Project Developer, PCH	612-2030	atder@ibw.com.ni
Victor Salazar Pereira	Funproteca	Project Developer	0311-2090 0311-0595	funprot@ibw.com.ni
María Engracia De Trinidad	Proleña	Project Developer, policies, funding	278-7252 278-2257	prolena.renovable@sdnnic.org.ni
César Barahona	Centro de Producción Más Limpia	Energy Efficiency Policies	278-3136	ceb@ibw.com.ni cpmlnic@cpmlnic.org.ni www.cpmlnic.org.ni
Bo Ekstrand	EFICONTROL	Energy Efficiency Project Developer	268-2413 266-0697	eficon@ibw.com.ni
Leoni Argüello	UNDP	Project Developer	266-1701	leonie.arguello@undp.org www.pnud.com.ni
Patricia Rodríguez Rivera	MULTICONSLT	Consultants	278-2530 278-0639	multiconsult@ibw.com.ni
Susan Kinne	Grupo FÉNIX, UNI	Project Developer	278-3133	fenix@fec.uni.edu.ni www.grupofenix.org
Carlos Fonseca	ANPPER	Project Developer, policies, funding	254-5356 254-5357	anpper@intelnett.com

NOTE: The previous list is introductory and is subject to updates. If some interested party wishes to integrate, please send a note to GSN: info@greenstream.net.

4.8 Panamá



4.8.1 Description of the Energy Sector

General information

The restructuring of the electric sector was initiated in 1997 in a more conservative form than in other countries, since the State retained between 48% and 49% of the actions of the generation and distribution enterprises that were privatized, and maintained 100% of the actions of the transmission enterprise that is also responsible of the National Dispatch Center. The private sector controls 92% of the generation, as opposed to Guatemala, Nicaragua and El Salvador where the State is owner and controls an important percentage of the generation, especially of hydraulic generation.

The deregulation and privatization of the Panamanian Electric Sector is given upon the approval of the Law 6 of 1997 (reformed in 1998). This Law contemplates an energy market prompted by commercial actors, who can sell and buy energy by means of contracts and in the spot market. In its market design, the State has contemplated four main objectives: 1) to promote competition and efficiency; 2) to improve the coverage and the quality of the energy and of the service; 3) to regulate the distribution and transmission services and 4) to improve the environmental quality.

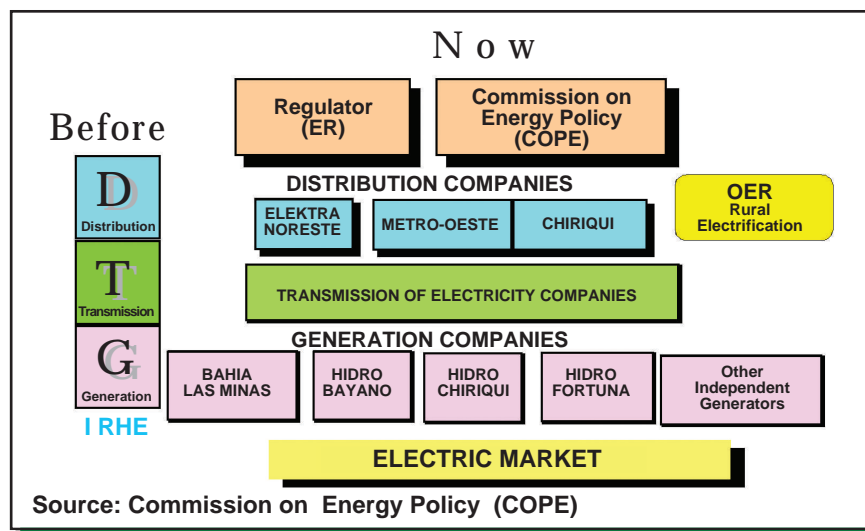


Figure 20. Structural change of the electric sector of Panama.

The new energy generation plants dedicated to the commercial service must obtain either a concession of 50 years, for projects based on hydroelectricity and geothermal energy,⁴⁹ or a license with duration of 40 years for thermal units and wind generation plants. Figure 20 demonstrates the transition of the electric sector in Panama.

The electric subsector in Panama is supported by the National Dispatch Center, the Public Utilities Regulating Entity, and the Energy Policies Commission, which have specific functions to regulate the market; to regulate the sector, to facilitate and to call for bids; commercial coordination and to dictate politics of the market agents, respectively.

Generation: Panama had around 1,318 MW of installed capacity for the year 2003 (not including the autogeneration by the Panama Canal Authority of 173.5 MW). Of these, 746 MW were based on hydraulic generation and 572 MW in thermal generation.

At present, four private enterprises control the 979 MW that belonged to the Hydraulic Resources and Electrification Institute (IRHE), the previous state electric business, i.e.: EGE Bahia Las Minas (property of ENRON), which controls 280 MW of thermal generation, AES Panama (property of AES) with 488.8 MW of installed capacity (446 hydraulics and 42.8 MW thermal), EGE Fortuna (property of the consortium Hidro-Quebec/El Paso Power) proprietor and operator of the Fortuna Hydroelectric Project with 300 MW.

Transmission: Panama is interconnected with Costa Rica and therefore, with Central America. The transmission system is property of the state enterprise ETESA (Electric Transmission Enterprise, S.A.)

Distribution: The distribution of the electric power in Panama is in the hands of three private enterprises that have been formed from the sale of assets that were previously property of the IRHE: the Metro-Western Electric Distribution Enterprise, S. A., the Chiriquí Electric Distribution Enterprise, S.A., and the Elektra Northeastern Distribution Enterprise, S.A.

The Spanish company Union Fenosa presented the winning offering in the bid for 51% of the actions of EDEMET and EDECHI. To Constellation Power, a division of the American consortium Baltimore Gas and Electric, was given the tender of ELEKTRA NORTHEASTERN, S.A., for 51% of its actions.

Legal framework focused toward the renewable energy

The main Panamanian legislation, related to renewable energy, is:

- ◆ *Law N°6* of February 3, 1997, Law by which the Regulatory and Institutional Framework for the Installment of the Electricity Public Service is dictated;
- ◆ *Decree N°22* of June 19, 1998, Regulation to the General Law of Electricity;
- ◆ *Law N°45* of August 10, 2004, establishes an incentives regime for the promotion of the hydroelectric generation systems and of other clean, renewable, and new sources, and dictates other dispositions.

In September of 2003, the Legislation Project 23 for the promotion of renewable energies was presented to the Legislative Assembly. It will soon be submitted to a first debate.

The electric market

The criteria and procedures in force for the purchase of power and/or energy establish a maximum period of 8 years for the contracts' market, nevertheless,

⁴⁹ The Law was left out with respect to other forms of renewable energy

after the fourth year there is a penalty or over-cost above the price offered in the competitive act of free concurrence. This legal disposition affects the structuring of the financial engineering of the projects that require long-term financing and therefore, contracts of longer time period; nevertheless, the objective of this disposition has been to require a better price if the time limit to contract is longer.

The electric generation contracts market according to the terms of an Energy Purchase-Sale Agreement (PPA) with a distribution company is determined by the best price offered in the public acts.

This is an important point in any energy generation project that participates in the market of Panama, because to compete in the open offering for selling firm capacity and energy under the PPA scheme, any developer must offer a market price. At present, the average price of the purchase-selling energy contracts and firm potency is around 6 cents of a dollar by monomic kWh. The energy can also be sold in the commercial market, where the historic reference price has been around 4.8 to 5.0 US\$/kWh. The following Figure presents the current scheme of the electric market in Panama.

