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CONSTANT GROUP LLC
130 West Pleasant Avenue, Suite 165
Maywood, NJ 07607
Phone: (201) 982-0940, Fax: (201) 843-3077
www.constgr.com

Definitional Mission for Latin America and the Caribbean Regional - Renewable Energy Projects in Central America (Costa Rica, El Salvador, Guatemala, Honduras and Panama)

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FINAL REPORT

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Mailing and Delivery Address: 1000 Wilson Boulevard, Suite 1600, Arlington, VA 22209-3901
Phone: 703-875-4357 **Fax:** 703-875-4009 **Web site:** www.ustda.gov **email:** info@ustda.gov

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Acronyms

ACP	Panama Canal Authority
ANAM	Autoridad Nacional del Ambiente (of Panama)
ASEP	Autoridad Nacional de los Servicios Públicos (National Public Service Authority of Panama)
CA	Central America
CABEI (BCIE)	Central American Development Bank (Banco Centroamericano de Integración Económica)
CAFTA- DR	Central American Free Trade Agreement- Dominican Republic
CDM	Clean Development Mechanism
CEL	Comisión Hidroeléctrica del Río Lempa (Public generation company in El Salvador)
CENCE	National Centre for Energy Controlling (of Costa Rica)
CER	certified emission reduction (credits)
CFL	Compact Flurocent Lights
CG	Constant Group LLC
CISA	La Esperanza Hydroelectric Project (in Honduras)
CMS	Cubic meters per second
CNE	National Energy Council (of El Salvador)
CNFL	Compañía Nacional de Fuerza y Luz (of Costa Rica)
CSE	Consejo Subsectoral de Energía (Energy Commission of Costa Rica)
DEE	Dirección de Energía Eléctrica (The Electrical Energy Directorate of El Salvador)
DEI	Diversified Energy International
DM	Definitional Mission
ENEE	Empresa Nacional de Energía Eléctrica (Honduras government electrical power company)
EPR	Empresa Propietaria de la Red (Independent company that implements SIEPAC)
EPR	Empresa Propietaria de la Red (of Costa Rica)
ESPH	Public Services Enterprise of Heredia (public power company in Costa Rica)
EU	European Union
FCN	Fondo Cafetero Nacional (of Honduras)
FTA	Free Trade Agreement
GAUREE	Generación Autónoma y Uso Racional de Energía Eléctrica (of Honduras)
GDP	Gross Domestic Product
GEF	Global Environmental Facility
GSL	Guatemala Solar Group, S.A.
GWh	Gigawatt-hour
HPP	Hydro Power Plant
ICE	Instituto Costarricense de Electricidad (of Costa Rica)
IDB	Inter-American Development Bank

IRHE	State Electricity Company of Panama
JASEC	La Junta Administrativa del Servicio Eléctrico de Cartago (public power company in Costa Rica)
MARNA	The Ministry of Environment and Natural Resources (of El Salvador)
MASL	Meters above sea level
MER	Mercado Electrico Regional (Regional wholesale electricity market)
MINAET	Ministry for Environment, Energy and Telecom (of Costa Rica)
MW	Megawatt
PLC	Programmable logic controller
RE	Renewable energy
RECO	Roatan Electric Company
SCADA	Supervisory control and data acquisition
SEN	National Electricity System (of Costa Rica)
SERNA	Secretaria de Recursos Naturales y Ambiente (Hydro permitting organization in Honduras)
SIEPAC	Sistema de Interconexion Electrica de los Paises America Central (Regional interconnection project)
SIGNET	The General Superintendence of Electricity and Telecommunications (of El Salvador)
SIN	Sistema Interconectado Nacional (National Interconnected Grid)
T&D	Transmission and Distribution
UNEP	United Nations Environmental Program
USAID	U.S. Agency for International Development
U.S. Ex-Im Bank	U.S. Export-Import Bank
USTDA	U.S. Trade and Development Agency
UT	Unidad de Transacciones S.A. de C.V. (El Salvador System Operator)
WB	The World Bank
WTE	Waste-to-Energy

Introduction

The U.S. Trade and Development Agency (USTDA) awarded Constant Group LLC ("CG" or "Consultant") a contract for a Definitional Mission (DM) to evaluate renewable energy potential of five (5) Central American countries, including Honduras, Panama, Costa Rica, El Salvador, and Guatemala.

The consultant traveled to all five countries and met with key sector officials, utilities, associations, and private developers to review current progress and the potential of renewable power developments. The Consultant was required to identify a number of key renewable power projects in each country that are in the initial development stages and could benefit from USTDA involvement. These projects are power generation related and can utilize any of the major renewable technologies, including small hydro, wind, biomass, solar, geothermal, and others.

It should be noted that the Consultant was presented with significant number of potential project opportunities. The Consultant has to prioritize some of the projects based on the national priority, Project Sponsor's objectives, data availability, failure to follow-up, and other factors. Exhibit 1 provides the summary of all projects selected for the detailed write-ups. Exhibit 2 provides details of some projects where the Project Sponsors either did not follow through or identified projects as not being a development priority.

The Consultant selected projects for detailed overview primarily based on the following specific considerations:

- Project meets national and local government development priority for the host country;
- Project has adequate U.S. export potential;
- Project will likely be financed;
- Project has some foreign competitive element that is to be addressed by the USTDA funding of the study; and
- The Project Sponsor is willing to allow U.S. companies to compete for contracts during project implementation.

Exhibit 1 – List of Projects Identified/Selected Under this DM

No.	Country	Name	Project Sponsor	Private/Public	Type	Size
1	Costa Rica	Montecristo Hydro Power Plant	JASEC	Public	Hydro	6 MW
2		Rio Blanco Hydro Power Project	ESPH	Public	Hydro	12 MW
3		Los Leones Wind Farm	ESPH	Public	Wind	40 MW
4		Santo Domingo Waste-to-Energy Power Plant	DEI	Private	Waste-To-Energy	56 MW
5	El Salvador	Mirazalcos Hydro Electric Project	Epsylon3	Private	Hydro	2.2 MW
6		CEL Solar PV Plant	CEL	Public	Solar	1 MW
7		Los Apantes Chacala Hydroelectric Project	Ingendehsa	Private	Hydro	1.5 MW
8		Sumpul Hydroelectric Project	Ingendehsa	Private	Hydro	16 MW
9	Guatemala	GSL Solar Project I - Esquintla	GSL	Private	Solar	10 MW
10		GSL Solar Project II - Champerico	GSL	Private	Solar	15 MW
11		Choloma Hydro Power Plant	Secacao	Private	Hydro	9.5 MW
12		Ona Hydro Power Plant	Secacao	Private	Hydro	30 MW
13		Samuc Hydro Power Plant	Secacao	Private	Hydro	5 MW
14		Three (3) Micro Hydro Power Plants	Anacafe	Private	Micro Hydro	0.1 MW
15	Honduras	Ulua Hydroelectric Project	Gruppo Terra	Private	Hydro	16.6 MW
16		Gualcarque Hydroelectric Project	ENEE	Public	Hydro	9.2 MW
17		Chinacla Hydro Power Project	HIDROSIERRA	Private	Hydro	13.5 MW
18	Panama	Pedregal Power Wind Project	Pedregal Power	Private	Wind	20-40 MW
19		Barro Blanco Hydro Project	PanAm	Private	Hydro	29 MW
20		Cerro Viejo Hydro Project	PanAm	Private	Hydro	4 MW
21		Alto Chagres Hydro Power Plant	ACP (Panama Canal Authority)	Public	Hydro	48 MW

Exhibit 2 –List of Additional Projects Discussed During this DM

No.	Country	Name	Project Sponsor	Private/Public	Type	Size	Notes
1	Costa Rica	Ciruelas Hydro Plant	CNFL	Public	Hydro	2 MW	Limited information provided
2		Brasil II Hydro Plant	CNFL	Public	Hydro	27 MW	Limited information provided
3		Nuesttro Amo Hydro Plant	CNFL	Public	Hydro	11 MW	Limited information provided
4		Airport North Hydro	ESPH	Public	Hydro	17 MW	Not a development priority
5	Guatemala	Several hydro projects identified by Invest Guatemala.	Various sponsors	Private	Hydro	Various	Organization director left company before providing any information
6		Bella Vista Hydro Plant	Developer of GSL Solar Project I	Private	Hydro	65 MW	Project was too big for this DM
7		Pojom I and II Hydro Power Plants	Proyectos y Desarrollos Hidricos, S.A	Private	Hydro	7+17 MW	Limited information provided
8	Honduras	Roatan Island Wind Farm	RECO	Private	Wind	20 MW	Limited information provided
9		Taylor WTE Project	Taylor	Private	Waste-To-Energy	Unknown	Sponsor encountered problems in development
10	Panama	2 more hydro power projects in addition to the 48 MW submitted were mentioned during meetings.	ACP	Public	Hydro	Unknown	Submitted 48 MW project is the highest priority. Remaining two are smaller in size and not high ACP priority.
11		La Cuchilla Hydro Project	PanAm Generating	Private	Hydro	5.8 MW	Not a development priority
12		El Remance Hydro Project	PanAm Generating	Private	Hydro	8 MW	Not a development priority
13		Cuesta de Piedra Hydro Project	PanAm Generating	Private	Hydro	6.78 MW	Not a development priority
14		Unnamed Wind Facility	Choice 1 Energy	Private	Wind	Unknown	Developer did not select a site yet

Costa Rica

Sector Primer – Costa Rica[1]

General[2]

Country Summary	Electricity System Summary
- Territory: 51,100 sq. km; - Population: 4.25 million (2009); - Access to Electricity: 98%; and - Ave GDP per Capita: $11,500 (2008).	- Installed Capacity: 2,095 MW (2008); - Energy Generated: 8,520 GWh (2007); - Peak Demand: 1,390 MW (2007) - Dominant Electricity Resource: Hydro; - Ave res. Tariff: $0.11/kW (2008); - Total generators: 37 (32 private); - Transmission: 1 company; and - Distribution: 8 companies.
Renewable Energy Summary	**Governance Summary**
- Hydro (95% of total energy production); and - Renewable potential – 7,000 MW (6,000 MW hydro with modest wind).	- ICE is the only buyer outside of limited quotas and Coops; - ARESEP – National regulator; - Coops are strong and fairly independent of ICE; - Existing cap on independent project development, outside of coops; and - Coops can generate for serving own territory.

Costa Rica has a total area of 51,100 sq. km, a population of over four million, and a per capita income of about $11,500. It is bordering both the Caribbean Sea and the North Pacific Ocean, between Nicaragua and Panama. Costa Rica has a coastline of 1,290 km in length.

Costa Rica has no domestic fossil energy resources. The installed electrical generating capacity of the National Electricity System (SEN) at the end of 2007, totaled 2,095 MW, with 67% provided by hydro power, 21% by thermal power generating facilities, 9% by geothermal plants and 3% by wind power.

The state-run electrical utility Instituto Costarricense de Electricidad (ICE) controls some 80% of this installed capacity. Private power generators own a share amounting to about 13% of total capacity, while the remaining 7% is run by cooperatives for rural electrification.

Costa Rica is able to meet 96% of its nationwide demand for electricity by utilizing renewable energy sources. Thermal power plants, which make up 21% of the electrical generating capacity in the country, are reserved primarily for use

[1] Sources of information for this primer include: information provided by MINAET, ICE, and Energy-policy Framework Conditions for Electricity Markets and Renewable Energies, GTZ, Dec. 2007;
[2] Some of statistics and estimates are estimated based country discussions and The Central American Carbon Finance Guide.

in times of low precipitation, contributing a share that amounted to slightly more than 3% of the total electric power generated.

The electricity transmission grid in Costa Rica is based on a 230 kV high voltage line system totaling just under 1,000 km in length and 138 kV medium voltage lines measuring some 700 km in total. Energy losses incurred in electricity transmission lie at about 4%. 98% of population have access to electricity.

The envisaged SIEPAC regional transmission is to comprise a central 1,830 km-long 230 kV main line. This should enable the region's interstate grid transmission capacity to grow from 4% of demand to 10%.

Electricity tariffs are generally based on the short-term marginal costs of the country's existing power generating facilities. In comparison with other Central American states, electricity prices remain stable and relatively low in Costa Rica owing to the country's lack of dependence on importing primary energy sources.

Envisaged additions to the nation's electrical generating capacity are spelled out in national plans for expansion of electricity production that are prepared by ICE about every two years. Such efforts are formulated in coordination and agreement with the National Development Plan and National Energy Plan. ICE bases its calculations for planned capacity expansion on a continuing annual increase in demand ranging between 5 and 6%.

According to planning up to 2016, thermally generated electric power is to assume a greater role in the coming years. Plans envision construction of three additional thermal power plants between 2010 and 2015. If all of these projects are indeed implemented, computational analyses by ICE foresee the share of total power generation provided by thermal power plants increasing from just less than 4% today to almost 20%. An assortment of projects has been proposed for the period from 2010 to 2025 for which final selection for implementation remains to be decided. Plans call for installation of 1,400 MW of additional hydro power capacity, 70 MW of new geothermal power generating capacity and a further 180 MW within the scope of wind power projects. In addition to the power plant projects of the state-run electrical utility ICE, the plan also includes projects currently under construction thanks to financing by private investors. As expansion of the country's power generation infrastructure cannot be financed by the state alone, it is anticipated that private investment in the form of BOT (Build-Operate-Transfer) contracts will increase in future.

The electricity market is dominated by the vertically integrated state-owned electrical utility ICE, which was founded in 1949. This company is active in the

fields of power generation, transmission, distribution and marketing. Owing to the fact that the National Centre for Energy Controlling (CENCE) forms an integral part of this enterprise, ICE also assumes the role of system operator.

The power provider Compañía Nacional de Fuerza y Luz (CNFL) was founded in 1941. In 1968, ICE purchased some 98% of the company's shares when the enterprise was nationalized. Private shareholders own the remaining stocks. CNFL is active in the fields of electricity production and distribution. With almost half a million customers throughout the country, it is the largest power distribution company in Costa Rica, serving a 41% share of this market in 2005. This power provider supplies the most densely populated region in the capital city's metropolitan area.

Four cooperatives (Coopelesca, Coope Alfaro Ruiz, Coope Guanacaste and Coope Santos) operate in rural regions of Costa Rica, all of them organized on a not-for-profit basis. The primary objective of these cooperatives is to achieve rural electrification in accordance with Law No. 8345 enacted in the year 2003. Two local power provider enterprises, JASEC in the province of Cartago and ESPH in the city of Heredia, assume similar special positions in the nation's electricity market. The primary task of these local power provider companies is to supply the public with electricity. JASEC was founded in 1964 and is active in electricity production and distribution. ESPH, in existence since 1976, specializes in providing water and electrical power, supplying some 65,000 customers in six of the country's cantons. In addition, there are 27 private generators active in Costa Rica who sell electricity to ICE.

Governmental responsibility and authority for energy policy lies with the Ministry for Environment, Energy and Telecom (MINAET). MINAET leads the Energy Commission (Consejo Subsectoral de Energía), which is composed of the most important institutions and state-run enterprises in the energy sector. These include the Ministry of Science and Technology, the Ministry of Planning and Economic Policy, the regulatory authority ARESEP, the national oil company RECOPE and the national electrical utility ICE. The association ACOPE represents the interests of the private power generation companies.

Renewable Energy

In Costa Rica, no separately defined tariffs are granted for electricity generated from renewable energy sources, such as within the scope of specific instruments of promotion. Nevertheless, utilization and promotion of renewable energy constitute an important guiding principle of national energy policy. The current

National Energy Plan confirms that use and promotion of renewable energy in the electricity sector makes a major contribution to environmental protection. Consequently, the long-term goal set for the electricity market calls for an increase in the share of electricity generated from renewable energy sources (excluding hydro power) to 15%.

In addition, several of the country's major laws stipulate promotion of renewable energy sources. Harnessing of hydro power was defined to be a primary task of the state-owned electricity enterprise ICE, anchored in the company's articles of organization in 1949. Law No. 5961 enacted in 1976 gave ICE a monopoly on research into and use of geothermal energy sources. The country's 1995 Environmental Law states that the state is obligated to investigate the availability of alternative energy sources and to promote their use in order to achieve sustainable economic growth

For the time period up to 2025, the current plan for expansion of electricity production calls for greater exploitation of renewable energy sources, primarily of hydro power, followed by geothermal energy and wind power. To a lesser degree it is also planned to utilize biomass as well, in particular biomass (bagasse). Solar energy, on the other hand, is to play only a marginal role due to the cost factors involved.

Hydro

The technically exploitable hydro power potential of Costa Rica is estimated to amount to 5,800 MW. Feasible exploitability is restricted, however, as some 800 MW of the identified potential lies in national parks where the use of hydro power is prohibited by law. Sites for a further 1,800 MW of potential electrical output are located in areas home to indigenous populations. ICE views implementation of such projects in these regions to be difficult.

Wind

Wind energy potential in Costa Rica is estimated by the government at between 500 and 600 MW. However, ICE is working on the assumption that existing legal restrictions limit the actually exploitable wind power potential to 274 MW, as the harnessing of wind energy (like hydro power) is prohibited in national parks, where many of the suitable sites are located. Wind energy is seen as an appropriate complementary source to hydro power in Costa Rica, as the summer is marked by strong winds that can be exploited to alleviate the consequences of dry periods on hydro power production. ICE began evaluating the national wind

power potential as long ago as the early 1980s. A relatively imprecise study of wind conditions was completed that classifies wind speeds in four ranges.

Movasa wind farm, with a total generating capacity of 24 MW, went on line in 1999. This installation, consisting of 32 turbines each rated at 750 kW, is the property of ERGA, a subsidiary of the Italian utility company ENEL. The purchase contract is with ICE. In 2002 the nation's newest wind farm was put into operation. The state-owned Tejona wind farm is operated directly by ICE. This facility comprises 30 wind turbines from the Danish manufacturer Vestas, each rated at 660kW. ICE itself paid the lion's share ($18.8 million) of the $26 million price tag for the wind farm, while support was received within the scope of a pilot CMD project from the Dutch power provider Essent ($3.9 million) as well as from the GEF ($3.3 million).

Biomass

The energy potential of biomass to generate electricity is estimated by ICE to be 317 MW. Biomass obtained as a by-product of the sugar industry (bagasse) is to be more extensively exploited in future for power generation. Contracts are currently in place for the purchase of surplus electricity generated by the two plants which use Bagasse as a fuel.

Solar

Average daily solar irradiation in Costa Rica reaches a maximum of 5-6 kWh/m2, but is subject to broad fluctuations. Photovoltaic (PV) systems are used in Costa Rica almost exclusively to provide electrification in regions remote from the established grid. The theoretical potential of solar energy in Costa Rica is estimated to be 10,000 MW. Heredia National University has been active in related research since 1977. 1,445 solar energy units for power generation had been installed in the country as of 2006. Almost all of these are deployed in decentralized systems providing a total generating capacity estimated to be 140 kW.

Geothermal

The potential of geothermal power in Costa Rica is estimated by some sources to be as high as 900 MW. In contrast, ICE assumes a potential of only 235MW, as its analysis takes account of restrictive factors. Such restrictions include, first and foremost, the fact that a large number of the suitable sites are located in national parks in the north of the country and that operation of such facilities at these locations is prohibited by law. A legislative initiative that would allow operation

of geothermal installations in national parks has had no success to date. At the end of 2007, Costa Rica had an installed geothermal generating capacity of 165MW, meeting some 9% of total electricity demand.

Opportunities for U.S. Firms[3]

The United States is Costa Rica's main trading partner, accounting for over half of Costa Rica's total imports. According to U.S. Census Bureau trade data, the U.S. had a $1.7 billion trade surplus with Costa Rica in 2008, as compared with surpluses of $637 million in 2007, $288 million in 2006, $183 million in 2005, and a deficit of $27 million in 2004.

While Costa Rica's close trading and investment relationship with the United States has long benefited both nations, it is also expected that the current recession in the U.S. will be felt in Costa Rica after some lag time, and could tend to diminish the level of bilateral trade and investment activity. Already, U.S. tourism to Costa Rica, for example, which drives both local employment and U.S. exports to build and supply the tourist resorts, has fallen off substantially in 2008. Countering that trend, however, is the important fact that the Central America- Dominican Republic-United States Free Trade Agreement (CAFTA-DR) entered into force on January 1, 2009, bringing new interest and opportunity in trade.

Strong growth in electricity demand drives significant amount of new generation projects in Costa Rica. Most of the imports will be in renewable generation (wing, geothermal, hydro), as well as in traditional fossil generation (coal and oil fired units). U.S. companies are fairly competitive in these technologies and should have significant advantages due advanced technologies, CAFTA, and geographical proximity.

Financing Options[4]

Government institutions in Costa Rica obtain much of their project funding from multilateral development banks, such as the IDB and the World Bank (IBRD), and from the two banks' equity investment affiliates, the Inter-American Investment Corporation (IIC) and International Finance Corporation (IFC). The CABEI and the Venezuelan Petroleum Fund (consisting of accumulated interest paid on loans to buy oil from Venezuela) are other sources of project financing in

[3] Some of the discussion in this section is based on 2009 Costa Rica Commercial Guide published by U.S. Department of Commerce
[4] Based on USCS 2009 Country Commercial Guide for U.S. Companies

the region. The U.S. Ex-Im Bank, the Overseas Private Investment Corporation (OPIC), and the World Bank's Multilateral Investment Guarantee Agency (MIGA) are open for business in Costa Rica. Ex-ImBank provides financing for the purchase of U.S. exports and can be an important financing source for U.S. equipment used in major projects. OPIC provides direct loans to smaller U.S. enterprises, loan guarantees for larger projects, equity investment funds to start or expand overseas investment projects involving U.S. participation, and political risk insurance to protect against currency inconvertibility, expropriation, and political violence.

Government procurement and projects financed by the multilateral development banks usually require a public tendering process, pre-feasibility studies, and environmental impact assessments in accordance with Costa Rican law and the relevant bank's regulations. Successful U.S. bidders usually have local representation to ensure compliance with strictly interpreted procedures. Disbursements of loans from the multilateral development banks to the Costa Rica Government are sometimes delayed by the requirement that the legislature ratify the loans, difficulties in obtaining local currency counterpart funds required by the banks, and prolonged administrative processes.

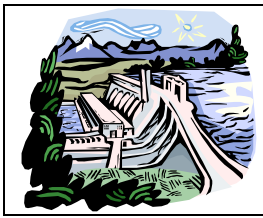
The Costa Rican Government has used concessions as a vehicle to realize large scale infrastructure improvements. The Government hopes to bring private investment into other areas currently monopolized by the state. Investors will be expected to obtain financing in large measure based upon their own creditworthiness and the projected cash flow of their projects.

The Consultant met with CABEI in Costa Rica. Major takeaways are:

- CABEI has significant track record of funding renewable projects (both private and public) in Costa Rica;
- Current pipeline of new projects under consideration includes several wind and hydro projects by ICE, ESPH, CNFL, and rural cooperatives;
- The Bank will fund up to 70% of project debt and can also take equity position;
- The Bank is rarely in for a long term as equity partner and generally tries to get out of it within 5 year window;
- CABEI has interest in further expanding its renewable energy portfolio; and
- Last year the Bank approved $32 million loan for the Pirris Hydro Project, and this year $52 million for HydroBonyic project.

Costa Rica Projects

Project 1 –JASEC 6 MW Montecristo Hydro Power Plant

	**Type: Run-on-river hydro**	**Name: Montecristo Hydro Power Plant**
	Size: 6 MW	**Project Sponsor: JASEC**

Project Background

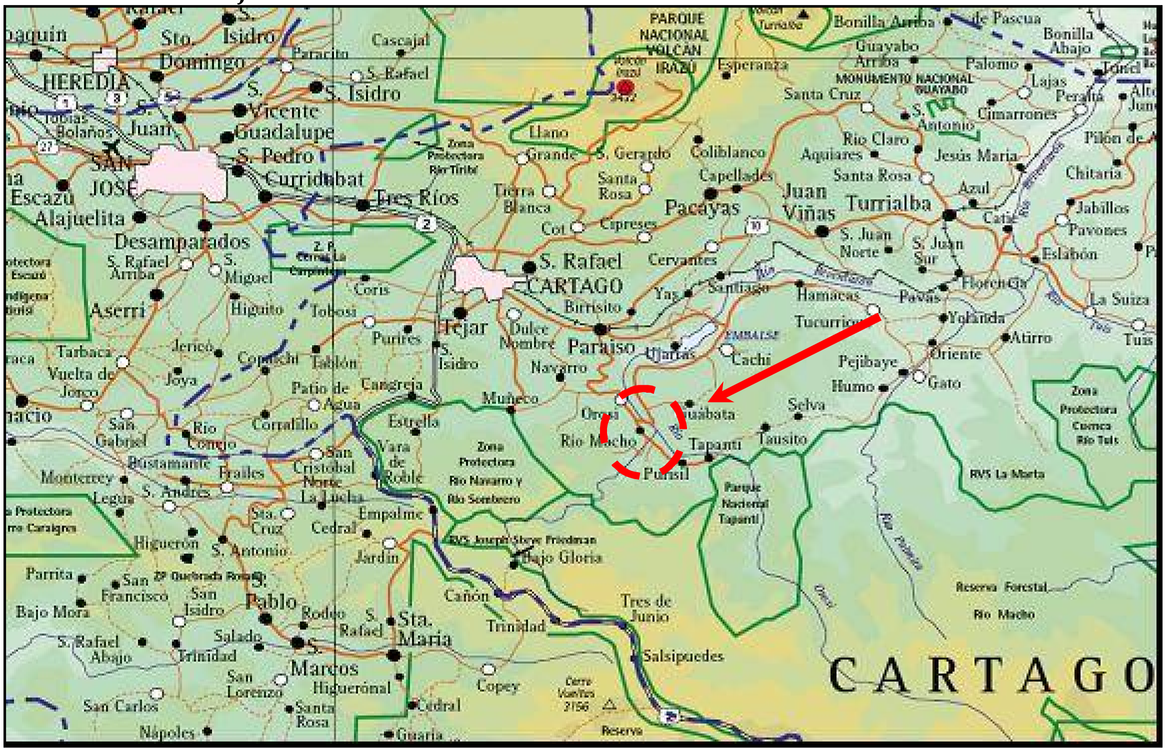
La Junta Administrativa del Servicio Eléctrico de Cartago (JASEC), a public company tasked to achieve rural electrification in accordance with Law No. 8345 enacted in the year 2003 proposed the construction of a 6 MW run-on-river power plant. JASEC operates in the province of Cartago. The primary task of this local power provider company is to supply the public with electricity. JASEC was founded in 1964 and is active in electricity production and distribution. The following project was proposed by JASEC for the development.

The project is located in San Francisco of Cartago, upstream of the site-making plant owned by the Rio Macho ICE, is a stretch of river that is outside national park. This project has elevation of 1660 m.

The proposed dam site is located exactly where the old Montecristo hydro power plant was situated until 1992. Water information available for this site is therefore very accurate and extensive. The project is backed by available 1955-92 hydrological data.

The proposed design flow is 8.2 m3/sec with 500 m of tunnel and 75 m head. The Montecristo Hydroelectric Project is expected to have a capacity of 6 MW generate about 26 GWh per year. Exhibit 1-1 provides the location of the proposed project.

Exhibit 1-1 - Project Location



Project Sponsor's Capabilities and Commitment

The Project Sponsor of the proposed project is JASEC, the municipally-owned utility of Cartago. JASEC's mission is to stimulate the growth and development of the quality of life of the inhabitants of the served zone, across the rendering of services of public interest, competitive worldwide, that overcomes the expectations of the clients.

The statistics reveal that from 1993, JASEC has had an important growth of agreement to the increase of the population in the served area. For example in the Central Canton, the population increased in 34.5 per cent on having happened from 105 392 inhabitants served in 1993 to 137 675 inhabitants in 2007. Another Canton that has had a high index of growth in population is Paraíso that from 24,595 inhabitants served by JASEC happened in 2007 to 43 518. Exhibit 1-2 illustrates the population dynamic in JASEC territory.

Exhibit 1-2 - Quantity of population area of coverage JASEC

Quantity of population				
Cantón	1993	1998	2003	2007 *
Central	105.392	116.732	130.757	137.675
Paraíso	24.595	28.287	40.984	43.518
Alvarado	10.680	11.735	13.078	13.717
Oreamuno	31.372	34.983	41.587	43.886
El Guarco	27.578	31.118	36.291	38.089
Total	**199.617**	**222.855**	**262.697**	**276.885**

The area of coverage is very well definite: Cartago, Oreamuno, El Guarco, Paraíso and Alvarado. The total area of the province of Cartago is 3120 square kilometers, whereas the area of JASEC's coverage is 309 square kilometers, for 10% covered by JASEC. A whole of 276,885 inhabitants receives JASEC's electric power in five served Cantones.

JASEC currently owns and operates Birris Hydroelectric System. The complex of electrical generation Birrís, composed by two plants in waterfall with installed power of 4,4 MW (Birrís III,) 18,6 MW (Birrís I). They are located in Cervantes , Alvarado and Santiago, Paraíso (Cartago).

Additionally, JASEC owns and operates electrical generation of Barro Morado, composed of two plants in waterfall with installed power of 988 kW (3 Pelton Turbines and 4 motor pumps), located in Agua Caliente, Cartago.

JASEC development activities include Toro III Hydroelectric Project (in alliance with ICE) , which will have a capacity of 46 MW. It is located in Venecia, San Carlos, Alajuela.

Implementation Financing

At this stage of the study, the cost of the project implementation is estimated at $20 million. The financing structure is not yet defined. JASEC will most likely be interested in 20-30% equity funding (similar to other projects funded that way) with the rest being funded by multilateral funding. JASEC may not have the balance sheet to fund this project internally.

The consultant has discussed project funding with the Project Sponsor and CABEI. CABEI has acknowledged past cooperation with JASEC on another projects, including Toro III.

CABEI is ready to support this proposed project, assuming its sound economics and required permitting and EIA.

U.S. Export Potential

Most of the export potential for the implementation of this project is in the procurement of hydro power turbines, substation equipment, instrumentation and control systems, and construction and engineering services. The overall estimated project cost is about $20 million for 6MW plant. U.S. exports could be as much as $9 million (45%) level.

The Project Sponsor provided the Consultant with summary estimates, which were developed during the pre-feasibility effort. Consultant believes that these estimates are reasonable and in line with own estimate.

A number of U.S. firms can supply the equipment:

Hydro Turbines:

- Canyon Hydro;
- Voith Siemens Hydro Power Generation;
- American Hydro Corporation;
- The James Leffel & Co.;
- North American Hydro;
- GE Energy Hydro.

In addition to equipment suppliers, U.S. engineering companies may be interested in EPC or task design contracts. Services suppliers potentially include:

- Black and Veatch;
- MWH Global;
- Shaw Group (Stone and Webster);
- URS (Washington Group);
- HydroWest International;
- PB Power.

The Consultant has contacted major equipment manufacturers and confirmed their interest in providing hydro turbines for small scale projects in Central America. Manufacturers confirmed their past international experience and their

comfortable position in supply logistics. They identified price/quality parameters as being a major driver for equipment selection in the region.

Foreign Competition and Market Entry Issues

In general, U.S. manufacturers are considered to be competitive in the design, manufacturing, and implementation of the proposed project scope. However, significant competition is expected to U.S. companies in Central America.

Major foreign competitors in the hydro power energy market include amongst others:

- Toshiba (Japan)
- Voith Siemens (Germany);
- Sulzer Hydro Ltd. (Switzerland);
- Moller Undenas Turbin AB (Sweden);
- Wasserkraft Volk AG – WKV (Germany);
- Alstom (France);
- Pompes RITZ France SAS (France);
- CITIC Heavy Machinery Company Ltd. (China);
- Andritz VA TECH Hydro (Austria);
- Bouving Fouress Limited (India);
- Dongfang Electric Corporation (China);
- Harbin Power Equipment Company (China);
- Norcan Hydraulic Turbines Inc. (Canada);
- Kharkov Turbogenerator Plant "Turboatom" (Ukraine); and
- LMZ (Russia).

Developmental Impact

Infrastructure -- The Project will be used to provide power at competitive prices and reduce the grid's dependence on expensive petroleum-based power. The project is expected to be about 6 MW. The project will be able to provide power to roughly over 10,000 households.

Human Capacity Building -- The proposed power plant will have significant job creation impact as well. The construction of the plant will require temporary manpower, both skilled and unskilled, with a maximum of 50 qualified persons at any one time during peak of construction. Preference will be given to hiring qualified local residents.

Operations phase employment opportunities will be made available for technical, administrative, and security people during the commercial operation phase.

Other - Assuming 26 GWh of electricity produced by hydro plant instead of coal, for example, the CO2 avoided emissions estimated at 20,000 tons per year.

Environmental Considerations

The project is expected to have a significant positive effect on the environment. Currently, large thermal plants are considered to be major sources of air pollution. Due to the nature of the technology, the proposed hydro power plant has no emissions. Implementation of the hydro power plant (HPP) is estimated by the Consultant to result in annual savings of about 42,000 BBL of oil and associated 20,000 tons of CO2 emissions. The construction of the plant will require the appropriate environmental assessment study. The study is also required if the Project Sponsor decides to pursue any international lending agency funding. The study will address all major issues associated with the construction of a hydro power facility of this size, such as flooding, resettlement, migratory fish control, archeological surveying, water quality, and other issues.

Among anticipated other positive impacts are:

- Conservation and mitigation measures in the river basin;
- No alteration of agricultural lands;
- Forestry conservation;
- Training, regarding environmental issues, provided to locals;
- New tourist and recreational activities;
- Life quality improvement for local communities due to new incomes; and
- Socail commitment regarding education, health and production of goods.

Potential negative impacts are:

- Natural river flow alteration;
- Flora and Fauna conditions, of a specific area, modified due to the new reservoir;
- Sound pollution during construction; and
- Heavy equipment transit.

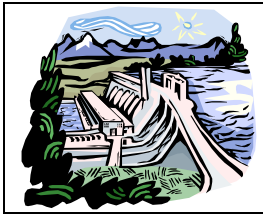
Follow-up and Further Information

The proposed project is in early development stages and requires significant development work. The Project Sponsor indicated interest in cooperating with U.S. companies for project preparation, project design and engineering, and EPC contracting.

Interested parties are encouraged to contact the Project Sponsor for more information and further cooperation steps.

Ing. Iván Mora Poveda
Coordinador Desarrollar Generación
UEN de Proyectos
Tel: (506) 2550-6989, (506) 25550-6800 Ext.325
E-Mail: ivan_mora@jasec.co.cr

Project 2 - ESPH 12 MW Rio Blanco Hydro Power Project

	**Type: Run-on-river hydro**	**Name: Rio Blanco Hydro Power Project**
	Size: 12 MW	**Project Sponsor: ESPH**

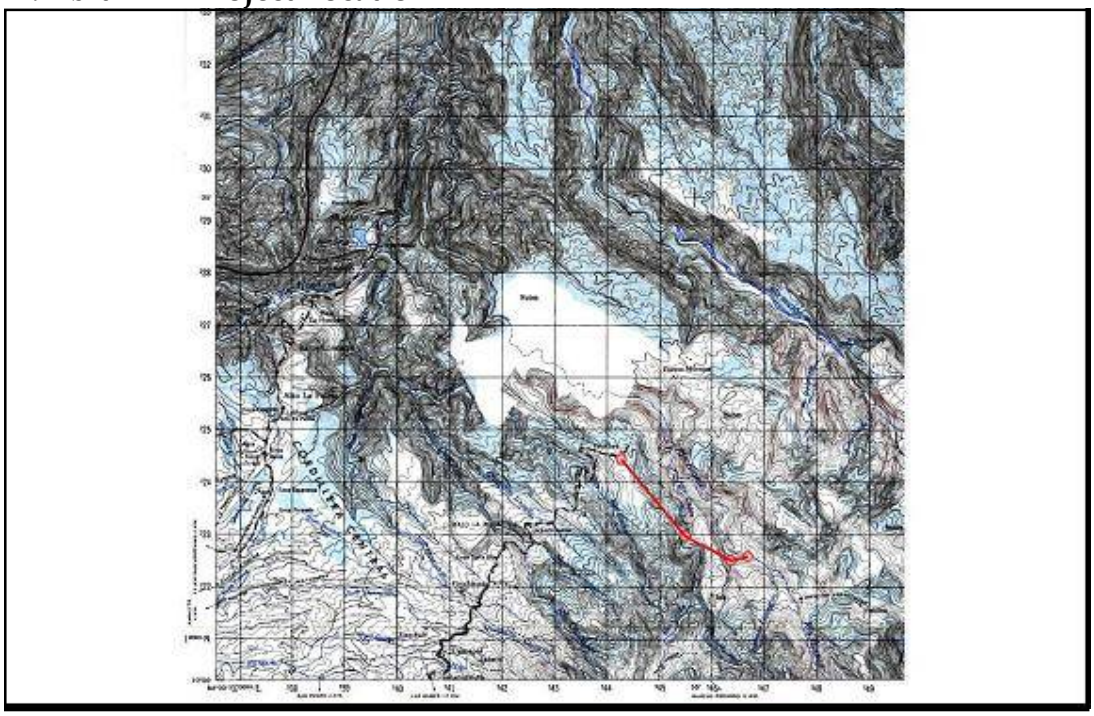
Project Background

The project is being proposed by ESPH, a municipal company in Heredia province (just outside of the capital city of San Jose). ESPH is an administrator and operator of provincial public utilities (safe drinking water, energy, streetlights and sewage).