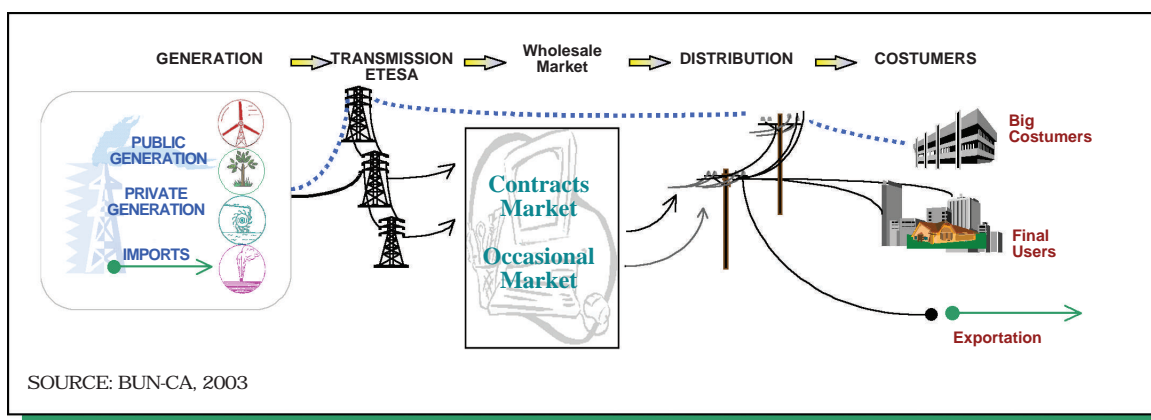


Figure 21. Scheme of the electric market in Panama

Main actions in rural electrification

The most recent data indicate that around 85% of the Panamanian population has access to electric services. In the rural areas, it is estimated that 55% of the population has access to this service. The rural electrification in Panama is responsibility of the Office of Rural Electrification (OER), adhered to the Social Investment Fund (FIS) of the Presidency of the Republic.

Article 95 of the Law N°6 bestows on the Office of Rural Electrification the responsibility to promote the electrification in those rural areas not serviced, not profitable and not concessioned, as well as the function of planning the projects to yearly assign

them, within the Budget of the State, the necessary resources in order to comply with this purpose.

In rural electrification, during the period 2000 to 2002, there was an investment in infrastructure of B/.7.4 million incorporating more than 6,538 homes to the electric service. The national level of electric service coverage is 81% based on a national census of the year 2000 and by means of the PLANER project (FIS/OER) it is contemplated to enlarge the coverage to 95% in a period of 10 to 12 years requiring an investment in infrastructure of more than B/.85 million. It is contemplated to carry out a study through non refundable technical cooperation sponsored by IADB to establish the bases for the development of the

PLANER to be initiated in the year 2004. It is also contemplated by means of the corresponding feasibility study carried out by the Mitsubishi Research Institute, the electric service coverage in remote areas by means of photovoltaic cells or solar energy, through the project PELESADE with the participation of Universidad Tecnológica de Panama, the FIS/OER, the Ministry of Education, the COPE/MEF and the Ministry of Health. The study contemplates the electric service coverage of 800 schools, 62 health centers, and 121 sustainable farms.

4.8.2 *National CDM Policy*

Ratification of the UNFCCC
Date Signed: March 18, 1993
Ratification Date: May 23, 1995

Kyoto Protocol
Date Signed: June 8, 1998
Ratification Date: March 5, 1999

By the Article 79 of the Law N°41, “General Law of Environment”, Panama recognizes that the absorption of carbon is an environmental service provided by the forests. In this way, the country hopes to establish the necessary mechanisms to obtain the financial and economic advantages promoted by the flexible mechanisms of the Kyoto Protocol for the forest sector.

The National Authority of the Environment (ANAM), besides being responsible of elaborating, coordinating and overseeing the execution of the national policies of climate change, has created, according to the Resolution N°AG-0040-2001, of February 14, 2001 of the ANAM, the National Climate Change Program responsible for assisting in the execution of the activities and commitments acquired by the Republic of Panama as a consequence

of the ratification of United Nations Framework Convention on Climatic Change and of the Kyoto Protocol.

One of the fundamental components of the National Program of Climate Change of Panama is the Subprogram of National Inventories and Mitigation of Greenhouse Gases. This component lodges the National Inventory of Greenhouse Gases and is responsible for maintaining a registration of the national mitigation project activities endorsed and periodically certified, to to be presented by the ANAM before the international institutional regime, through National Communications.

Additionally, like a NGO with legal jurisdiction, the Panamanian Foundation of Environmental Services (FUPASA), has been created to execute the activities related to the carbon emissions reductions in the country. FUPASA, in contribution with the Environmental National Authority (ANAM) has developed a regulation for the implementation of the article 79 of the General Law of the Environment and its adaptation to the flexible mechanisms of the Kyoto Protocol.

The Focal Point of CDM and CC in Panama is:

u Eduardo Reyes, SubAdministrador ANAM
E-mail: e.reyes@anam.gob.pa
Tel: (507) 315-1117 / 315-0663
<http://www.anam.gob.pa/adecucion/cambioclimatico/index2.htm>.

It can also be contacted:

u Lic. Luis Villareal, Director de FUPASA
E-mail: pespanama@cwpanama.net
Tel: (507) 270-7339

4.8.3 Examples of Renewable Energy Projects

To date, Panama counts on suitable projects for carbon dioxide emissions reduction through the clean development mechanism, the projects are:

Table 33. Projects under the CDM in the energy sector, Panama.

Project	Type	Installed Capacity (MW)	Estimated emissions reductions (tonCO ₂ /year)	Investment (in millions US\$)	Status
Algarrobos	Hydroelectric	11	42.000	15.0	Feasibility
Bajo de Mina	Hydroelectric	25	95.498	90.0	Feasibility
Bayano III	Hydroelectric	85	210.825	57.8	Under Construction
Bonyic	Hydroelectric	30	49.731	57.0	Feasibility
Cerro Tute	Wind	12-20	56.922	N.D.	Pre- Feasibility
La Miel	Wind	12-20	63.247	N.D.	Pre- Feasibility
Dolega	Hydroelectric	3	17.000	3.5	In operation
Estí	Hydroelectric	120	N.D.	N.D.	In operation
Fortuna	Hydroelectric	N.D.	31.500	12.6	Pre- Feasibility
Hornitos	Wind	30	101.000	26.1	Feasibility
Macho de Monte	Hydroelectric	2	12.500	N.D.	In operation
Monte Lirio	Hydroelectric	52	103.787	101.8	Feasibility
Pando	Hydroelectric	33	62.705	62.7	Feasibility
Paso Ancho	Hydroelectric	12	25.947	20.0	Feasibility
Quebro	Hydroelectric	9	10.847	13.1	Pre- Feasibility
Sistema rural	Wind	2-5	N.D.	N.D.	Project Idea
Valle de Antón	Hydroelectric	2	5.700	3.5	In operation
Total		440-459	889.209	463.1	

Source: ANAMA, FUPASA. National Climate Change Programa

At present the Ministry of Economy and Finances, through the Commission of Energy Policy (COPE), is presenting to the Global Environment Fund (GEF), through the UNDP, a national project focused on the removal of barriers for electric generation with wind sources.

This project has as an objective the reduction greenhouse gases produced by electric generation based on thermal sources in the national interconnected system. The estimated result is the installation and set in motion of the first wind generation park with an installed capacity of 25 MW and operated by the private sector. With this project, an annual reduction of emissions of 42.158 tons of CO₂ equivalent⁵⁰ is expected.

4.8.4 *Relevant Organisations*

Energy Policy Commission -COPE.

It was created by means of the Law N°6 of February 3, 1997, "By which the Regulatory and Institutional Framework for the Installment of the Public Utility of Electricity is dictated", is an entity adhered to the Ministry of Economy and Finance, with the purpose of formulating the global policies and defining the strategy of the energy sector in Panama; and whose fundamental objective is to favor the supply of energy to the population that is reliable, diversified, of minimum cost, promoting its efficient use and the development of renewable sources in an environmentally sustainable way, enlarging the coverage and respecting the legal security of the investments. Among others, it has the following functions: i. Formulating, strategically planning and establishing the policies of the energy sector, ii. Overseeing the fulfillment of the energy policies established in the energy sector, and iii. Proposing the necessary legislation

for the adequate enforcement of the energy policies and the execution of the strategy.

More information with:

u Michael Mihalitsianos
Tel: +507 264-8110
Fax: +507 269-3123
E-mail: michaelm@cwpanama.net

National Authority of the Environment-ANAM. It created by means of the Law N°41 of July 1, 1998, like the Autonomous Entity Rector of the State in natural resources and environmental matters, to assure the fulfillment and application of the laws, the regulations and the national policies of the environment. In the setting of its functions, it is represented, before the Executive Body, by the Minsitry of Planning and Economic Policies.

More information with:

u Darysbeth Martínez
Tel: 507+ 315-0855
E-mail: d.martinez@anam.gob.pa
www.anam.gob.pa

Public Utilities Regulating Entity - ERSP. It is an autonomous Agency of the State, created by means of the Law N°26 of January 29, 1996. The Regulating Entity has to its charge the control and fiscalization of the public utilities provision of drinking water, sanitary sewer system, electricity, telecommunications, radio and television, as well as the transmission and distribution of natural gas, with subject to the dispositions of the Law and the respective current sectorial norms in public utilities matter.

More information with:

u Rafael De Gracia
Tel: +507 265-3555 / 265-4619
E-mail: rdegracia@enteregulador.gob.pa
www.enteregulador.gob.pa

Rural Electrification Office-OER. It is a body of the State that functions linked to the Social Investment Fund (FIS), adhered to the Ministry of the

⁵⁰Más información sobre el proyecto con Michael Mihalitsianos; Secretario Ejecutivo, COPE: michaelm@cwpanama.net

Presidency created by means of the Law N°6 of February 3, 1997. The OER has the mission to promote the electrification in the not profitable rural areas, not served and not concessioned; evaluating the options for the installment of the service in the respective area, through market mechanisms, as long as its possible, understanding that the best option will be that which requires the smallest subsidy for initial investment on behalf of the State.

More information with:

- u Jorge Barrios; Director
Tel: +507 207-9322 / 207-9321
E-mail: jbarrios@hotmail.com
www.fis.gob.pa/direcciones/programas/ramas.asp

Electric Transmission Enterprise, S.A.-ETESA. This enterprise is governed by the dispositions of corporation and private rights; its capital is one hundred percent possessed by the State, its main function is the energy transmission activity in Panama. It has its own resources originating from the charges for the transmission service (access and use of the transmission grid), from the integrated operation service of the National Integrated System, from the meteorology and hydrology services and from the basic studies put at the disposal of possible investors.

More information with:

- u José Quiróz
Tel: +507 227-2240 / 225-8900
E-mail: [jquroz@etesa.com.pa](mailto:jquiroz@etesa.com.pa)
www.etesa.com.pa

Electricity Distributor Enterprises: The following distribution enterprises are found in Panama: Electric Distribution Enterprise Chiriquí, S.A. (EDECHI): enterprise dedicated to the electricity distribution activity, it belongs to the Consortium Union FENOSA, and its area of concession undertakes the provinces of Chiriquí and Bocas del Toro. Electric Distribution Enterprise

Metro - Western (EDEMET): enterprise dedicated to the electricity distribution activity in its area of concession in the provinces of Veraguas, Coclé, Herrera, Los Santos, the western sector of the province of Panama and part of the reverted areas (old zone of the Panama Canal), in the province of Panama. This enterprise also belongs to Union FENOSA. Northeastern Electric Distribution Enterprise, S. A. (ELEKTRA NORTHEASTERN): enterprise dedicated to the electricity distribution activity and its area of concession undertakes the provinces of Darién, Colon, and the Eastern and Metropolitan sectors of the Province of Panama, the islands of the Gulf of Panama and the region of San Blas.

Panamanian foundation of Services Environmental FUPASA. It was created by the National Authority of the Environment, the private sector and the organized civil society, on March 23, 1999, like an initiative to strategically position Panama in the emerging market of reduction of greenhouse gases (GHG) by source and absorption. FUPASA is a not-for-profit Foundation, whose main objective is the promotion and channeling of resources and investment that facilitate the implementation of international environmental economic instruments such as the Clean Development Mechanism (CDM), of the Kyoto Protocol, in addition to the development of other environmental services at the national as well as the international level.

More information with:

- u Luis Villareal, Presidente
Tel: +507 270-7339
E-mail: pespanama@cwpanama.net

4.8.5 *List of Contacts, Consultants and Suppliers*

Table 34. List of renewable energy contacts in Panamá.

Name	Enterprise	Specialty	Telephone (507)	E-mail
Michael Mihalitsianos	Comisión de Política Energética	Policies	264-8110	michaelm@cwpanama.net
Eduardo Reyes	Autoridad Nacional del Ambiente	Policies	315-1117 315-0663	e.reyes@anam.gob.pa www.anam.gob.pa
Rafael De Gracia	Ente Regulador de los Servicios Públicos	Policies	265-3555 265-4619	rdgracia@enteregulador.gob.pa
Jorge Barrios	Oficina de Electrificación Rural	Policies	207-9322 207-9321	jbarrios@hotmail.com
José Quiróz	Empresa de Transmisión Eléctrica	Policies	227-2240 225-8900	jquiroz@etesa.com.pa
Oscar Rendoll	Centro Nacional de Despacho	Policies	230-4117	orendoll@etesa.com.pa
Lider Sucre	Asociación Nacional de Conservación de la Naturaleza - ANCON	Project Development	314-0060	lsucre@ancon.org www.ancon.org
Ligia Lobo	Consultora	Project Development	266-9045 234-2433	lmlobo@cwpanama.net
Adonai Rios	ADEMIPP	Project Development	996-0218	ademipp@cwpanama.net
José Luis Saiz	Hidro Panamá, S.A.	Project Development	264-3859	jlsaizv@cwpanama.net
Humberto Rodríguez	Electric Power Panamá, S.A.	Project Development	225-8188	zeolites@cwpanama.net
Freddy Stadlin	Swisscontrol S.A	Supplier	221-5066	fstadlin@swiscontrol.com www.swiscontrol.com
Carlos Rothery	Solarpan, S.A.	Supplier	213-8060	solarpan@bellsouth.net.pa
Orlando Aguilar	Consultor BUN-CA Panamá	Project Development, policies, funding	638-7656 236-4734 603-3710	panama@bun-ca.org oaguilar@fim.utp.ac.pa
Alida Spadafora	UNDP	Project Development	265-0838	alida.spadafora@undp.org

NOTE: The previous list is introductory and is subject to updates. If some interested party wishes to integrate, please send a note to GSN: info@greenstream.net.

5 INTERNATIONAL CARBON MARKET

This Chapter explains briefly the current state and likely future trends of the international carbon market. Emphasis is given to the project-based transactions, especially to Certified Emission Reductions (CERs).

5.1 Background

Because of existing or expected regulations or for voluntary reasons, many governments and companies have started to implement measures to reduce greenhouse gas emissions. Greenhouse gases are not local pollutants; they mix up high in the atmosphere affecting the thermal balance of the earth. Therefore for the global climate change the impact of one tonne of CO₂ emitted in Finland is equal to one tonne emitted in Central America. This phenomenon is the basis for the development of the so-called international carbon market, where either emission allowances or emission reductions (such as Certified Emission Reductions) are traded.