The proposed Rio Blanco project is located in the Coronado county, northeast of the city of San Jose, Costa Rica. The site is known as Cascajal, just below the Irazú Volcano and close to the Braulio Carrillo National Park. The area is characterized by a heavy rainfall regime, which records an annual maximum of 4000 mm. Rivers to be used are Rio Cajon and Rio Blanco.

The proposed project envisions the construction of 12 MW run-on-river power plant to help supply ESPH demand, which is currently supplied from other ESPH plants and with purchased energy from ICE. Plant is expected to generate 55 GWh annually. Exhibit 2-1 provide details of the project location.

Exhibit 2-1 – Project Location



Hoja Cartográfica Carrillo – Scale 1:50.000

Major project characteristics include:

Coordinates:	E 546 000 a 542 000, N 223000 a 226 000
Altitude of intake (diversion):	Rio Cajon 1700 m. above sea level
	Rio Blanco 1700 m. above sea level
Altitude of tailrace:	Rio Blanco 1210 m. above sea level
Intake flow:	Rio Cajon 2.5 m3/s
	Rio Blanco 0.5 m3/s
Average annual rainfall:	Rio Cajon 4036 mm
	Rio Blanco 3840 mm
Watershed area:	Rio Cajon: 15.39 km2
	Rio Blanco: 7.87 km2
Current status:	Pre-feasibility studies completed.

Project Sponsor's Capabilities and Commitment

The ESPH (Public Utilities Company of Heredia) originated as a municipal company and was officially constituted in 1976 as a consortium of three neighbor municipal governments in the Heredia province (just outside of the capital city of San Jose) for the development and administration of public utilities (safe drinking water, energy, streetlights and sewage). The area served is roughly 142

km2 and encloses the metropolitan area and suburbs of Heredia city, and the rural cities of San Rafael, San Isidro plus other surrounding counties. The population served is close to 250,000 inhabitants. The company's main business is energy generation and distribution. Annual energy sales amounted to 485 GWh/yr in 2008.

The ESPH has developed major public utilities projects that make of Heredia one of the areas with the highest human development index and with the highest concentration of exporting companies in the country. In 2005, the ESPH put into operation its newest and largest energy generation project, the Los Negros project, a 18 MW hydro power plant located in northern Costa Rica.

The ESPH has followed a tradition of sustainable use of water and natural resources to generate clean renewable energy since its first and smallest (2.2 MW) hydro power project in 1949. Concern for climate change effects and its mitigation has motivated ESPH's action and creativity. Currently, the ESPH is remodeling an old 6 MW hydro power plant, which will be used to feed and put back into operation a formerly abandoned electric train in the metropolitan area. This will contribute to reactivate clean massive transportation means, reduce critical pollution levels and traffic congestion.

In 2000, the ESPH made a significant contribution in sustainable development by creating and charging directly its customers, a small green fee (roughly $ 0.25/month) which is earmarked for local watershed and forest conservation activities. The stream of revenues is used to fund a local Payment for Environmental Services (PES) scheme that works in a similar fashion to the New York Catskill Mts. Farmer and landowner in watersheds used for the cities water supply can receive up to $150/ha/yr. for forest protection and management.

Implementation Financing

Historically, the ESPH, just as most public utilities projects, was financed through conventional development bank loans. However, the availability of such funds significantly dropped since the 1990's. Due to the growth of investment funds, these became the new source of funding for public utilities projects in Costa Rica, including those of the ESPH. Trust funds, certificates and deposits replaced traditional forms. Among the investment funds used were growth, liquid, real state, mortgage and short term offered in local o foreign currency.

The ESPH saw investment funds as a mechanism to access the necessary financial resources for its infrastructure projects, (such as its most recent 18 MW

hydro power plant) through a well-planed indebtedness supported by the value/flow of revenues from a portfolio or specific assets, such as, securities and investment in properties.

U.S. Export Potential

Most of the export potential for the implementation of this project is in the procurement of hydro power turbines, substation equipment, instrumentation and control systems, and construction and engineering services. The overall estimated project cost (w/o construction contingency) is about $36 million for 12MW plant. U.S. exports could be as much as $16 million (45%) level.

The Project Sponsor provided the Consultant with summary estimates, which were developed during the pre-feasibility effort. Consultant believes that these estimates are reasonable and in line with own estimate.

A number of U.S. firms can supply the equipment:

Hydro Turbines:

- Canyon Hydro;
- Voith Siemens Hydro Power Generation;
- American Hydro Corporation;
- The James Leffel & Co.;
- North American Hydro;
- GE Energy Hydro.

In addition to equipment suppliers, U.S. engineering companies may be interested in EPC or task design contracts. Services suppliers potentially include:

- Black and Veatch;
- MWH Global;
- Shaw Group (Stone and Webster);
- USR (Washington Group);
- HydroWest International;
- PB Power.

The Consultant has contacted major equipment manufacturers and confirmed their interest in providing hydro turbines for small scale projects in Central America. Manufacturers confirmed their past international experience and their

comfortable position in supply logistics. They identified price/quality parameters as being a major driver for equipment selection in the region.

Foreign Competition and Market Entry Issues

In general, U.S. manufacturers are considered to be competitive in the design, manufacturing, and implementation of the proposed project scope. However, significant competition is expected to U.S. companies in Central America.

Major foreign competitors in the hydro power energy market include amongst others:

- Toshiba (Japan)
- Voith Siemens (Germany);
- Sulzer Hydro Ltd. (Switzerland);
- Moller Undenas Turbin AB (Sweden);
- Wasserkraft Volk AG – WKV (Germany);
- Alstom (France);
- Pompes RITZ France SAS (France);
- CITIC Heavy Machinery Company Ltd. (China);
- Andritz VA TECH Hydro (Austria);
- Bouving Fouress Limited (India);
- Dongfang Electric Corporation (China);
- Harbin Power Equipment Company (China);
- Norcan Hydraulic Turbines Inc. (Canada);
- Kharkov Turbogenerator Plant "Turboatom" (Ukraine); and
- LMZ (Russia).

Developmental Impact

Infrastructure -- The Project will be used to provide power at competitive prices and reduce the grid's dependence on expensive petroleum-based power. The project is expected to be about 12 MW. The project will be able to provide power to roughly over 20,000 households.

Human Capacity Building -- The proposed power plant will have significant job creation impact as well. The construction of the plant will require temporary manpower, both skilled and unskilled, with a maximum of 100 qualified persons

at any one time during peak of construction. Preference will be given to hiring qualified local residents.

Operations phase employment opportunities will be made available for technical, administrative, and security people during the commercial operation phase. The average number of personnel envisioned at the plant will be 10.

Other - Assuming 55 GWh of electricity produced by hydro plant instead of coal, for example, the CO2 avoided emissions estimated at 45,000 tons per year.

The proposed project can be considered a rural electrification project. The remote location will strengthen the electricity grid and reduce transmission losses. It will also provide more power to be distributed in the area where more electrification is desired.

Environmental Considerations

Energy projects in Costa Rica must undergo a strict Environmental Impact Assessment (EIA) procedures required and scrutinized by the Ministry of Environment, as one of the basic conditions for its approval. ESPH´s hydro power projects comply with the EIA and water permits. The study will address all major issues associated with the construction of a hydro power facility of this size, such as flooding, resettlement, migratory fish control, archeological surveying, water quality, and other issues.

The ESPH has innovated by charging a monthly green fee to its customers. The revenues obtained are used to finance a Payment for Environmental Services (PES) program in the watersheds where its projects are located. Eligible farmers and private forest owners in the watersheds of interest of ESPH projects can receive up to $70/ha/yr. In this way, there is sustainable use of renewable resource to generate clean energy and zero carbon dioxide emissions. Farmers and landowners in this rural poor area of the country have a new income opportunity and direct participation in legitimate conservation efforts in these watersheds. The potential increase in forest cover will impact positively in enhanced summer flows and reduced sedimentation in the local rivers.

The project is expected to have a significant positive effect on the environment. Currently, large thermal plants are considered to be major sources of air pollution. Due to the nature of the technology, the proposed hydro power plant has no emissions. Implementation of the hydro power plant (HPP) is estimated by the Consultant to result in annual savings of 45,000 tons of CO2 emissions.

Among anticipated other positive impacts are:

- Conservation and mitigation measures in the river basin;
- No alteration of agricultural lands;
- Forestry conservation;
- Training, regarding environmental issues, provided to locals;
- New tourist and recreational activities;
- Life quality improvement for local communities due to new incomes; and
- Social commitment regarding education, health and production of goods.

Potential negative impacts are:

- Natural river flow alteration;
- Flora and Fauna conditions, of a specific area, modified due to the new reservoir;
- Sound pollution during construction; and
- Heavy equipment transit.

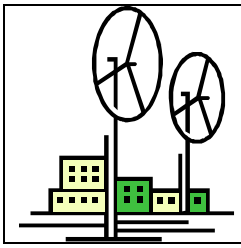
Follow-up and Further Information

The proposed project is in early development stages and requires significant development work. The Project Sponsor indicated interest in cooperating with U.S. companies for project preparation, project design and engineering, and EPC contracting.

Interested parties are encouraged to contact the Project Sponsor for more information and further cooperation steps.

ESPH SA
Mr. Allan Benavides
General Manager
Apdo: 26-3000 Heredia
Costa Rica
Tel. 506-2562-3774
Fax 506-2237-5666
E-Mail: abenavides@esph-sa.com

Project 3 - ESPH 40 MW Los Leones Wind Farm

	**Type: Wind**	**Name: Los Leones Wind Farm**
	Size: 40 MW	**Project Sponsor: ESPH**

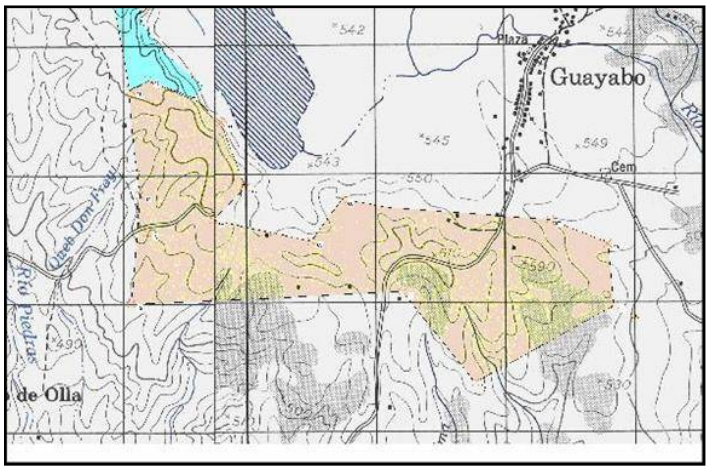
Project Background

The project is being proposed by ESPH, a municipal company in Heredia province (just outside of the capital city of San Jose). ESPH is an administrator and operator of provincial public utilities (safe drinking water, energy, streetlights and sewage).

The proposed Los Leones wind project is located in the Guanacaste province; North Pacific part of Costa Rica at the project site is called Bagaces. Several winds farms are located nearby.

The proposed project envisions the construction of 40 MW wind farm to help supply ESPH demand and demand of the neighboring Rural Electrification Cooperative of Guanacaste (Coopeguancaste). Currently load is supplied from other ESPH and Coopeguancaste plants and with purchased energy from ICE. Plant is expected to generate 151 GWh annually. Exhibit 3-1 provide details of the project location.

Exhibit 3-1 – Project Location



Major project characteristics include:

Altitude:	550 m. above sea level
Average annual speed:	18 m/s
Area:	150 hectares
Current status:	Basic studies pending.

Project Sponsor's Capabilities and Commitment

The ESPH (Public Utilities Company of Heredia) originated as a municipal company and was officially constituted in 1976 as a consortium of three neighbor municipal governments in the Heredia province (just outside of the capital city of San Jose) for the development and administration of public utilities (safe drinking water, energy, streetlights and sewage). The area served is roughly 142 km2 and encloses the metropolitan area and suburbs of Heredia city, and the rural cities of San Rafael, San Isidro plus other surrounding counties. The population served is close to 250,000 inhabitants. The company's main business is energy generation and distribution. Annual energy sales amounted to 485 GWh/yr in 2008.

The ESPH has developed major public utilities projects that make of Heredia one of the areas with the highest human development index and with the highest concentration of exporting companies in the country. In 2005,the ESPH put into operation its newest and largest energy generation project, the Los Negros project, a 18 MW hydro power plant located in northern Costa Rica.

The ESPH has followed a tradition of sustainable use of water and natural resources to generate clean renewable energy since its first and smallest (2.2 MW) hydro power project in 1949. Concern for climate change effects and its mitigation has motivated ESPH's action and creativity. Currently, the ESPH is remodeling an old 6 MW hydro power plant, which will be used to feed and put back into operation a formerly abandoned electric train in the metropolitan area. This will contribute to reactivate clean massive transportation means, reduce critical pollution levels and traffic congestion.

In 2000, the ESPH made a significant contribution in sustainable development by creating and charging directly its customers, a small green fee (roughly $ 0.25/month) which is earmarked for local watershed and forest conservation activities. The stream of revenues is used to fund a local Payment for Environmental Services (PES) scheme that works in a similar fashion to the New

York Catskill Mts. Farmer and landowner in watersheds used for the cities water supply can receive up to $150/ha/yr. for forest protection and management.

Implementation Financing

Historically, the ESPH, just as most public utilities projects, was financed through conventional development bank loans. However, the availability of such funds significantly dropped since the 1990's. Due to the growth of investment funds, these became the new source of funding for public utilities projects in Costa Rica, including those of the ESPH. Trust funds, certificates and deposits replaced traditional forms. Among the investment funds used were growth, liquid, real state, mortgage and short term offered in local o foreign currency.

The ESPH saw investment funds as a mechanism to access the necessary financial resources for its infrastructure projects, (such as its most recent 18 MW hydro power plant) through a well-planed indebtedness supported by the value/flow of revenues from a portfolio or specific assets, such as, securities and investment in properties.

U.S. Export Potential

The wind project major components include wind turbine, tower, balance of plant equipment, and interconnection equipment.

Several major U.S. and international manufacturers produce major equipment for wind turbines in the U.S. for domestic and regional markets.

Average cost of the on-shore wind project is around $2,000/kW. In case of 40 MW project the total will be around $80 million, if which about 75% or $60 million will be wind turbine cost, and the rest would be balance of plant, interconnection, and soft costs. U.S exports that can be expected in the purchase of the main wind turbine equipment are at 75% of the total project cost. At the same time, it should be noted that wind manufacturers from Europe, Canada, Brazil, India, China, and Japan can compete for projects in Central America.

However, U.S. in 2008 alone has installed over 4,000 MW of new wind capacity bringing the total to over 22,000 MW. Based on AWEA data[5] over 50% of these wind turbines were manufactured in the U.S.

[5] American Wind Energy Association ▪ 3rd Quarter 2008 Market Report

Major wind turbine manufacturers in the U.S. include:

- Clipper (Cedar Rapids, Iowa);
- Vestas Americas (Portland, Oregon and production facilities in Colorado);
- GE Energy (Tehachapi, California and production facility in Pensacola, Florida)
- Suzlon Wind Energy Corporation (Chicago, Illinois and production facilities in Pipestone, Minesota)
- Gamesa (Langhorne, PA with production facilities in Fairless Hills, PA)

Regionally, Vestas has provided 71 wind turbines to Costa Rica with total capacity of 50 MW and 24 turbines to Jamaica with total capacity of 21 MW.

Recently, Suzlon has entered into is Brazil through a contract signed with – SIIF Energies do Brazil Ltda. The project is poised to double Brazil's current installed capacity of 200 MW.

In 2008, Gamesa broke into the Venezuelan market with the installation of 100 MW in what will be the country's first wind farm. Gamesa also installed 65 MW of wind turbines in Dominican Republic in 2007.

GE Energy is currently negotiating several new contracts in the CA region. Details of these contracts are still confidential.

Foreign Competition and Market Entry Issues

Following international companies are world leaders in wind power equipment.

- Vestas (Denmark)
- Enercon (Germany)
- Gamesa (Spain)
- Acciona (Spain)
- Siemens (Germany)
- REpower (Germany)
- Mitsubishi (Japan)

The foreign competition is very strong in the wind power equipment market. However, Central America is traditionally services from local (i.e., South and North America) suppliers. Several major international companies have major manufacturing facilities in U.S. and Canada. It should be noted that regionally,

Brazil and Mexico are considered highly yielding markets for wind projects. Therefore, many international suppliers have plans to initiate assembly and manufacturing facilities there.

Projects in Central America will be driven by economic factors and long freight for wind equipment is not favoring European and Japanese manufacturers. At the same time, U.S. based manufacturers are currently having difficulty keeping up wit the internal U.S. equipment demand and may not be that interested in small procurements from Central American countries. Planned expansion of Vestas plants in Windsor and Pueblo, CO; and GE Energy plants in Schenectady, NY and Memphis, TN should permit these companies increased supplies to Central America.

Developmental Impact

This project will yield significant economical and technical benefits locally to Costa Rica as well as regionally due to the reduction of greenhouse gas emissions.

Infrastructure - The Costa Rica Government estimates its demand for electricity will increase dramatically over the next 10 years. To meet a 5-7% annual increase in demand, Costa Rica needs to drastically increase its electric generation capacity and expand its energy sources.

Assuming 40 MW of wind being built, the project will be able to provide power to roughly over 60,000 households.

Human Capacity Building -- The proposed power plant will have significant job creation impact as well. The construction of the plant will require temporary manpower, both skilled and unskilled, with a maximum of 100 qualified persons at any one time during peak of construction. Preference will be given to hiring qualified local residents.

Operations phase employment opportunities will be made available for technical, administrative, and security people during the commercial operation phase. There will also be need for a number of personnel at the plant.

Other - The implementation of this Project will affect the energy mix of the country, injecting every year near 151 GWh of renewable energy to the national system and avoiding the emission of 116,000 tons of CO2. It allows project to apply for registration under the Clean Development Mechanism (CDM) and

trade with Certified Emission Reduction Credits (CER). In addition, the project will save the country annually over $14 million of fuel imports for thermoelectric plants (250,000 BBL of Bunker).

The proposed project can be considered a rural electrification project. The remote location will strengthen the electricity grid and reduce transmission losses. It will also provide more power to be distributed in the area where more electrification is desired.

Environmental Considerations

The project is expected to have a significant positive effect on the environment. Currently, large thermal plants are considered to be major sources of air pollution in Costa Rica. Due to the nature of the technology, the proposed wind power plant has no emissions. Noise implications are typical of the wind project. The Project Sponsor indicated interest in remote locations, away from local villages. The construction of plant should not have any major impact on the environment, however the appropriate environmental assessment study will be required if the Project Sponsor decides to pursue World Bank or any other international lending agency funding.

Among anticipated other positive impacts are:

- Substitution of fossil energy with renewable wind;
- No air emissions; and
- Limited exposure to lubricants and other potential water and soil contaminants.

Potential negative impacts are:

- Noise;
- Flora and Fauna conditions due to rotating equipment;
- Sound pollution during construction; and
- Heavy equipment transit.

Follow-up and Further Information

The proposed project is in early development stages and requires significant development work. The Project Sponsor indicated interest in cooperating with U.S. companies for project preparation, project design and engineering, and EPC contracting.

Interested parties are encouraged to contact the Project Sponsor for more information and further cooperation steps.

ESPH SA
Mr. Allan Benavides
General Manager
Apdo: 26-3000 Heredia
Costa Rica
Tel. 506-2562-3774
Fax 506-2237-5666
E-Mail: abenavides@esph-sa.com

Project 4 –DEI 56 MW Santo Domingo Waste-to-Energy Power Plant

	**Type: Waste-to-energy**	**Name: Santo Domingo Waste-to-Energy Power Plant**
	Size: 56 MW	**Project Sponsor: Diversified Energy International**

Project Background

Diversified Energy International (DEI), a Panamanian registered company, with all U.S. principles is proposing a 56 MW Waste-to-Energy (WTE) project to be developed in Costa Rica.

While site is not yet selected, possible location currently discussed is in the Municipality of Santo Domingo. It is close to Open Waste Disposal Centre near 4 Municipalities and Close to 34.5 kV, 69 kV and 138 kV Transmission Lines to the ICE Substation in Colima- Tibás.

DEI plans to use WTE technology to incinerate domestic, industrial and medical wastes and produce energy. The project will have the following benefits:

- Environment cleaning and purification (elimination of the waste)
- Landfills cleaning (stop the waste burial)
- Underground water sources keeps pure and clean
- Health benefits (no waste, no diseases and no plagues)
- Water from the waste called "lixiviates" become clean with the high tech and temperature process, and could be released to rivers as POTABLE
- Clean Energy generation at a lower cost avoiding mass destruction of the natural resources and fossil fuels
- Renovation of the Waste Trucks for each Municipality

Overall project is expected to be 56 MW, but will be developed in stages. The technology used is of a modular design with each unit capable of producing 8 MW while consuming about 180 MT of waste daily. Each next stage is planned to be completed 18 month after the previous one. Following outlines details of waste sources:

PHASE 1: 360 Daily Tons (16 MW)
- Tibás: 70 Tons daily
- Guadalupe: 150 Tons daily
- San Pablo: 80 Tons daily
- Santo Domingo: 60 Tons daily

PHASE 2: 320 Daily Tons (16 MW)
- Heredia: Daily Waste 320 Tons

PHASE 3: 600 Tons (24 MW)
- Escazú: Daily Waste 200 Tons
- San José: Daily Waste 400 Tons

DEI plans to use fairly simple business model. DEI plans to generate renewable energy from municipal solid waste, a zero cost fuel source, and sell it under a 20 to 25 year contract to the local energy distribution company at wholesale rates for a profit. In addition there are other potential revenue streams such as:

1. Tipping fees charged to accept and process the trash
2. The sale of plant by-products: metals for recycling, ash to cement companies, potable water
3. Reserving some production capacity to sell to private entities such as manufacturers or on the spot market at retail rates

Project Sponsor's Capabilities and Commitment

DEI is comprised of experienced individuals in implementing power plants for private and public entities. DEI is primarily focused on Waste to Energy (WTE), Geo Thermal and Solar Energy technology.

DEI is currently in the advanced development stages for two more similar facilities in Nicaragua and Puerto Rico. Details are as follows:

- Nicaragua: Final Plant will be 240MW and will represent $187M total investment. Two initial phases currently being developed are 95 MW total with $73M annual revenues.

- Puerto Rico: Final Plant will be 500MW and will represent $388M total investment. Phase 1 currently developed (confidential location) is 50MW plant with $36M annual revenues; and Phase 2 currently being developed in District of Ponce is 40MW with $30M annual revenues.

Company principles include Bryan Matheny, CEO; Christian Beyer, CMO; Chad Richardson, CFO; and Carlos Tunnermann, COO.

Implementation Financing

The company plans to partner with a private equity firm to put up 20 – 30% of the project costs in the form of equity. For the remainder DEI has two options: 1) we will work with the US Export Import bank to acquire loan guarantees than syndicate with multiple banks for debt financing; 2) one of waste to energy technology vendors has established financing through their bank that will provide the remaining debt financing.

From an emissions standpoint, DEI assumes that emissions from the proposed project will dramatically cut down on all key particulates and chemicals going into the atmosphere, and will this qualify for Carbon Trading Credits.

U.S. Export Potential

The proposed project estimate is $168 million for 56 MW plant (or about $3,000/kW). This number is much more than what the Project Sponsor foresees. The Consultant is basing its estimate on average WTE technology, while the Project Sponsor has in mind specific packaged design. The information on the manufacturer and cost is confidential. Therefore, the Consultant made its own estimate for the purposes of this report.

The Consultant has assumed circulating fluidized bed (CFB) unit for the project. U.S. manufacturers will be more competitive on this type of technology. Conventional boilers/incinerators may use majority of parts produced in Brazil, China and India. With that technology, overall project cost w/o funding and contingency is estimated at about $168 million, with U.S. exports estimated at 35-60% of the total cost.

No detailed cost estimate exists for the project. A number of U.S. firms having suitable credentials would likely be interested in the proposed project. U.S. equipment suppliers can potentially include:

Steam Turbines:

- Elliott Group;
- General Electric; and
- Siemens-Westinghouse.

Boilers/Incinerators:

- AE&E Von Roll;
- Indeck Boilers;
- Foster Wheeler; and
- Babcock & Wilcox.

Electrical, Controls and Auxiliary Equipment:

- Eaton Electrical (Cutler-Hammer);
- Siemens-Westinghouse;
- Square D Co. (Schneider Electric);
- Encorp Inc.;
- Cooper Power Systems;
- Automated Control Systems;
- GE Energy, GE Industrial, and GE Power Systems;
- Honeywell;
- Motorola;
- Hammond Power Solutions; and
- Kohler Power Systems.

Environmental Controls:

- Babcock & Wilcox;
- Babcock Power Environmental, Inc.;
- Wheelabrator Air Pollution; and
- McGill AirClean LLC.

In addition to equipment suppliers, U.S. engineering companies may be interested in EPC or task design contracts. Services suppliers potentially include:

- Black and Veatch;
- MWH Global;
- Shaw Group (former Stone and Webster);
- Burns and Roe Enterprises, Inc.;
- Sargent and Lundy;

- URS Corporation (former Washington Group); and
- PB Power.

Foreign Competition and Market Entry Issues

In general, U.S. manufacturers and suppliers would be considered to be quite competitive in the design, manufacturing, and implementation of the proposed project. However, geographical location and host-country historical ties with other nations may result in serious competition by foreign firms to U.S. companies supplying equipment/services.

Exhibit 13-1 lists major foreign competitors in the regional energy market.

Exhibit 13-1 – Major Equipment Foreign Manufacturers

EQUIPMENT	COMPANIES, ORIGIN
Incinerators, Boilers and HRSGs	CNIM, France; CMI, Belgium; Kawasaki, Japan; NEM, Netherlands; Standard Fasel-Lentjes, Netherlands; Doosan Babcock, S. Korea.
Generators	Ansaldo Energia, Itay; Jenbacher AG, Austria; MAN-B&W, Germany; Mitsubishi, Japan; Nigata, Japan; Rolls Royce, UK; Wartsila, Finland; Volvo, Sweden
Gas Turbine Generators	Alstom Power, UK; Centrax GT, UK; Hitachi, Japan; Kawasaki, Japan, JGT, Japan, Mitsubishi, Japan; MTU-Friedrichshafen, Germany; Rolls Royce, UK; Sulzer, Switzerland; Turbomeca, France; Volvo, Sweden
Steam Turbine Generators	Alstom, Switzerland; Dresser-Rand, Norway; Kawasaki, Japan; Mannesmann Demag, Germany; Voest-Alpine, Austria; Siemens, Germany.
Control Systems	Axsia Howmar, UK; Amot Controls, UK; ABB, Germany; Fortum Engineering, Finland; Siemens, Germany; Yokogawa, Japan
Engineering Services	TEPSCO, Japan; Fichtner, Germany; Lahmeyer International, Germany; Mott Connell, UK; PB, Singapore; SNC, Canada.

Developmental Impact

New landfills are increasingly difficult to site, permit, and operate in metropolitan areas to support regional and national growth. While the proposed 56 MW plant will not resolve difficult situation with garbage disposal, it will delay the need for a new landfill and may serve as a pilot solution example for other additional and larger plants in the future.

Also, according to USTDA criteria, project's potential development impact includes:

Infrastructure -- The project, if implemented, would be a positive contributor to the country's development objectives. The project is expected to add generating capacity of 56 MW and to provide power to roughly 80,000 households.

Market-Oriented Reform -- While garbage collection and utilization laws exist, the proposed project will provide another environmentally responsible option for waste reduction in Costa Rica. If successful, the project can be replicated throughout the country and even become a law in the future mandating permanent waste utilization instead of landfill storage.

Human Capacity Building -- The project has a potential of creating as much as 100 part-time construction and technical jobs for 1-2 years. When the facility is finished, it will require a full-time staff of about 15-20 workers, including operators, technicians, and other workers. In addition, the full-time staff will require equipment training on and off-site.

Technology Transfer and Productivity Enhancement -- While the technology for this WTE plant is not yet selected, it will be most likely new and innovative as compared to other existing power facilities that use traditional fuel sources.

Other -- The proposed project will reduce the CO2 emissions from the landfill by 230,000 tons/year (assuming 300 GWh/year generation) by displacing methane and other greenhouse gases release.

Environmental Considerations

The proposed WTE plant will use solid municipal waste, which would otherwise go in as landfill. The significant potential problems that arise due to the landfill are (1) contamination of ground water which in turn can create health hazards for the people, (2) generation of methane gas during of MSW decomposition which, if uncollected, is a potent greenhouse gas, (3) the use of relatively large areas of land which could otherwise be used for habitation, cultivation or growing trees and, (4) the unsavory aesthetics of the decomposing garbage and the general health hazards from dust dispersal that it can create. All these problems would be adequately addressed by the installation of a WTE plant.

However, the WTE plant, while categorized, as a renewable source of energy and environment friendly does need varying environmental control measures depending on the type of MSW being considered. NOx, sulphur dioxide, carbon dioxide, trace amounts of heavy metals, and possibly some toxic derivatives from

organic compounds are produced in the process of burning MSW but these can be controlled by the commercially available technologies today. Likewise the water discharges (chemical and heat) as in the case of conventional plants can readily be controlled with available technologies.

The project should also qualify as a Clean Development Mechanism (CDM) project under the Kyoto Protocol. The proposed project will reduce emissions from the landfill by 230,000 tons/year by displacing methane and other greenhouse gases release.

Among anticipated other positive impacts are:

- Improvement in garbage and waste management;
- Less air pollution than older fossil plants; and
- Decrease in landfill methane emissions.

Potential negative impacts are:

- Impacts on flora and fauna due to new fossil-fired generation;
- Social impacts due to reduction of scavenging;
- Sound pollution during construction; and
- Heavy equipment transit.

Follow-up and Further Information

The proposed project is in development stages and requires significant development work. The Project Sponsor indicated interest in cooperating with U.S. companies for project preparation, project design and engineering, and EPC contracting.

Interested parties are encouraged to contact the Project Sponsor for more information and further cooperation steps.

Diversified Energy International Inc
6622 Lincoln Drive, Philadelphia PA 19119
Phone: 303-570-8981
URL: www.energy-intl.com
Email: info@energy-intl.com
Chad Richardson
720-261-8198
CRichardson@Energy-Intl.com

El Salvador

Sector Primer – El Salvador[6]

General[7]

Country Summary	Electricity System Summary
- Territory: 21,041 sq. km; - Population: 7.18 million (2009); - Access to Electricity: 84%; and - Ave GDP per Capita: $6,200 (2008).	- Installed Capacity: 1,250 MW (2008); - Energy Generated: 5,655 GWh (2008); - Peak Demand: 924 MW (2008) - Dominant Electricity Resource: equal Hydro/Fossil; - Ave res. Tariff: $0.139/kW (2006); - Total generators: 24 (12 private); - Transmission: 1 company; and - Distribution: 5 companies.
Renewable Energy Summary	**Governance Summary**
- Hydro (55% of total energy production); - Renewable potential: 1,500 MW (mostly hydro and geothermal); and - Several major hydro and geothermal projects are being licensed and developed.	- Distribution companies purchase from generators via PPAs and reflect cost in tariffs; - SIGET – National regulator; and - Newly created CNE is in charge of planning and strategy.

El Salvador has a total area of 21,041 sq. km, a population of over seven million, and a per capita income of about $6,200. It is bordering the North Pacific Ocean, between Guatemala and Honduras. El Salvador has a coastline of 307 km in length.

In the course of exploration of the energy sector in El Salvador, the predominant theme sounded by a number of energy sector participants and observers familiar with the country was that of uncertainty. The sector has a history in recent years of governmental intervention in pricing and other issues related to energy; these policies included multi-year rate freezes and significant governmental power cost subsidies. Recently elected administration did not yet announce its views and priorities for the electricity sector. However, the new administration has acknowledged that the subsidies in place are probably not sustainable. The respective legislative agendas of the new President and the legislature may conflict in this area of the economy. The outcome of these political differences will only become known over time, which leaves current decision makers in a state of uncertainty over whether to invest in energy infrastructure and, if so, to what extent.

[6] Sources of information for this primer include: Advances in Renewable Development in Central, by Cristhian Escobar AGER, 2007; Regional: Accelerating Renewable Energy Investments through CABEI in Central America, GEF, 2008; and CA Energy and Competitiveness Conference, 2007

[7] Some of statistics and estimates are estimated based country discussions and The Central American Carbon Finance Guide.

Despite the current uncertainties regarding energy policies, the Salvadorian electricity system does have a well-established, market-based structure at the wholesale level; there is no retail competition in El Salvador. The system was liberalized in 1998. Prior to this, the government owned substantially all of the country's generating, transmission, and distribution assets. In the course of the restructuring in 1998, the distribution companies were sold to foreign investors, as was all thermal generation. The system operation was separated from CEL, the state-owned organization that owns the bulk of the country's hydroelectric resources, and assigned to an independent, private entity, the Unidad de Transacciones S.A. de C.V., or UT, whose shares are owned by an association of market participants. This organization is also referred to at times as the Market Administrator. The transmission company (ETSAL) was spun off from CEL as well, as was all geothermal generation.

The Electrical Energy Directorate (Dirección de Energía Eléctrica, or DEE), is the administrative unit within the Ministry of Economy that proposes, interprets, and executes governmental electricity sector policies within the country; this includes policies pertaining to renewable energy. The General Superintendence of Electricity and Telecommunications (SIGET) is the regulatory body for both the electricity and telecommunications sectors. SIGET regulates the power market, the distribution companies and consumer prices. SIGET also awards the "concessions" for hydro projects in El Salvador. These concessions have indefinite lives, but are not transferable to third parties.

The Ministry of Environment and Natural Resources (MARNA) is responsible for formulating policies and executing policies related to the environment. Finally, the National Energy Council (CNE) serves the energy sector as an advisory body, evaluating governmental policies and recommending courses of action. This group will be influential in determining whether the country adopts strong energy efficiency and renewable energy policies. According to the head of SIGET, CNE may acquire greater influence in regulatory affairs under the new administration, but the exact nature of any modifications to the regulatory paradigm are not known at this time.

The wholesale market has two components: the Contracts Market (MC), and the System Regulating Market (MRS) or spot market. Charges for use of the transmission system are determined by the Market Administrator based on a complex formula that takes into account the costs of investment, operating costs and maintenance associated with each component of the system. A planned conversion to wholesale dispatch based on marginal costs is expected to be implemented on January 1, 2010. Bids by producers are submitted to the

wholesale market operator on a day-ahead basis. There is no real-time transaction capability. Capacity bids will be allowed as part of the January 1 revision of market mechanics; however, the ability to vary bids by hour will not be allowed under the new rules.