The carbon market can be divided at least in two ways. As to the tradable commodities, they can be either:

- u Emission allowances under a cap-and-trade scheme; or
- u Emission reductions based on specific projects.

Assigned Amount Units (AAUs) allocated to Annex I countries under the Kyoto Protocol and the European Emission Allowances (EUAs) allocated to European companies under the European Union Emissions Trading Scheme (EU ETS) are examples of emission allowances. In both cases, a cap is given for emissions and an amount of allowances corresponding to that cap is allocated. In the case of the Kyoto Protocol, the Annex I countries have a defined Assigned Amount, which is the cap of the greenhouse gas emissions for a country; in the case of the EU ETS, the companies included in the scheme have an established cap based on the national allocation plan. In a cap-and-trade system a participant, whose emissions are below its

allocated amount, can sell the excess allowances to a participant whose emissions exceed its allocated amount. In the end of a budget period a participant must always surrender allowances corresponding to its actual emissions.

Emission reductions are tradable commodities that are based on a hypothetical baseline, i.e. what would have happened in the absence of an emissions reduction project that was implemented. Joint Implementation (JI) and Clean Development Mechanism (CDM) in the Kyoto Protocol are examples of project-based emission reduction mechanisms.

Another way to divide the carbon market is based on the regime where the carbon commodities are used. In this way, the tradable commodities can be divided for example in Kyoto-compliant and non-Kyoto-compliant instruments.⁵¹ Non-Kyoto-compliant tradable instruments include for instance verified emission reductions (VERs) used voluntarily by some companies for marketing purposes, for demonstrating good corporate citizenship, or for developing special “climate-neutral” products or brands. Also regulations in countries not intending to ratify the Kyoto Protocol (notably some States in the USA and Australia) create markets for non-Kyoto-compliant carbon commodities.

Another environmental commodity which has a lot in common with emission allowances and emission reductions is the green electricity certificate or guarantee of origin. This

⁵¹As the Kyoto Protocol is not in place yet, the Kyoto-compliant commodities are often referred to as pre-Kyoto-compliant.

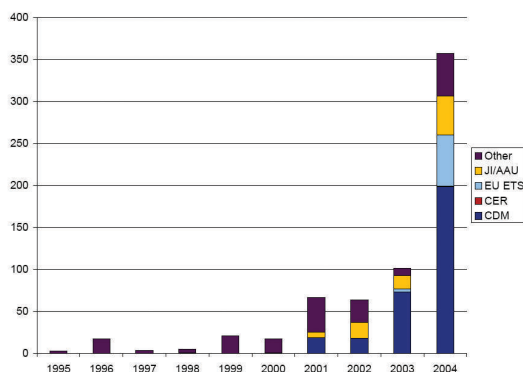
market is based on certificates or guarantees which are given to electricity producers using renewable sources for power generation. Often one certificate is given for each megawatt-hour of electricity generated from renewable source. These certificates are then traded both in voluntary and in regulatory markets. More information on renewable certificates can be found at www.recs.org.

In the following, the carbon market is analysed with a special emphasis on the market for Certified Emission Reductions (CERs) generated by CDM projects.

5.2 Volume of the Carbon Market

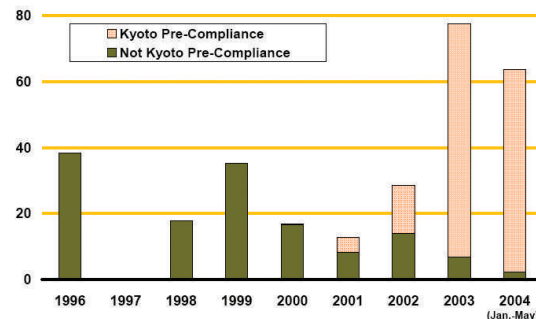
First known carbon transactions occurred already in 1995. Figure 20 shows how the market has developed. In 2003, the net present value of the transactions was estimated at EUR 100 million. The share of the CDM projects was about EUR 75 million. The market for 2004 is estimated to grow to some EUR 350 million, out of which EUR 200 million corresponds to CDM transactions.

Figure 22. Historical value of the known carbon transactions. Figures in million € using a 7% discount rate for forward transactions. Source: Point Carbon. Outlook for 2004: An update. (www.pointcarbon.com).



In terms of volume of CO₂e traded, about 30 million tonnes of project-based emission reductions were traded in 2002 and almost 80 million tonnes in 2003 (see Figure 23).

Figure 23. Volume of project-based emission reductions traded in million tCO₂e. Source: the World Bank. State and Trends of the Carbon Market 2004. (www.carbonfinance.org).



5.3 Buyers and Sellers in the Carbon Market

As said earlier, the shift in the projects has been towards Kyoto (pre-) compliance projects, which means that the majority of the projects is today implemented either in the developing or the transition countries. Figure 24 shows the location of the projects in volume terms. It can be seen that Latin America has been the leading area with 40% of all volumes over the period 2002-03. Asia is rapidly increasing its share of the projects, however. In the period 2003-2004 countries like India, China and Southeast Asian countries already accounted for 51% of the contracted volumes.

Traditionally the Government of the Netherlands and the Prototype Carbon Fund managed by the World Bank have been the most important buyers of CERs in the international carbon market. The balance is, however, quickly changing and last year Japanese companies made also a significant amount of carbon transactions (see Figure 25). In the near future, it can be expected that European companies will play an important role in the carbon market as buyers. This is because of the recently-approved linking directive that links CERs from CDM projects and ERUs from JI projects into the European Union Emissions Trading Scheme.

Figure 24. Location of emission reduction projects (share of volume of ERs supplied). Source: the World Bank. State and Trends of the Carbon Market 2004. (www.carbonfinance.org).

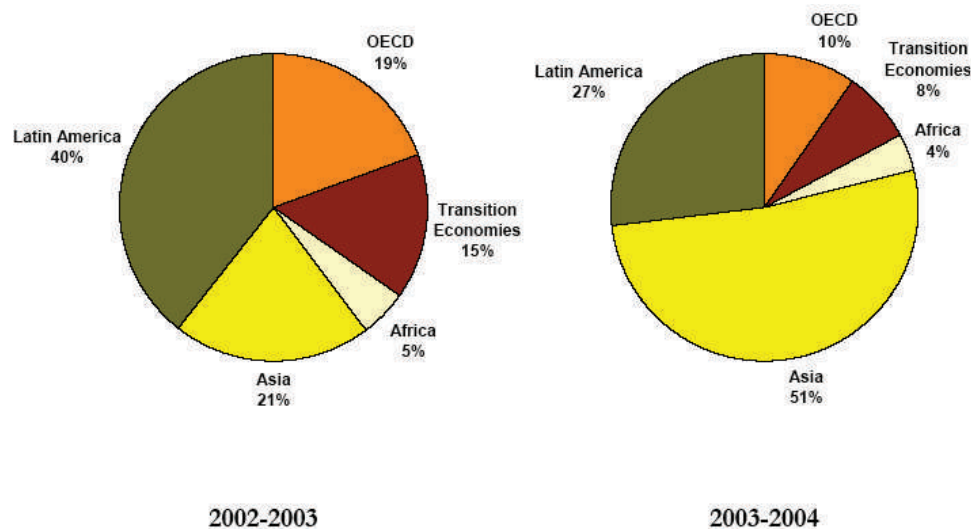
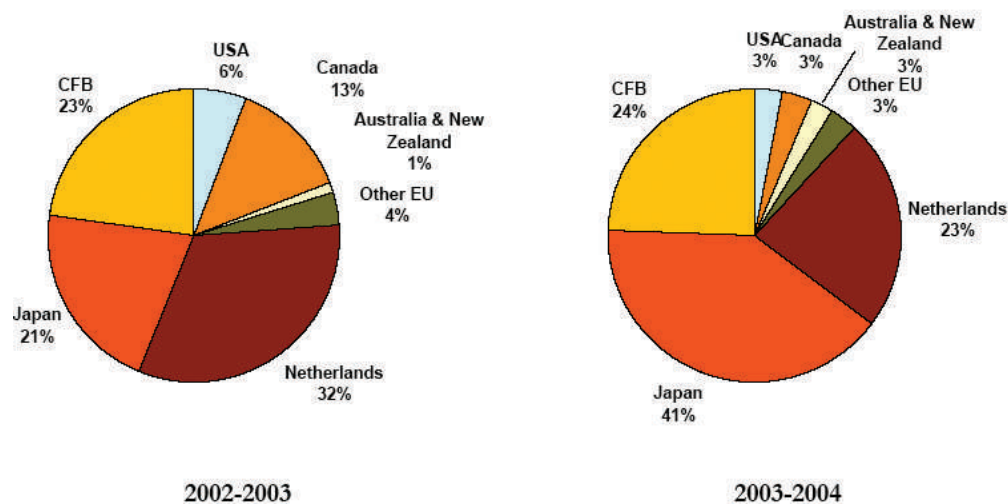


Figure 25. Market buyers (share of volume of ERs purchased). Source: the World Bank. State and Trends of the Carbon Market 2004. (www.carbonfinance.org). CFB = Carbon Finance Business, i.e. mainly PCF and CDCF).

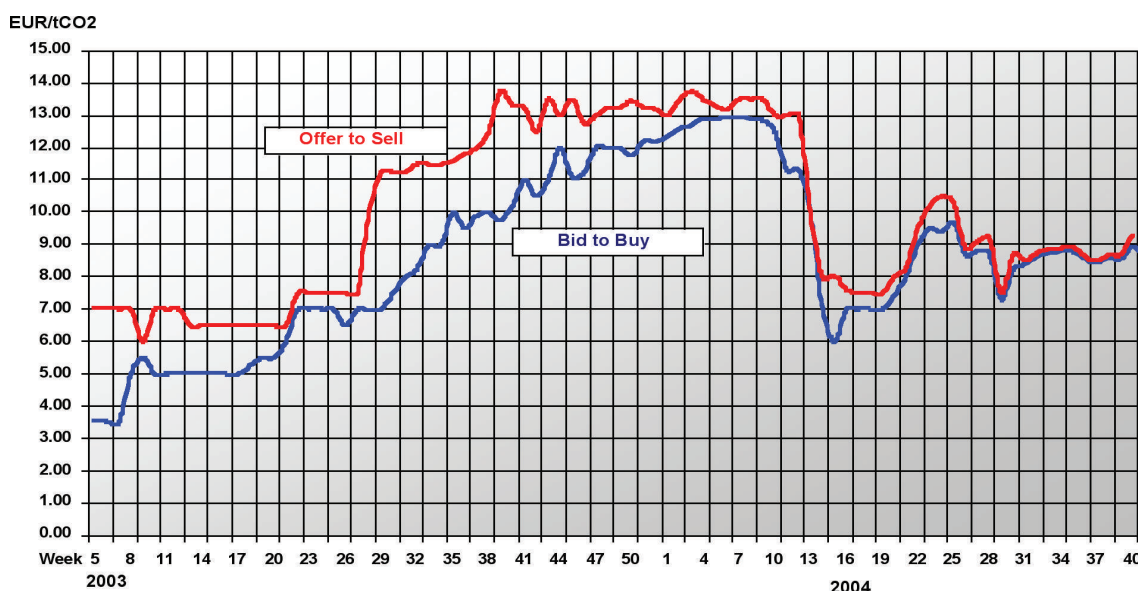


5.3.1 CERs in the EU Emissions Trading Scheme

When the EU Emissions Trading Scheme (EU ETS) starts in 2005, it will be the world's largest carbon market. Approximately 15,000 installations in energy, cement, metal, pulp and paper and other industries will be allocated EU emission allowances (EUAs). Some 2 billion allowances will be allocated yearly for the first trading period 2005-2007.

Forward trading with EU Allowances has already started and it is expected that some 8 million tCO₂e will be traded in 2004. Figure 24 shows the prices for EUAs in 2004-2005. The prices have varied between \approx 3.50 and \approx 14.00. It is important to note, however, that the market is not yet liquid and single trades can have a major impact on the price.

Figure 26. Price volatility for the EU Allowances (EUAs) in 2003-2004. The bids and offers are forwards of 2005 EUAs. Source: GreenStream Network Ltd.



The ETS directive recognizes the need to link project-based emission reductions, such as CDM and JI, into the EU ETS. The exact rules are set out in the so-called linking directive, which amends the EU ETS directive. The linking directive was formally approved by the Council of European Union on 13 September 2004 and its official publication is expected to happen soon. The EU member states have 12 months to implement the changes required by the linking directive once it has been published.

The principal features of the linking directive are:

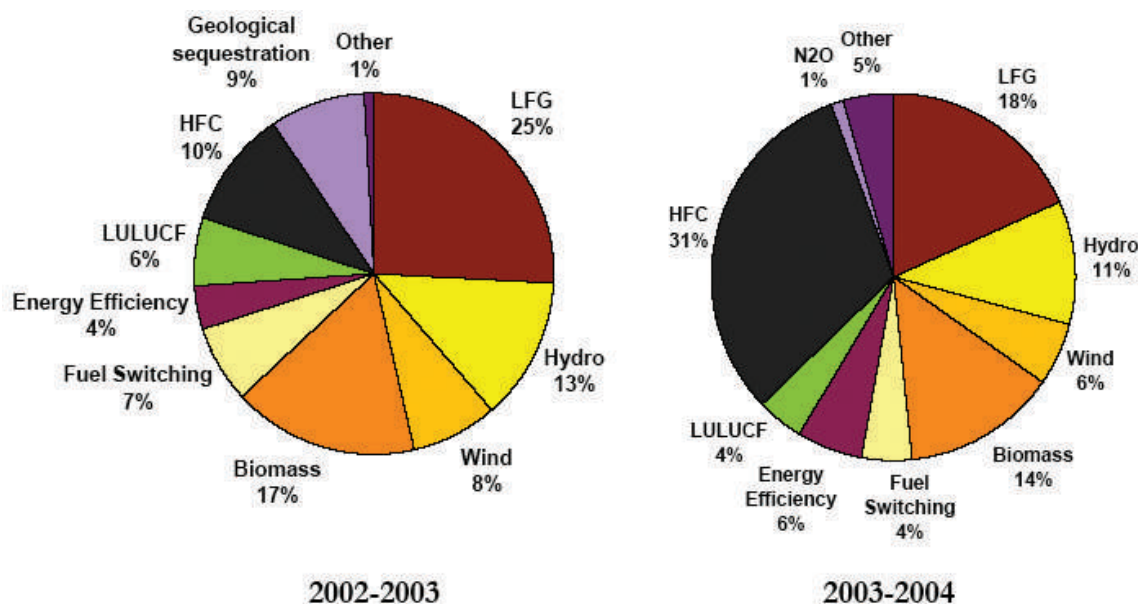
- u EU member states may allow companies to use CERs for compliance starting from 2005 and ERUs starting from 2008. CERs and ERUs are converted into EUAs in the national registry and the resulting EUAs are immediately redeemed for compliance purposes;
- u CERs from nuclear projects are excluded, as well as tCERs and ICERs from sinks projects for the time being;

- u Hydroprojects exceeding 20 MW must fulfil the guidelines of the World Commission on Dams;
- u Each member state must establish a maximum amount of CERs and ERUs which may be used as a percentage of the initial allocation for each installation during the period 2008-2012.