Producers accounting for less than 5 MW of capacity may not bid into the grid; in fact, these projects cannot even connect to the grid. These producers instead must either contract with counterparties in the contract market, or sell directly to the distribution companies. This limitation on small bids has implications for the renewables sector, as described in more detail in the subsequent Renewable Energy section of this chapter.

Fossil energy accounts for approximately 40% of capacity, with renewable energy (primarily hydroelectric and geothermal) making up the remainder. The eleven private sector generation companies that participate in the wholesale spot market account for approximately 65% of total electricity generation within the country. The only public company with generation capacity is CEL (Comisión Hidroeléctrica del Río Lempa), which owns 97% of the country's hydroelectric capacity. CEL also shares ownership in LaGeo, one of the largest geothermal generators in the world. Control of LaGeo is currently a matter of a legal dispute between CEL and the other owner of the company, ENEL, the Italian energy company.

Peak demand for 2008 was around 924 MW, compared to an installed capacity of 1,250 MW. Annual energy demand for that year was 5,655 GWh (UT Boletin Estadistico, 2008). Prior to the current year, demand growth was a steady 5% per year; while the current worldwide economic crisis has also been felt in Salvador and electricity demand has fallen accordingly, most knowledgeable observers that were interviewed as a part of this study voiced expectations that an economic recovery would spur a return to a rate of growth in the 5% range.

The transmission system has no congestion problems; the entire system was restructured following the war in the 1980's, and provides for adequate capacity and redundancy. El Salvador is also one of the countries included in the SIEPAC project, which will integrate the electricity network of the country with the rest of the Central American region. AES, the U.S.-based energy company, owns and operates all but two of the distribution companies in El Salvador.

Renewable Energy

While the capacity for wind energy in the country is almost non-existent, El Salvador is the largest producer of geothermal energy in Central America. Except for hydroelectric generation owned by CEL, the rest of the generation capacity is owned by private interests. With demand expected to grow at an annual rate of 5% in the coming years, the Government's 2007 National Energy Strategy identified hydroelectric and geothermal projects as the best options to meet demand in the future and to diversify the country's energy mix. This would also reduce both the dependence on traditional thermal sources and the associated vulnerability to high oil prices that has prevailed in the past two or three years.

SIGET and the Ministry of Economy have both voiced public support for renewable energy; interviews with representatives of these two bodies also revealed a conviction that renewables would be officially supported for economic and environmental reasons. During the interview with Oscar Samoya, Director of Energy in Ministry of Economy, he voiced strong support for renewables, stating that renewable energy promotion will be a high priority with the new government. He also observed that the new government recognizes the need to clarify renewable energy laws in order to remove some of the uncertainty currently prevalent among investors in the energy sector.

One downside to renewable power is that grid operations are not accommodating for small producers. At present, small producers must contract in the bilateral market, or sell into the "minor market" directly to distribution companies. The distribution companies are not very enthusiastic about contracting with small producers, so there's a limited market for this energy. These rates tend to be around eight to nine% less than spot prices, and even these are largely due to simple good will on the part of AES, the principal distribution company in El Salvador.

Legally, the distribution companies can unilaterally set the price and hourly capacities for these sales. On the other hand, firms locally known as commercializes have made progress in aggregating the output from some of these smaller producers so that they may in combination connect to the grid and sell power into the spot market. Several parties during our interview process pointed out that the lack of a real time bidding capacity for smaller renewable energy providers, particularly those with highly variable production schedules

such as photovoltaic solar, is a serious deficiency in terms of developing renewable energy projects within the country.

Hydro

Significant new hydro projects (under CEL management) already approved and under way include Cimarone and Chaparral. A number of pre-feasibility studies of small hydro projects (less than 1 MW) have been performed in recent years on behalf of CEL; 65 potential sites have been identified, five of which were studied in some detail. Two are now in production.

With respect to hydro resources, there is another potential technical issue in El Salvador: hydro units have a much lower head than in other Central American countries. For instance, the highest head in El Salvador is around 240 meters, whereas in Guatemala the heads for hydro units average 500 to 600 meters. Additionally, while there is a strong environmental element in new administration, this faction may be somewhat hostile to new hydro projects. Permitting of new projects can be very slow; many smaller developers may not proceed until the laws are clarified as to the permitting process for new hydro units.

Geothermal

In our interview with Ing. Tomas Villafuerte, head of SIGET, he noted that he expects installation of smaller units (1 to 9 MW) to prevail due to lower capital costs and easier exploration (vent testing) for smaller capacity units. He sees 18 promising sites in the southern tier of geothermal vents (offering much higher temperatures, around 300 degrees C); northern tier of geothermal sites has not been explored, but newer technology makes this potentially feasible despite lower temps (averaging around 180 degree C).

A significant hurdle to geothermal development is a legal one: laws require geological studies of an area in which to get a concession, but no one will invest in the exploration until they have the concession. SIGET sees correcting this as a priority. That organization is leading studies of renewables for the new government, but how the government sets its future priorities in this respect remains to be seen.

Opportunities for U.S. Firms[8]

The U.S.-Central American-Dominican Republic Free Trade Agreement (CAFTA-DR), entered into force March 1, 2006 between the United States and El Salvador. El Salvador was the first nation in Central America to implement the agreement. Preliminary 2008, trade statistics from El Salvador's Central Bank indicated that the United States is El Salvador's leading trade partner, enjoying a 34.21% import market share (1.8 billion in 2007). The U.S. is the destination of 48% of Salvadoran exports. Central America, Germany and Japan are other top bilateral trade partners.

Historically, U.S. firms have been viewed in a favorable light by Salvadorian companies. Oscar Samoya, Director of Energy in Ministry of Economy, voiced positive views of U.S. firms operating in Salvador, including AES. He made it clear that the new government expected to continue its positive working relationships with these companies.

From a competitive standpoint, there is plenty of competition to provide equipment for renewable energy projects in El Salvador. CEL is currently working with a German firm on a test photovoltaic project; they view U.S. as a potential source of converters and other related equipment, although similar equipment can be obtained from China, Japan, and Germany. They are also currently working with a Spanish firm on a hydro project.

Sr. Axel Soderberg, Vicerector Financiero, Universidad Jose Simeon Canas (UCA), stated that smaller hydro projects are supplied mostly by Chinese firms. U.S. firms have, on the other hand, been fairly successful in winning bids to equip larger hydro projects. For instance, the company Ingendehsa purchases practically all its hydro equipment from a U.S. company. This company and two of its proposed hydro projects are featured in the subsequent Project Profiles.

Financing Options

Credit ratings have dropped recently for many Salvadorian firms, so financing is problematic for many of them. Governmental sources of funding are also limited; any initiatives that would result in new governmental debt issuances require a two-thirds super-majority in the legislature in order to pass.

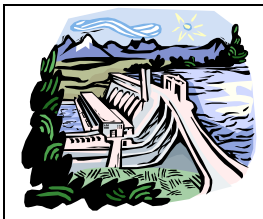
[8] Some of the discussion in this section is based on 2009 El Salvador Commercial Guide published by U.S. Department of Commerce

The government and CEL have approached the CABEI for funding, although this source may not have sufficient resources to provide financing. The IDB, IMF and World Bank are currently negotiating with the new government, and reports of progress have been positive. Some of the developers view the carbon credit markets as potential sources of funding. AMSA, the public water company, relies on donations, although it is mainly dependent on governmental funding; this reliance on government funding is problematic, given the two-thirds majority required for new government debt issuances. Finally, some parties view the USAID as a source of possible funds, whether this is an accurate perception or not.

The head of SIGET specifically acknowledged that developers need external help due to the cost of the latest technologies. One hurdle to financing is that banks have historically insisted on a five year loan term, which small hydro project cash flows typically cannot support. The BMI facility (funded by the IDB) via first line banks have allowed for more generous loan terms: 15 years for civil projects, 10 year loans for equipment, and 5 year loans for feasibility studies. Banco Centralamerico also provides funding for small hydro projects. The new administration recognizes the need to make these projects more attractive to banks.

El Salvador Projects

Project 5 –Epsylon3 2.2 MW Mirazalcos Hydro Electric Project

	**Type: Run-on-river hydro**	**Name: Mirazalcos Hydro Electric Project**
	Size: 2.2 MW	**Project Sponsor: Epsylon3**

Project Background

The Mirazalcos hydro project has been of interest to various parties since the 1920s. In 1960 the Cano Family acquired the Mirazalcos Farm and attempted to implement the project in the 1990s by initiating a feasibility study prepared by the Joint Staff of the Hydroelectric Commission of the Lempa River (CEL) and the University José Simeon Cañas (UCA). In 1998, the environmental study made by ECOS Ingenieros was approved. In 1999, GEMIRA contracted the Canadian company WESA Ltd to conduct feasibility and design studies, and SIGET awarded the concession for the utilization of hydraulic resources. However, the project was never begun due to the lack of the capital required.

Currently, Epsylon3 S.A. de C.V. and Cano- Przlutzki S.A. de C.V. have restarted the preliminary and feasibility studies and are in the design and actualization of technical and investment calculations phase.

The hydro unit will be installed at the Mirazalcos Farm, consisting of approximately 130 Acres, which is located in Cantón Los Canales, Municipality of Juayua, Department of Sonsonate, approximately 80 km from the capital, San Salvador. This is a strategic location since the La Calera and El Bebedero rivers offer a number of technical advantages; both rivers are ideal for a hydro unit due to its flow and falls.

The installed capacity of the Mirazalcos unit will be 2.2 MW; its infrastructure will consist of a dam for the river diversion (Azud type), works for the water intake, gates, grills to impede the penetration of foreign bodies that may damage the hydraulic turbine, a hydraulic conduction tunnel of approximately 2,100 m in length, forced pipes, machinery house, a channel for the turbine discharge, electricity generation equipment, internal electrical net, and delivery circuit and accesses.

Project Sponsor's Capabilities and Commitment

The Mirazalcos project is promoted by the company GEMIRA S.A de C.V.; the project consists of the construction of a small hydroelectric plant (PCH). Its main purpose is selling electricity to the retail electricity market and when convenient to the wholesale electricity market. Stakeholders are expected to procure 70% of the investment from outside sources and they will contribute the remaining 30%.

Currently, Cano-Przylutzki owns 100% of the stock in GEMIRA S.A. de C.V.; however, it is expected that Epsylon3 S.A. de C.V. will acquire 82.5% and that Cano-Przylutzki S.A. de C.V., will retain the remaining 17.5%. It is important to note that GEMIRA is managing the project and is the owner of Mirazalcos farm. The stakeholders are listed in the following chart:

Company	Shareholding%
EPSYLON 3 S.A. de C.V. (82.5%)	
Ing. José Antonio Rodriguez	20%
Ing. José Vicente Machado	20%
Ing. Luis Humberto Alvarenga	20%
Ing. Marvin O. Hernández	10%
Ing. Maximiliano Martínez	10%
Ing. José Roberto Puente	10%
Ing. Jaime Córdoba	5%
Ing. José Suria	5%
Cano-Przylutzki S.A. de C.V (17.5%)	
Ing. Guillermo Ernesto Cano	100%

Stakeholders are broadly experienced in the country's electricity business such as generation, transmission, distribution and commercialization of electricity.

Implementation Financing

The project's total investment is approximately $5.7 million. The following chart presents the main investment items and related value:

Project's Total Investment in $	
Electricity generation equipment	1,870,000
Electric network	202,000
Hydraulic Works	2,722,719
Civil Works	209,174
Terrain	20,000
Preliminary studies	117,000
Interests to capitalize	593,773
Investment Total Amount	**$ 5,734,665**

As mentioned above, stakeholders plan to contribute 30% of the investment and plan to acquire financing for the remaining 70%.

Considering the total amount of the investment, it is important to mention that Cano-Przylutzki S.A. de C.V. is the owner of the Mirazalcos farm and to this date they have already invested $680,600 divided as follows: $117,000 for preliminary studies, $543,000 for digging and tunnel works, and $20,000 for terrain procurement.

A 20 year financial projection was prepared beginning from 2009. The main assumption of this projection is that the unit will be constructed over a 20 month period, with energy production commencing in 2011. Certain technical assumptions, such as the total capacity factor of the plant, the gross fall height, etc, were determined in accordance with the feasibility study specifications prepared by the company WESA Ltd.; these study results are actually undergoing review and are being updated at this time.

In $ Thousands	2009	2010	2011	2012	2013	2014	2015	2018	2019	2020
Electric Energy Sells	-	-	1,386	1,407	1,428	1,450	1,472	1,539	1,562	1,585
Direct Costs										
Remunerations	-	-	(56)	(57)	(59)	(61)	(62)	(68)	(70)	(72)
Depreciation	-	-	(177)	(177)	(177)	(177)	(177)	(177)	(177)	(177)
Other costs			(47)	(48)	(50)	(51)	(52)	(57)	(58)	(60)
Total plant direct costs			(279)	(282)	(285)	(288)	(292)	(302)	(305)	(309)
Gross Utility	**-**	**-**	**1,107**	**1,125**	**1,143**	**1,161**	**1,180**	**1,237**	**1,256**	**1,276**
Administrative expense.	(56)	(60)	(114)	(117)	(121)	(124)	(128)	(140)	(144)	(148)
Operational utility	**(56)**	**(60)**	**993**	**1,008**	**1,022**	**1,037**	**1,052**	**1,097**	**1,112**	**1,128**
Financial expenditures	(198)	(396)	(396)	(372)	(346)	(317)	(284)	(164)	(115)	(61)
Legal Reserve	-	-	(54)	(57)	(60)	(63)	(66)	(78)	(82)	(87)
ISR	-	-	-	-	-	-	-	-	-	-
Utility	**(254)**	**(455)**	**543**	**579**	**617**	**658**	**701**	**855**	**915**	**980**

Sales Assumptions

The financial projection assumes that the Mirazalcos unit will begin production of energy in the year 2011. The annual production will average 12.6 +- 2.4 GWh. There are two alternatives in consideration for the energy sales:

- Projections assume that the Mirazalcos unit will execute a contract with the distribution company AES CLESA in order to utilize its network with a voltage 13.2 Kv and sell the electricity with at a price of $100 per MWh.

- Otherwise, the Mirazalcos unit may execute an agreement with Excelergy S.A. de C.V., for the commercialization and sale of electrical energy in the spot market, at an expected energy price of $150 per MWh.

Production Capacity Assumptions and Energy Generation

The following table contains the expected capacity factor for the unit:

Production Assumptions	
Plant Factor	0.654
Installed Capacity	2.2 MW

Other Assumptions

1. The financial projection assumes that the Mirazalcos project will not pay income taxes during the first ten years following the project's commercial commencement; this is in accordance with the Tax Incentives Law to Foment Renewable Energy for Electricity Generation.

2. The remunerations assumption includes salaries and benefits for the administrative area (General Manager, one Accountant and one Administrative Assistant), and the operative plant (one operation chief, one technical assistant, four operators and four pressure engineers).

3. Depreciation assumptions are as follows:

Investment	Useful Life
Electricity Generation Equipment	25
Electrical network	30
Hydraulic works	40
Civil Works	40

U.S. Export Potential

Most of the export potential for the implementation of this project is in the procurement of hydro power turbines, substation equipment, instrumentation and control systems, and construction and engineering services. The overall estimated project cost (w/o construction contingency) is about $5.7 million for 2.2MW plant. U.S. exports could be as much as $3 million (45%) level.

The Project Sponsor provided the Consultant with summary estimates, which were developed during the pre-feasibility effort. Consultant believes that these estimates are reasonable and in line with own estimate.

A number of U.S. firms can supply the equipment:

Hydro Turbines:

- Canyon Hydro;
- Voith Siemens Hydro Power Generation;
- American Hydro Corporation;
- The James Leffel & Co.;
- North American Hydro;
- GE Energy Hydro.

In addition to equipment suppliers, U.S. engineering companies may be interested in EPC or task design contracts. Services suppliers potentially include:

- Black and Veatch;
- MWH Global;
- Shaw Group (Stone and Webster);
- USR (Washington Group);
- HydroWest International;
- PB Power.

The Consultant has contacted major equipment manufacturers and confirmed their interest in providing hydro turbines for small scale projects in Central America. Manufacturers confirmed their past international experience and their comfortable position in supply logistics. They identified price/quality parameters as being a major driver for equipment selection in the region.

Foreign Competition and Market Entry Issues

Epsylon3 has selected the small hydro and, possibly, the small geothermal markets in El Salvador due to the lack of interest (and therefore competition) from the large international companies such as AES and Duke Energy. Additionally, these small units are easier to license and cheaper to construct. Epsylon3 views a portfolio of these small units as less risky than a single large unit of equal capacity.

In general, U.S. manufacturers are considered to be competitive in the design, manufacturing, and implementation of the proposed project scope. However, significant competition is expected to U.S. companies in Central America.

Major foreign competitors in the hydro power energy market include amongst others:

- Toshiba (Japan)
- Voith Siemens (Germany);
- Sulzer Hydro Ltd. (Switzerland);
- Moller Undenas Turbin AB (Sweden);
- Wasserkraft Volk AG – WKV (Germany);
- Alstom (France);
- Pompes RITZ France SAS (France);
- CITIC Heavy Machinery Company Ltd. (China);
- Andritz VA TECH Hydro (Austria);
- Bouving Fouress Limited (India);
- Dongfang Electric Corporation (China);
- Harbin Power Equipment Company (China);
- Norcan Hydraulic Turbines Inc. (Canada);
- Kharkov Turbogenerator Plant "Turboatom" (Ukraine); and
- LMZ (Russia).

Developmental Impact

Infrastructure -- The Project will be used to provide power at competitive prices and reduce the grid's dependence on expensive petroleum-based power. The project is expected to be about 2.2 MW. The project will be able to provide power to roughly over 6,000 households. The project would connect with the CLESA grid (the local distributor), and the power injection at this point would improve and stabilize the voltage for CLESA clients in the surrounding area, and perhaps even beyond. This is important because CLESA has received complaints that home appliances burn out due to low voltage or voltage variations.

The project would have some impact in improving about 4,200 meters of rural (coffee plantation) roads, improving access to some of the neighboring communities (500 people or so). The road would not be paved, but the width and improved surface would improve conditions over what exists today.

Human Capacity Building -- One important factor is that the municipal taxes paid to Juayua would be significant (for Juayua standards), and that would benefit the local population indirectly. The project would only employ 8 local people as permanent employees, and 20 others eventually for cleaning and maintenance. However, during construction, some 300 people would be employed directly for about 18 months, and they would have an income approximately triple what they earn by working in the coffee plantations. Epsylon3 would train its employees and raise the educational and technical level of local personnel.

Other - Assuming 12 GWh of electricity produced by hydro plant instead of coal, for example, the CO2 avoided emissions estimated at 9,000 tons per year.

The proposed project can be considered a rural electrification project. The remote location will strengthen the electricity grid and reduce transmission losses. It will also provide more power to be distributed in the area where more electrification is desired.

Environmental Considerations

The project is expected to have a significant positive effect on the environment. Currently, large thermal plants are considered to be major sources of air pollution. Due to the nature of the technology, the proposed hydro power plant has no emissions. Implementation of the hydro power plant (HPP) is estimated by the Consultant to result in annual savings of 20,000 BBL of oil and associated 9,000 tons of CO2 emissions. The construction of the plant will require the appropriate environmental assessment study. The study is also required if the Project Sponsor decides to pursue any international lending agency funding. The study will address all major issues associated with the construction of a hydro power facility of this size, such as flooding, resettlement, migratory fish control, archeological surveying, water quality, and other issues.

Among anticipated other positive impacts are:

- Conservation and mitigation measures in the river basin;
- No alteration of agricultural lands;
- Forestry conservation;
- Training, regarding environmental issues, provided to locals;
- New tourist and recreational activities;
- Life quality improvement for local communities due to new incomes; and

- Socail commitment regarding education, health and production of goods.

Potential negative impacts are:

- Natural river flow alteration;
- Flora and Fauna conditions, of a specific area, modified due to the new reservoir;
- Sound pollution during construction; and
- Heavy equipment transit.

Follow-up and Further Information

The proposed project is in early development stages and requires significant development work. The Project Sponsor indicated interest in cooperating with U.S. companies for project preparation, project design and engineering, and EPC contracting.

The Project Sponsor, Epsylon3, has completed a preliminary project profile for the Mirazalcos unit. Epsylon3 appears to be a very entrepreneurial company with strong management and local renewable energy expertise on board. In our opinion the company has the technical means to develop a project of this kind, and is very open to accepting bids from U.S. exporters should the project reach the implementation stage.

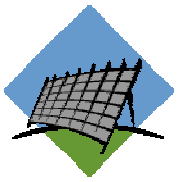
Additionally, the company's stated strategy of selecting small hydro and geothermal projects due to their relative simplicity, lowered probability of political resistance, and reduced risk is a sound approach to developing renewable energy in El Salvador.

Interested parties are encouraged to contact the Project Sponsor for more information and further cooperation steps.

Ing. José Antonio Rodríguez
e-mail: jarodriguez@epsylon3.com
Tel: 2208-4287

Lic. Amelia Cuellar Toledo
e-mail: acuellar@edeceren.com
Tel: 2208-4287

Project 6 – CEL 1 MW Solar PV Plant

	**Type: Solar PV**	**Name: Solar PV Plant**
	Size: 1 MW	**Project Sponsor: CEL**

Project Background

The project consists of the construction of a photovoltaic plant of at least 1 MW of capacity, with all the principal and auxiliary equipment to be connected to the national transmission or distribution grid, at the 5 de Noviembre Hydroelectric Power Plant. This plant is located at approximately 13º59´ north latitude and 88 º 45´ west longitude, on the border of the departments of Cabañas and Chalatenango, in northern El Salvador. The photovoltaic plant is expected to generate approximately 1,825 MWh annually.

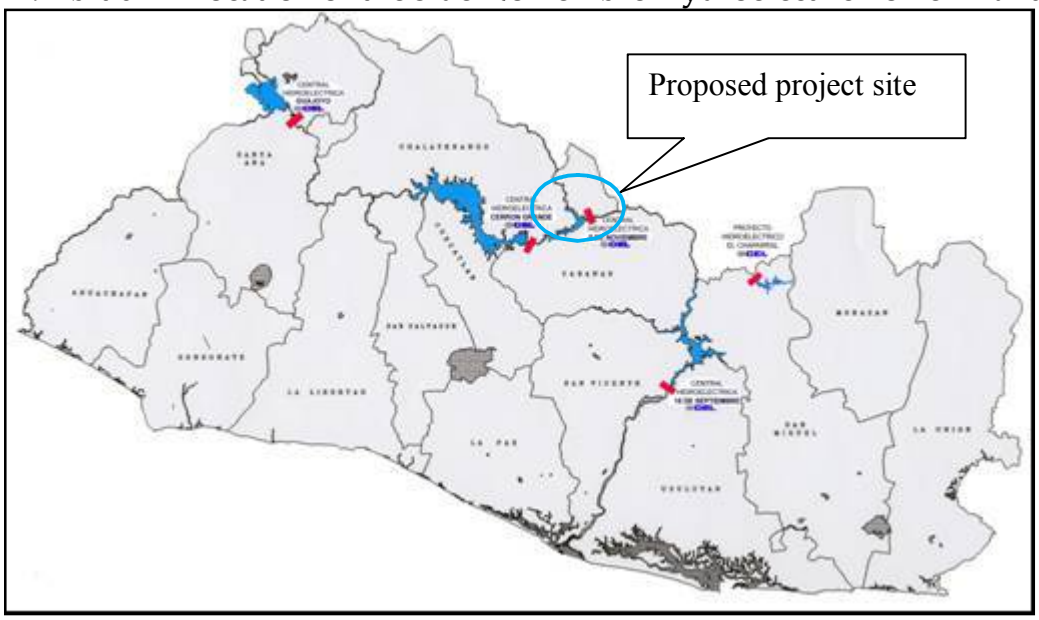
During 2006, the Ministry of Environment and Natural Resources (MARN), the "José Simeón Cañas" Central American University, and the National Services of Territorial Studies (SNET) conducted a study to determine the solar and wind potential in El Salvador as part of the country's fulfillment of certain obligations under the UNFCCC. These agreements are aimed at the promotion of measures, programs and projects which reduce GHG emissions. That study showed that the solar potential in the national territory is good, and justified the execution of large scale photovoltaic plant.

For this project, it will be necessary to acquire an Environmental Permit from the Ministry of Environment and Natural Resources (MARN), after an environmental impact assessment study is carried out. The Regulatory Commission is the Superintendencia General de Electricidad y Telecomunicaciones (SIGET) and according to the General Law of Electricity, excepting hydro and geothermal, all other renewables do not require a concession from SIGET. Therefore, no objection is expected from SIGET

There is no pre-feasibility study at the present time.

The following Exhibit 6-1 depicts the site details of the proposed project.

Exhibit 6-1 - Location of the 5 de Noviembre Hydroelectric Power Plant



Project Sponsor's Capabilities and Commitment

The Comisión Ejecutiva Hidroeléctrica del Río Lempa (CEL) is an autonomous, not-for-profit government institution that operates the four hydroelectric plants in the country. Additional current renewable projects include the following:

1) A pilot project installation of a 25 kW Photovoltaic Plant at its headquarters building with connection to the distribution grid, completed by CEL in June, 2009. The equipment came from China and Japan. There was a public bid for the purchase of equipment, and there was no limitation on the origin of such equipment.

2) The Hydroelectric Project El Chaparral with a generation capacity of 68 MW (in progress). The equipment will come mainly from Europe and Asia.

3) Feasibility study for the El Cimarrón Hydroelectric Project. The public bid for this project is in progress now.

4) Feasibility study of two wind farms. Consultant services are from Spain.

In 2008, CEL had net earnings of $ 2.6 million and had total assets of $978.7 million.

Because CEL is an autonomous government institution, its financial sources are generated from electric energy sales, so the government does not finance any of its activities or operation.

Implementation Financing

Currently, CEL is financing the Hydroelectric Project El Chaparral with CABEI funds, which has financed projects in the past; this source is available for future financing.

Additionally, there is a financial proposal from KfW of Germany for the Photovoltaic Power Plant Project.

U.S. Export Potential and Competition[9]

Most of the export potential for the implementation of this project is in the procurement of PV cells and auxiliary equipment. The overall estimated project cost is about $5-6 million for 1MW plant. U.S. exports could be as much as $6 million (100%) level.

The industry may be subdivided into the following groups representing different steps in the PV supply chain:

- Producers of upstream materials, i.e. feedstock, ingots, blocks/bricks and wafers;
- Producers of semi-finished and finished PV products, i.e. PV cells and modules; and
- Producers of balance-of-system components for PV systems, i.e. charge regulators, inverters, storage batteries, mounting structures, appliances etc.

There are four major producers of solar photovoltaic grade silicon: Wacker in Germany, REC Solar Grade Silicon and Hemlock Semiconductor Corporation in the USA, and Tokuyama in Japan. Between them they produced about 60% of the feedstock required by the PV industry. The balance was sourced from a handful of smaller companies, emerging producers in China and Russia and remaining inventories and rejects from the semiconductor industry (recycled wafers, pot scrap, tops and tails etc.

[9] Based on TRENDS IN PHOTOVOLTAIC APPLICATIONS, Survey report of selected IEA countries, IEA, 2007.

Japan is the leading producer of photovoltaic cells and modules with Germany in second place. The Japanese producer Sharp maintained its lead, with the German producer Q-Cells in second position, followed by Kyocera, Sanyo Electric and Mitsubishi Electric. These five companies accounted for about 60% of total cell production. The four Japanese companies are also significant producers of modules. The United States is the third largest producing country of PV cells.

It should be noticed that the producers of the PV cells may not participate in assembly and packaging to create a finished PV module.

Major U.S. PV Cell producers include:

- Sharp;
- SolarWorld;
- Schott Solar;
- BP Solar; and
- First Solar.

Major U.S. PV Module producers include:

- Sharp;
- Solar Factory;
- SolarWorld;
- First Solar; and
- BP Solar.

From a cost perspective, balance of system (BOS) components (the components that are not the PV modules) account for between 20% (standard grid connected system) and 70% (off-grid installation) of the total PV system costs. Accordingly the production of BOS products has become an important sector within the wider PV industry. Particularly with the rapid expansion of the worldwide market for grid-connected PV systems, inverters are currently the focus of the interest. Following the further growth of the market for grid-connected PV, manufacturers of PV inverters for grid interconnection again experienced a considerable increase in their output.

Developmental Impact

Infrastructure -- The Project will be used to provide power at competitive prices and reduce the grid's dependence on expensive petroleum-based power. The

project is expected to be about 1 MW. The project will be able to provide power to roughly over 2,000 households.

Access roads will be necessary as well as connection to the transmission/distribution grid.

Human Capacity Building -- The proposed power plant will have job creation impact as well. The construction of the plant will require temporary manpower, both skilled and unskilled.

Operations phase employment opportunities will be made available for technical, administrative, and security people during the commercial operation phase.

Other - Assuming 2 GWh of electricity produced by instead of coal, for example, the CO2 avoided emissions estimated at 1,500 tons per year.

The proposed project can be considered a rural electrification project. The remote location will strengthen the electricity grid and reduce transmission losses. It will also provide more power to be distributed in the area where more electrification is desired.

Environmental Considerations

The project is expected to have a significant positive effect on the environment. Currently, large thermal plants are considered to be major sources of air pollution. Due to the nature of the technology, the proposed plant has no emissions. Implementation of the power plant is estimated by the Consultant to result in annual savings of 3,000 BBL of oil and associated 1,500 tons of CO2 emissions. The construction of the plant will require the appropriate environmental assessment study. The study is also required if the Project Sponsor decides to pursue any international lending agency funding. The study will address all major issues associated with the construction of a facility of this size.

Among anticipated other positive impacts are:

- Substitution of fossil energy with renewable solar;
- No air emissions; and
- No exposure to lubricants and other potential water and soil contaminants.

Potential negative impacts are:

- Sound pollution during construction; and
- Heavy equipment transit.

Follow-up and Further Information

The proposed project is in early development stages and requires significant development work. The Project Sponsor indicated interest in cooperating with U.S. companies for project preparation, project design and engineering, and EPC contracting.

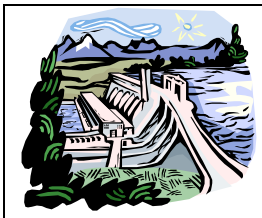
Interested parties are encouraged to contact the Project Sponsor for more information and further cooperation steps.

Ing. Miguel Dominguez
Jefe Unidad de Gestion y Control de Proyectos
Comision Ejecutiva
Hidroelectrica del Rio Lempa (CEL)
Tel (503) 2211-6131
mdominguez@cel.gob.sv

and

Ing. Luis Carlos Henriquez
Jefe del Departmento de Gestion y Financiamento de Proyectos
Comision Ejecutiva
Hidroelectrica del Rio Lempa (CEL)
Tel (503) 2211-6136
lhenriquez@cel.gob.sv

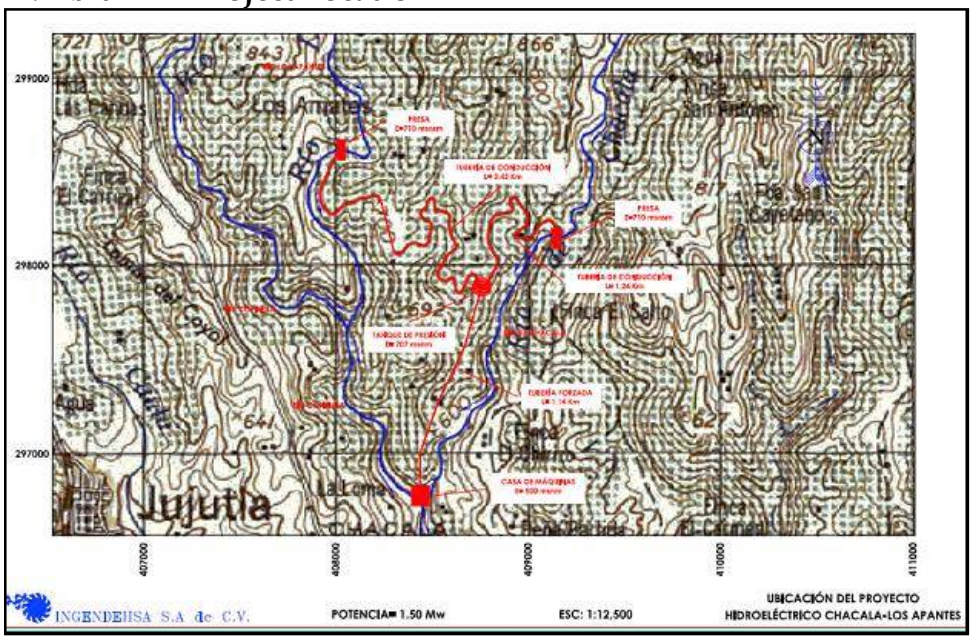
Project 7 – Ingendehsa 1.5 MW Los Apantes Chacala Hydroelectric Project

	**Type: Run-on-river hydro**	**Name: Los Apantes Chacala Hydroelectric Project**
	Size: 1.5 MW	**Project Sponsor: Ingendehsa**

Project Background

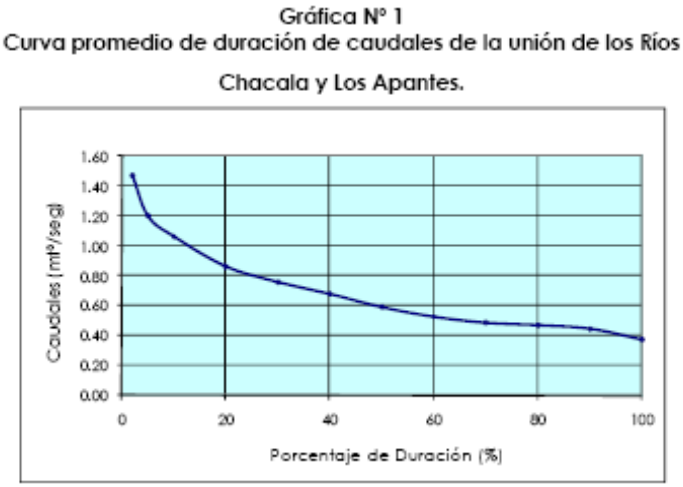
This project involves the construction of two small dams, one designed to shunt water from the Río de Chacala to a pressure tank and the other to shunt the waters of the River Apantes into the same tank. The flow caught in each river will be transported through pipelines that, for the Rio Chacala, have a length of 1.24 km, while for the Rio Apantes the pipeline length is 2.42 km. From the union of those two pipelines in the pressure tank, water will lead to the machine house (containing the turbine) through a pressure pipe approximately 1.14 km. Finally, the water flow is led back to the River Copinula, at the point of confluence of the Rivers Chacala, Los Apantes and Copinula, by means of a discharge channel leading from the turbine. The general arrangement of the work is shown in the following Exhibit 7-1.

Exhibit 7-1 – Project Location



The design flow of the plant is estimated at a value of 0.86 m ^{3} / sec corresponding to 20% of the duration curve of flow estimates for the union of Chacala and Los Rios Apantes. The Preliminary Duration Curve is shown in the following Exhibit 7-2.

Exhibit 7-2 – Duration Curve



The project will be interconnected with the CLESA-AES system, a 13.2 kV transmission line from the machine house to the AES-CLESA grid; the length of this new line is estimated to be about 700 meters to the grid serving the people of Jujutla, Department of Ahuachapán. The proposed line passes through land used for the cultivation of coffee and oranges, so it will be necessary for the construction of the line to minimize the cutting of trees and other impacts on the environment.

Average annual energy output is estimated using a plant factor of 0.6, yielding annual energy of 8.12 GWh. These results in gross revenues of approximately $869,064, including the sale of carbon credits representing a total of 6,000 tones of CO2 not emitted to the atmosphere, depending on the generation of the plant. The current cost of a tone of carbon in the international market was assumed to be $17.00 / CT.