5.4 Technologies in the Projects

Figure 27 shows the distribution of emission reduction projects contracted among different technologies. It can be seen that landfill gas related projects had the largest share in 2002-03 followed by biomass and hydropower projects. In 2003-04, however, the amount of HFC (Hydrofluorocarbons) projects has increased significantly. This is mainly due to the enormous Global Warming Potential (GWP) of these greenhouse gases. The two very first CDM projects that are currently requesting registration are both related to the destruction of a very potent greenhouse gas HFC23, which has a GWP of 11,700 (each tonne of HFC23 corresponds to 11,700 tCO₂e).

Figure 27. Technology share of emission reduction projects (in percent of total volume contracted). Source: the World Bank. State and Trends of the Carbon Market 2004. (www.carbonfinance.org). LFG = Landfill Gas, HFC = Hydrofluorocarbons, LULUCF = Land-use, Land-use Change and Forestry.



5.5 Non-Kyoto Regimes

Besides the Kyoto Protocol (and EU ETS which is legally independent of Kyoto but closely tied to it), there are some other markets for verified emission reductions. Generally, the prices paid in these markets are lower than the prices for CERs (except maybe for some segments of the retail market). On the other hand, the rules and regulations for the verification of the emission reductions may also be easier to fulfil. As examples of such non-Kyoto systems we can mention Chicago Climate Exchange, New South Wales GHG Abatement Scheme, The Climate Trust and the retail market.

The Chicago Climate Exchange (CCX) is a pilot GHG cap-and-trade system in which a group of North American companies have voluntarily agreed to limit their GHG emissions. These companies can comply through internal reductions, purchase of allowances from other companies facing emission limitations, or purchase of credits from ER projects that meet specific criteria.

The prices in CCX have been between USD 0.75-1.00 per tonne. More information on CCX can be found at www.chicagoclimateex.com.

The New South Wales (NSW) GHG Abatement Scheme in Australia imposes mandatory greenhouse gas benchmarks on all NSW electricity retailers and other parties. Participants are required to reduce their GHG emissions by offsetting their excess emissions through the surrender of so-called abatement certificates. These certificates are created by accredited abatement certificate providers and can be traded. The penalty level is AUD 10.50 and the spot prices have been between AUD 10.00-10.60 due to shortage of offer on the market. More information can be found at www.greenhousegas.nsw.gov.au.

The Climate Trust in Oregon, USA (www.climatetrust.org) is a non-profit organisation established in 1997 as Oregon Climate Trust. The Trust plays a key role in implementing which requires new power plants to offset approximately 17% of their carbon

dioxide emissions. A plant developer may choose to meet part or all of its reduction target by paying funds to the Climate Trust, which uses the funds to buy emission reductions. The price in the Climate Trust has been about USD 2.00 per tonne in average.

The Retail Market refers to individuals, corporations and events that purchase small volumes of emission reductions from projects that have consumer appeal. These ERs are not usually intended for compliance, although they may have been generated in compliance with CDM or JI procedures. Instead, their purpose is to demonstrate concern about climate change and to take some responsibility for the impact of corporations and businesses on climate in a transparent and responsible way. The retail market is growing rapidly and often pays a premium for ERs that will be achieved within a year or so of purchase. Prices for reductions from small projects with a strong sustainable development contribution command premiums in the marketplace, with prices ranging from US\$5–12/tCO₂e.

ANNEX I – ARTICLE 12 OF THE KYOTO PROTOCOL

1. A clean development mechanism is hereby defined.
2. The purpose of the clean development mechanism shall be to assist Parties not included in Annex I in achieving sustainable development and in contributing to the ultimate objective of the Convention, and to assist Parties included in Annex I in achieving compliance with their quantified emission limitation and reduction commitments under Article 3.
3. Under the clean development mechanism:
 - a. Parties not included in Annex I will benefit from project activities resulting in certified emission reductions; and
 - b. Parties included in Annex I may use the certified emission reductions accruing from such project activities to contribute to compliance with part of their quantified emission limitation and reduction commitments under Article 3, as determined by the Conference of the Parties serving as the meeting of the Parties to this Protocol.
4. The clean development mechanism shall be subject to the authority and guidance of the Conference of the Parties serving as the meeting of the Parties to this Protocol and be supervised by an executive board of the clean development mechanism.
5. Emission reductions resulting from each project activity shall be certified by operational entities to be designated by the Conference of the Parties serving as the meeting of the Parties to this Protocol, on the basis of:
 - a. Voluntary participation approved by each Party involved;
 - b. Real, measurable, and long-term benefits related to the mitigation of climate change; and
 - c. Reductions in emissions that are additional to any that would occur in the absence of the certified project activity.
6. The clean development mechanism shall assist in arranging funding of certified project activities as necessary.
7. The Conference of the Parties serving as the meeting of the Parties to this Protocol shall, at its first session, elaborate modalities and procedures with the objective of ensuring transparency, efficiency and accountability through independent auditing and verification of project activities.
8. The Conference of the Parties serving as the meeting of the Parties to this Protocol shall ensure that a share of the proceeds from certified project activities is used to cover administrative expenses as well as to assist developing country Parties that are particularly vulnerable to the adverse effects of climate change to meet the costs of adaptation.
9. Participation under the clean development mechanism, including in activities mentioned in paragraph 3(a) above and in the acquisition of certified emission reductions, may involve private and/or public entities, and is to be subject to whatever guidance may be provided by the executive board of the clean development mechanism.
10. Certified emission reductions obtained during the period from the year 2000 up to the beginning of the first commitment period can be used to assist in achieving compliance in the first commitment period.

Annex II – Small-scale CDM project Design Document

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.
7. A small-scale project activity with different components eligible to be proposed⁵²

⁵² 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”.

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).

CONTENTS

- A. General description of project activity
- B. Baseline methodology
- C. Duration of the project activity / Crediting period
- D. Monitoring methodology and plan
- E. Calculation of GHG emission reductions by sources
- F. Environmental impacts
- G. Stakeholders comments

Annexes

Annex 1: Information on participants in the project activity

Annex 2: Information regarding public funding

- 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:

(Please state briefly how anthropogenic greenhouse gas (GHG) emission reductions are to be achieved (detail to be provided in section B.) and provide the estimate of total anticipated reductions in tonnes of CO₂ equivalent as determined in section E. below.)

- A.4.4 Public funding of the project activity:

(Indicate whether public funding from Parties included in Annex I is involved in the proposed project activity. If public funding from one or more Annex I Parties is involved, please provide information on sources of public funding for the project activity in annex 2, including an affirmation that such funding does not result in a diversion of official development assistance and is separate from and is not counted towards the financial obligations of those Parties.)

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

(Please refer to appendix C to the simplified M&P for the small-scale CDM project activities for guidance on how to determine whether the proposed project activity is not a debundled component of a larger project activity.)

B. Baseline methodology

B.1 Title and reference of the project category applicable to the project activity:
(Please refer to the UNFCCC CDM web site for the most recent list of the small-scale CDM project activity categories contained in appendix B of the simplified M&P for small-scale CDM project activities.)

B.2 Project category applicable to the project activity:
(Justify the choice of the applicable baseline calculation for the project category as provided for in appendix B of the simplified M&P for small-scale CDM project activities.)

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)*

(Justify that the proposed project activity qualifies to use simplified methodologies and is additional using attachment A to appendix B of the simplified M&P for small-scale CDM project activities.)

(National policies and circumstances relevant to the baseline of the proposed project activity shall be summarized here as well.)

B.4 Description of the project boundary for the project activity:
(Define the project boundary for the project activity using the guidance 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.)