Hydroelectric Project-Los Apantes Chacala is located approximately 3 km northeast of the primary municipality in the Department of Jujutla Ahuachapán, Republic of El Salvador. One of the primary access points is through a paved road that leads to Jujutla, from the Road-Concepción Apaneca of Ataco.

Project Sponsor's Capabilities and Commitment

Ingendehsa specializes in the preparation of feasibility studies and the final design of hydroelectric projects. Sr. Jose Hermes Landaverde Garcia worked at Harz Engineering (Chicago, Illinois) prior to his post at Ingendehsa. He has been with Ingendehsa since 2000; in that time he has participated in the development of 20 small hydro projects in Honduras and El Salvador. These projects ranged in capacity from 1 to 35 MW five of these are now in operation, while the remainder are in various stages of arranging financing.

Additional information on the company may be found at their website: www.ingendehsa.com (Spanish only).

Implementation Financing

According to the company's economic evaluation, the project is economically feasible because the internal rate of return (IRR) is greater than the opportunity cost as reflected by the discount rate used of 9.00%.

Considering the preliminary curve of flow duration obtained for the project, the design flow has been estimated at 0.86 m3 / s for 20% of that curve. The maximum power of the project under these conditions has been estimated at 1.500 kW and the average annual energy production is 8,125,776 KWh, with an average plant capacity factor of 0.62. According to the conditions of fall and net flow, a Pelton turbine type would be appropriate.

In the preliminary economic assessment of the project, it is assumed that 70% of the total investment ($3.1 million) will be obtained through a loan from private banks at an interest rate of approximately 10%, while the remaining 30% ($1.35 million) will be provided by funds from investors. Ingendehsa evaluated the project using a discount rate of 9.00%, the opportunity cost used to determine a project's economic performance. The following financial indicators summarize the results of the company's financial analysis:

1. Total Investment: $4.49 million
2. Net Present Value: $4.1 million
3. Internal Rate of Return: 30.39%
4. Benefit-Cost Ratio: 1.71
5. Investment per kW installed: $2,999

U.S. Export Potential

Most of the export potential for the implementation of this project is in the procurement of hydro power turbines, substation equipment, instrumentation and control systems, and construction and engineering services. The overall estimated project cost (w/o construction contingency) is about $4.5 million for 1.5 MW plant. U.S. exports could be as much as $2 million (45%) level.

The Project Sponsor provided the Consultant with summary estimates, which were developed during the pre-feasibility effort. Consultant believes that these estimates are reasonable and in line with own estimate.

A number of U.S. firms can supply the equipment:

Hydro Turbines:

- Canyon Hydro;
- Voith Siemens Hydro Power Generation;
- American Hydro Corporation;
- The James Leffel & Co.;
- North American Hydro;
- GE Energy Hydro.

In addition to equipment suppliers, U.S. engineering companies may be interested in EPC or task design contracts. Services suppliers potentially include:

- Black and Veatch;
- MWH Global;
- Shaw Group (Stone and Webster);
- USR (Washington Group);
- HydroWest International;
- PB Power.

The Consultant has contacted major equipment manufacturers and confirmed their interest in providing hydro turbines for small scale projects in Central America. Manufacturers confirmed their past international experience and their comfortable position in supply logistics. They identified price/quality parameters as being a major driver for equipment selection in the region.

Foreign Competition and Market Entry Issues

In general, U.S. manufacturers are considered to be competitive in the design, manufacturing, and implementation of the proposed project scope. However, significant competition is expected to U.S. companies in Central America.

Major foreign competitors in the hydro power energy market include amongst others:

- Toshiba (Japan)
- Voith Siemens (Germany);
- Sulzer Hydro Ltd. (Switzerland);
- Moller Undenas Turbin AB (Sweden);
- Wasserkraft Volk AG – WKV (Germany);
- Alstom (France);
- Pompes RITZ France SAS (France);
- CITIC Heavy Machinery Company Ltd. (China);
- Andritz VA TECH Hydro (Austria);
- Bouving Fouress Limited (India);
- Dongfang Electric Corporation (China);
- Harbin Power Equipment Company (China);
- Norcan Hydraulic Turbines Inc. (Canada);
- Kharkov Turbogenerator Plant "Turboatom" (Ukraine); and
- LMZ (Russia).

Developmental Impact

Infrastructure -- The Project will be used to provide power at competitive prices and reduce the grid's dependence on expensive petroleum-based power. The project is expected to be about 1.5 MW. The project will be able to provide power to roughly over 2,000 households.

Human Capacity Building -- The proposed power plant will have significant job creation impact as well. The construction of the plant will require temporary manpower, both skilled and unskilled.

Operations phase employment opportunities will be made available for technical, administrative, and security people during the commercial operation phase.

Other - Assuming 8 GWh of electricity produced by hydro plant instead of coal, for example, the CO2 avoided emissions estimated at 6,000 tons per year.

The proposed project can be considered a rural electrification project. The remote location will strengthen the electricity grid and reduce transmission losses. It will also provide more power to be distributed in the area where more electrification is desired.

Environmental Considerations

The project is expected to have a significant positive effect on the environment. Currently, large thermal plants are considered to be major sources of air pollution. Due to the nature of the technology, the proposed hydro power plant has no emissions. Implementation of the hydro power plant is estimated by the Consultant to result in annual savings of 13,000 BBL of oil and associated 6,000 tons of CO2 emissions. The construction of the plant will require the appropriate environmental assessment study. The study is also required if the Project Sponsor decides to pursue any international lending agency funding. The study will address all major issues associated with the construction of a hydro power facility of this size, such as flooding, resettlement, migratory fish control, archeological surveying, water quality, and other issues.

Among anticipated other positive impacts are:

- Conservation and mitigation measures in the river basin;
- No alteration of agricultural lands;
- Forestry conservation;
- Training, regarding environmental issues, provided to locals;
- New tourist and recreational activities;
- Life quality improvement for local communities due to new incomes; and
- Social commitment regarding education, health and production of goods.

Potential negative impacts are:

- Natural river flow alteration;
- Flora and Fauna conditions, of a specific area, modified due to the new reservoir;
- Sound pollution during construction; and
- Heavy equipment transit.

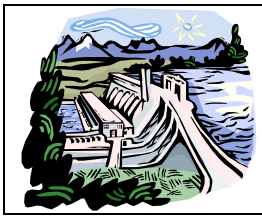
Follow-up and Further Information

The proposed project is in early development stages and requires significant development work. The Project Sponsor indicated interest in cooperating with U.S. companies for project preparation, project design and engineering, and EPC contracting.

Interested parties are encouraged to contact the Project Sponsor for more information and further cooperation steps.

Ing. Jose Hermes Landaverde Garcia
Representante Legal
Ingendehsa, S.A. de C.V.
Tel (503) 2273-6243
hlandaverde@integra.com.sv

Project 8 – Ingendehsa 16 MW Sumpul Hydroelectric Project

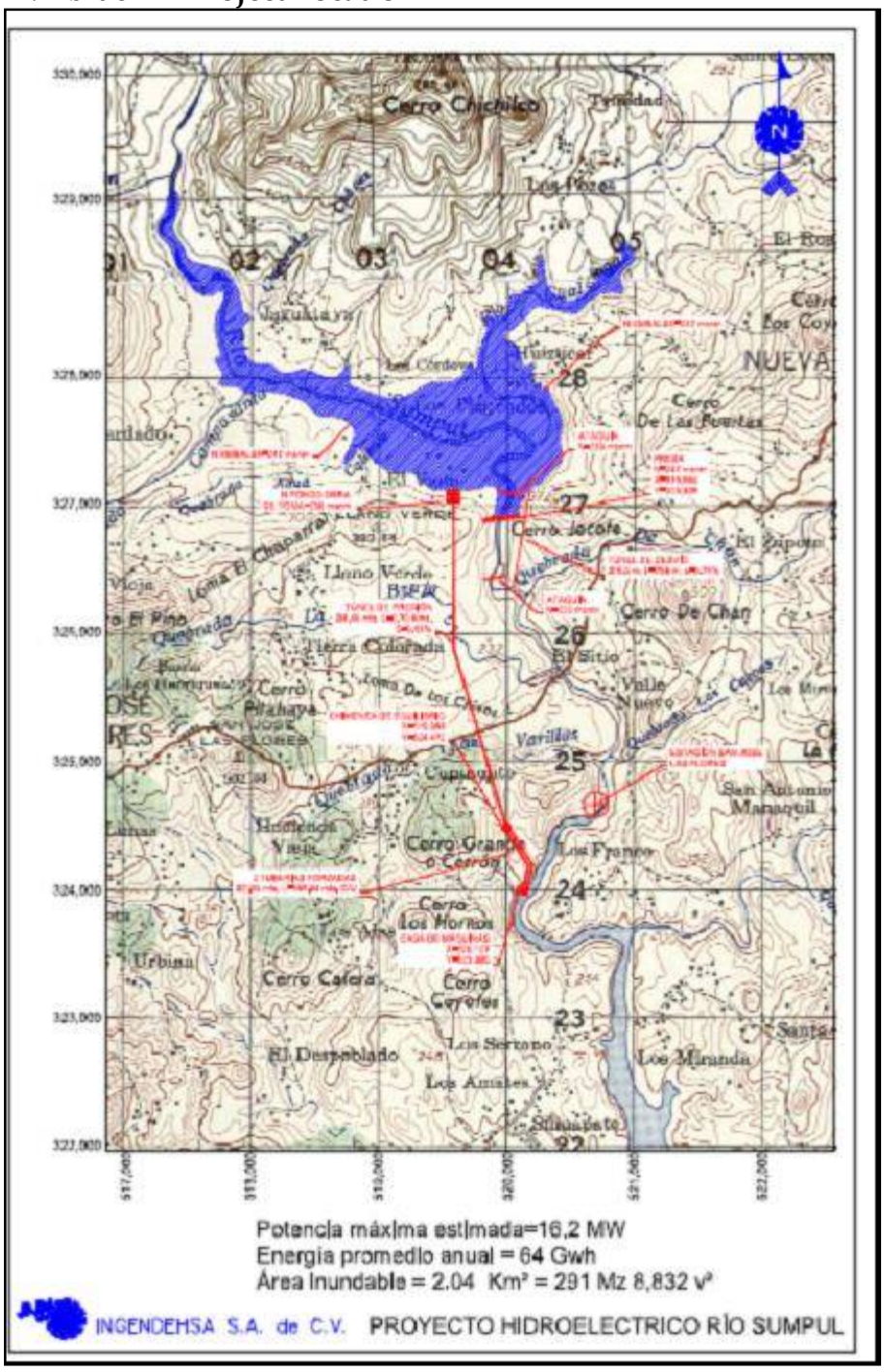
	**Type: Run-on-river hydro**	**Name: Sumpul Hydroelectric Project**
	Size: 16 MW	**Project Sponsor: Ingendehsa**

Project Background

This project involves the construction of a dam and a regulatory storage reservoir with a height of approximately 39 meters, including the foundation. The unit will be designed to take water from the Sumpul River, through a 2.7 km long pressurized tunnel to a balancing chimney and then to the turbine 'machine house' by means of two 2.90 meter pipes of diameter and 566 mts of length. The balance chimney is a structure that serves as transition between the tunnel of pressure tunnel and the turbine pipes. Finally, the water volume is led back to the Sumpul River.

The Sumpul project is located approximately 11 km to the northeast of the city of Chalatenango, Republic of El Salvador. Its main access is a paved road out of that city that leads to the populations of San Miguel de Mercedes, the San Antonio Farms, San Isidro Labrador and San Jose Las Flores. The site of the project is located about 4 km to the northeast of the San Jose Las Flores. The following diagram (Exhibit 8-1) illustrates the detailed siting of the facility on a topographical map.

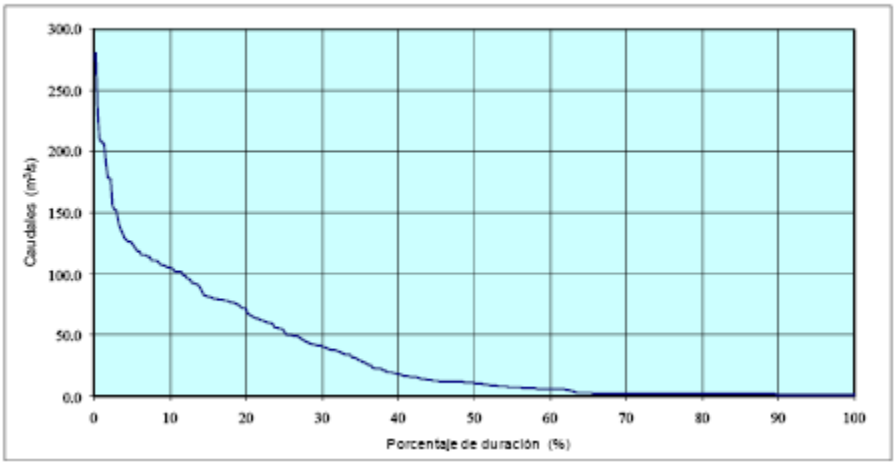
Exhibit 8-1 – Project Location



The designed volume of the power station has been estimated to be equal to 33.32 TM ^{3} /sec. This value corresponds to 33.8% of the duration curve of the flow estimates of the Sumpul, incorporating the regulation dam into the calculation. The duration curve for the Sumpul is shown in the following Exhibit 8-2.

Exhibit 8-2 – Duration Curve

Gráfica N° 1.Curva promedio de duración de caudales del Río Sumpul.



The Sumpul project will be interconnected with the hydroelectric power station 5 de November, owned by CEL and located about 10 km to the west of the machine house.

Preliminary analysis indicates that the dam has the capacity to operate at maximum power during 4 hours daily in the rainy season months and at minimum capacity from 3 to 4 hours during the dry season. The installed maximum installed capacity of the project is planned to be 16.2 MW. The estimated annual production energy is estimated to be approximately 64 GWh, which will generate annual gross income of approximately $ 6.8 million in the first year of operation, including the sale of the carbon bonds that represent a total of 45,000 tons of CO2. The current cost of a ton of carbon in the international market is $17.0/ton.

Project Sponsor's Capabilities and Commitment

Ingendehsa specializes in the preparation of feasibility studies and the final design of hydroelectric projects. Sr. Jose Hermes Landaverde Garcia worked at Harz Engineering (Chicago, Illinois) prior to his post at Ingendehsa. He has been with Ingendehsa since 2000; in that time he has participated in the development of 20 small hydro projects in Honduras and El Salvador. These projects ranged in capacity from 1 to 35 MW five of these are now in operation, while the remainder are in various stages of arranging financing.

Additional information on the company may be found at their website: www.ingendehsa.com (Spanish only).

Implementation Financing

According to the company's economic evaluation, the project is economically feasible because the internal rate of return (IRR) is greater than the opportunity cost as reflected by the discount rate used of 9.00%.

In the company's preliminary economic evaluation of the Sumpul project, it was assumed that 70% of the total investment ($33,879,103) will be obtained through a bank loan at an interest rate of 10%, with the remaining 30% ($14,518,908) contributed by investors in the project. Using a discount rate of 9%, it was determined that the project is technically and economically feasible. The following financial indicators summarize the results of the company's financial analysis:

1. Total investment: $48.4 million
2. Present net value: $22.6 million
3. Internal rate of return: 20.04%
4. Benefit-Cost ratio: 1.42
5. Investment per kW installed: $2,991

U.S. Export Potential

Most of the export potential for the implementation of this project is in the procurement of hydro power turbines, substation equipment, instrumentation and control systems, and construction and engineering services. The overall estimated project cost (w/o construction contingency) is about $48 million for 16 MW plant. U.S. exports could be as much as $22 million (45%) level.

The Project Sponsor provided the Consultant the summary estimates, which were developed during the pre-feasibility effort, which are reasonable and in line with Consultant's own estimate.

A number of U.S. firms can supply the equipment:

<u>Hydro Turbines:</u>

- Canyon Hydro;
- Voith Siemens Hydro Power Generation;
- American Hydro Corporation;

- The James Leffel & Co.;
- North American Hydro;
- GE Energy Hydro.

In addition to equipment suppliers, U.S. engineering companies may be interested in EPC or task design contracts. Services suppliers potentially include:

- Black and Veatch;
- MWH Global;
- Shaw Group (Stone and Webster);
- USR (Washington Group);
- HydroWest International;
- PB Power.

The Consultant has contacted major equipment manufacturers and confirmed their interest in providing hydro turbines for small scale projects in Central America. Manufacturers confirmed their past international experience and their comfortable position in supply logistics. They identified price/quality parameters as being a major driver for equipment selection in the region.

Foreign Competition and Market Entry Issues

In general, U.S. manufacturers are considered to be competitive in the design, manufacturing, and implementation of the proposed project scope. However, significant competition is expected to U.S. companies in Central America.

Major foreign competitors in the hydro power energy market include amongst others:

- Toshiba (Japan)
- Voith Siemens (Germany);
- Sulzer Hydro Ltd. (Switzerland);
- Moller Undenas Turbin AB (Sweden);
- Wasserkraft Volk AG – WKV (Germany);
- Alstom (France);
- Pompes RITZ France SAS (France);
- CITIC Heavy Machinery Company Ltd. (China);
- Andritz VA TECH Hydro (Austria);
- Bouving Fouress Limited (India);
- Dongfang Electric Corporation (China);

- Harbin Power Equipment Company (China);
- Norcan Hydraulic Turbines Inc. (Canada);
- Kharkov Turbogenerator Plant "Turboatom" (Ukraine); and
- LMZ (Russia).

Developmental Impact

Infrastructure -- The Project will be used to provide power at competitive prices and reduce the grid's dependence on expensive petroleum-based power. The project is expected to be about 16 MW. The project will be able to provide power to roughly over 24,000 households.

Human Capacity Building -- The proposed power plant will have significant job creation impact as well. The construction of the plant will require temporary manpower, both skilled and unskilled.

Operations phase employment opportunities will be made available for technical, administrative, and security people during the commercial operation phase.

Other - Assuming 64 GWh of electricity produced by hydro plant instead of coal, for example, the CO2 avoided emissions estimated at 45,000 tons per year.

The proposed project can be considered a rural electrification project. The remote location will strengthen the electricity grid and reduce transmission losses. It will also provide more power to be distributed in the area where more electrification is desired.

Environmental Considerations

The project is expected to have a significant positive effect on the environment. Currently, large thermal plants are considered to be major sources of air pollution. Due to the nature of the technology, the proposed hydro power plant has no emissions. Implementation of the hydro power plant is estimated by the Consultant to result in annual savings of 105,000 BBL of oil and associated 45,000 tons of CO2 emissions. The construction of the plant will require the appropriate environmental assessment study. The study is also required if the Project Sponsor decides to pursue any international lending agency funding. The study will address all major issues associated with the construction of a hydro power

facility of this size, such as flooding, resettlement, migratory fish control, archeological surveying, water quality, and other issues.

Among anticipated other positive impacts are:

- Conservation and mitigation measures in the river basin;
- No alteration of agricultural lands;
- Forestry conservation;
- Training, regarding environmental issues, provided to locals;
- New tourist and recreational activities;
- Life quality improvement for local communities due to new incomes; and
- Social commitment regarding education, health and production of goods.

Potential negative impacts are:

- Natural river flow alteration;
- Flora and Fauna conditions, of a specific area, modified due to the new reservoir;
- Sound pollution during construction; and
- Heavy equipment transit.

Follow-up and Further Information

The proposed project is in early development stages and requires significant development work. The Project Sponsor indicated interest in cooperating with U.S. companies for project preparation, project design and engineering, and EPC contracting.

Interested parties are encouraged to contact the Project Sponsor for more information and further cooperation steps.

Ing. Jose Hermes Landaverde Garcia
Representante Legal
Ingendehsa, S.A. de C.V.
Tel (503) 2273-6243
hlandaverde@integra.com.sv

Guatemala

Sector Primer - Guatemala[10]

General[11]

Country Summary	Electricity System Summary
- Territory: 108,889 sq. km; - Population: 13.3 million (2009); - Access to Electricity: 84%; and - Ave GDP per Capita: $5,300 (2008).	- Installed Capacity: 1,957 MW (2009); - Peak Demand: 1,500 MW (2009) - Dominant Electricity Resource: equal Hydro/Fossil; - Ave res. Tariff: $0.15/kW (2008); - Total generators: 20 (19 private); - Transmission: 3 companies; and - Distribution: 3 companies.
Renewable Energy Summary	**Governance Summary**
- Hydro (45% of total energy production); and - Renewable potential: 14,000 MW (mostly hydro 5000 MW and wind 8,000 MW).	- Distribution companies purchase from generators; - CNEE – National regulator; and - Possible to orderly permit new facilities and receive long-term PPAs.

Guatemala has a total area of 108,889 sq. km, a population of over thirteen million, and a per capita income of about $5,300. It is bordering the North Pacific Ocean, between El Salvador and Mexico, and bordering the Gulf of Honduras (Caribbean Sea) between Honduras and Belize. Guatemala has a coastline of 400 km in length. Guatemala is the largest and most populous of the Central American countries. The agricultural sector accounts for about one-fourth of GDP, two-fifths of exports, and half of the labor force. Coffee, sugar, and bananas are the main products, with sugar exports benefiting from increased global demand for ethanol.

Total installed capacity within Guatemala is approximately 1,957 MW. Of this, non-renewable fuels account for 1,033 MW; renewable energy generation accounts for the remaining 924 MW. The following Exhibit 2 contains more details regarding the units in production.

[10] Sources of information for this primer include: Advances in Renewable Development in Central, by Cristhian Escobar AGER, 2007; Regional: Accelerating Renewable Energy Investments through CABEI in Central America, GEF, 2008; and Central America Energy and Competitiveness Conference, 2007

[11] Some of statistics and estimates are estimated based country discussions and The Central American Carbon Finance Guide.

Exhibit 2 – Installed Capacity

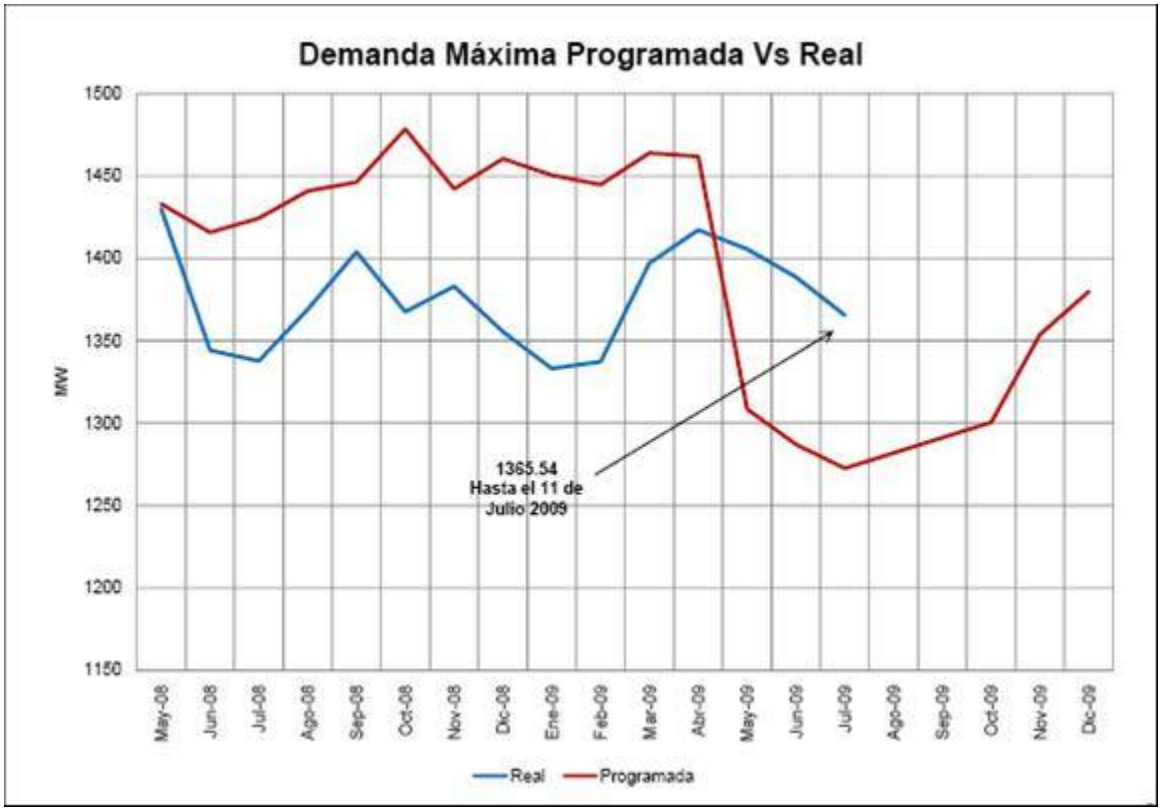
No.	Plant	Power MW	Technology	Fuel	Observations
1	San José	132,40	Steam Turbine	Carbon	-
2	Tampa	78.10	Gas Turbine	Diesel	-
3	S&S	23.70	Gas Turbine	Diesel	-
4	Esc Gas 5	14,90	Gas Turbine	Diesel	-
5	Arizona	155.70	IC Motor	Bunker	-
6	Polywatt	125.50	IC Motor	Bunker	-
7	PQP	114,60	IC Motor	Bunker	-
8	Las Palmas	66,40	IC Motor	Bunker	-
9	Genor	41,40	IC Motor	Bunker	-
10	Sidegua	38,00	IC Motor	Bunker	-
11	Textiles	15,00	IC Motor	Bunker	-
12	Progreso	51.00	IC Motor	Bunker	-
13	Amatex	18,20	IC Motor	Bunker	-
14	Electrogeneration	15,50	IC Motor	Bunker	-
15	GECSA	15.00	IC Motor	Bunker	-
16	Madre Tierra	15.90	Steam Turbine	Bunker	Not sugar cane harvest season
17	Santa Ana	21.80	Steam Turbine	Bunker	Not sugar cane harvest season
18	Concepción	21.30	Steam Turbine	Bunker	Not sugar cane harvest season
19	La Unión	22.90	Steam Turbine	Bunker	Not sugar cane harvest season
20	Magalena	21.50	Steam Turbine	Bunker	Not sugar cane harvest season
21	Pantaleón	24,60	Steam Turbine	Bunker	Not sugar cane harvest season
	TOTAL	1033.40			

IC Motor = Internal combustion motor

No.	Plant	Power MW	Technology	Fuel	Observations
1	Madre Tierra	19.27	Steam Turbine	Bagasse	Sugar cane harvest season
2	Santa Ana	27,83	Steam Turbine	Bagasse	Sugar cane harvest season
3	Concepción	24,20	Steam Turbine	Bagasse	Sugar cane harvest season
4	La Unión	29.80	Steam Turbine	Bagasse	Sugar cane harvest season
5	Magdalena	36,60	Steam Turbine	Bagasse	Sugar cane harvest season
6	Pantaleón	42.90	Steam Turbine	Bagasse	Sugar cane harvest season
7	Tululá	9.95	Steam Turbine	Bagasse	Sugar cane harvest season
8	Trinidad	7.20	Steam Turbine	Bagasse	Sugar cane harvest season
9	Calderas	2.70	Steam Turbine	Geothermic	-
10	Zunil	18,00	Steam Turbine	Geothermic	-
11	Atitlan	18.00	Steam Turbine	Geothermic	-
12	Chixoy	272.00	Hydroelectric	Water	-
13	Aguacapa	80,10	Hydroelectric	Water	-
14	Jurún Marinalá	60.00	Hydroelectric	Water	-
15	Los Esclavos	14,00	Hydroelectric	Water	-
16	Renace	60.00	Hydroelectric	Water	-
17	Canadá	47.40	Hydroelectric	Water	-
18	Las Vacas	39,00	Hydroelectric	Water	-
19	Pasabien	12.00	Hydroelectric	Water	-
20	Matanzas	11.70	Hydroelectric	Water	-
21	Montecristo	13,60	Hydroelectric	Water	-
22	El Recreo	26.00	Hydroelectric	Water	-
23	Rio Bobos	10,00	Hydroelectric	Water	-
24	Secacao	16,30	Hydroelectric	Water	-
25	Poza Verde	9.60	Hydroelectric	Water	-
26	El Salto	2,00	Hydroelectric	Water	-
27	San Isidro	4.00	Hydroelectric	Water	-
28	Palín II	5.00	Hydroelectric	Water	-
29	Candelaria	5.00	Hydroelectric	Water	-
	TOTAL	92435			

Total electricity demand for the country was forecasted to reach almost 1,500 MW in 2009, although the current economic downturn has prevented demand from reaching that magnitude. Following Exhibit 3 shows planned or forecasted demand ("Programada") versus actual demand ("Real") since May 2008.

Exhibit 3 – Demand Forecast vs. Actual



Guatemala has had continuous energy demand growth based on historical records, and continues to do so at a rate of 5-7% annually for the last 10 years, and all scenarios point to this general trend to continue. This was in part an effect of the Free Trade Agreement with the United States, principal commercial partner, and the natural demand growth of energy in the 90's. The population with access to energy increased from 50% coverage to almost 85% within the decade.

The present trends points that in the next 5 years, 2009-2013, the marginal technology to be continued in use will rely heavily on Bunker (distillate, or No. 6 fuel oil). Presently the spot market price is $0.15/KWh, with oil prices now settling below $50/barrel after having gone through a period of volatility with prices exceeding $145/barrel in the summer of 2008. Although there is a global recession which culminated with a near collapse in the financial markets in fall 2008, there nonetheless will remain price volatility in the energy markets for some time to come. By 2014 important changes to the market may be effected by the completion of Coal plants of great sizes for the market. As an example generating coal plants already contracted by utility Union Fenosa for 300 MWs, with 15 year long PPAs (2012-2027). The establishment of these types of plants is

a move away from Bunker fuel and a new dependency on a commodity now priced in the market at $110/metric ton.

The indicative policy of the Guatemalan government points out to a reconversion of the generating pool, as it awaits the establishment of important generation projects such as the 800 MW bilateral hydroelectric plants with México at the Usumacinta River, thereby increasing by 2022 our hydro capacity to 53% of generating pool. This reconversion requires a great deal of investment in renewable energy and coal plants to the order of $ 3.400 billion prior to 2020, or roughly $350 million annually.

The structure and participants in the national electric sector are outlined in the following sections.

Ministry of Energy and Mines (MEM) -- This is the governmental organization responsible for the formulation and coordination of policies, State plans, indicative programs related to the electric sub-sector, and the application of the Electricity General Law. It is responsible for addressing all issues applicable to energy, hydrocarbon production, distribution and commercialization, and mining resources exploitation.

National Commission of Electric Power (CNEE) -- This is the technical body of the Ministry, in charge of the enforcement of the Electricity General Law. It is the regulating entity responsible for creating favorable conditions for electric power generation, transmission, distribution and commercialization activities, by issuing technical standards, fair prices, and regulatory measures.

Wholesale Market Administrator (AMM) -- The Wholesale Market Administrator of the Wholesale Market is a private, nonprofit entity. This grid operator coordinates transactions among the electricity wholesale market participants, guaranteeing a free market with clear rules and encouraging electric system investments. The AMM also monitors the maintenance of Guatemala's electric power supply.

The Wholesale Market agents are:

- Generators
- Carriers
- Distributors
- Traders
- Large Users

The regulatory framework of the Guatemalan electric sector is based on a competitive market model with free access and a price system reflecting free offer and demand balances. In those segments in which economies of scale create natural monopolies, prices are fixed by the regulating entity based on economic costs.

Three segments are relevant in this sector's activities: Generation, Transmission and Distribution. Generation is developed in a free and competitive environment constituted by a market of opportunities based on short term marginal cost dispatch, and on a market of contracts, in which agents and large users may contract freely for power transactions.

Transmission and distribution are regulated activities. The legal structure ruling the electric subsector is based on the following:

- Political Constitution of the Republic;
- Electricity General Law, Decree No 93-96
- Regulation of the Electricity General Law, Government Agreement No 256-97 and its reforms;
- Wholesale Market Administrator, Government Agreement No. 299-98 and its reforms; and
- Coordination, Commercial and Operation Standards of the Wholesale Market Administrator.

The Electricity General Law is the basic legislation pertaining to the electricity sector and is composed of the following principles:

- Electricity generation is open and no authorization or special condition is required by the State, except those specifically recognized by the Political Constitution of the Republic of Guatemala and the laws of the country. For example, the use of State property for these purposes will require proper authorization by the Ministry when the central's power exceeds 5MW;
- Electricity transmission involving the use of public properties and final distribution service will be subject to regulatory oversight; and
- Prices for electricity are market-determined, except for transmission and distribution services, which are subject to regulation.

The Guatemalan transmission system has a trunk line infrastructure which allows the electric power flow through a 1,009 km network consisting of 138kv and 230kv lines.

There are four companies in Guatemala offering electric power transmission service; the companies with the longest systems are ETCEE and TRELEC. ETCEE owns 100% of 138kV lines.

According to law, the CNEE must develop an Expansion Plan of the Transmission System every two (2) years and has to include a ten (10) year planning horizon. The plan must take into account all generation projects under construction, particularly those that will come into operations within the scope of the stipulated study.

CNEE's Strategic Projects Division is currently preparing the Expansion Plan of the Transmission System, jointly with carrier companies and other interested parties' participation. In the process of its planning activities, problems in the transmission network have been identified; these issues are due to a combination of increased demand and lack of investment during previous years. Both short- and long-term remedies for these problems are being developed as the planning process proceeds.

Renewable Energy

Guatemala has consistently expressed interest in developing further its renewable energy portfolio. The country has significant potential for the development of both hydro and geothermal resources, although the hydro units are generally viewed as being less risky and are located in more accessible regions.

According to the last "Indicative Expansion Plan of the Generation System, 2008-2018" produced by the CNEE, a majority of new generation facilities were to consist of renewable technologies:

> "A relevant point of the analysis is the impact to the environment at the implementation of the Plan regarding production and emissions to the atmosphere, both from thermal and hydroelectric projects. At the implementation of the Indicative Plan for the Expansion, CO2 emissions would be reduced in a long term due to different hydroelectric projects start-up and electric power production through bunker plants displacement," according to the 2008 Indicative Expansion Plan of the Generation System 2008-2018, developed by the CNEE and approved by the MEM. The following table shows the expected makeup of generation expansion units for the years 2008-2022:"

Type	Mw	% (%)
Renewables	1608	59
Non-renewables	850	31
Interconnection-Guatemala-Mexico	200	7
Total	2,658	~98

In 2022 the proportion of renewable resources in electric power generation will reach an average value of 64% across the three demand scenarios comprising CNEE's planning process.

Furthermore, the CNEE explicitly recognized the need to adjust its Transmission plan to facilitate more remote renewable energy projects:

> "Promotion of investments for new generation power plants based on renewable resources located far away from the biggest loading centers by providing them with energy transmission means through the works proposed in the Expansion Plan of the Transmission System." CNEE Transmission Plan, 2008.

Hydro

The gross potential[12] of all rivers in the country has been estimated in 10,900 MW, and the technical profitable potential is close to the 5,000 MW.

World Energy Research (WER) has secured construction contracts and purchase power agreements for three new hydro electric projects in Guatemala. The contracts are the result of full-fledged support from the Guatemalan government.[13]

HPE, a paper producer, completed 8.2 MW of hydro capacity, producing approximately 42 GWh of electricity per year. The overall project cost was a little over $12 million with over half of the funding by CABEI.

A number of hydro projects have been identified in Guatemala and are presented in the projects section of this report.

[12] Sustainable Energy for Guatemala, 2007, http://www.reeep.org
[13] "World Energy Research to Build 3 New Hydro Projects in Guatemala", http://cincinnati.bizjournals.com/cincinnati/prnewswire/press_releases/national/Washington/2009/11/03/PH02939

Wind

The estimated potential to generate electricity is 7,800 MW, based on wind speeds. These have been estimated by the SWERA Project at the United Nations Environment Program.

Geothermal

The estimated potential to generate electricity with geothermic resources is approximately 1000 MW. No developments are identified in this area.

Solar

Estimated annual global radiation values for the entire country are 5.3 Kwh/m2/ day, according to SWERA maps. Several solar projects are described in the projects section of this report.

Opportunities for U.S. Firms[14]

Guatemala is an excellent market for U.S. products. Guatemalan GDP reached an estimated $33 billion in 2007 and exports from the United States to Guatemala exceeded $4.6 billion. U.S. products and services enjoy high name recognition in Guatemala, and U.S. firms have a good reputation in the Guatemalan marketplace. As a result, more than one third of all Guatemalan imports come from the United States.

The signing of the U.S.-Central America-Dominican Republic Free Trade Agreement (CAFTA-DR) on August 5, 2004, represented a giant step toward greater economic integration between the U.S. and Guatemala. The Agreement, ratified by the U.S. and all other participating countries, provides for the immediate elimination of tariffs and quotas on more than 80% of U.S. exports, while tariffs on the remaining 20% will be phased out over the next 10 to 15 years. With the inclusion of the Dominican Republic, CAFTA-DR is the second largest Latin American market for U.S. goods, surpassed by only Mexico.

In 2006, Guatemala imported over $107 million worth of electrical equipment into the country. Over 50% ($57 million) were imported from United States. U.S. Commercial Service in Guatemala sees the following power equipment as the

[14] Some of the discussion in this section is based on 2008 Guatemala Commercial Guide published by U.S. Department of Commerce

most promising for imports from the United States: electrical power generators, transformers, hydraulic turbines, circuit breakers, switchgears, conducting cable, and parts of steam and other turbines.

Among the interviewees contacted in this study, a consistently positive opinion was expressed regarding United States renewables equipment and the companies that produce the goods. In fact, this was almost uniformly reiterated even when explicit questions were posed concerning the relative low costs of Chinese equipment. Several of the interviewees pointed out that quality was a concern as well as price, and expressed doubts that the Chinese equipment could match that of U.S. goods in terms of quality.

Financing Options

A wide variety of sources of project financing are available in Guatemala, both from U.S. and international organizations. The OPIC and the U.S. Ex-Im Bank are involved in private sector projects in Guatemala and after CAFTA-DR implementation have shown interest in participating in more projects in the Region. The IFC, the MIGA, the World Bank and the IDB are all active players in project finance in Guatemala, especially when projects coincide with these organizations' priorities related to the implementation of Guatemala's peace accords. The CABEI continues to play an important role in many projects, especially those related to public services and infrastructure.

Bank loans, both international as well as domestic, appear to play a predominant role in funding energy projects in Guatemala. Private partnerships and other corporate arrangements are routinely used to raise equity funds, usually for around 30% of the total project investment.

The CABEI was cited as a possible source for funding by one of the developers interviewed, although this source may not have sufficient resources to provide financing. The IDB, IMF and World Bank were not mentioned as major sources of funding, although this is not a definitive finding. Some of the developers view the carbon credit markets as potential sources of funding as well.

Guatemala Projects

Project 9 – GSL 10 MW GUATESOL I Esquintla Solar Project

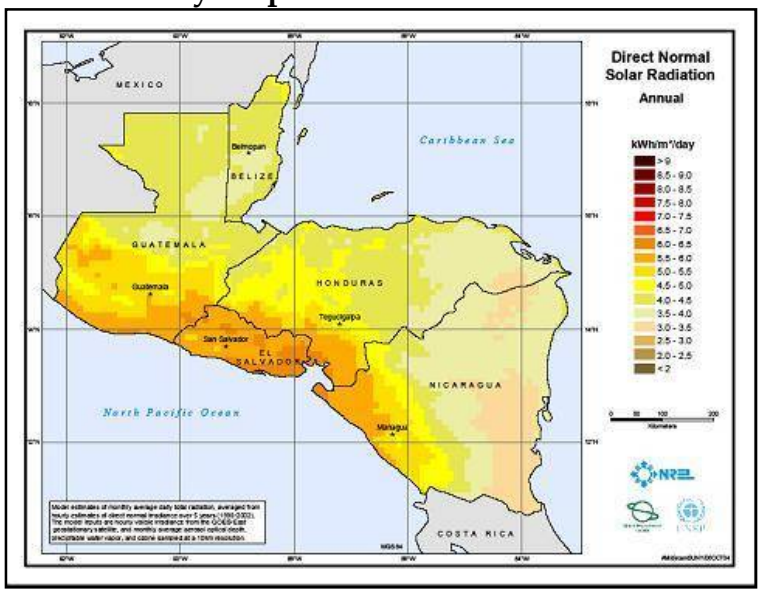
	Type: Concentrated Solar	**Name: GUATESOL I Esquintla Solar**
	Size: 10 MW	**Project Sponsor: Guatemala Solar Group, S.A.**

Project Background

Guatemala Solar Group, S.A. (GSG) and its partners are currently developing the first of its kind Concentrated Solar Power (CSP) project ever to be built in Guatemala. The 25 MW project is being developed to satisfy a Power Purchase Agreement (PPA) between GSG and a major Guatemala client, Energia Total S.A., who is also a partner in the project and one of Guatemala's emerging electric power distributors. The project will be developed in two phases. Phase One, which is called GUATESOL I, will consist of a 10 MW CSP plant to be built near Esquintla.

The southern Pacific Coast of Guatemala is a region which combines the best conditions for the development of GUATESOL, for it has the highest radiation levels throughout the year and the terrain is flat. The following Exhibit 9-1 depicts the solar radiation levels in Central America.

Exhibit 9-1 – Solar Intensity Map



The project plan includes a thermal storage capability in order to extend the working hours of energy production beyond peak afternoon solar exposure. During the midday hours, when the sun's radiation is highest and when twice as much energy is collected than is required by the power block, the excess thermal energy is diverted to a central Thermal Energy Storage (TES) tank, consisting of molten potassium and sodium nitrate salt where it is stored for later use by the power block after the sun goes down. TES systems using molten salt have been in operation for over two decades and have proven to be beneficial to leveling the cost per kilowatt hour (kWh) to as much as 11% lower than the cost per kWh of systems not using TES. Recent advances in TES technologies have resulted in longer sustainable storage hours and overall thermal retention and efficiencies. It is now possible under optimal conditions to store solar thermal energy up to 15 hours. However, the added cost of the expanded solar field necessary to supply the extra HTF media capacity has to be considered in trying to achieve a longer daily production cycle. Technically, 24 hour solar power may be possible, but it may not be economically viable for this reason. GUATESOL will be designed to achieve 6 hours of storage.

Exhibit 9-2

Project Snapshot

Project: Concentrated Solar Power (CSP)

Project Name: GUATESOL CSP Project

Technologies: Parabolic Troughs, Steam Turbines & Generators, Thermal Storage and Cooling Systems

Capacity: 25 MW, 144,800,000 kWh/year

Operation: 16 hours/day, 362 days/year

Expected Life of Project: 25 -30 years

Investment: US $80 million

Employment: 60 full-time jobs (estimate)

CO_2 Equivalent Reduction: 86,880 tonnes

GUATESOL I will consist of approximately 114 rows of parabolic troughs, aligned in a north to south direction, connected to a two-tank thermal storage system and a power block made up of a standard steam turbine and generator. The rated capacity of the power block will be 10 MW and with the addition of thermal storage, the system is expected to operate an average of 16 hours per day, 362 day per year. The entire 10 MW system is expected to produce 160,000 kW hours of electricity per day, or 57.9 GWh per year. Because most of the routine maintenance can be done after hours, when the sun goes down, the system is expected to only be shut down for three days each year for scheduled maintenance or major repairs. The total estimated capital cost to complete Phase One is $31.7 million. The time required to complete the construction and commission the plant is approximately 18 months.

Energy transmission is a key factor for the project, which will be located in areas of important consumption in Guatemala, and coincidentally located in a region with a great solar potential. The location of the GUATESOL project is advantageous as far as 69kv transmission lines are concerned. Escuintla and Champerico guarantee the reliability of dispatch for the plant generation capacity, as well as the reduction of energy losses and better revenues.

The CSP plant system is being designed by Naanovo Energy Inc., a Canadian alternative energy company with experience in CSP solar and Waste to Energy (WTE) technology. Naanovo has been working closely with GSG to develop the pre-feasibility study, to design the most appropriate CSP system layout, to identify key component manufacturers and to procure parabolic troughs.

Project Sponsor's Capabilities and Commitment

Guatemala Solar Group, S.A. (GSG) is a corporation formed in 2008 under the laws of Guatemala with the sole purpose of developing and operating solar power generation projects, using the latest concentrated solar power technology to take advantage of the abundant solar resources available in Guatemala. The founding members of GSG are Giovanni Andrino, B.A. in economics, and Roberto A. Barrera, Electrical Engineer.

GSG has brought together a Guatemalan investment group made up of professionals and energy experts to develop GUATESOL. As of July 2008, GSG has successfully concluded negotiations with its commercial partner Energía Total, commercial agent of the firm Electro Consulting, S.A., for the sale of 100% of the energy to be produced by the solar power plant. The contract between GSG and Energía Total is for 25 MW to be delivered to the grid at a minimum set

price of $0.08/kWh. However, Energia Total has agreed to allow a certain portion of the supply to be available to the spot market where price trends have historically been much higher in Guatemala, to allow the plant to generate a higher rate of pay to average out at $0.10/kWh.

GSG has a total of over 100 acres of land in each existing location to carry out the project. The land is the property of Grupo PAF (Pesca, SA, Aves Reproductoras de Centroamérica, SA y Frigoríficos de Guatemala, S.A.), principal buyer or end user of all of the energy and minority shareholder of GSG. PAF's shareholding status was acquired by their provision of the land.

Shareholder contribution of GSG members as of July 2008 was estimated to be over $1.3 million paid in land contributions, salaries, professional fees, engineering and design work, electrical studies, business trips to the United States and within Guatemala, commission fees, office and other expenses. The expected investment in developing GUATESOL is estimated to be just over $81 million. Investor contribution is expected to be 30% of the cost, or roughly $24 million, and with external financing of 70% or $57 million.

GSG is presently receiving technical and design support from Eliasol Energy Inc., and various component suppliers, to complete the development and completion of GUATESOL. Locally, GSG has succeeded in integrating investors and energy sector professionals with ample experience and knowledge of the industry to guarantee the success of the development, operation, and maintenance of this generation project. GSG has also acquired the financial guarantees to cover its long term signed PPAs.

The GUATESOL project development team consists of the two Guatemalan energy market experts contracted by Solar Group (GSG), Naanovo Energy, and two former Acciona executives, all of whom are experienced and knowledgeable in CSP technologies and alternative energy projects. The initial lead project developers are Giovanni Andrino and Roberto Barrera of Electro Consulting S.A.

Implementation Financing

The total capital required for the project is $81.4 million to be invested in two phases as presented in Exhibit 9-3.

Exhibit 9-3 - Capital Cost

GUATESOL Capital Investment, million	
GUATESOL I	$32.6
GUATESOL II	$48.7
TOTAL CAPITAL INVESTMENT	**$81.3**

GSG has secured a commitment from a regional bank, CABEI for $22.2 million, or 70% of the first phase of the project against $9.5 million, or 30% of the first phase of the project. Equity partners for Phase One have been identified and are currently considering the extent of their involvement in the project. It is expected that GSG and its equity partners will have the 30% equity requirement in place by the end of January 2009.

The Exhibit 9-4 below highlights pro forma statements separately for the two phases of the Guatesol project.

Exhibit 9-4 – Project Pro-Forma

GUATESOL I - Income and Expense Forecast ($millions)										
	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10
Cash Equity	9.7	0	0	0	0	0	0	0	0	0
Loan Proceeds	22.7	0	0	0	0	0	0	0	0	0
Carbon Credits	6.1	0	0	0	0	0	0	0	0	0
Operating Income	0	2.8	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7
Total Income	38.5	2.8	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7
Cost of Goods	0	0	0	0	0	0	0	0	0	0
Gross Income	38.5	2.8	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7
Project Capital Costs	23.5	8.9	0	0	0	0	0	0	0	0
Operating Expenses	.2	.5	.8	.8	.8	.8	.8	.9	.9	.9
Total Expenses	23.7	9.4	.8	.8	.8	.8	.8	.9	.9	.9
EBITDA	14.7	-6.5	4.9	4.9	4.9	4.9	4.8	4.8	4.8	4.8
P&I	1.5	2.1	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8
Income Taxes	0	0	0	0	0	0	0	0	0	0
Net Income	13.1	-8.7	2.1	2.1	2.1	2.0	2.0	2.0	2.0	2.0
Cumulative Surplus	**13.1**	**4.4**	**6.5**	**8.7**	**10.8**	**12.9**	**15.0**	**17.1**	**19.2**	**21.2**

U.S. Export Potential

Details of the project cost in $ million are listed below:

Proposed Equipment Costs	
Solar Field Equipment - Troughs	$19.9
Power Block – Steam Turbine and Generator	$4.8
Boiler Costs	$0.6
Thermal Storage Costs – Two Tank Molten Salt System	$0.6
Cooling Costs – Cooling Towers	$0.6
Line and Substation Costs	$0.6
Control Room and Fencing	$0.6
TOTAL	**$27.7**

The total cost of installation is projected to be $4.68 million. This cost figure includes all costs for shipping and receiving of key components, civic work, engineering and assembly.

Guatesol will require the purchase of goods and services from the United States in the following areas, from its inception:

1. Engineering;
2. Galvanized steel for all of the parabolic troughs (1172), each weighing about 1 metric ton;
3. Solar mirrors;
4. Turbo generator for the power block;
5. Transforming and line equipment for the substation;
6. Cooling tower equipment;
7. Storage equipment; and
8. Boiler Equipment.

There is over $20 million business potential by United States companies during the course of developing, building and operating the thermal solar plant. Some of the potential sources for procurement in the U.S. include:

Galvanized Steel:

- Continental Steel and Tube Co.;
- AAA Galvanizing Inc.; and
- NuTek Steel Inc.

Solar Mirrors:

- Schott;
- Reflectech;
- SkyFuel;
- Ausra; and
- Edtek.

Steam Turbines:

- Elliott Group;
- Dresser Rand;
- General Electric; and
- Siemens-Westinghouse.

Electrical, Controls and Auxiliary Equipment:

- Eaton Electrical (Cutler-Hammer);
- Siemens-Westinghouse;
- Square D Co. (Schneider Electric);
- Encorp Inc.;
- Cooper Power Systems;
- Automated Control Systems;
- GE Energy, GE Industrial, and GE Power Systems;
- Honeywell;
- Motorola;
- Hammond Power Solutions; and
- Kohler Power Systems.

In addition to equipment suppliers, U.S. engineering companies may be interested in EPC or task design contracts. Services suppliers potentially include:

- Solargenix Energy;
- Black and Veatch;
- MWH Global;
- Shaw Group (former Stone and Webster);
- Burns and Roe Enterprises, Inc.;
- Sargent and Lundy;
- URS Corporation (former Washington Group); and
- PB Power.

Foreign Competition and Market Entry Issues

In general, U.S. manufacturers and suppliers would be considered to be competitive in the design, manufacturing, and implementation of the proposed project. However, geographical location and host-country historical ties with other nations may result in serious competition by foreign firms to U.S. companies supplying equipment/services.

Exhibit 9-5 lists major foreign competitors in the regional energy market.

Exhibit 9-5 – Major Equipment Foreign Manufacturers

EQUIPMENT	COMPANIES
Solar	Flagsol, Germany; Flabeg, Germany; Schott Solar, Germany; BrightSource Energy, Israel; Solel, Israel;
Generators	Ansaldo Energia, Itay; Jenbacher AG, Austria; MAN-B&W, Germany; Mitsubishi, Japan; Nigata, Japan; Rolls Royce, UK; Wartsila, Finland; Volvo, Sweden
Steam Turbine Generators	Alstom, Switzerland; Dresser-Rand, Norway; Kawasaki, Japan; Mannesmann Demag, Germany; Voest-Alpine, Austria; Siemens, Germany.
Control Systems	Axsia Howmar, UK; Amot Controls, UK; ABB, Germany; Fortum Engineering, Finland; Siemens, Germany; Yokogawa, Japan
Engineering Services	TEPSCO, Japan; Fichtner, Germany; Lahmeyer International, Germany; Mott Connell, UK; PB, Singapore; SNC, Canada; Solar Millenium, Germany.

Developmental Impact

Infrastructure -- The Project will be used to provide power at competitive prices and reduce the grid's dependence on expensive petroleum-based power. The project is expected to be about 10 MW. The project will be able to provide power to roughly over 15,000 households.

Human Capacity Building -- The proposed power plant will have significant job creation impact as well. The construction of the plant will require temporary manpower, both skilled and unskilled.

Operations phase employment opportunities will be made available for technical, administrative, and security people during the commercial operation phase.

Other - Assuming 48 GWh of electricity produced by solar plant instead of coal, for example, the CO2 avoided emissions estimated at 37,000 tons per year.

The proposed project can be considered a rural electrification project. The remote location will strengthen the electricity grid and reduce transmission losses. It will also provide more power to be distributed in the area where more electrification is desired.

Environmental Considerations

The project is expected to have a significant positive effect on the environment. Currently, large thermal plants are considered to be major sources of air pollution. Due to the nature of the technology, the proposed solar plant has no emissions. Implementation of the solar power plant is estimated by the Consultant to result in annual savings of 78,000 BBL of oil and associated 37,000 tons of CO2 emissions. The construction of the plant will require the appropriate environmental assessment study. The study is also required if the Project Sponsor decides to pursue any international lending agency funding. The study will address all major issues associated with the construction of a solar facility of this size.

Among anticipated other positive impacts are:

- Substitution of fossil energy with renewable solar;
- No air emissions; and
- No significant exposure to lubricants and other potential water and soil contaminants.

Potential negative impacts are:

- Impacts on flora and fauna due to thermal solar;
- Sound pollution during construction; and
- Heavy equipment transit.

Follow-up and Further Information

The Project Sponsor has completed a detailed preliminary project profile for the Guatesol project. They are looking for funding for a detailed feasibility study.

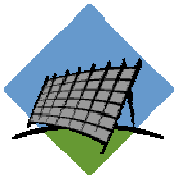
GSG and their advisors offer management and local renewable energy expertise. In our opinion, the company has the technical means to develop a project of this kind, particularly as they have worked closely with North American consulting firms with established track records in the solar power business. Furthermore, they have expressly stated intent to acquire equipment and possibly consulting

services from U.S. exporters should the project reach the implementation stage. The existence of a letter of intent, or purchase power agreement, means that the project has a high probability of eventually acquiring favorable funding.

Interested parties are encouraged to contact the Project Sponsor for more information and further cooperation steps.

Giovanni Andrino
Director of Sales and Marketing
Electro Consulting, S.A.
7ma. Av. 7-78 Zona 4
Oficina 208 Edificio Centroamericano
Guatemala, C.A.
Cell: (502) 5991 7185

Project 10 – GSL 15 MW GUATESOL II Champerico Solar Project

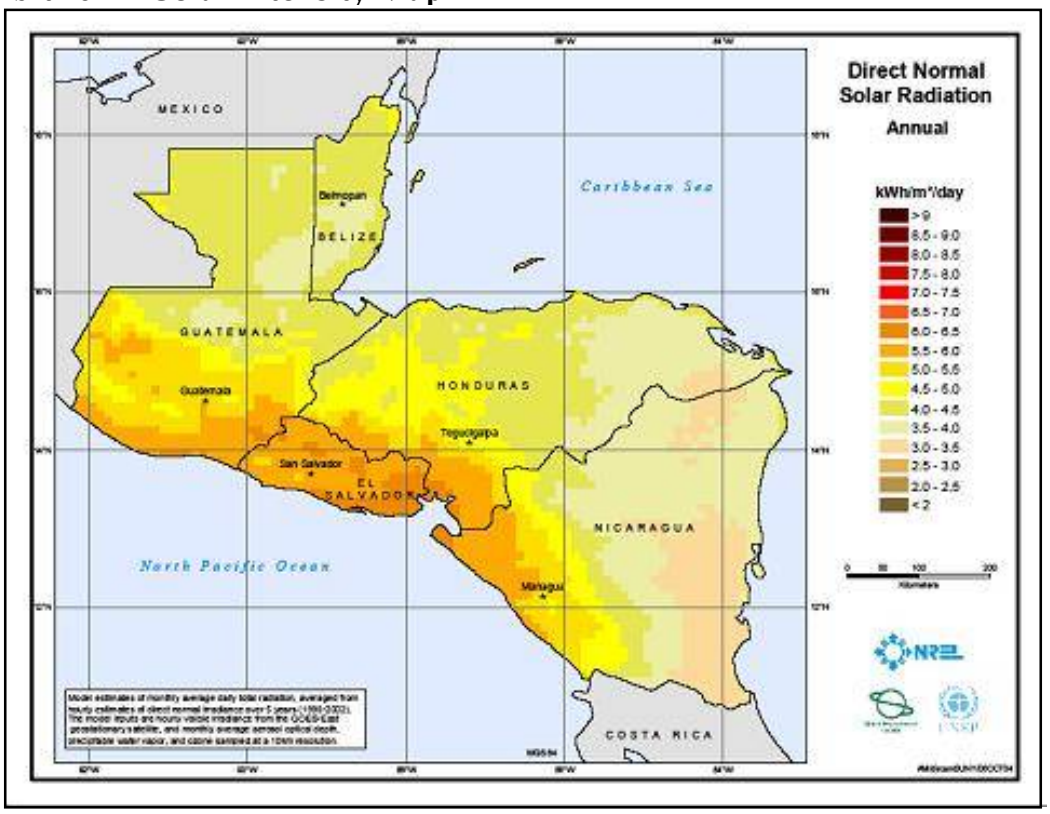
	**Type: Concentrated Solar**	**Name: GUATESOL II Champerico Solar Project**
	Size: 15 MW	**Project Sponsor: Guatemala Solar Group, S.A.**

Project Background

Guatemala Solar Group, S.A. (GSG) and its partners are currently developing the first of its kind Concentrated Solar Power (CSP) project ever to be built in Guatemala. The 25 MW project is being developed to satisfy a Power Purchase Agreement (PPA) between GSG and a major Guatemala client, Energia Total S.A., who is also a partner in the project and one of Guatemala's emerging electric power distributors. The project will be developed in two phases. Phase two, called GUATESOL II will comprise a 15 MW CSP plant and will be built adjacent to the Masagua, Escuintla site, or at an alternate location to the east near Champerico, Retalhuleu. The exact location will be determined later.

The southern Pacific Coast of Guatemala is a region which combines the best conditions for the development of GUATESOL, for it has the highest radiation levels throughout the year and the terrain is flat. The following Exhibit 10-1 depicts the solar radiation levels in Central America.

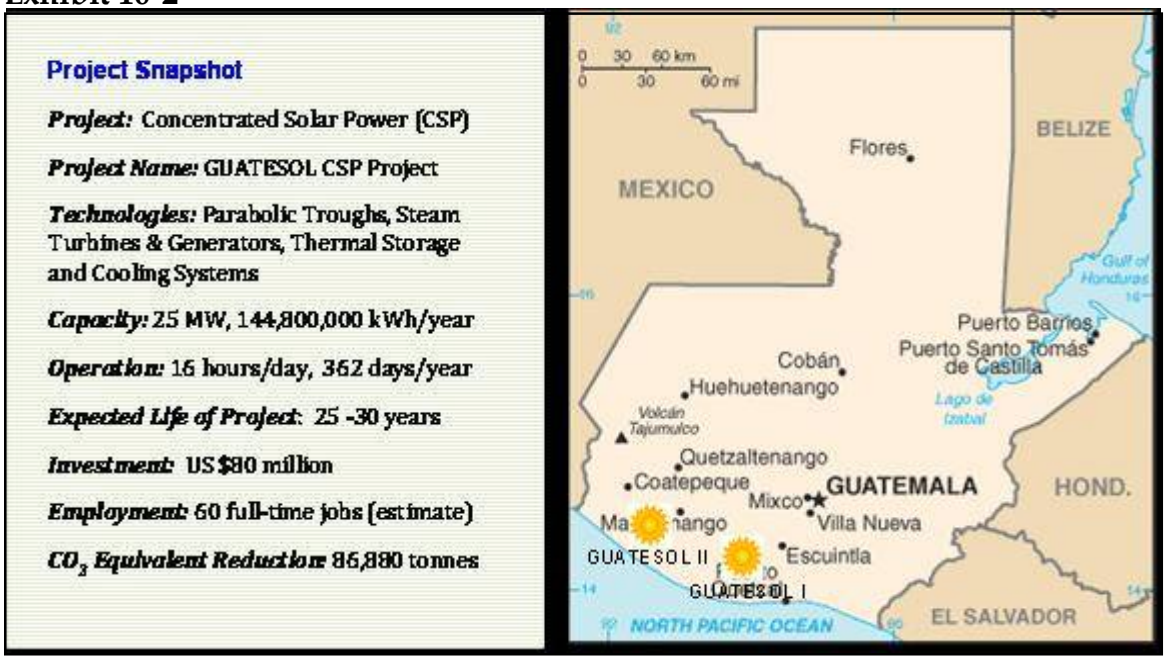
Exhibit 10-1 – Solar Intensity Map



The project plan includes a thermal storage capability in order to extend the working hours of energy production beyond peak afternoon solar exposure. During the midday hours, when the sun's radiation is highest and when twice as much energy is collected than is required by the power block, the excess thermal energy is diverted to a central Thermal Energy Storage (TES) tank, consisting of molten potassium and sodium nitrate salt where it is stored for later use by the power block after the sun goes down. TES systems using molten salt have been in operation for over two decades and have proven to be beneficial to leveling the cost per kilowatt hour (kWh) to as much as 11% lower than the cost per kWh of systems not using TES. Recent advances in TES technologies have resulted in longer sustainable storage hours and overall thermal retention and efficiencies. It is now possible under optimal conditions to store solar thermal energy up to 15 hours. However, the added cost of the expanded solar field necessary to supply the extra HTF media capacity has to be

considered in trying to achieve a longer daily production cycle. Technically, 24 hour solar power may be possible, but it may not be economically viable for this reason. GUATESOL will be designed to achieve 6 hours of storage.

Exhibit 10-2



GUATESOL II will consist of 170 rows of troughs similarly aligned in a north south direction and connected to a thermal storage system and power block with rated capacity of 15 MW. Similar to GUATESOL I, operation will average 16 hours per day, 362 day per year and produce 240,000 kW hours of electricity per day, or 86,880,000 kWh per year. The total estimated capital cost to complete Phase Two is expected to be $48.7 million. The time required to complete construction of Phase Two and commission the plant is also 18 months, but construction is not expected to commence until after Phase One has been completed.

Energy transmission is a key factor for the project, which will be located in areas of important consumption in Guatemala, and coincidentally located in a region with a great solar potential. The location of the GUATESOL project is advantageous as far as 69kv transmission lines are concerned. Escuintla and Champerico guarantee the reliability of dispatch for the plant generation capacity, as well as the reduction of energy losses and better remuneration.

The CSP plant system is being designed by Naanovo Energy Inc., a Canadian alternative energy company with experience in CSP solar and Waste to Energy (WTE) technology. Naanovo has been working closely with GSG to develop the

pre-feasibility study, to design the most appropriate CSP system layout, to identify key component manufacturers and to procure parabolic troughs.

Project Sponsor's Capabilities and Commitment

Guatemala Solar Group, S.A. (GSG) is a corporation formed in 2008 under the laws of Guatemala with the sole purpose of developing and operating solar power generation projects, using the latest concentrated solar power technology to take advantage of the abundant solar resources available in Guatemala. The founding members of GSG are Giovanni Andrino, B.A. in economics, and Roberto A. Barrera, Electrical Engineer.

GSG has brought together a Guatemalan investment group made up of professionals and energy experts to develop GUATESOL. As of July 2008, GSG has successfully concluded negotiations with its commercial partner Energía Total, commercial agent of the firm Electro Consulting, S.A., for the sale of 100% of the energy to be produced by the solar power plant. The contract between GSG and Energía Total is for 25 MW to be delivered to the grid at a minimum set price of $0.08/kWh. However, Energia Total has agreed to allow a certain portion of the supply to be available to the spot market where price trends have historically been much higher in Guatemala, to allow the plant to generate a higher rate of pay to average out at $0.10/kWh.

GSG has a total of over 100 acres of land in each existing location to carry out the project. The land is the property of Grupo PAF (Pesca, SA, Aves Reproductoras de Centroamérica, SA y Frigoríficos de Guatemala, S.A.), principal buyer or end user of all of the energy and minority shareholder of GSG. PAF's shareholding status was acquired by their provision of the land.

Shareholder contribution of GSG members as of July 2008 was estimated to be over $1.3 million paid in land contributions, salaries, professional fees, engineering and design work, electrical studies, business trips to the United States and within Guatemala, commission fees, office and other expenses. The expected investment in developing GUATESOL is estimated to be just over $81 million. Investor contribution is expected to be 30% of the cost, or roughly $24 million, and with external financing of 70% or $57 million.

GSG is presently receiving technical and design support from Eliasol Energy Inc., and various component suppliers, to complete the development and completion of GUATESOL. Eliasol is a world leader in developing renewable energy projects and, in particular, the design and development of solar power projects using "best in class" Concentrated Solar Power (CSP) technologies. Their

support for this project is of great significance to its success. Locally, GSG has succeeded in integrating investors and energy sector professionals with ample experience and knowledge of the industry to guarantee the success of the development, operation, and maintenance of this generation project. GSG has also acquired the financial guarantees to cover its long term signed PPAs.

The GUATESOL project development team consists of the two Guatemalan energy market experts contracted by Solar Group (GSG), Naanovo Energy, and two former Acciona executives, all of whom are experienced and knowledgeable in CSP technologies and alternative energy projects. The initial lead project developers are Giovanni Andrino and Roberto Barrera of Electro Consulting S.A.

Giovanni Andrino is the temporary acting President and the chief negotiator for obtaining power purchase agreements for the project, securing the technologies for the project and coordinating the various activities of the project development team, and elaborating the feasibility study. Educated in Canada with a Bachelor of Arts (BA) degree in Economics from the University of Guelph in Ontario, Canada, Mr. Andrino has worked with several international companies in sales, marketing and alternative energy.

Roberto Barrera is the temporary COO and co-negotiator of the GSG project. He overlooks all of the market and regulatory issues related to the Guatesol enterprise, as well as a advising during the feasibility study preparation. He is a professional electrical engineer and holds a Master of Business Administration (MBA) degree and Bachelors of Science (BSc) from Universidad Rafael Landívar in Guatemala. Mr. Barrera has held senior positions with the Comisión Nacional de Energía Eléctrica (CNEE) and the Instituto Nacional de Electrificación (INDE) based in Guatemala.

Implementation Financing

The total capital required for the project is $81,378,273, to be invested in two phases as presented in Exhibit 10-3.

Exhibit 10-3 - Capital Cost

GUATESOL Capital Investment, million	
GUATESOL I	$32.6
GUATESOL II	$48.7
TOTAL CAPITAL INVESTMENT	**$81.3**

GSG has secured a commitment from a regional bank, CABEI for $22.2 million, or 70% of the first phase of the project against $9.5 million, or 30% of the first phase of the project. Equity partners for Phase One have been identified and are currently considering the extent of their involvement in the project. It is expected that GSG and its equity partners will have the 30% equity requirement in place by the end of January 2009. Financing commitments for the second phase have not yet been secured.

The Exhibit 10-4 below highlights pro forma statements separately for the two phases of the Guatesol project.

Exhibit 10-4 – Project Pro-Forma

GUATESOL II - Income and Expense Forecast ($millions)										
	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10
Cash Equity	14.5	0	0	0	0	0	0	0	0	0
Loan Proceeds	33.9	0	0	0	0	0	0	0	0	0
Carbon Credits	9.1	0	0	0	0	0	0	0	0	0
Operating Income	0	4.3	8.6	8.6	8.6	8.6	8.6	8.6	8.6	8.6
Total Income	57.6	4.3	8.6	8.6	8.6	8.6	8.6	8.6	8.6	8.6
Cost of Goods	0	0	0	0	0	0	0	0	0	0
Gross Income	57.6	4.3	8.6	8.6	8.6	8.6	8.6	8.6	8.6	8.6
Project Capital Costs	35.2	13.0	0	0	0	0	0	0	0	0
Operating Expenses	.2	.5	.8	.8	.9	.9	.9	.9	.9	.9
Total Expenses	35.4	13.5	.8	.8	.9	.9	.9	.9	.9	.9
EBITDA	22.2	-9.2	7.8	7.8	7.7	7.7	7.7	7.7	7.7	7.6
P&I	2.4	3.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2
Income Taxes	0	0	0	0	0	0	0	0	0	0
Net Income	19.8	-12.4	3.6	3.6	3.5	3.5	3.5	3.5	3.5	3.4
Cumulative Surplus	**19.8**	**7.4**	**11.0**	**14.6**	**18.1**	**21.7**	**25.2**	**28.8**	**32.3**	**35.7**

U.S. Export Potential

Details of the project cost (in $ million) are listed below:

Proposed Equipment Costs	
Solar Field Equipment - Troughs	$19.9
Power Block – Steam Turbine and Generator	$4.8
Boiler Costs	$0.6
Thermal Storage Costs – Two Tank Molten Salt System	$0.6
Cooling Costs – Cooling Towers	$0.6

Line and Substation Costs	$0.6
Control Room and Fencing	$0.6
TOTAL	**$27.7**

The total cost of installation is projected to be $4.68 million. This cost figure includes all costs for shipping and receiving of key components, civic work, engineering and assembly.

Guatesol will require the purchase of goods and services from the United States in the following areas, from its inception:

1. Engineering.
2. Galvanized steel for all of the parabolic troughs (1172), each weighing about 1 metric ton.
3. Solar mirrors.
4. Turbo generator for the power block.
5. Transforming and line equipment for the substation.
6. Cooling tower equipment
7. Storage equipment
8. Boiler Equipment

There is over $20 million business potential by United States companies during the course of developing, building and operating the thermal solar plant. Some of the potential sources for procurement in the U.S. include:

Galvanized Steel:

- Continental Steel and Tube Co.;
- AAA Galvanizing Inc.; and
- NuTek Steel Inc.

Solar Mirrors:

- Schott;
- Reflectech;
- SkyFuel;
- Ausra; and
- Edtek.

Steam Turbines:

- Elliott Group;
- Dresser Rand;
- General Electric; and
- Siemens-Westinghouse.

Electrical, Controls and Auxiliary Equipment:

- Eaton Electrical (Cutler-Hammer);
- Siemens-Westinghouse;
- Square D Co. (Schneider Electric);
- Encorp Inc.;
- Cooper Power Systems;
- Automated Control Systems;
- GE Energy, GE Industrial, and GE Power Systems;
- Honeywell;
- Motorola;
- Hammond Power Solutions; and
- Kohler Power Systems.

In addition to equipment suppliers, U.S. engineering companies may be interested in EPC or task design contracts. Services suppliers potentially include:

- Solargenix Energy;
- Black and Veatch;
- MWH Global;
- Shaw Group (former Stone and Webster);
- Burns and Roe Enterprises, Inc.;
- Sargent and Lundy;
- URS Corporation (former Washington Group); and
- PB Power.

Foreign Competition and Market Entry Issues

In general, U.S. manufacturers and suppliers would be considered to be competitive in the design, manufacturing, and implementation of the proposed project. However, geographical location and host-country historical ties with other nations may result in serious competition by foreign firms to U.S. companies supplying equipment/services.

Exhibit 10-5 lists major foreign competitors in the regional energy market.

Exhibit 10-5 – Major Equipment Foreign Manufacturers

EQUIPMENT	COMPANIES
Solar	Flagsol, Germany; Flabeg, Germany; Schott Solar, Germany; BrightSource Energy, Israel; Solel, Israel;
Generators	Ansaldo Energia, Itay; Jenbacher AG, Austria; MAN-B&W, Germany; Mitsubishi, Japan; Nigata, Japan; Rolls Royce, UK; Wartsila, Finland; Volvo, Sweden
Steam Turbine Generators	Alstom, Switzerland; Dresser-Rand, Norway; Kawasaki, Japan; Mannesmann Demag, Germany; Voest-Alpine, Austria; Siemens, Germany.
Control Systems	Axsia Howmar, UK; Amot Controls, UK; ABB, Germany; Fortum Engineering, Finland; Siemens, Germany; Yokogawa, Japan
Engineering Services	TEPSCO, Japan; Fichtner, Germany; Lahmeyer International, Germany; Mott Connell, UK; PB, Singapore; SNC, Canada; Solar Millenium, Germany.