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:

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

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

(Please provide contact information and indicate if the person/entity is also a project participant listed in annex 1 of this document.)

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).

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.)*

C.2 Choice of the crediting period and related information: *(Please underline the selected option (C.2.1 or C.2.2) and provide the necessary information for that option.)*

(Note that the crediting period may only start after the date of registration of the proposed activity as a CDM project activity. In exceptional cases, the starting date of the crediting period can be prior to the date of registration of the project activity as provided for in paragraphs 12 and 13 of decision 17/CP.7 and in any guidance by the Executive Board, available on the UNFCCC CDM web site.)

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):*

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.):*

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

(The monitoring plan shall incorporate a monitoring methodology specified for 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 and represent good monitoring practice appropriate to the type of project activity.)

The monitoring plan shall also provide information on the collection and archiving of the data specified in appendix B of the simplified M&P for small-scale CDM project activities to:

- Estimate or measure emissions occurring within the project boundary;*
- Determine the baseline, as applicable;*
- Estimate leakage, where this needs to be considered.*

Project participants shall implement the registered monitoring plan and provide data, in accordance with the plan, through their monitoring reports.

Operational entities will verify that the monitoring methodology and plan have been implemented correctly and check the information in accordance with the provisions on verification. This section shall provide a detailed description of the monitoring plan, including an identification of the data to be collected, its quality with regard to accuracy, comparability, completeness and validity, taking into consideration any guidance contained in the methodology, and archiving of the data collected.

Please note that monitoring data required for verification and issuance are to be kept for two years after the end of the crediting period or the last issuance of CERs for this project activity, whichever occurs later.

An overall monitoring plan that monitors performance of the constituent project activities on a sample basis may be proposed for bundled project activities. If bundled project activities are registered with an overall monitoring plan, this monitoring plan shall be implemented and each verification/certification of the emission reductions achieved shall cover all of the bundled project activities.)

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

(Please refer to the UNFCCC CDM web site for the most recent version of the indicative list of small-scale CDM project activities contained in appendix B of the simplified M&P for small-scale CDM project activities.)

(If a national or international monitoring standard has to be applied to monitor certain aspects of the project activity, please identify this standard and provide a reference to the source where a detailed description of the standard can be found.)

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

(Justify the choice of the monitoring methodology applicable to the project category as provided for in appendix B.)

D.3 Data to be monitored:

(The table below specifies the minimum information to be provided for monitored data. Please complete the table for the monitoring methodology chosen for the proposed project activity from the simplified monitoring methodologies for the applicable small-scale CDM project activity category contained in appendix B of the simplified M&P for small-scale CDM project activities.

Please note that for some project categories it may be necessary to monitor the implementation of the project activity and/or activity levels for the calculation of emission reductions achieved.

Please add rows or columns to the table below, as needed)

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

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

(Please provide contact information and indicate if the person/ entity is also a project participant listed in annex 1 of this document.)

E. Calculation of GHG emission reductions by

E.1 Formulae used:

(In E.1.1 please provide the formula used to calculate the GHG emission reductions by sources in accordance with the applicable project category of small-scale CDM project activities contained in appendix B of the simplified M&P for small-scale CDM project activities.

In case the applicable project category from appendix B does not indicate a specific formula to calculate the GHG emission reductions by sources, please complete E.1.2 below.)

E.1.1 Selected formulae as provided in appendix B:

(Describe the calculation of GHG emission reductions in accordance with the formula specified for the applicable project category of small-scale CDM project activities contained in appendix B of the simplified M&P for small-scale CDM project activities.)

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: *(for each gas, source, formulae/algorithm, emissions in units of CO₂ equivalent)*

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 *(for each gas, source, formulae/algorithm, emissions in units of CO₂ equivalent)*

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

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 CO₂ equivalent)*

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:

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

F. Environmental impacts

F.1 If required by the host Party, documentation on the analysis of the environmental impacts of the project activity: *(if applicable, please provide a short summary and attach documentation)*

G. Stakeholders comments

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

G.2 Summary of the comments received:

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

Annex 1

CONTACT INFORMATION FOR PARTICIPANTS IN THE PROJECT ACTIVITY

(Please repeat table as needed)

Organization:	
Street/P.O.Box:	
Building:	
City:	
State/Region:	
Postcode/ZIP:	
Country:	
Telephone:	
FAX:	
E-Mail:	
URL:	
Represented by:	
Title:	
Salutation:	
Last Name:	
Middle Name:	
First Name:	
Department:	
Mobile:	
Direct FAX:	
Direct tel:	
Personal E-Mail:	

Annex 2

INFORMATION REGARDING PUBLIC FUNDING

ANNEX III – SELECTED TECHNICAL ASSISTANCE FUNDING FOR PROJECT DEVELOPMENT

Institution	Technical assistance	Link to guidelines / contact details	Link to guidelines / contact details
Central American Bank for Economic Integration (CABEI)	Project Preparation Facility of USD 5 million	Eligible countries: Costa Rica, El Salvador, Guatemala, Honduras, Nicaragua The facility is tied to the global lines of credits for each country. CABEI has offices in Costa Rica, El Salvador, Guatemala, Honduras and Nicaragua.	www.bcie.org
Development Bank (CDB)	Pre-investment and pre-feasibility studies can be financed by the Basic Needs Trust Fund (BNTF)	Eligible country: Belize Community Groups, Non-Government Organisations, Government Organisations and Agencies and Community-Based Organisations may apply by using the available at the website.	www.caribank.org Caribbean Development Bank P.O. Box 408 Wilkey, St. Michael Barbados, W.I. Tel. +246-431 1600 Fax +246-426 7269 info@caribank.org Belize office: BNTF Office c/o Social Investment Fund Constitution Drive P.O. Box 459 Belmopan Cayo District, Belize Tel: 501-822-0239/0508 Fax: 501-822-0279
World Bank Trust Funds	Various types of technical assistance in the pre-investment stage	Several funds with different specific targets and criteria which may be obtained by contacting each fund.	http://www.worldbank.org/rmc/tf/
World Bank Trust Funds	Technical assistance, specific studies	ESMAP is a trust fund under the World Bank. It is a global technical assistance program which provides policy advice on sustainable energy development to governments of developing countries. ESMAP also contributes to the transfer of technology and knowledge in energy sector management and the delivery of modern energy services to the poor.	http://www.worldbank.org/rmc/tf/
Inter-American Development Bank (IADB)	Technical Co-operation Program	Special priority for project development within environment and small scale finance.	www.iadb.org

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Inter-American Development Bank (IADB)	Technical Co-operation Program	Special priority for project development within environment and small scale finance.	www.iadb.org
Multilateral Investment Fund (MIF)	Technical assistance grants	MIF is part of the IDB Group. Support for small-scale interventions and pilot projects	www.iadb.org/mif
Nordic Project Fund (NOPEF)	Interest free loans and grants for project development	For projects outside Europe. Requires strong Nordic interest, applicants must be companies that operate in the Nordic region. Loans may cover up to 40% of approved development expenses Covers: feasibility studies, evaluation of potential business partners, financial analysis and documentation preparation, legal assistance, contract negotiations	www.nopef.com
Ministry for Foreign Affairs of Finland: EIT Appropriation	Technical assistance for feasibility studies, training, acquisition of expert services and planning costs	Eligible applicants: Finnish companies for economic, industrial and technological projects in developing countries. May cover up to 50% of the project development, and the applicant must normally cover the remaining costs.	www.formin.fi