Developmental Impact

Infrastructure -- The Project will be used to provide power at competitive prices and reduce the grid's dependence on expensive petroleum-based power. The project is expected to be about 15 MW. The project will be able to provide power to roughly over 25,000 households.

Human Capacity Building -- The proposed power plant will have significant job creation impact as well. The construction of the plant will require temporary manpower, both skilled and unskilled.

Operations phase employment opportunities will be made available for technical, administrative, and security people during the commercial operation phase.

Other - Assuming 100 GWh of electricity produced by solar plant instead of coal, for example, the CO2 avoided emissions estimated at 53,000 tons per year.

The proposed project can be considered a rural electrification project. The remote location will strengthen the electricity grid and reduce transmission losses. It will also provide more power to be distributed in the area where more electrification is desired.

Environmental Considerations

The project is expected to have a significant positive effect on the environment. Currently, large thermal plants are considered to be major sources of air pollution. Due to the nature of the technology, the proposed solar plant has no emissions. Implementation of the solar power plant is estimated by the Consultant to result in annual savings of 163,000 BBL of oil and associated 53,000 tons of CO2 emissions. The construction of the plant will require the appropriate environmental assessment study. The study is also required if the Project Sponsor decides to pursue any international lending agency funding. The study will address all major issues associated with the construction of a solar facility of this size.

Among anticipated other positive impacts are:

- Substitution of fossil energy with renewable solar;
- No air emissions; and
- No significant exposure to lubricants and other potential water and soil contaminants.

Potential negative impacts are:

- Impacts on flora and fauna due to thermal solar;
- Sound pollution during construction; and
- Heavy equipment transit.

Follow-up and Further Information

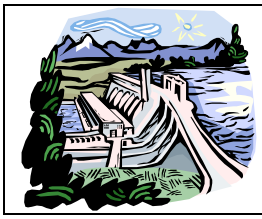
The Project Sponsor has completed a detailed preliminary project profile for the Guatesol project. They are looking for funding for a detailed feasibility study.

GSG and their advisors offer management and local renewable energy expertise. In our opinion, the company has the technical means to develop a project of this kind, particularly as they have worked closely with North American consulting firms with established track records in the solar power business. Furthermore, they have expressly stated intent to acquire equipment and possibly consulting services from U.S. exporters should the project reach the implementation stage. The existence of a letter of intent, or purchase power agreement, means that the project has a high probability of eventually acquiring favorable funding.

Interested parties are encouraged to contact the Project Sponsor for more information and further cooperation steps.

Giovanni Andrino
Director of Sales and Marketing
Electro Consulting, S.A.
7ma. Av. 7-78 Zona 4
Oficina 208 Edificio Centroamericano
Guatemala, C.A.
Cell: (502) 5991 7185

Project 11 – Secacao 9.5 MW Choloma Hydro Power Plant

	**Type: Run-on-river hydro**	**Name: Choloma Hydro Power Plant**
	Size: 9.5 MW	**Project Sponsor: Secacao**

Project Background

The proposed project is located in Senahú (equivalent of county – "municipio"), in Alta Verapaz (equivalent of State – "departamento"), in northeastern Guatemala. It is located close to two existing small hydroelectric plants developed by the same Project Sponsors: Hidroelectrica Secacao (16.5 MW), and Hidroelectrica Candelaria (4.6 MW).

With an estimated capacity of 9.5 MW and 34 GWh annual energy generation, the project captures the flows from four small rivers through a 4.5 kilometer long low-pressure penstock which leads the combined flow to the Choloma river where the project's intake structures, which include a small dam and reservoir of approximately 19,000 cubic meters, are to be installed. From here a four- to five-kilometer long high pressure penstock transports the water to the Machine House location. Gross head for the project is estimated at 460 meters, and design flow is 2.5 cubic meters per second. The machine house will contain a two-jet pelton turbine with horizontal shaft, an air- or water—cooled generator, and all electrical, hydraulic and lubricating systems, including a control room with electrical panels and a SCADA system which will hold the PLC software and function as an automatic control center. Water discharge is led back to the original Choloma River basin. Next to the power house a switchyard and substation are to be installed. Power output will be transformed to 69 kilovolts, and will then be conducted through a high-voltage transmission line (to be built), which will be about 7 kilometers in length and will inject the electricity into the existing Secacao substation. From here the electricity is directly injected into the national grid.

The Project Sponsor owns the land for the project, the transmission line, and the access roads.

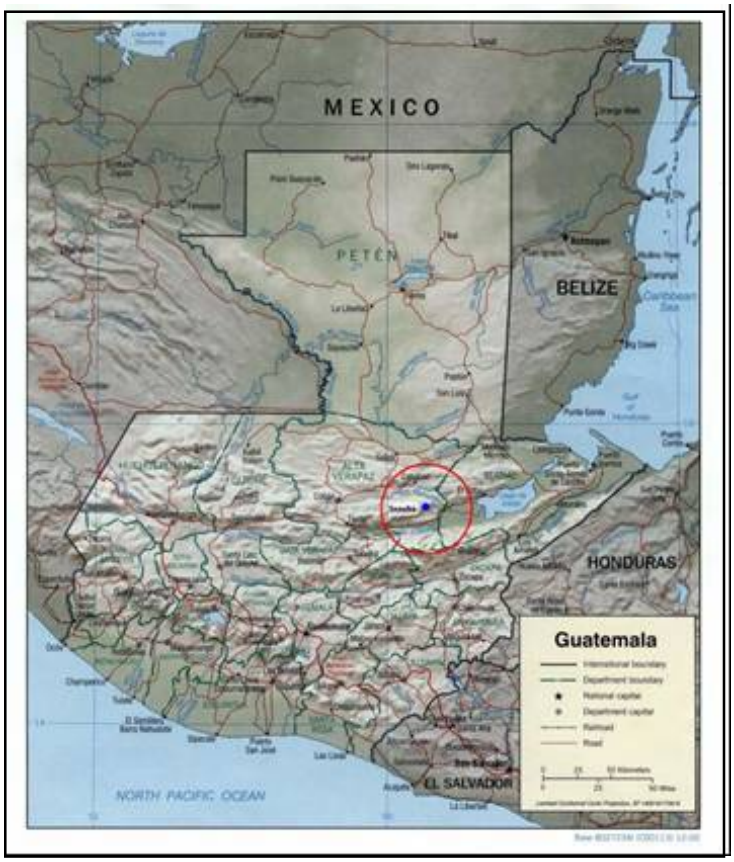
The likely regulatory commission response to the project is expected to be very positive, as hydro power is desired in Guatemala's mainly fossil-fuel based generation system; in particular, small scale hydro power projects generally receive little opposition from environmental lobby groups.

Required licenses and permits and their respective status for this project are as follows:

- Environmental impact study (license) – obtained, may need revision
- Ministry of Energy Authorization of Water-Use Rights – pending
- Regulator's ("Comisión Nacional de Energía Eléctrica") interconnection (to the grid) authorization – pending
- Construction License from the local municipality (Senahú) – obtained

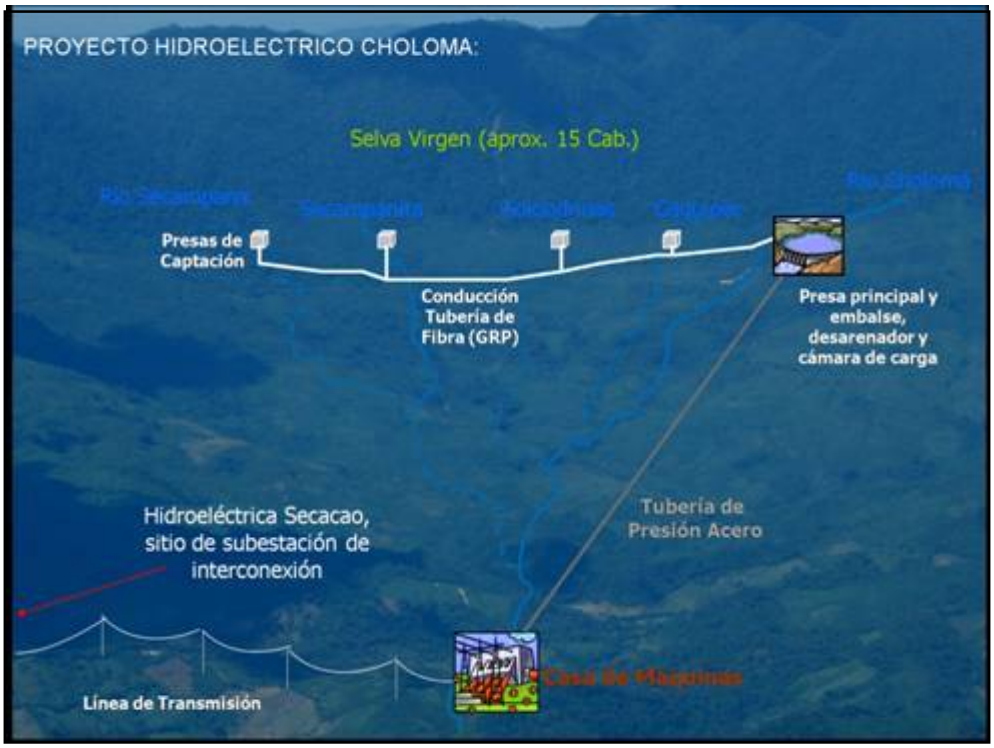
The Exhibit 11-1 shows the general project location within Guatemala.

Exhibit 11-1 – Project Location



The following Exhibit 11-2 depicts the proposed project layout:

Exhibit 11-2 – Site Layout



Key:

- Selva Virgen: Rainforests
- Presas de Captacion: Diversion dams
- Conduccion Tuberia de Fibra: Low-pressure penstock (fiber or steel)
- Presa principal: Dam, reservoir, desanders and intake structure
- Tuberia de Alta Presion: High-pressure penstock
- Casa de Maquinas: Machine or Power house
- Linea de Transmision: Transmision line

Project Sponsor's Capabilities and Commitment

The Project Sponsor is a Guatemalan closely held corporation with three partners (stockholders). The sponsors have jointly developed two existing hydroelectric projects near the new projects site, as mentioned before. The first (Secacao – 16.5 MW) initiated operations in 1998, and the second (Candelaria – 4.6 MW) in 2006.

The existing hydroelectric plants (and thus the sponsors) bring the following strengths to the new project's development:

Highly skilled "mounting – erection" crew, for the installation of the electromechanical equipment and 100% of both penstocks (for the latter, a cable-crane owned by the sponsors is used to reduce the need for access roads, which reduces cost and adverse environmental impacts). Highly skilled and experienced operations crew for electrical installation support and plant operation after construction. Existing operators camp, food court, entertainment, etc. Existing transmission line built for prior developments, which allows for the new project to be interconnected to the nearby grid.

Experience in power purchase agreement (PPA) negotiations and electricity market know-how (Choloma has a "binding" letter of intent by a highly reputable and solid off-taker under a 10-year PPA).

The Project Sponsors are financially stable and known in the Guatemalan banking sector, having established a very positive reputation through conservative and professional development of prior hydroelectric projects already mentioned. Local banks, plus the CABEI, consider the sponsor a desirable and first rate customer.

Equipment for prior projects, with respect to turbines and generators and main-inlet valves has come from Europe (England / France). Control systems, SCADA system and switchyard of the existing Candelaria project came from the U.S.; the main project consultant and design engineer for existing projects, and the new Choloma project, is located in Seattle (EES Consulting).

Implementation Financing

It is anticipated that the project will be funded through a project finance approach, with a 30% equity and 70% debt structure, and a loan term of 12 to 14 years including a 2 year grace period. Financing is being sought currently, and has been a longer than anticipated process due to complicated international financial conditions. Even though firm financing offers have been received, interest rate conditions are not considered favorable enough for a long-term financing requirement. Due to prevailing international interest rates, negotiations for financing have been for now re-focused on a group of three local banks that would fund the debt structure jointly, and on CABEI.

In order to attain a competitive interest rate, the sponsors are considering the following options:

- Increasing equity participation

- Negotiating a non-penalized loan prepayment option in order to refinance the project at any time (typically refinancing can result in lower interest rates if this is done once the project is successfully constructed and operations have begun).

U.S. Export Potential

Most of the export potential for the implementation of this project is in the procurement of hydro power turbines, substation equipment, instrumentation and control systems, and construction and engineering services. The overall estimated project cost (w/o construction contingency) is about $30 million for 9.5MW plant. U.S. exports could be as much as $14 million (45%) level.

Project Sponsor provided the Consultant with summary estimates, which were developed during the pre-feasibility effort. Consultant believes that these estimates are reasonable and in line with own estimate.

A number of U.S. firms can supply the equipment:

Hydro Turbines:

- Canyon Hydro;
- Voith Siemens Hydro Power Generation;
- American Hydro Corporation;
- The James Leffel & Co.;
- North American Hydro;
- GE Energy Hydro.

In addition to equipment suppliers, U.S. engineering companies may be interested in EPC or task design contracts. Services suppliers potentially include:

- EES Consulting;
- Black and Veatch;
- MWH Global;
- Shaw Group (Stone and Webster);
- USR (Washington Group);
- HydroWest International;
- PB Power.

The Consultant has contacted major equipment manufacturers and confirmed their interest in providing hydro turbines for small scale projects in Central

America. Manufacturers confirmed their past international experience and their comfortable position in supply logistics. They identified price/quality parameters as being a major driver for equipment selection in the region.

Foreign Competition and Market Entry Issues

In general, U.S. manufacturers are considered to be competitive in the design, manufacturing, and implementation of the proposed project scope. However, significant competition is expected to U.S. companies in Central America.

Major foreign competitors in the hydro power energy market include amongst others:

- Toshiba (Japan)
- Voith Siemens (Germany);
- Sulzer Hydro Ltd. (Switzerland);
- Moller Undenas Turbin AB (Sweden);
- Wasserkraft Volk AG – WKV (Germany);
- Alstom (France);
- Pompes RITZ France SAS (France);
- CITIC Heavy Machinery Company Ltd. (China);
- Andritz VA TECH Hydro (Austria);
- Bouving Fouress Limited (India);
- Dongfang Electric Corporation (China);
- Harbin Power Equipment Company (China);
- Norcan Hydraulic Turbines Inc. (Canada);
- Kharkov Turbogenerator Plant "Turboatom" (Ukraine); and
- LMZ (Russia).

Developmental Impact

Infrastructure -- The Project will be used to provide power at competitive prices and reduce the grid's dependence on expensive petroleum-based power. The project is expected to be about 9.5 MW. The project will be able to provide power to roughly over 20,000 households.

Human Capacity Building -- The proposed power plant will have significant job creation impact as well. The construction of the plant will require temporary manpower, both skilled and unskilled, with a maximum of 50 qualified persons

at any one time during peak of construction. Preference will be given to hiring qualified local residents.

Operations phase employment opportunities will be made available for technical, administrative, and security people during the commercial operation phase. The average number of personnel envisioned at the plant will be 10.

Other - Assuming 34 GWh of electricity produced by hydro plant instead of coal, for example, the CO2 avoided emissions estimated at 26,000 tons per year.

The proposed project can be considered a rural electrification project. The remote location will strengthen the electricity grid and reduce transmission losses. It will also provide more power to be distributed in the area where more electrification is desired.

Environmental Considerations

The project has negligible environmental impacts, and has obtained an approval of its Environmental Impact Study by Guatemala's Environmental Ministry.

The Project Sponsors have created a reforestation company that is funded by the hydro power plants and is charged with reforesting all surrounding areas, including those around the new Choloma project, in addition to managing and protecting existing natural rainforests. In approximately five years it is anticipated that about 1,700 hectares (approximately 4,200 acres) will have been reforested. To date, over 600 hectares (almost 1,500 acres) have already been established.

Finally, the Project Sponsors established a not-for-profit Foundation aimed at improving the quality of life for local surrounding communities, funded by revenue coming from the sale of carbon credits under the Kyoto Protocol of United Nations by the Candelaria Hydroplant, with a main focus on education, health services, and basic infrastructure (primarily water, roads and electricity). As part of this effort, to date nine surrounding communities (over 800 families) have obtained free electricity connections to their homes (through a private-public partnership between the Project Sponsors and the Guatemalan state); an ambulance (vehicle) was donated to the local town's hospital (10 km away from the site); and a health center was built in a central location of the surrounding communities. This health center was successfully taken over by the Guatemalan Health Ministry in order to stock it with medicines and to establish professional health practitioners at the facility.

Due to the nature of the technology, the proposed hydro power plant has no emissions. Implementation of the hydro power plant is estimated by the Consultant to result in annual savings of 26,000 tons of CO2 emissions.

Among anticipated other positive impacts are:

- Conservation and mitigation measures in the river basin;
- No alteration of agricultural lands;
- Forestry conservation;
- Training, regarding environmental issues, provided to locals;
- New tourist and recreational activities;
- Life quality improvement for local communities due to new incomes; and
- Socail commitment regarding education, health and production of goods.

Potential negative impacts are:

- Natural river flow alteration;
- Flora and Fauna conditions, of a specific area, modified due to the new reservoir;
- Sound pollution during construction; and
- Heavy equipment transit.

Follow-up and Further Information

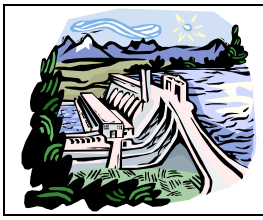
The Project Sponsor, Hidroelectrica Secacao, has completed a preliminary project profile for the Choloma unit. They are looking for funding for a detailed feasibility study.

Secacao is a well established, entrepreneurial company with strong management and local renewable energy expertise on board. In our opinion the company has the technical means to develop a project of this kind. Furthermore, they have expressly stated an intent to acquire software, systems, equipment, and consulting services from U.S. exporters should the project reach the implementation stage. The existing reputation of the company as well as the existence of a letter of intent, or purchase power agreement, mean that the project has a very high probability of eventually acquiring favorable funding.

Interested parties are encouraged to contact the Project Sponsor for more information and further cooperation steps.

Sr. Rudolf W. Jacobs
Hidroelectrica Secacao S.A.
16 Calle 0-26 Zona 14
Guatemala, C.A. 01014
Tel (502) 2368-3330
rjacobs@hidrosecacao.com

Project 12 – Secacao 30 MW Ona Hydroelectric Project

	**Type: Run-on-river hydro**	**Name: Ona Hydroelectric Project**
	Size: 30 MW	**Project Sponsor: Secacao**

Project Background

The project is located in El Quetzal county (equivalent of county – "municipio"), in San Marcos department (equivalent of State – "departamento"), in south western Guatemala. The project will be developed on private land owned by Finca Ona on the Naranjo River, one of the largest rivers in that part of the country. Once complete, the estimated 30.0 MW of plant capacity will generate an average of 169 GWh of electricity annually.

The project captures the flow from the Narano River through its dam and intake structures located on the river's bed. The dam forms a small reservoir of approximately 300,000 cubic meters in the river channel. Downstream from the dam a desander will separate the fine particles and sand from the water to be used for generation. From the desander the water will flow into a 7 kilometer long pressurized (low pressure) tunnel that transports the water to the power house via a short high pressure steel penstock. Gross head for the project is estimated at 210 meters, and design flow is 18 cubic meters per second. The power house will contain two sets of the following equipment: main inlet valve, 2 jet Pelton turbine with horizontal shaft, an air or water—cooled generator, and all electrical, hydraulic and lubricating systems. The power house will also include a control room with electrical panels and a SCADA system which will hold the PLC software and function as an automatic control center. Water discharge is led back to the original Naranjo River basin. Next to the power house a switchyard and substation are to be installed, and power output will be transformed to 69 kilovolts, and will then be conducted through a high-voltage transmission line to be built, which will be about 10 kilometers in length and will inject the electricity into the national grid.

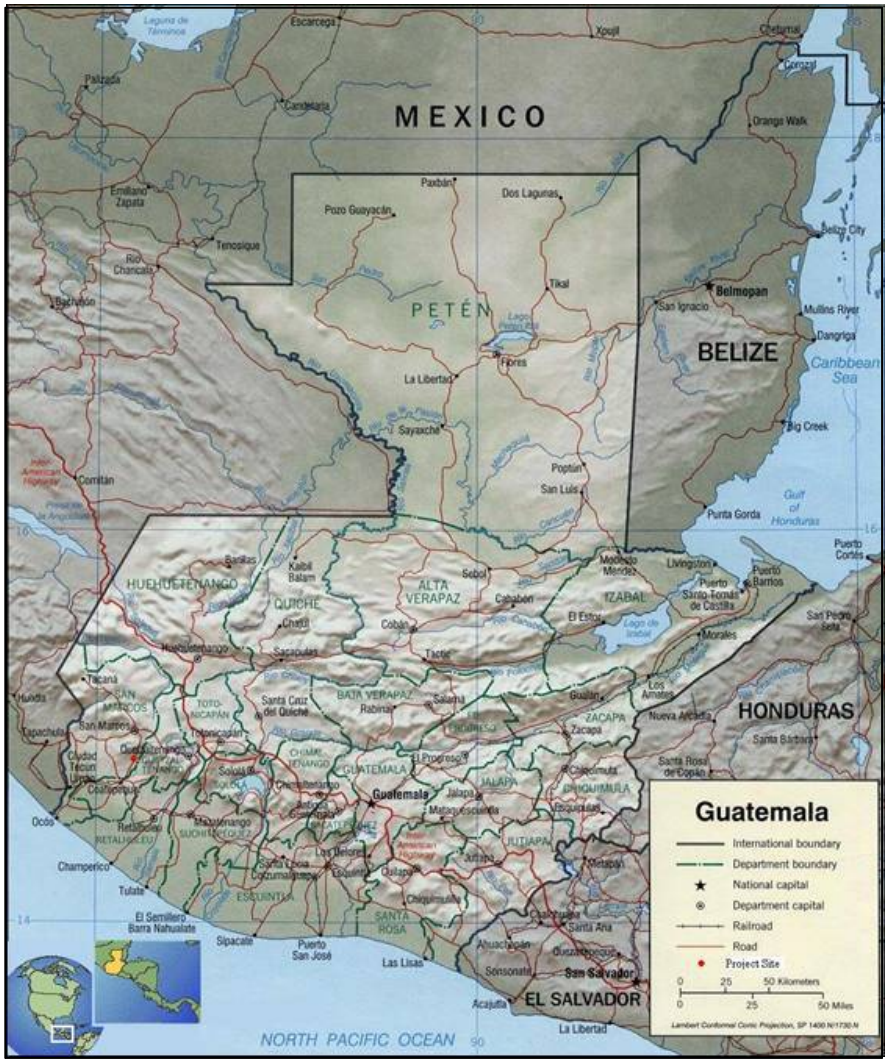
The Project Sponsors own the land for the project, the transmission line right of way, and the access roads.

Expected governmental reaction to this project is very positive, as hydro power is desired in Guatemala's mainly fossil fuel based generation system; small scale hydro power projects in particular receive little opposition from environmental lobby groups. The projects in Guatemala generally need the following licenses:

1. Environmental impact study (license) – pending
2. Ministry of Energy Authorization of Water-Use Rights – pending
3. Regulator's ("Comisión Nacional de Energía Eléctrica") interconnection (to the grid) authorization – pending
4. Construction License from the local municipality (El Quetzal) – pending

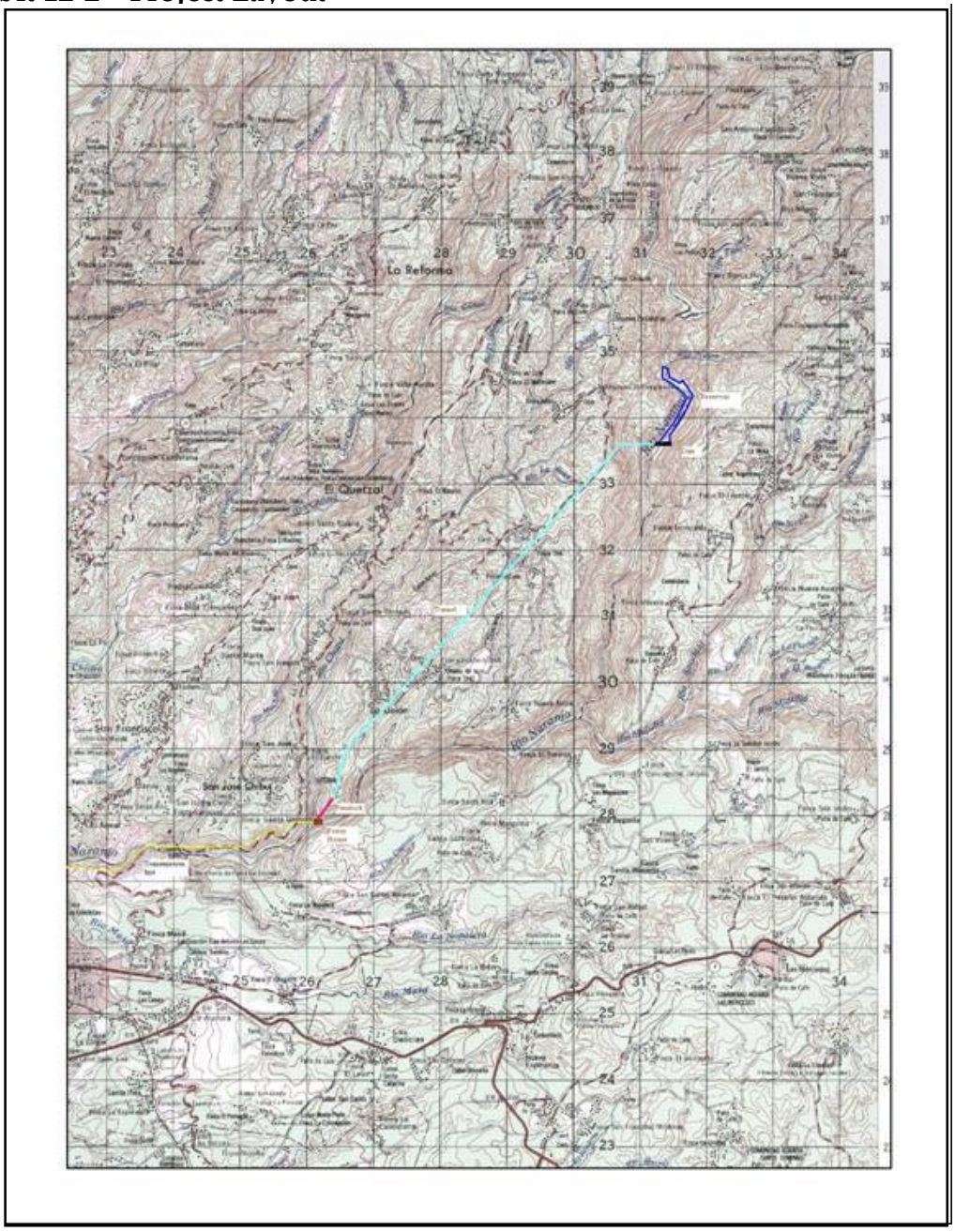
Site details are shown in the following Exhibit 12-1.

Exhibit 12-1 – Project Location



The following Exhibit 12-2 depicts the proposed project layout.

Exhibit 12-2 – Project Layout



Project Sponsor's Capabilities and Commitment

The Project Sponsor is a Guatemalan closely held corporation with three partners (stockholders). The sponsors have jointly developed two existing hydroelectric

projects near the new projects site, as mentioned before. The first (Secacao – 16.5 MW) initiated operations in 1998, and the second (Candelaria – 4.6 MW) in 2006.

The existing hydroelectric plants (and thus the sponsors) bring the following strengths to the new project's development:

- Highly skilled "mounting – erection" crew, for the installation of the electromechanical equipment and 100% of both penstocks (for the latter, a cable-crane owned by the sponsors is used to reduce the need for access roads, which reduces cost and adverse environmental impacts).
- Highly skilled and experienced operations crew for electrical installation support and plant operation after construction.
- Existing operators camp, food court, entertainment, etc.
- Existing transmission line built for prior developments, which allows for the new project to be interconnected to the nearby grid.
- Highly professional independent consulting firm used in prior project developments located in Seattle, WA (EES Consulting, Mr. Jack Snyder – snyder@eesconsulting.com).
- Experience in power purchase agreement (PPA) negotiations and electricity market know-how.

The Project Sponsors are financially stable and known in the Guatemalan banking sector, having established a very positive reputation through conservative and professional development of prior hydroelectric projects already mentioned. Local banks, plus the CABEI, consider the Project Sponsor a desirable and first rate customer.

Equipment for prior projects, with respect to turbines and generators and main-inlet valves has come from Europe (England / France). Control systems, PLC/SCADA system and switchyard of the existing Candelaria project came from the USA; the main project consultant and design engineer for existing projects, and the new Ona project, is located in Seattle (EES Consulting).

Implementation Financing

It is anticipated that the project will be funded through a project finance approach, with 30% equity and 70% debt structure, and a loan term of 12 to 14 years including a 2 year grace period. Financing is being sought currently, and has been a longer than anticipated process due to complicated international financial conditions. Even though firm financing offers have been received,

interest rate conditions are not considered favorable enough for a long-term financing requirement. Due to prevailing international interest rates, negotiations for financing have been for now re-focused on a group of three local banks that would fund the debt structure jointly, and on CABEI.

In order to attain a competitive interest rate, the Project Sponsors are considering the following options:

- Increasing equity participation
- Negotiating a non-penalized loan prepayment option in order to refinance the project at any time (typically refinancing can result in lower interest rates if this is done once the project is successfully constructed and operations have begun).

U.S. Export Potential

Most of the export potential for the implementation of this project is in the procurement of hydro power turbines, substation equipment, instrumentation and control systems, and construction and engineering services. The overall estimated project cost (w/o construction contingency) is about $90 million for 30MW plant. U.S. exports could be as much as $40 million (45%) level.

The Project Sponsor provided the Consultant with summary estimates, which were developed during the pre-feasibility effort. Consultant believes that these estimates are reasonable and in line with own estimate.

A number of U.S. firms can supply the equipment:

<u>Hydro Turbines:</u>

- Canyon Hydro;
- Voith Siemens Hydro Power Generation;
- American Hydro Corporation;
- The James Leffel & Co.;
- North American Hydro;
- GE Energy Hydro.

In addition to equipment suppliers, U.S. engineering companies may be interested in EPC or task design contracts. Services suppliers potentially include:

- EES Consulting;
- Black and Veatch;
- MWH Global;
- Shaw Group (Stone and Webster);
- USR (Washington Group);
- HydroWest International;
- PB Power.

The Consultant has contacted major equipment manufacturers and confirmed their interest in providing hydro turbines for small scale projects in Central America. Manufacturers confirmed their past international experience and their comfortable position in supply logistics. They identified price/quality parameters as being a major driver for equipment selection in the region.

Foreign Competition and Market Entry Issues

In general, U.S. manufacturers are considered to be competitive in the design, manufacturing, and implementation of the proposed project scope. However, significant competition is expected to U.S. companies in Central America.

Major foreign competitors in the hydro power energy market include amongst others:

- Toshiba (Japan)
- Voith Siemens (Germany);
- Sulzer Hydro Ltd. (Switzerland);
- Moller Undenas Turbin AB (Sweden);
- Wasserkraft Volk AG – WKV (Germany);
- Alstom (France);
- Pompes RITZ France SAS (France);
- CITIC Heavy Machinery Company Ltd. (China);
- Andritz VA TECH Hydro (Austria);
- Bouving Fouress Limited (India);
- Dongfang Electric Corporation (China);
- Harbin Power Equipment Company (China);
- Norcan Hydraulic Turbines Inc. (Canada);
- Kharkov Turbogenerator Plant "Turboatom" (Ukraine); and
- LMZ (Russia).

Developmental Impact

Infrastructure -- The Project will be used to provide power at competitive prices and reduce the grid's dependence on expensive petroleum-based power. The project is expected to be about 30 MW. The project will be able to provide power to roughly over 60,000 households.

Human Capacity Building -- The proposed power plant will have significant job creation impact as well. The construction of the plant will require temporary manpower, both skilled and unskilled, with a maximum of 300 qualified persons at any one time during peak of construction. Preference will be given to hiring qualified local residents.

Operations phase employment opportunities will be made available for technical, administrative, and security people during the commercial operation phase. The average number of personnel envisioned at the plant will be 15.

Other - Assuming 169 GWh of electricity produced by hydro plant instead of coal, for example, the CO2 avoided emissions estimated at 130,000 tons per year.

The proposed project can be considered a rural electrification project. The remote location will strengthen the electricity grid and reduce transmission losses. It will also provide more power to be distributed in the area where more electrification is desired.

Environmental Considerations

The project has negligible environmental impacts, and in process of obtaining an approval of its Environmental Impact Study by Guatemala's Environmental Ministry.

The Project Sponsors have created a reforestation company that is funded by the hydro power plants and is charged with reforesting all surrounding areas, including those around the new Choloma project, in addition to managing and protecting existing natural rainforests. In approximately five years it is anticipated that about 1,700 hectares (approximately 4,200 acres) will have been reforested. To date, over 600 hectares (almost 1,500 acres) have already been established.

Finally, the Project Sponsors established a not-for-profit foundation aimed at improving the quality of life for local surrounding communities, funded by

revenue coming from the sale of carbon credits under the Kyoto Protocol of United Nations by the Candelaria Hydroplant, with a main focus on education, health services, and basic infrastructure (primarily water, roads and electricity). As part of this effort, to date nine surrounding communities (over 800 families) have obtained free electricity connections to their homes (through a private-public partnership between the Project Sponsors and the Guatemalan state); an ambulance (vehicle) was donated to the local town's hospital (10 km away from the site); and a health center was built in a central location of the surrounding communities. This health center was successfully taken over by the Guatemalan Health Ministry in order to stock it with medicines and to establish professional health practitioners at the facility.

Due to the nature of the technology, the proposed hydro power plant has no emissions. Implementation of the hydro power plant is estimated by the Consultant to result in annual savings of 130,000 tons of CO2 emissions.

Among anticipated other positive impacts are:

- Conservation and mitigation measures in the river basin;
- No alteration of agricultural lands;
- Forestry conservation;
- Training, regarding environmental issues, provided to locals;
- New tourist and recreational activities;
- Life quality improvement for local communities due to new incomes; and
- Social commitment regarding education, health and production of goods.

Potential negative impacts are:

- Natural river flow alteration;
- Flora and Fauna conditions, of a specific area, modified due to the new reservoir;
- Sound pollution during construction; and
- Heavy equipment transit.

Follow-up and Further Information

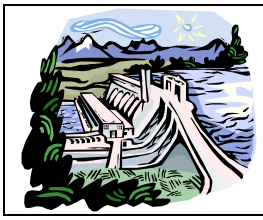
The Project Sponsor, Hidroelectrica Secacao, has completed a preliminary project profile for the Ona unit. They are looking for funding for a detailed feasibility study.

Secacao is a well established, entrepreneurial company with strong management and local renewable energy expertise on board. In our opinion the company has the technical means to develop a project of this kind. Furthermore, they have expressly stated an intent to acquire software, systems, equipment, and consulting services from U.S. exporters should the project reach the implementation stage. The existing reputation of the company as well as the existence of a letter of intent, or purchase power agreement, mean that the project has a very high probability of eventually acquiring favorable funding.

Interested parties are encouraged to contact the Project Sponsor for more information and further cooperation steps.

Sr. Rudolf W. Jacobs
Hidroelectrica Secacao S.A.
16 Calle 0-26 Zona 14
Guatemala, C.A. 01014
Tel (502) 2368-3330
rjacobs@hidrosecacao.com

Project 13 – Secacao 5 MW Samuc Hydro Power Plant

	Type: Run-on-river hydro	Name: Samuc Hydro Power Plant
	Size: 5 MW	Project Sponsor: Secacao

Project Background

The San Isidro estate is located in Alta Verapaz, Guatemala; due to its location and climate the land has been designated to a reforestation project. Today, 650 hectares have been reforested with pine and cypress trees; this is a project that has been on the works for over 10 years, employing people from the nearby communities. Certain hillsides of the land have been left untouched with the natural fauna and flora of that region; it is there where various natural spring water rivers are found like San Isidro and Samuc.

The Hydroelectric Samuc, is a project for the generation of renewable clean energy, with an estimated capacity of 5.0 MW; using the flow of the rivers San Isidro and Quebrada Samuc, which are located within the perimeter of the San Isidro estate in San Cristobal, Department of Alta Verapaz, Guatemala (Exhibit 13-1).

Exhibit 13-1 – Project Location

The project will consist of two Machine Houses; the first one will have a capacity of 1.28 MW, with a design flow of 0.80m3/sec and a water fall of 197 m. The second one will have 3.75 MW of capacity, with a design flow of 1.50m3/sec and a water fall of 305 m.

The hydroelectric plant has been designed to work without a dam or reservoir, the project captures the flow upstream of the San Isidro River and carries it through a low-pressure penstock to the machine hose 1. The second project captures the flow downstream of the Samuc River and carries it through an open canal picking up the water discharged at the first machine house where a low-pressure penstock starts leading the combined flow to the machine house 2.

The generation at plant No. 1 is 5.019 GWh/year with a plant factor of 0.45; the plant No.2 has a generation of 15.185 GWh/year with a plant factor of 0.46. The estimated total generation is 20.205 GWh/year.

Preliminary financial analysis of the project give positive results with the internal rate of return is 27.7%, having a positive cash flow after 4.2 years of operation (70% debt for 12 years). The Project Sponsors own the land for the project.

Project Sponsor's Capabilities and Commitment

The Project Sponsor is a Guatemalan closely held corporation with three partners (stockholders). The sponsors have jointly developed two existing hydroelectric projects near the new projects site, as mentioned before. The first (Secacao – 16.5 MW) initiated operations in 1998, and the second (Candelaria – 4.6 MW) in 2006.

The existing hydroelectric plants (and thus the sponsors) bring the following strengths to the new project's development:

Highly skilled "mounting – erection" crew, for the installation of the electromechanical equipment and 100% of both penstocks (for the latter, a cable-crane owned by the sponsors is used to reduce the need for access roads, which reduces cost and adverse environmental impacts). Highly skilled and experienced operations crew for electrical installation support and plant operation after construction. Existing operators camp, food court, entertainment, etc. Existing transmission line built for prior developments, which allows for the new project to be interconnected to the nearby grid.

Experience in power purchase agreement (PPA) negotiations and electricity market know-how (Choloma has a "binding" letter of intent by a highly reputable and solid off-taker under a 10-year PPA).

The Project Sponsors are financially stable and known in the Guatemalan banking sector, having established a very positive reputation through conservative and professional development of prior hydroelectric projects already mentioned. Local banks, plus the CABEI, consider the Project Sponsor a desirable and first rate customer.

Equipment for prior projects, with respect to turbines and generators and main-inlet valves has come from Europe (England / France). Control systems, PLC/Scada system and switchyard of the existing Candelaria project came from the USA; the main project consultant and design engineer for existing projects, and the new Choloma project, is located in Seattle, USA (EES Consulting).

Implementation Financing

It is anticipated that the project will be funded through a project finance approach, with a 30% equity and 70% debt structure, and a loan term of 12 to 14

years including a 2 year grace period. Financing is being sought currently, and has been a longer than anticipated process due to complicated international financial conditions. Even though firm financing offers have been received, interest rate conditions are not considered favorable enough for a long-term financing requirement. Due to prevailing international interest rates, negotiations for financing have been for now re-focused on a group of three local banks that would fund the debt structure jointly, and on CABEI.

In order to attain a competitive interest rate, the Project Sponsors are considering the following options:

- Increasing equity participation
- Negotiating a non-penalized loan prepayment option in order to refinance the project at any time (typically refinancing can result in lower interest rates if this is done once the project is successfully constructed and operations have begun).

U.S. Export Potential

Most of the export potential for the implementation of this project is in the procurement of hydro power turbines, substation equipment, instrumentation and control systems, and construction and engineering services. The overall estimated project cost (w/o construction contingency) is about $13 million for 5 MW plant. U.S. exports could be as much as $6 million (45%) level.

The Project Sponsor provided the Consultant with summary estimates, which were developed during the pre-feasibility effort. Consultant believes that these estimates are reasonable and in line with own estimate.

A number of U.S. firms can supply the equipment:

Hydro Turbines:

- Canyon Hydro;
- Voith Siemens Hydro Power Generation;
- American Hydro Corporation;
- The James Leffel & Co.;
- North American Hydro;
- GE Energy Hydro.

In addition to equipment suppliers, U.S. engineering companies may be interested in EPC or task design contracts. Services suppliers potentially include:

- EES Consulting;
- Black and Veatch;
- MWH Global;
- Shaw Group (Stone and Webster);
- USR (Washington Group);
- HydroWest International;
- PB Power.

The Consultant has contacted major equipment manufacturers and confirmed their interest in providing hydro turbines for small scale projects in Central America. Manufacturers confirmed their past international experience and their comfortable position in supply logistics. They identified price/quality parameters as being a major driver for equipment selection in the region.

Foreign Competition and Market Entry Issues

In general, U.S. manufacturers are considered to be competitive in the design, manufacturing, and implementation of the proposed project scope. However, significant competition is expected to U.S. companies in Central America.

Major foreign competitors in the hydro power energy market include amongst others:

- Toshiba (Japan)
- Voith Siemens (Germany);
- Sulzer Hydro Ltd. (Switzerland);
- Moller Undenas Turbin AB (Sweden);
- Wasserkraft Volk AG – WKV (Germany);
- Alstom (France);
- Pompes RITZ France SAS (France);
- CITIC Heavy Machinery Company Ltd. (China);
- Andritz VA TECH Hydro (Austria);
- Bouving Fouress Limited (India);
- Dongfang Electric Corporation (China);
- Harbin Power Equipment Company (China);
- Norcan Hydraulic Turbines Inc. (Canada);
- Kharkov Turbogenerator Plant "Turboatom" (Ukraine); and
- LMZ (Russia).

Developmental Impact

Infrastructure -- The Project will be used to provide power at competitive prices and reduce the grid's dependence on expensive petroleum-based power. The project is expected to be about 5 MW. The project will be able to provide power to roughly over 10,000 households.

Human Capacity Building -- The proposed power plant will have significant job creation impact as well. The construction of the plant will require temporary manpower, both skilled and unskilled, with a maximum of 50 qualified persons at any one time during peak of construction. Preference will be given to hiring qualified local residents.

Operations phase employment opportunities will be made available for technical, administrative, and security people during the commercial operation phase. The average number of personnel envisioned at the plant will be 10.

Other - Assuming 20 GWh of electricity produced by hydro plant instead of coal, for example, the CO2 avoided emissions estimated at 15,000 tons per year.

The proposed project can be considered a rural electrification project. The remote location will strengthen the electricity grid and reduce transmission losses. It will also provide more power to be distributed in the area where more electrification is desired.

Environmental Considerations

The project has negligible environmental impacts, and has obtained an approval of its Environmental Impact Study by Guatemala's Environmental Ministry.

The Project Sponsors have created a reforestation company that is funded by the hydro power plants and is charged with reforesting all surrounding areas, including those around the new Choloma project, in addition to managing and protecting existing natural rainforests. In approximately five years it is anticipated that about 1,700 hectares (approximately 4,200 acres) will have been reforested. To date, over 600 hectares (almost 1,500 acres) have already been established.

Finally, the Project Sponsors established a not-for-profit Foundation aimed at improving the quality of life for local surrounding communities, funded by revenue coming from the sale of carbon credits under the Kyoto Protocol of United Nations by the Candelaria Hydroplant, with a main focus on education, health services, and basic infrastructure (primarily water, roads and electricity). As part of this effort, to date nine surrounding communities (over 800 families) have obtained free electricity connections to their homes (through a private-public partnership between the Project Sponsors and the Guatemalan state); an ambulance (vehicle) was donated to the local town's hospital (10 km away from the site); and a health center was built in a central location of the surrounding communities. This health center was successfully taken over by the Guatemalan Health Ministry in order to stock it with medicines and to establish professional health practitioners at the facility.

Due to the nature of the technology, the proposed hydro power plant has no emissions. Implementation of the hydro power plant is estimated by the Consultant to result in annual savings of 15,000 tons of CO2 emissions.

Among anticipated other positive impacts are:

- Conservation and mitigation measures in the river basin;
- No alteration of agricultural lands;
- Forestry conservation;
- Training, regarding environmental issues, provided to locals;
- New tourist and recreational activities;
- Life quality improvement for local communities due to new incomes; and
- Social commitment regarding education, health and production of goods.

Potential negative impacts are:

- Natural river flow alteration;
- Flora and Fauna conditions, of a specific area, modified due to the new reservoir;
- Sound pollution during construction; and
- Heavy equipment transit.

Follow-up and Further Information

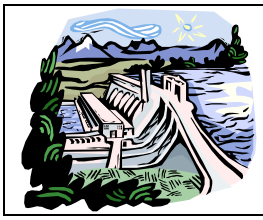
The Project Sponsor, Hidroelectrica Secacao, has completed a preliminary project profile for the Samuc unit. They are looking for funding for a detailed feasibility study.

Secacao is a well established, entrepreneurial company with strong management and local renewable energy expertise on board. In our opinion the company has the technical means to develop a project of this kind. Furthermore, they have expressly stated an intent to acquire software, systems, equipment, and consulting services from U.S. exporters should the project reach the implementation stage. The existing reputation of the company as well as the existence of a letter of intent, or purchase power agreement, mean that the project has a very high probability of eventually acquiring favorable funding.

Interested parties are encouraged to contact the Project Sponsor for more information and further cooperation steps.

Sr. Rudolf W. Jacobs
Hidroelectrica Secacao S.A.
16 Calle 0-26 Zona 14
Guatemala, C.A. 01014
Tel (502) 2368-3330
rjacobs@hidrosecacao.com

Project 14 – 0.1 MW Anacafe Micro Hydro Projects

	Type: Micro hydro	Name: Micro Hydro Projects
	Size: 0.1 MW	Project Sponsor: Anacafe

Project Background

There are several coffee producers with potential for hydro generation, including San Juan Bautista R.L. Cooperative, located in Moyuta, Jutiapa, Guatemala; Civil Society La Florida R.L., located in Colomba Costa Cuca, Quetzaltenango; and Buena Vista farm, located in San Felipe Retalhuleu, Guatemala (Exhibit 14-1).

Exhibit 14-1 – Project Location

Coffee cooperative, San Juan Bautista, is located in Moyuta, Jutiapa, 125 km from Guatemala City, between 800 and 1100 meters above sea level. Its principal activity is agriculture, producing 1500 bags (of 49 kg/ea.) of parchment coffee per year. The coffee mill actually works with an engine plant that uses fossil fuel to operate. Nevertheless, this cooperative has access to a private water source,

with a waterfall of 25 to 30 meters that can be a source for hydro generation. In the past, this farm had its own hydro power source, but with time, this activity was abandoned. Although this source is not actually functioning, it still has the water intake, reservoir, forced pipe, and generators.

Civil Society La Florida is located in Colomba Costa Cuca, Quetzaltenango, 219 kms from Guatemala City, between 800 and 1100 meters above sea level. Company is engaged in ecotourism project and produces 5000 bags (of 49 kg/ea.) of parchment coffee per year. The coffee mill needs around 35 kWh to operate. La Florida has access to a water source within the property, with a waterfall of about 30 m, which can be utilized as a hydro power source. This farm had installation for hydro generation fifty years ago, still maintaining its water intake, reservoir, forced pipe, turbines and generators in regular conditions. Nevertheless they have the potential to establish a new hydro generation project.

Data for these water sources are presented in Exhibit 14-2.

Exhibit 14-2 – Unit Characteristics

Producing Unit	Jurisdiction	Waterfall (meters)	Flow (m^3 per second)	Estimated Hydro power Potential (Kw)
San Juan Bautista	Moyuta, Jutiapa	35	0.016	4.5
La Florida	Colomba Costa Cuca, Quetzaltenango	31	0.026	7

No previous studies exist for these locations.

The third project considered as potential for hydro generation is Finca Buena Vista, in San Felipe Retalhuleu. This is an experimental farm of the National Coffee Association, which has abundant water resources, with an estimated potential to produce 50 KW.

Project Sponsor's Capabilities and Commitment

The Consultants did not yet receive any details regarding Anacafe or cooperatives mentioned. Web research did not yield any significant results.

Implementation Financing

The hydroelectric projects are intended to become property of the Coffee Cooperative and Civil Society; nevertheless Anacafe has the ability to become the institution to fund the implementation of the projects in cooperation with the coffee producers.

The San Juan Bautista Cooperative is now participating in Anacafe's Coffee Trust with a local bank. This credit was provided by Guatemala's Government to alleviate producers from the coffee prices crisis, back in 2002, and is managed by Anacafe, in which the local bank provides financing for activities related to income diversification or installation of coffee mills. San Juan Bautista benefits from a credit of $140,000 from 2006 to 2016, being up to date to payments.

On the other hand, Anacafe is an institution created by law, which receives 1% of the FOB of national coffee exports. In average, for the last four harvests, the total coffee exports were $ 536 million per year. Additionally, Anacafe has managed about $ 20 million from external cooperation projects, since 1989 to 2008, with USAID, AECID, European Union and British Embassy.

U.S. Export Potential

Most of the export potential for the implementation of this project is in the procurement of micro hydro power package. The overall estimated project cost (w/o construction contingency) is about $0.5 million for 0.1 MW plant. U.S. exports could be as much as $0.5 million (100%) level. It should be noted that this project can be fully sourced outside of the U.S.

A number of U.S. firms can supply the equipment:

Hydro Turbines:

- Hydro Turbines Inc.
- Lo Power Engineering;
- Harris Hydroelectric;
- ES&D;
- LVM Ltd.

In addition to equipment suppliers, smaller U.S. engineering companies may be interested in EPC or task design contracts.

Foreign Competition and Market Entry Issues

In general, U.S. manufacturers are considered to be competitive in the design, manufacturing, and implementation of the proposed project scope. Almost all developed countries produce variations of micro turbines.

Developmental Impact

Infrastructure -- The Project will be used to provide power in isolated areas reducing grid dependence.

Human Capacity Building -- The proposed power plant will have some significant job creation impact as well. The construction of the plant will require temporary manpower, both skilled and unskilled.

Operations phase employment opportunities will be made available for technical, administrative, and security people during the commercial operation phase.

The proposed project can be considered a rural electrification project. The remote location will strengthen the electricity grid and reduce transmission losses. It will also provide more power to be distributed in the area where more electrification is desired.

Environmental Considerations

The project has negligible environmental impacts due to its size.

Due to the nature of the technology, the proposed hydro power plant has no emissions. Implementation of the hydro power plant is estimated by the Consultant to result in annual savings of 300 tons of CO2 emissions.

Among anticipated other positive impacts are:

- Conservation and mitigation measures in the river basin;
- No alteration of agricultural lands;
- Forestry conservation;
- Training, regarding environmental issues, provided to locals;
- New tourist and recreational activities;
- Life quality improvement for local communities due to new incomes; and

- Social commitment regarding education, health and production of goods.

Potential negative impacts are:

- Natural river flow alteration;
- Flora and Fauna conditions, of a specific area, modified due to the new reservoir;
- Sound pollution during construction; and
- Heavy equipment transit.

Follow-up and Further Information

Interested parties are encouraged to contact the Project Sponsor for more information and further cooperation steps.

Rosa María Aguilar
Ingeniera Forestal
Coordinación de Ambiente
ANACAFE
Asociación Nacional del Café
http://www.anacafe.org/
5 Calle 0-50 Zona 14
Guatemala, Guatemala 01014
PBX: (502) 2421-3700
Rosa.MAM@anacafe.org

Honduras

Sector Primer – Honduras

General[15]

Country Summary	Electricity System Summary
- Territory: 112,000 sq. km; - Population: 7.8 million (2009); - Access to Electricity: 72% (2007); and - Ave GDP per Capita: $4,300 (2007).	- Installed Capacity: 1,516 MW (2009); - Energy Generated: 5,947 GWh (2006); - Peak Demand: 1,088 MW (2006) - Dominant Electricity Resource: Fossil; - Ave res. Tariff: $0.085/kW (2007); - Total generators: 40 (27 private); and - T&D: 1.
Renewable Energy Summary	**Governance Summary**
- Hydro (33% of total energy production); - Other renewable (4%); and - Renewable potential – 3,400 MW (mostly hydro with 120 MW geothermal and some wind).	- Single buyer model with ENEE domination; - ENEE has not unbundled distribution function; - CNE – National regulator; and - Long process to permit new facilities; and to negotiate new PPAs.

With a total area of 112,000 sq. km and a population of over seven million, and a per capita income of about $4,300 (2007), Honduras is the second largest country in Central America. It is located on the Caribbean Sea, between Guatemala and Nicaragua and bordering the Gulf of Fonseca (North Pacific Ocean), between El Salvador and Nicaragua. Honduras has a coastline of 820 km in length.

In April 2006, Honduras signed into legislation the Dominican Republic-Central American Free Trade Agreement (DR-CAFTA), a trade agreement that increased market access in the United States and the other countries in the region for Honduran goods. Similarly, the government completed a FTA with Mexico.

The issue of energy security continues to represent a major concern for Honduras. The country has been facing surging power demand, with potential power shortages. The 1998 drought caused by El Nino forced the Honduran government to declare an energy emergency. As a result, the Honduran government initiated steps towards construction of more thermal power as a quick fix solution since the maturity period for hydro plants is much longer. This further increased dependence on imported fuel. Thus, the country transformed form a hydro dominated system of the mid 1990s to a thermo dominated in the recent years.

[15] Some of statistics and estimates are estimated based country discussions and The Central American Carbon Finance Guide.

Honduras' power generation capacity mainly comes from fossil energy, all of which must be imported. Hydroelectric power is second in use for power generation. The existing installed capacity of the generation system of Honduras is 1,515.99 MW (2009), of which 28.6% (433 MW) make up the hydroelectric plants owned by ENEE, 8% (125 MW) are the thermal plants owned by ENEE, 2% (32 MW) hydro power plants owned by other government institutions, 52% (786 MW) are privately owned thermal plants, 4% (61 MW) are privately owned hydroelectric plants, and 5% (81 MW) are biomass privately owned power plants.[16]

For 2006, Honduras' total power generated was 5,947 GWh of energy, of which national utility Empresa Nacional de Energía Eléctrica (ENEE) and private companies generated 2,002.5 GWh (34%) and 3,945 GWh (66%), respectively. Within the total power generated, thermal energy amounted to 3,789.1 GWh (63.7%), hydroelectric produces 1,938.3 GWh (32.6%), and renewable energy (including biomass energy) generates 231.6 GWh (3.9%).[17]

Honduras relies heavily on fossil fuels for its energy generation but there is a distribution of energy production between state-owned and private companies. Currently, private ownership in generation comprises about 60%.

Due to energy shortages in the 1990s and as a consequence of the 1994 Electricity Framework Law, Honduras permitted the privatization of its energy markets, encouraging foreign and domestic private investment. The private companies constructed mainly coal- and diesel-fired thermal plants because their quick construction period was more advantageous than hydro power plants. Therefore, thermal generation has grown more readily than hydro power generation. Recent fossil contracts include 250 MW Pavana and 230 MW Choloma III heavy fuel oil plants.

The hydroelectric sector is almost totally controlled by the state-owned ENEE (seven plants with 464.4 MW or 97.2%). Private companies operate three more hydroelectric plants (13.6 MW) from which ENEE purchases electricity. Major hydroelectric plants in Honduras are Francisco Morazán, also known as Cajón (300 MW), and Río Lindo (80 MW). The generation capacities of the remaining plants range from 1.2 MW to 30 MW.

ENEE remains the major market participant and has not been unbundled yet. It controls the distribution and transmission markets and generates most of the

[16] Discussions with ENEE
[17] Source: Departamento Planeamiento Económico, Sub-Dirección de Planificación – Empresa Nacional de Energía Eléctrica, at http://www.enee.hn/

electricity, buying the remaining electricity from the private companies. Market competition has not yet been introduced, but was discussed and promoted in the 1994 electricity law.

ENEE's share of generation is gradually decreasing as an increasing number of private players come into the generation market. However, the model remains a single buyer model wherein ENEE is the sole buyer through PPAs. ENEE however, remains in full control of transmission and distribution of electric energy. The 1994 Electricity Law stipulates that ENEE should be unbundled both vertically and horizontally. The country would be divided into economically viable distribution zones. ENEE has prepared a plan to create 4 distribution enterprises from its existing business activities (to be privatized) and submitted it to CNE for review. Although the law does not expressly forbid vertically integrated enterprises, it does specify conditions under which vertical integration can exist, and limits ENEE's participation in distribution activities to 30% of the market. New participants in generation and distribution activities will de facto horizontally desegregate the sector. However, this plan remains significantly on the drawing board and little progress appears to have been made towards unbundling of the utility.

Honsuras is the participant in the Sistema de Interconexion Electrica de los Paises America Central (SIEPAC), an 1,100-mile transmission line linking Panama, Costa Rica, Honduras, Nicaragua, and El Salvador; and the construction of interconnectors connecting Mexico, Belize, and Guatemala with the SIEPAC. The completion of the SIEPAC is the first phase of the plan, and the member countries started an independent company, Empresa Propietaria de la Red (EPR), to complete phase one. Techint Mexico will construct the line in Guatemala, El Salvador and Honduras. The Inter-American Development Bank (IDB) is funding the majority of the project ($170 million), while Spain is funding an additional $70 million. EPR estimates that the SIEPAC development will be operational by late 2009.

Overall, the energy sector remains vertically integrated with high T&D losses (to the extent of 25%), poorly targeted subsidized tariffs, poor corporate governance, and weak regulatory mechanism. The ENEE losses amount to about 2% of the GDP, impacting the macroeconomics of the Country. Reforms have been legislated but not yet fully enforced.

In talking to various officials during this DM it was observed that there is a pressing need for institutional and legal framework corrections and a strong regulatory mechanism. Also needed was capacity building at various levels in the sector but in particular it was opined that ENEE, CNE and SERNA are the

best candidates for capacity building in the immediate future. Such issues if addressed appropriately, will provide a significant impetus to the development of RE in Honduras.

Additionally, rural electrification is an important development goal of the country. This would also promote the development of off grid renewable energy in conjunction with the grid connected renewables.

Renewable Energy

Hydro

Currently, over 30% of the installed capacity of the national interconnected system is hydro plants. There has been an intensive use of small- and medium-scale hydro energy, with 14 out of 16 existing hydro plants with capacity below 30 MW.

In Honduras, there is a large potential for electricity generation based on hydro power. In 2003 then President Ricardo Mauduro put in place a Special Commission for the Development of Hydroelectric Projects.

There are 16 new hydro projects that are expected to be commissioned before 2011, with an overall capacity of 206.5 MW. The two largest projects are the Cangrejal and Patuca 3. There are also other large hydro power projects that are not included in the power expansion plan. Some of the most prominent projects are:

Cangrejal is a planned dam on the Rio Cangrejal near La Ceiba, with an associated 40 MW power plant. It may have some non-resolved environmental issues, including the flooding of rapids that are a well-known whitewater sports destination and attract many tourists.

Patuca 3 is a dam on the Patuca River in the Department of Olancho, with an associated 100 MW power plant. The location is a protected area that is part of the Mesoamerican Biological Corridor and is inhabited by indigenous people.

Concerning medium-size and small dams, private developers receive tax breaks. Specifically, private producers are benefiting from fiscal incentives, tax exemptions, and the recognition of 10% of the short-term marginal cost per kWh as a premium. Fiscal incentives for small and medium-size hydro power have

created a bias toward this type of development and against other renewable options.

Wind

Due to the diversity of the Honduran landscape, the potential for wind development varies considerably. Currently, there is a 90 MW wind project under way, which is expected to begin operation in 2009. This project, financed by Mesoamerica Energy, will be located in Cerro de Hula, in the municipalities of Santa Ana and San Buenaventura, 20km South of Tegucigalpa.

Solar

Honduras has a large potential for solar photovoltaic generation. In fact, it is a practical solution for servicing energy-isolated rural communities. Currently, there are about 5,000 individual Solar Home Systems, which makes up for a total capacity of approximately 15 to 25 kW of power per system.

The growth of a wider photovoltaic market in Honduras has been hampered by a combination of high unit prices, absence of financing assistance, and a lack of government support.

Biomass

Honduras has a large potential for electricity generation from biomass, mainly from the sugar industry. Currently, there are nine biomass projects in operation, with a total of 82 MW installed capacity. These plants are estimated to supply 5% of the total demand of energy in Honduras for 2009.

Geothermal

The three planned geothermal projects in Honduras add up to 85.5 MW of installed capacity. The largest of them is called Platanares, in the Department of Copan, which is expected to begin operations in 2011 with an installed capacity of 40.5 MW and a generation of 354.8 GWh per year.

Diversification

The diversification of energy sources is a key element of the energy strategy to reduce the volatility of generation prices, reduce dependency on imported fuel, and improve energy security. The experience in Honduras shows that reliance on a single source of energy to meet energy demand (for example, hydroelectric

generation or oil-based thermal generation) increases the vulnerability of energy supply, either to energy shortages during drought conditions or to the volatility of oil prices. Reliance on a single source of supply—a large generation project, energy imports from one country—is also a risky strategy because energy supply is vulnerable to disruptions in the source of supply.

Honduras has many options to diversify energy sources, including development of indigenous renewable resources, mainly large and medium hydro, minihydro, windpower, and biomass, which can be economically competitive.

The development of renewable energy generation projects (defined as up to 50 MW) has been promoted by Decrees No. 85-98 and 267-98, complementing the Electricity Law of 1994. This law contemplates tax breaks to developers and a secure buyer for energy at attractive prices (ENEE is the default buyer at prices with a premium.). Under this umbrella, private sponsors have negotiated about 30 PPAs with ENEE for small renewable energy plants.

Despite this, the potential for the development of off-grid renewable sources appears to be largely untapped. There are opportunities in developing microhydro and photovoltaic generation. However, there is a lack of specific incentives and policies for off-grid rural electrification programs. Even the new Renewable Bill, which is now before the fails to emphasize specific incentives and mechanisms for off-grid solutions.

Opportunities for U.S. Firms[18]

U.S. exporters enjoy an enviable position in the Honduran market, and saw this position improve after the 2006 implementation of the Central American Free Trade Agreement (CAFTA-DR), which was signed by the U.S., Honduras, El Salvador, Nicaragua, Costa Rica, Guatemala, and the Dominican Republic in August 2004. Honduras was the second country to ratify CAFTA-DR, which entered into force for Honduras on April 1, 2006. CAFTA-DR eliminates most tariffs and other barriers to U.S. goods destined for the Central American market, provides protection for U.S. investments and intellectual property and creates more transparent rules and procedures for doing business.

For the period January-November 2007, Honduran imports of tractors, telecom equipment, electrical generators, industrial machinery, and general consumer goods all showed the most increases. The U.S. is the chief trading partner for

[18] Some of the discussion in this section is based on 2008 Honduras Commercial Guide published by U.S. Department of Commerce

Honduras, supplying almost half of Honduran imports. U.S. exports to Honduras in 2007 were $4.5 billion, up approximately 21% from the previous year. With CAFTA-DR in effect, about 80% of U.S. goods can now enter the region duty-free, with tariffs on the remaining 20% to be phased out within 10 years.

Financing Options

Concessionary loans and grants from international financial institutions and bilateral donors in the Honduran energy sector are focused on rural electrification, energy efficiency, and renewable energy.

Currently, the World Bank is contributing funds and assistance through three projects related to the energy sector in Honduras:

- Global Environmental Facility (GEF) project for rural electrification approved in December 2005 and implemented by the Honduran Social Fund (FHIS) Rural Electrification;
- Rural Infrastructure Project financed by IDA credit ($47m) and approved in December 2005; and
- Project for Carbon Emission Reduction Credits approved in December 2004 to support the construction of the La Esperanza hydro power plant, a 12 MW run of the river plant on the Intibuca River by a private developer called CISA (Consorcio de Inversiones S.A.).

Currently, the IDB is contributing funds and assistance to the following projects in the energy sector in Honduras:

- Energy Sector Support Loan supported through a $29 million credit approved in September 2008. This project will finance priority investments in transmission and support a program for reducing losses;
- Rural Electrification Project supported through a $35 million credit approved in November 2004 and implemented by ENEE; and
- A geothermal feasibility study in Platanares.

The IDB has also financed an advanced pre-feasibility study for the Patuca 3 large hydroelectric project.

Between 2000 and 2007, the European Union (EU) has financed the Generación Autónoma y Uso Racional de Energía Eléctrica (GAUREE) project, which aims at

increasing the use of energy-efficient CFLs. The total cost of the project is $ 9.06 million, with a total contribution from the EU of $ 6.785 million.

Electrification projects have also been carried out with resources from the Central American Bank for Economic Integration (Banco Centroamericano de Integración Económica), and with cooperation from countries like Finland, Japan, Korea, and Norway. In addition, there is an agreement in place with the Fondo Cafetero Nacional (FCN) for the electrification of coffee-producing regions. The President of the CBEI announced in July 2007 that the Bank would provide "strong" financing, consisting of a "first disbursement" of $ 100 million.

The Consultant discussed renewable projects financing with representatives of Inter-American Development Bank, the World Bank, and CABEI. Views expressed by all of these insitutions were very similar and are summarized below:

IDB

- Banks are open to funding RE projects in Honduras and in the region. Up-to-date, most RE projects currently being funded by CABEI, WB, and international private banks;
- Financial institutions see more venture funds financing as well as bi-lateral donor funds (for example from Finland and Germany);
- IDB specifically mentioned lack of transparency in the energy sector; Approval procedures decidedly suffer from lack transparency and delays.
- According to IDB, the government is not adhering to the 10% incentive provision for renewable projects. All hydro projects PPAs, for instance, have been negotiated and the tariffs determined under the negotiated regimen and higher than the 10% over marginal cost dictated by the law; and
- The IDB focus thus far is only public sector projects though they will begin financing private sector towards the end of 2009. Currently, they have a credit line for ENEE of about $50 million mostly for non generation type projects.

CABEI

- The CABEI came out as a very dynamic group active in financing renewable projects. They have funds for RE projects;
- Currently they have 9-10 renewable projects in the pipeline – both in public and private sector. These projects have been given the government approvals and are in fairly advanced stages of development;

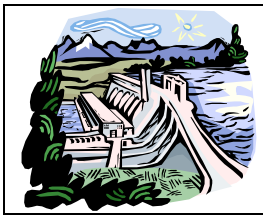
- The trend is clearly more private. Permits and FS are in place by the time the applications are received;
- Normal basis of funding is 70/30 debt/equity; and
- The bank has funds for feasibility studies, some are tied;

WB

- RE, both private and public, is very high on their agenda. However, the bank only funds non generation type projects in the public sector (ENEE);
- Banks sees ENEE as ready for major reforms. The perception is that they have improved a bit now but a long ways to go;
- Line of credit in public sector: about $30 million. IDB has about $53 million. Focus on T&D and reorganization, load management, etc.;
- The high dependence on oil is primarily the result of slow progress in implementing hydro projects;
- Somewhat troubled by way the government bypassed the 2007 RE Law to approve several hydro and coal projects under a 2007 Energy Emergency declaration. However, some of these are still awaiting congressional approval. The funding institutions will most likely not get involved in such projects;
- ENEE needs capacity building particularly in the area of contract negotiations;
- Local private sector firms are active and some of them have high credibility (Example – the Grupo Terra) and IFC will fund them. IFC may also take equity position in some of the projects;
- IDA is also funding small RE projects to be implemented by PIR. Around $15 million has already been committed; and
- The Bank is of opinion that U.S. Ex-Im Bank support would be important for promotion of U.S. equipment in the region.

Honduras Projects

Project 15 – Grupo Terra 16.6 MW Ulua Hydroelectic Project

	**Type: Run-on-river hydro**	**Name: Ulua Hydroelectic Project**
	Size: 16.6 MW	**Project Sponsor: Grupo Terra**

Project Background

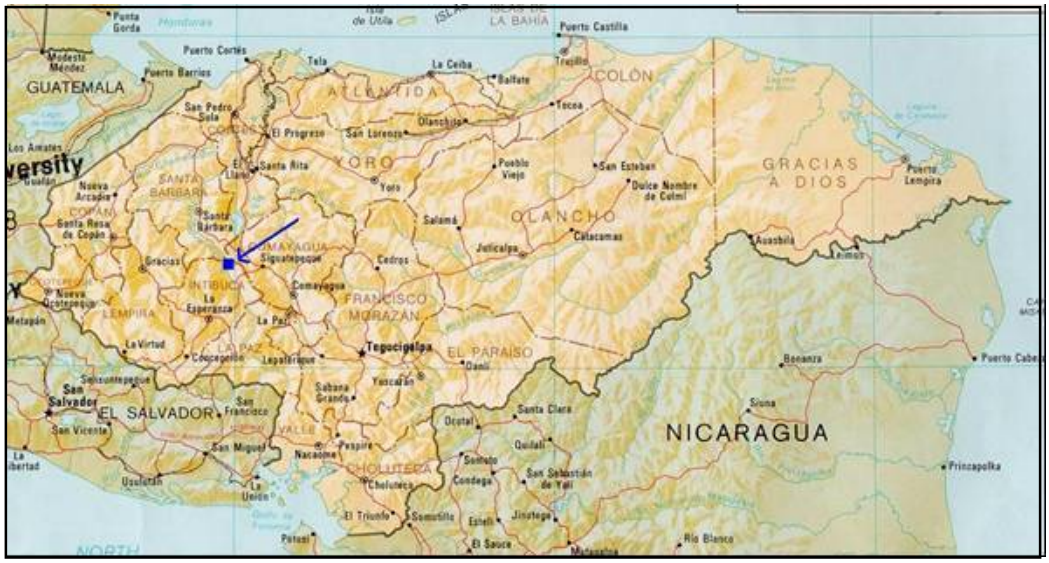
Grupo Terra is a Honduran group of companies with energy production as one of its main business. As part of its expansion strategy, Grupo Terra is currently developing hydroelectric projects in Honduras and the rest of Central America. Ulua Hydroelectric, UHP, with 16.6 MW, is one these projects under development.

A Phase 1 of the pre-feasibility study of UHP has been completed in October 2008. The study was carried out by INTEGRAL, a Colombian engineering firm. In that study, INTEGRAL recommended to continue into the pre-feasibility - phase 2, which basically consist in improving the proposed preliminary design by using detailed survey works.

UHP is located in Comayagua and Intibucá departments in central Honduras (Exhibit 15-1)

In terms of permits, an exclusive right of study permit has been issued to ALTEHSA, one of the subsidiaries of Grupo Terra, in 2008.

Exhibit 15-1 – Location of Ulua Hydroelectic Project



The proposed project has following major characteristics:

Design flow (m3/s):	42
Gross head (m):	47
Net head (m):	46.3
Dam height (m):	50
Roads (km):	7
Transmission (km):	29
Installed capacity (MW):	16.67
Generation (GWh/yr):	78.03

Project Sponsor's Capabilities and Commitment

Grupo Terra (http://www.terra.hn) is a Central American corporation with interests in energy generation, oil supply and services, real estate, and airport management and services.

Grupo Terra started back in 1978 as a private investor and project developer in real state, and has grown to diversified privately-owned corporation in the region. Grupo Terra not only has diversified into different sectors but has also vertically integrated each one of them. The company had joined the energy sector back in 1994, since then, it has been developing a number of projects, including hydroelectric power. The company has an installed capacity of 25 MW in hydroelectric plants and 94MW more under construction. It also has 350 MW of

installed capacity in other power generation technologies. Grupo Terra employs more than 1,600 personnel in 3 countries of Central American.