ANEX IV - EQUITY, GRANTS AND LOANS

Institution	Financial Instruments	Main terms and criteria for achieving finance	Link to guidelines/ contact details
Central American Bank for Economic Integrations (CABEI)	Direct loans Co-financing Guarantees Micro-finance through intermediaries Special facility for sustainable development	Eligible countries: Costa Rica, El Salvador, Guatemala, Honduras, Nicaragua	www.bcie.org CABEI has headquarters in Honduras. CABEI has offices in Guatemala, El Salvador, Costa Rica and Nicaragua. Tel: (504) 240-2243
Caribbean Development Bank (CDB)	Direct loans Co-finance	Eligible country: Belize	www.caribank.org Caribbean Development Bank P.O. Box 408 Willey, St. Michael Barbados, W.I. Tel. +246-431 1600 Fax +246-426 7269 info@caribank.org Belize office: BNTF Office c/o Social Investment Fund Constitution Drive P.O. Box 459 Belmopan Cayo District, Belize Tel: (501) 822-0239/0508 Fax: (501) 822-0279
Corporación Andina de Fomento (CAF)	Loans Project structuring and financing Co-financing Guarantees Equity investments	Eligible country: Panama	www.caf.com
Inter-American Development Bank (IADB)	Loans Guarantees Grants	IDB supports economic and social development and regional integration in Latin America and the Caribbean. It does so mainly through lending to public institutions, but it also funds some private projects, typically in infrastructure and capital markets development.	www.iadb.org IDB has headquarters in Washington D.C. It has an office in each of the Central American Countries.
Inter-American Investment Corporation (IIC)	Direct loans Direct equity or quasi-equity investments Credit to local financial intermediaries Guarantees for and investments in capital markets offerings	ICC is part of the IDB Group. IIC's mission is to promote and support the development of the private sector and the capital markets in its Latin American and Caribbean member countries as the institution charged with fostering the development of small and medium-size enterprises to further sustainable economic development. All Central American countries are IIC's members.	www.iic.int Central American Regional Office Mr. Gustavo Romero P. O. Box 1142-1007 San José, Costa Rica Tel: (506) 233-2543 Fax: (506) 257-0083 Email: gustavorc@iadb.org

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Multilateral Investment Fund (MIF)	Grants Loans Equity Quasi-equity	MIF is also part of the IDB Group. Its mandate is to support innovative private sector development and improve economic prospects for those less equipped to benefit from market reforms. MIF can provide resources to both public and private sector organizations. Private sector agencies can include non-governmental organizations, industry associations, chambers of commerce, etc. but must be non-profit. Organisations from all the Central American countries are eligible	www.iadb.org/mif MIF has offices in each of the Central American Countries.
International Finance Corporation (IFC)	Loans, equity finance, syndicated loans, risk management products, intermediary finance	The International Finance Corporation (IFC) is a member of the World Bank Group. It promotes sustainable private sector investment in developing countries as a way to reduce poverty and improve peoples' lives. IFC's Project Criteria includes: <ul style="list-style-type: none"> • The project must be located in a developing country that is a member of IFC (all Central American countries); • It must be in the private sector; • It must be technically sound; • It must have good prospects of being profitable; • It must benefit the local economy; and It must be environmentally and socially sound, satisfying as well as those of the host country. 	www.ifc.org
Nordic Development Fund (NDF)	Long-term concessional loans to public sector Financial support for private sector activities: -Subordinated loans -Credit lines via local financing institutions -Equity	Partner countries Honduras and Nicaragua. NDF's activities to support private sector development are not limited to partner countries.	www.ndf.fi P.O. Box 185, FIN-00171 Helsinki Finland
Finnish Fund for Industrial Cooperation (Finnfund)	Equity financing Investment loans Mezzanine financing Guarantees (in exceptional cases) Co-financing	Finnfund is a Finnish development finance company that provides long-term risk capital for private projects in developing countries. Apart from co-investing with Finnish companies Finnfund finances ventures that use Finnish technology, cooperate with Finnish partners on a long-term basis or generate major environmental or social benefits.	www.finnfund.fi P.O. Box 391 FIN-00121 Helsinki Finland Tel. +358 9 348 434 Fax +358 9 3484 3346
E+Co	Debt Equity	E+Co provides early stage seed capital between USD 25,000 – 250,000 for sustainable energy ventures.	www.energyhouse.com E+Co Latin America and Caribbean (LAC) Regional Office Fernando Alvarado, LAC Regional Manager P.O. Box 13443-1000 San José, Costa Rica Tel: (506) 296-3532 Fax: (506) 296-4810 Email: eycolac@amnet.co.cr

Annex V – Carbon Finance

Technical assistance related to carbon finance

Institution	Description	Website
UNCTAD	UNCTAD/Earth Council Institute Carbon Market Programme contains useful information on carbon markets and CDM, including a self-learning course on CDM.	www.unctad.org/ghg
UNDP	UNDP's Energy for Sustainable Development website has many resources, including the UNDP CDM User's Guide	www.undp.org/energy/climate.htm
UNEP	Capacity Development for the CDM (CD4CDM) is UNEP's CDM capacity building programme.	http://cd4cdm.org/unepecdm.htm
UNIDO	UNIDO's Sustainable Energy and Climate Change Programme has various CDM-related capacity building activities	http://www.unido.org/doc/18258
World Bank	World Bank's Carbon Finance Unit has several facilities that provide technical assistance related to carbon finance: - BioCFPlus - PCFPlus - CDCFPlus	www.carbonfinance.org
Comercializadora Eléctrica de Guatemala S.A. (COMEGSA)	Technical assistance for Project preparation in MDL terms and Trading of CER's Eligible countries: El Salvador, Guatemala	www.comegsa.com.gt www.comegsa.net

Carbon finance for projects

Institution	Description	Website
Austrian JI/CDM Programme	The Austrian JI/CDM Programme aims to make a contribution to achieving the Austrian reduction commitment under the Kyoto Protocol through the application of JI and CDM. The first call for CDM projects was closed on 30 September 2004.	www.ji-cdm-austria.at
Canada's CDM and JI Office	CDM and JI Office of the Ministry for Foreign Affairs of Canada.	www.dfait-maeci.gc.ca/cdm-ji/
Cerupt	Cerupt and Erupt programmes buys CERs and ERUs for the Dutch Government. It is currently open only for JI projects.	www.cerupt.nl
CO2e.com	Broker of emission reductions	www.co2e.com
EcoSecurities	Broker of emission reductions	www.ecosecurities.com
EcoSecurities-Standard Bank Carbon Facility	ESSB currently buys emission reductions only from Central and Eastern Europe and Central Asia.	www.essbcarbonfacility.com
Evolution Markets	Broker of emission reductions	www.evolutionmarkets.com
Finnish CDM/JI Pilot Programme	The objective of Finland's CDM/JI Pilot Programme is to gather experiences on CDM and JI. The Pilot Programme is implemented by the and the work is supervised by an	http://global.finland.fi/english/projects/cdm

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	inter-ministerial Steering Committee. The Finnish Environment Institute (SYKE) is responsible for the identification and practical implementation of the pilot projects in co-operation with the relevant ministries.	
GreenStream Network Ltd.	Broker of emission reductions	www.greenstream.net
IFC-Netherlands Carbon Facility (INCaF)	INCaF is an arrangement under which the IFC will purchase GHG emission reductions for the benefit of the Government of the Netherlands from CDM projects.	http://www.ifc.org/ifcext/enviro.nsf/e11ffa331b366c54ca2569210006982f/abb832c91a1ebe0385256ddc0083a4c1?OpenDocument
World Bank	World Bank's Carbon Finance Unit manages several trust funds that purchase CERs from CDM projects: <ul style="list-style-type: none"> - Prototype Carbon Fund (PCF) - Netherlands Clean Development Facility - Community Development Carbon Fund (CDCF) - BioCarbon Fund (BioCF) - Italian Carbon Fund 	www.carbonfinance.org

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