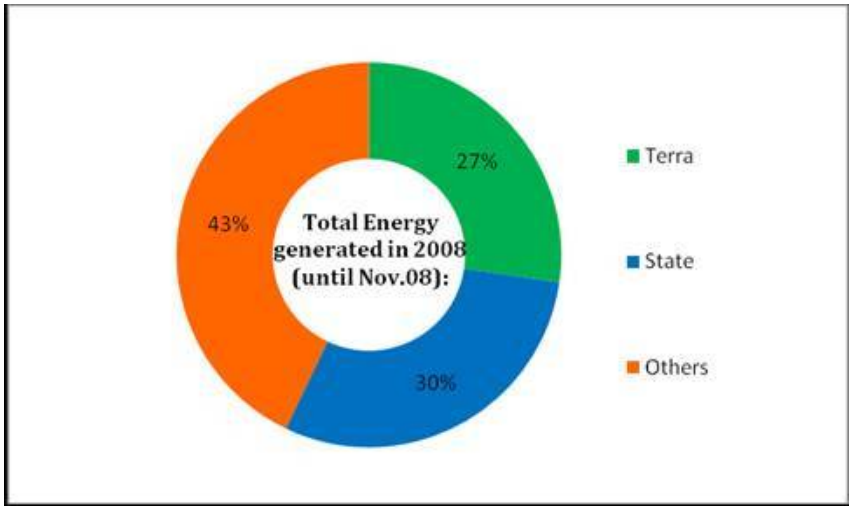
In the last 5 years, Grupo Terra invested over $675 million in projects that have impacted the economic growth of the region. Some of these implemented projects are presented in Exhibit 15-2.

Exhibit 15-2 – Existing Power Projects

Project	Installed Capacity (MW)
Hydroelectric La Gloria	5.8
Hydroelectric Cuyamapa	12.2
Hydroelectric Papaloate	2.0
Hydroelectric Xacbal (in Guatemala – under construction with planned commissioning in 2010)	94.0

Grupo Terra's Energy Division is one of the largest private Central American energy developers and operators. It specializes in the construction, repair, operation, and maintenance of energy projects. Grupo Terra's expertise has been concentrated in thermoelectric and hydroelectric technologies. As presented in Exhibit 15-3, up to November 2008, Grupo Terra had produced 27% of the total energy generated in Honduras in 2008.

Exhibit 15-3 – Energy Generation in Honduras



The Energy Division continues to develop new projects focusing on renewable energy generation technologies that contribute to the sustainable development of the region's environment. Projects currently under study:

- Hydroelectric Project Gualcarque (10 MW), Honduras - Final Engineering
- Hydroelectric Project Ulua (16.7 MW), Honduras - Pre-Feasibility
- Hydroelectric Project Cangrejal (35 MW), Honduras - Feasibility
- Hydroelectric Project Chel (6 MW), Guatemala - Feasibility

Implementation Financing

At this stage of the study, the cost of the project implementation is estimated at $55 million that will be disbursed in two years of construction. The financing structure implemented includes 20% to 25% equity from Grupo Terra and the other part from banks. The Project Sponsor of the project is Alternativas Energéticas de Honduras (ALTEHSA), a subsidiary of Grupo Terra. As it was done for other projects developed by Grupo Terra, CABEI will be the first choice to finance this investment. However, other sources will be studied according to the market conditions at the time of project implementation.

Grupo Terra has a background with financial institutions like CABEI, IFC, FMO, and RBTT to name a few. The company has excellent track record of debt funding. CABEI has recently participated in financing projects like Hydroelectric Cuyamapa and ENERSA – Cogeneration.

Implementation financing of these types of projects has been discussed by Consultant with CABEI, IDB, and the WB. All organizations were familiar with Grupo Terra and have provided positive feedback on the possibility of new project funding for them.

U.S. Export Potential

Most of the export potential for the implementation of this project is in the procurement of hydro power turbines, substation equipment, instrumentation and control systems, and construction and engineering services. The overall estimated project cost is about $55 million for 16.6MW plant (3,213/kW). U.S. exports could be as much as $25 million (45%) level.

The Project Sponsor provided the Consultant with summary estimates, which were developed during the pre-feasibility effort. Consultant believes that these estimates are reasonable and in line with own estimate.

A number of U.S. firms can supply the equipment:

Hydro Turbines:

- Canyon Hydro;
- Voith Siemens Hydro Power Generation;
- American Hydro Corporation;
- The James Leffel & Co.;
- North American Hydro;
- GE Energy Hydro.

In addition to equipment suppliers, U.S. engineering companies may be interested in EPC or task design contracts. Services suppliers potentially include:

- Black and Veatch;
- MWH Global;
- Shaw Group (Stone and Webster);
- USR (Washington Group);
- HydroWest International;
- PB Power.

The Consultant has contacted major equipment manufacturers and confirmed their interest in providing hydro turbines for small scale projects in Central America. Manufacturers confirmed their past international experience and their comfortable position in supply logistics. They identified price/quality parameters as being a major driver for equipment selection in the region.

Foreign Competition and Market Entry Issues

In general, U.S. manufacturers are considered to be competitive in the design, manufacturing, and implementation of the proposed project scope. However, significant competition is expected to U.S. companies in Central America. Major foreign competitors in the hydro power energy market include amongst others:

- Toshiba (Japan)
- Voith Siemens (Germany);
- Sulzer Hydro Ltd. (Switzerland);

- Moller Undenas Turbin AB (Sweden);
- Wasserkraft Volk AG – WKV (Germany);
- Alstom (France);
- Pompes RITZ France SAS (France);
- CITIC Heavy Machinery Company Ltd. (China);
- Andritz VA TECH Hydro (Austria);
- Bouving Fouress Limited (India);
- Dongfang Electric Corporation (China);
- Harbin Power Equipment Company (China);
- Norcan Hydraulic Turbines Inc. (Canada);
- Kharkov Turbogenerator Plant "Turboatom" (Ukraine); and
- LMZ (Russia).

The procurement of equipment and services in the plants build by Grupo Terra has been carried out through international bidding processes, in order to select the best offer both in economic and technical terms. So far, the main suppliers had been from these nationalities:

Feasibility and Final Design Studies:	U.S., Costa Rica, El Salvador, Colombia
Steel Pipe:	Costa Rica
Glass Reinforced Pipe:	Colombia
Electro-Mechanic Equipment:	Brazil, Germany
Controller Electronic Systems:	U.S., Germany, Brazil

Developmental Impact

Infrastructure -- The Project will be used to provide power at competitive prices and reduce the grid's dependence on expensive petroleum-based power. The project is expected to be about 16.6 MW. The project will be able to provide power to roughly over 25,000 households.

Project will also result in over 10 kilometers of new roads that are expected to be built, improving the communication between communities of the area. Existing roads will be repaired as well.

Construction of new facilities like schools or community centers as a part of the social commitment is foreseen.

National interconnection system will be expanded by over 29 km new transmission lines.

Human Capacity Building -- The proposed power plant will have significant job creation impact as well. The construction of the plant will require temporary manpower, both skilled and unskilled, with a maximum of 100 qualified persons at any one time during peak of construction. Preference will be given to hiring qualified local residents.

Operations phase employment opportunities will be made available for technical, administrative, and security people during the commercial operation phase. The average number of personnel envisioned at the plant will be 12.

Other - The implementation of this Project will affect the energy mix of the country, injecting every year near 78GWh of renewable energy to the national system and avoiding the emission of 54,000 tons of CO2. It allows HP Ulua to apply for registration under the Clean Development Mechanism (CDM) and trade with Certified Emission Reduction Credits (CER). In addition, the project will save the country annually over $5.4 million of fuel imports for thermoelectric plants (110,000 BBL of Bunker).

The proposed Project can be considered a rural electrification project. The remote location will strengthen the electricity grid and reduce transmission losses. It will also provide more power to be distributed in the area where more electrification is desired.

Environmental Considerations

The Project is expected to have a significant positive effect on the environment. Currently, large thermal plants are considered to be major sources of air pollution. Due to the nature of the technology, the proposed hydro power plant has no emissions. Implementation of the hydro power plant (HPP) is estimated by the Consultant to result in annual savings of 110,000 BBL of oil and associated 54,000 tons of CO2 emissions. The construction of the plant will require the appropriate environmental assessment study. The study is also required if the Project Sponsor decides to pursue any international lending agency funding. The study will address all major issues associated with the construction of a hydro power facility of this size, such as flooding, resettlement, migratory fish control, archeological surveying, water quality, and other issues.

Among anticipated other positive impacts are:

- Conservation and mitigation measures in the river basin;
- No alteration of agricultural lands;
- Forestry conservation;
- Training, regarding environmental issues, provided to locals;

- New tourist and recreational activities;
- Life quality improvement for local communities due to new incomes; and
- Social commitment regarding education, health and production of goods.

Potential negative impacts are:

- Natural river flow alteration;
- Flora and Fauna conditions, of a specific area, modified due to the new reservoir;
- Sound pollution during construction; and
- Heavy equipment transit.

Follow-up and Further Information

U.S. companies are encouraged to contact the Project Sponsor for further information about the project and opportunities in providing services and equipment.

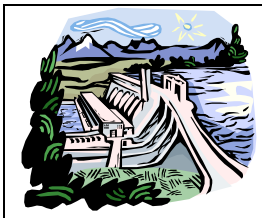
Main follow-up contact is:

Walter D. Sandoval
Renewable Energy Manager
Power Division
wsandoval@terra.hn
Tel: +504 236-8788
Fax: +504 221-4127
Cel: +504 3392-5837
WEB: www.terra.hn
Grupo Terra
Residencial Las Cumbres
1ra Avenida, 3ra Calle Bloque "E"
Tegucigalpa, Honduras

and

Kevin Carias Villalta
Gestor de Proyectos Hidroelectricos
Tel: (504) 236-8788 Ext 1415
Movil: (504) 3390-8349
kcarias@terra.hn

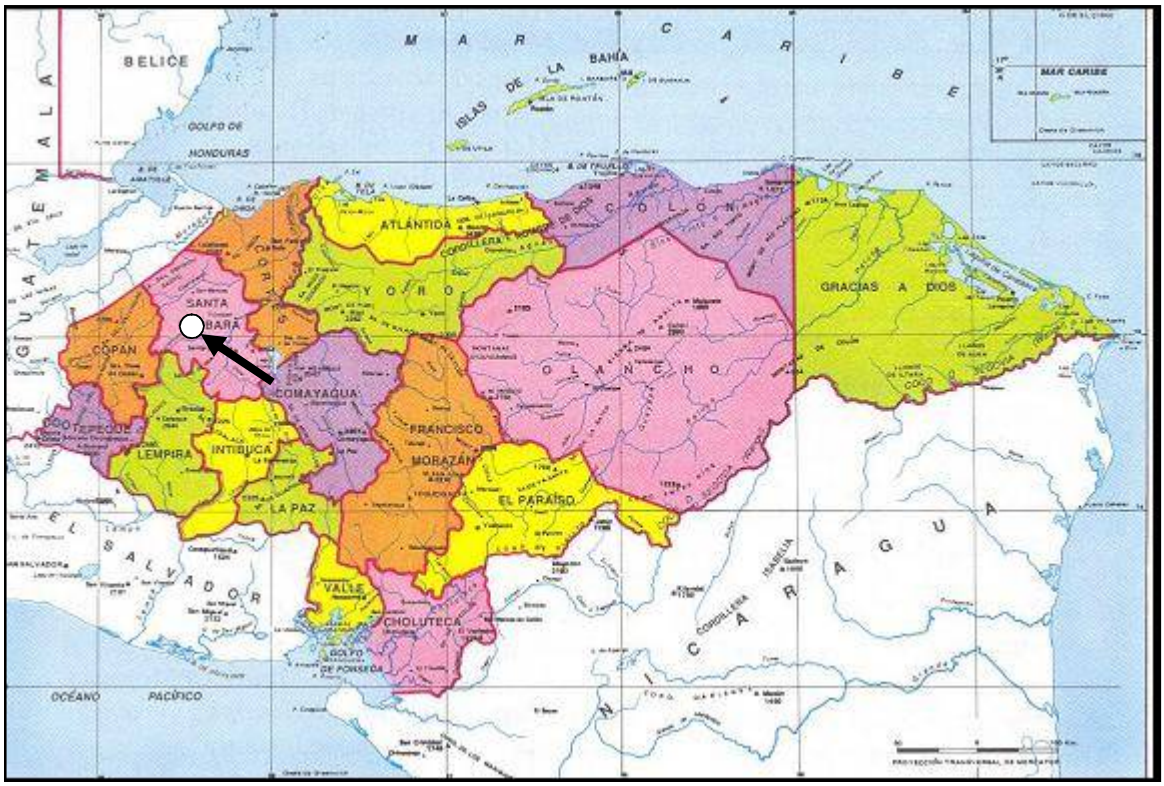
Project 16 - ENEE 9.2 MW Gualcarque Hydroelectric Project

	**Type: Run-on-river hydro**	**Name: Gualcarque Hydroelectric Project**
	Size: 9.2 MW	**Project Sponsor: ENEE**

Project Background

The Gualcarque Hydroelectric Project is located in the municipality of San Francisco de Ojuera in the Department of Santa Barbara, on the Gualcarque River which is a tributary of the Ulua River. Location of the project is marked on Exhibit 16-1.

Exhibit 16-1 – Project Location



The Project is located near the community of San Ramon, in the Municipality of San Francisco de Ojuera, Department of Santa Barbara. The drainage area of the project up to the dam site is 495.6 km2, the maximum elevation of the main river is 2,000 meters above sea level (MASL) and the minimum elevation is 420 MASL. The length of the main river is 46.6 km, up to the dam. Since the middle of the year 2000, ENEE installed a hydrometric station on the Gualcarque River, to investigate the potential of the river.

The average estimated flow is 18.13 m3/s, and the maximum floods 593.0, 779.0, 1030.0, 1304.0, and 2090.0 m3/s for the return periods of 10, 20, 50, 100, and 1000 years respectively.

The proposed dam site will be located were the riverbed elevation is 460 MASL, in the community of San Ramon, about 12 Km south of the town of San Francisco de Ojuera in the Department of Santa Barbara. The proposed dam will be located at riverbed elevation is 460 MASL. According to the topographical and geological conditions, the site is apt to construct a concrete gravity dam with an overflow spillway.

A concrete gravity dam will be build; the main body will be 20 m in height. The total length of the dam crest is approximately 130.0 m and part of which will serve as the spillway which has the capacity to evacuate 1,304 CMS, which corresponds to the flood with a return period of 100 years.

The intake structure will be located upstream from the dam, on the right bank; it will be a reinforced concrete structure big enough to divert the design flow of 11.15 CMS.

Water from the intake to the forebay will be conveyed by a headrace tunnel which will be located on the right bank of the river. The gravity tunnel will be located at the beginning of the headrace, with an approximate length of 2, 600 m, a slope of 0.0015 and an internal diameter of 2.4 m creating a section big enough to carry the design flow 11.15 CMS.

A surface penstock will lead the water from the forebay to the powerhouse along a mountainous hillside. A steel penstock 200 m long will be installed, with an inner diameter of 1750 mm (70 inches) and a thickness of 6 mm.

With a rated flow of 11.15 CMS which correspond to 40% of the duration curve and an effective head of 98.31 m a horizontal type Pelton turbine will be selected to insure generation during the drought period and give more flexibility to the

project. Considering the rated flow and the net head, the projects installed capacity is 9.2 MW.

Based on the location of the Project, the nearest interconnection point to the national grid is the town of Santa Fe. The power generated by the Gualcarque Power Plant will be sent to Santa Fe to interconnect to 34.5 kV line. The estimated length of the line is 16.5 kilometers.

Project Sponsor's Capabilities and Commitment

The ENEE (Empresa Nacional de Energía Eléctrica - http://www.enee.hn), is Honduras's government owned and operated electrical power company, operating within the Electricity sector in Honduras.

The organization was created on February 20, 1957, as an autonomous organization responsible for the production, transmission, distribution and commercialization of electrical energy in Honduras. The first large scale project was the first hydroelectrical power plant, Cañaveral, which included the construction of transmission lines and substations in order to distribute it's generated power to the final consumers. In 1985 the Francisco Morazán Hydroelectric Project (El Cajon Dam) was completed at a cost of $ 775 million.

ENEE employs more than 2,500 people. ENEE serves 1.4 million households and 1 million commercial customers. Currently its power generation accounts for about 30% of the total consumption on the National Electric System, but it is the only transmission, distribution and commercialization company in the country.

Every two years, ENEE must submit to the Regulator system expansion plans (i.e. procurement of new generation capacity and transmission expansion), which are to be approved by the Energy Cabinet. By law, ENEE has the mandate of prioritizing renewable-based generation when determining the optimal expansion plan.

Transmission networks are, by law, subject to an "open access" rule. Transmission networks can be built and owned by public, private, or mixed ownership operating enterprises. However, in practice ENEE is responsible for transmission and System Operations through its Dispatch Center, which determines the system's hourly marginal cost of generation.

The 1994 Law mandated ENEE to divide its distribution network by regions. The partition, which was to be approved by ENEE, would be followed by the sale of

those networks to cooperatives, municipalities, worker's associations, other similar types of groups, or to private companies, always subject to approval by the National Congress. ENEE continues its operations as a vertically integrated state-owned enterprise, being the de facto sole buyer, responsible for procuring all the new energy required to meet demand.

In the period 1997-2006, ENEE has invested about $ 189 million in its activities, the areas that have receive the largest amount of funds being distribution and transmission.

The existing installed capacity of the generation system of Honduras is 1,515.99 MW (updated to 2009). Of which 28.6% (432.7 MW) make up the hydroelectric plants owned by ENEE, 8.2% (124.6 MW) are the thermal plants owned by ENEE, 2.1% (31.7 MW) hydro power plants owned by other government institutions, 51.8% (785.5 MW) are private own thermal plants, 4.0% (60.69 MW) are private owned hydroelectric plants, and 5.3% (80.8 MW) are biomass private owned power plants.

Hydroelectric power plants of ENEE

- Francisco Morazán (also known as El Cajón) 300 MW;
- Río Lindo, 80 MW;
- Cañaveral, 29 MW;
- El Níspero, 22.5 MW; and
- Santa María del Real, 1.2 MW.

Thermal power plants of ENEE

- Santa Fé (diesel), 5.0 MW;
- La Ceiba (diesel), 26.6 MW;
- La Puerta Hitachi (gas turbine), 18 MW; and
- La Puerta General Electric (gas turbine), 15 MW.

Implementation Financing

The total Project cost given these assumptions with the interest during construction and the expected development cost is estimated to be $ 28.9 million. Considering the total investment cost and the Project's installed capacity of 9.2 MW, the unit cost per installed kilowatt is $ 3,138.

ENEE claims that it is capable of self-funding the project of this size and complexity. At the same time, based on several discussions, its ability to borrow maybe limited. There are a number of project being currently developed with

ENEE involvement via Build-Own-Transfer scheme. These projects include Los Llanitos (98 MW), Jicatuyo (173 MW) and Piedras Amarillas (104 MW) hydroelectric projects. ENEE may choose to implement the proposed Gualcarque Hydroelectric Project under same arrangement.

The IDB currently has a credit line for ENEE of about $50 million mostly for non generation type projects. CABEI has funded ENEE projects in the past. WB reiterated that it does not plan to fund generation type projects in the public sector, however, it provides $30 million credit line to ENEE.

U.S. Export Potential

Most of the export potential for the implementation of this project is in the procurement of hydro power turbines, substation equipment, instrumentation and control systems, and construction and engineering services. The overall estimated project cost is about $30 million for 9.2MW plant (3,138/kW). U.S. exports could be at as much as $14 million (45%) level. Exhibit 16-2 provides project cost breakdown was provided by ENEE.

Exhibit 16-2 – Project Cost Estimate

Item	Cost $ million	% of total EPC Cost
- Civil	$6.5	
- Mechanical	$9.3	
- Electrical (T&D)	$0.8	
Direct Cost	$16.6	72%
Indirect Cost	$6.6	28%
Total EPC Cost	$23.2	100%
Total Project Cost (w/IDC and Development)	$28.95	

Summary estimates, which were developed during the pre-feasibility effort are reasonable and in line with Consultants' own estimate.

A number of U.S. firms can supply the equipment:

Hydro Turbines:

- Canyon Hydro;
- Voith Siemens Hydro Power Generation;
- American Hydro Corporation;
- The James Leffel & Co.;
- North American Hydro;
- GE Energy Hydro.

In addition to equipment suppliers, U.S. engineering companies may be interested in EPC or task design contracts. Services suppliers potentially include:

- Black and Veatch;
- MWH Global;
- Shaw Group (Stone and Webster);
- USR (Washington Group);
- HydroWest International;
- PB Power.

The Consultant has contacted major equipment manufacturers and confirmed their interest in providing hydro turbines for small scale projects in Central America. Manufacturers confirmed their past international experience and their comfortable position in supply logistics. They identified price/quality parameters as being a major driver for equipment selection in the region.

Foreign Competition and Market Entry Issues

In general, U.S. manufacturers are considered to be competitive in the design, manufacturing, and implementation of the proposed project scope. However, significant competition is expected to U.S. companies in Central America.

Major foreign competitors in the hydro power energy market include amongst others:

- Toshiba (Japan)
- Voith Siemens (Germany);
- Sulzer Hydro Ltd. (Switzerland);
- Moller Undenas Turbin AB (Sweden);
- Wasserkraft Volk AG – WKV (Germany);
- Alstom (France);
- Pompes RITZ France SAS (France);
- CITIC Heavy Machinery Company Ltd. (China);
- Andritz VA TECH Hydro (Austria);
- Bouving Fouress Limited (India);
- Dongfang Electric Corporation (China);
- Harbin Power Equipment Company (China);
- Norcan Hydraulic Turbines Inc. (Canada);
- Kharkov Turbogenerator Plant "Turboatom" (Ukraine); and
- LMZ (Russia).

Up to this date, the most of the equipment installed in the hydro power plants in operation property of ENEE comes from: Germany, Sweden, U.S., Switzerland, Spain, and Japan. As to the implementation of the Gualcarque Hydroelectric Project, ENEE has no objection to have the project implemented by an American company or to installed American manufacture equipment. In fact ENEE has had experience working with American consulting companies in the hydroelectric field with very good results. ENEE expects full open competition for this project.

Developmental Impact

Infrastructure -- The Project will be used to provide power at competitive prices and reduce the grid's dependence on expensive petroleum-based power. The project is expected to be about 9 MW. The project will be able to provide power to roughly over 12,000 households.

Human Capacity Building -- The proposed power plant will have significant job creation impact as well. The construction of the plant will require temporary manpower, both skilled and unskilled, with a maximum of 100 qualified persons at any one time during peak of construction. Preference will be given to hiring qualified local residents.

Operations phase employment opportunities will be made available for technical, administrative, and security people during the commercial operation phase. The average number of personnel envisioned at the plant will be 10.

Other - The implementation of this Project will affect the energy mix of the country, injecting every year near 35GWh of renewable energy to the national system and avoiding the emission of 24,000 tons of CO2. It allows HP Ulua to apply for registration under the Clean Development Mechanism (CDM) and trade with Certified Emission Reduction Credits (CER). In addition, the project will save the country annually over $2.7 million of fuel imports for thermoelectric plants (55,000 BBL of Bunker).

The proposed project can be considered a rural electrification project. The remote location will strengthen the electricity grid and reduce transmission losses. It will also provide more power to be distributed in the area where more electrification is desired.

Environmental Considerations

The project is expected to have a significant positive effect on the environment. Currently, large thermal plants are considered to be major sources of air pollution. Due to the nature of the technology, the proposed hydro power plant has no emissions. Implementation of the hydro power plant (HPP) is estimated by the Consultant to result in annual savings of 55,000 BBL of oil and associated 24,000 tons of CO2 emissions. The construction of the plant will require the appropriate environmental assessment study. The study is also required if the Project Sponsor decides to pursue any international lending agency funding. The study will address all major issues associated with the construction of a hydro power facility of this size, such as flooding, resettlement, migratory fish control, archeological surveying, water quality, and other issues.

Among anticipated other positive impacts are:

- Conservation and mitigation measures in the river basin;
- No alteration of agricultural lands;
- Forestry conservation;
- Training, regarding environmental issues, provided to locals;
- Life quality improvement for local communities due to new incomes; and
- Social commitment regarding education, health and production of goods.

Potential negative impacts are:

- Natural river flow alteration;
- Flora and Fauna conditions, of a specific area, modified due to the new reservoir;
- Sound pollution during construction; and
- Heavy equipment transit.

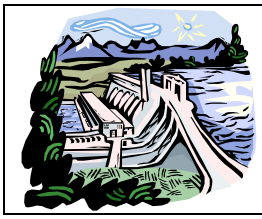
Follow-up and Further Information

U.S. companies are encouraged to contact the Project Sponsor for further information about the project and opportunities in providing services and equipment.

Main follow-up contact is:

Rose Mary Salgado de Callejas
rosemsalgado@yahoo.com
ENEE
Teléfono (504) 238-6500, (504) 238-6501
Fax (504) 238-6511
Dirección: Edificio FACACH, 2do piso, Blv Morazán,
Tegucigalpa, Honduras

Project 17 - HIDROSIERRA 13.5 MW Chinacla Hydro Power Project

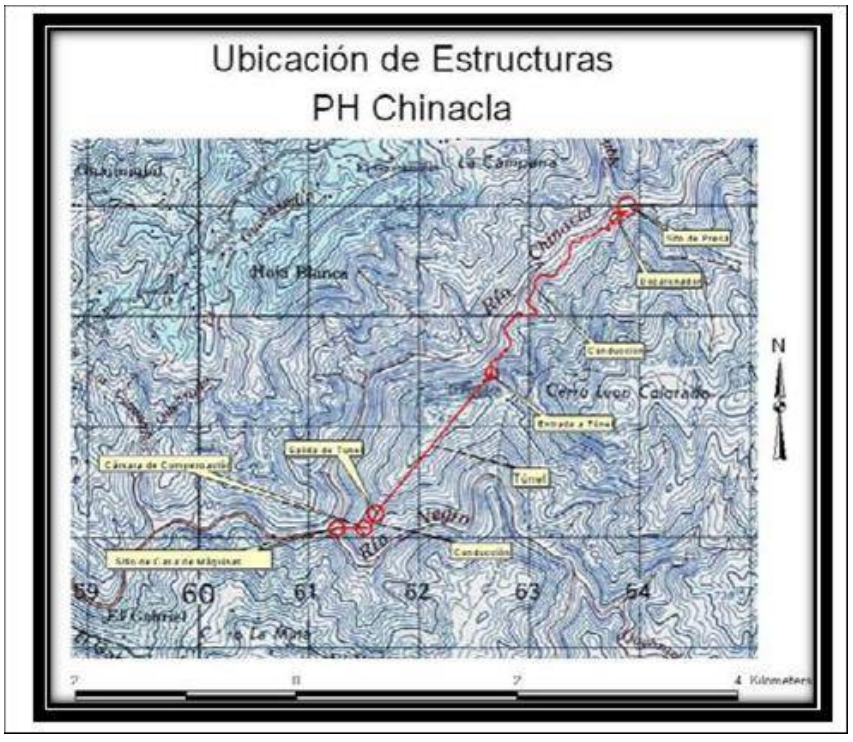
	Type: Run-on-river hydro	Name: Chinacla Hydro Power Project
	Size: 13.5 MW	Project Sponsor: HIDROSIERRA

Project Background

The project is been developed by the Honduran company Hidroelectrica de la Sierra, S.A. (HIDROSIERRA), and will have main characteristic to be grid connected located in the west part of Honduras. It is important to mention that this part of the country is the poorest area in Honduras.

This Project is located in the municipality of San Mar Department of Intibucá, west part of the country. Exhibit 17-1 provides the map of the location with a preliminary configuration.

Exhibit 17-1 – Project Location



The project was first identified by an inventory study by Harza Engineering in 1967. Then in the early 80´s, the Technical Mission of China accompanied by the national utility company, ENEE, studied the potential characteristic of this site as a hydroelectric project under a cascade configuration, 4 run of river plants with a total capacity of approximately 40 MW. Later in 1994, ENEE published a Master Plan called "Least Cost Generation Expansion Plan" which mixed thermal and hydro projects for the next 20 years. More than 30 potential sites were evaluated, and Rio Chinacla (also known as Rio Negro and Chinacla project) was among those considered but the investigations only lead to a pre-feasibility diagnosis.

The main purpose of conducting and further assessing the studies prepared initially by ENEE in joint effort with China and Taiwan government was to build more Hydroelectric plants but due to improper administration, the electricity sector in Honduras experienced a severe financial crisis when electricity tariffs were not adjusted to cover the debt service of the El Cajón hydroelectric project (300 MW) commissioned in the mid-1980s, and ENEE's performance was poor (electricity losses of about 28%, overstaffing, and poor maintenance of thermal plants). The financial crisis led to the energy crisis of 1993 when a severe drought coincided with a lack of generation reserve capacity. There was an urgent need to mobilize private financing to expand generation capacity and to improve ENEE's performance. The response to this crisis was the sector reform of 1994, based on a new Electricity Law that established a competitive power market (vertical unbundling, freedom of entry to all sector activities, open access to transmission and distribution networks, and freedom of choice for large users); furthermore the hydro-dominated generation system of the mid-1990s was converted to a thermo dominated system, and Honduras now depends on imported fuels for about 70% of its power generation (almost all thermal generation under PPAs).

By 1995, all new generation projects where conducted by the private sector, and in order to create attractive investments conditions, new laws and incentives were promoted and approved by the Honduran government. As a result several hydroelectric projects under 50 MW were extended as study concessions to private investors both local and international, the government institution authorized to extend permits, contracts and licenses to the private sector is the Secretaria de Recursos Naturales y Ambiente (SERNA). In 2002, the private company INDECO applied for a study concession of the river Chinacla, by December 22nd of 2005 under favorable resolution No. 667-2005, SERNA grants the study permit to INDECO. From 2005 to 2007, the hydrology data was collected and measurements of the river were performed with flow data and accurate weather information, resulting a hydrology report that proved the river was feasible to conduct further studies.

Due to expansion in other projects, in April 2008, INDECO transfers the rights of the study permit (equivalent to a resource concession) to the Honduran company Hidroelectrica de la Sierra (HIDROSIERRA). HIDROSIERRA is now the company owner of the permits and studies related to Rio Chinacla. Presently the company has applied to an Operation Contract with duration of 25 years, a Water Contract and an Environmental License which are all in a very advance stage of approval. All of the above contracts and licenses were requested with a preliminary study, more detailed studies needs to be conducted previous to construction, specifically in the critical areas of the potential project such as detailed surveying (penstock route, tunnel), geological studies (intake areas, tunnel route, etc), and final designs. These detailed studies will be determining for the application of financial assistance either from local or international banks. Besides the technical and field studies, many men hour have been investment towards social and environmental aspects of the project. Both municipalities have approved the project in their board meetings and the local communities have been involved in the overall process.

Recently a group of 17 people participated in the visit of an operating hydroelectric plant located 5 hours away from their community. This experience enabled the group to appreciate a run of river plant and the positive economical, environmental and social benefits of this type of generation. It is important to mention that the local communities in San Marcos de la Sierra and Colomoncagua live in very poor conditions (find attached the social and economical report). The properties where the project will be developed are municipal and some are used by locals but are not privately owned, the company has the plan to legalize the land to the users that have the proper documents and work closely with the municipality to obtain the proper land use rights. Presently the area is hard to access and doesn't have a productive use.

Proposed project characteristics are as follows:

Basin Size, collection area:	722.92 km2
Medium Flow Design:	10.00 m3 /s
Net head:	159.09 m
Proposed capacity:	13.51 MW (324.24 MW/day)
Tunnel Length:	1,640 m + 2,245 m
Type: circular, diameter:	3.00 m operating as canal
Pressure Pipe Length:	395 m, Diameter: 1.80 m
Net Head:	160 m
Number of Units:	2 Pelton Turbines

Project Sponsor's Capabilities and Commitment

HIDROSIERRA, is a Honduran company created 100% to develop, build and operate Rio Chinacla Hydro project. This company is 95% owned by Grupo Renovable de Energia Incorporated (GREEN Inc.) a holding company that owns other small scale hydroelectric projects in the North of the country totaling a 30 MW portfolio. Due to the structure complexity and the financial demands of guarantees, HIDROSIERRA will only own this project that represents an investment of over $30 million. Elsia Paz, the general manager of HIDROSIERRA is the 5% owner of the project.

Implementation Financing

Chinacla Hydroelectric Project is been considered for a 13.5 MW installed capacity with a cost per MW of $ 2.3 million, with a total project cost of $ 31.2 million. As pre-investment requirements the project represents $350,000 of which almost 50% has already been invested by the Project Sponsor. Taking in consideration the financial history surrounding this type of project, most likely it will be financed by a development bank by 60% of the total amount, and a local bank as Financial Intermediary, for a total debt of 70%. This project represents a financial advantage, it is large enough to attract financing resources outside the country, making administration and due diligence worth while for solid financials institutions abroad. Presently this project requires further studies in order to apply to any sources of funding with experience in this type of projects.

U.S. Export Potential

Most of the export potential for the implementation of this project is in the procurement of hydro power turbines, substation equipment, instrumentation and control systems, and construction and engineering services. The overall estimated project cost is about $31 million for a 13.5MW plant (2,314/kW). U.S. exports could be as much as $14 million (45%) level.

Only summary estimates were developed during the pre-feasibility effort. Based on other similar projects they are a little light but reasonable in general.

A number of U.S. firms can supply the equipment:

Hydro Turbines:

- Canyon Hydro;
- Voith Siemens Hydro Power Generation;
- American Hydro Corporation;
- The James Leffel & Co.;
- North American Hydro;
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In addition to equipment suppliers, U.S. engineering companies may be interested in EPC or task design contracts. Services suppliers potentially include:

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Major foreign competitors in the hydro power energy market include amongst others:

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- Voith Siemens (Germany);
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Developmental Impact

Infrastructure -- The Project will be used to provide power at competitive prices and reduce the grid's dependence on expensive petroleum-based power. The project is expected to be about 13.5 MW. The project will be able to provide power to roughly over 17,000 households.

Human Capacity Building -- The proposed power plant will have significant job creation impact as well. The construction of the plant will require temporary manpower, both skilled and unskilled, with a maximum of 100 qualified persons at any one time during peak of construction. Preference will be given to hiring qualified local residents.

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Among anticipated other positive impacts are:

- Conservation and mitigation measures in the river basin;
- No alteration of agricultural lands;
- Forestry conservation;
- Training, regarding environmental issues, provided to locals;
- Life quality improvement for local communities due to new incomes; and
- Social commitment regarding education, health and production of goods.

Potential negative impacts are:

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- Flora and Fauna conditions, of a specific area, modified due to the new reservoir;
- Sound pollution during construction; and
- Heavy equipment transit.

Follow-up and Further Information

U.S. companies are encouraged to contact project developer for further information about the project and opportunities in providing services and equipment.

Main follow-up contact is:

Elsia Paz
Grupo Renovable de Energia Incorporated (GREEN Inc.)
(504)220-6731 ext 12
(504)98-986763
elsiapaz@gmail.com

Panama

Sector Primer – Panama[19]

General[20]

Country Summary	Electricity System Summary
- Territory: 75,420 sq. km; - Population: 3.4 million (2009); - Access to Electricity: 87%; and - Ave GDP per Capita: $11,700 (2008).	- Installed Capacity: 1,663 MW (2009); - Energy Generated: 4,935 GWh (2007); - Peak Demand: 1,120 MW (2009) - Dominant Electricity Resource: equal Hydro/Fossil; - Ave res. Tariff: $0.12/kW (2007); - Total generators: 24 (21 private); - Transmission: 1 company; and - Distribution: 3 companies.
Renewable Energy Summary	**Governance Summary**
- Hydro (52% of total energy production); and - Renewable potential – 2,800 MW (mostly hydro with modest wind).	- Distribution companies purchase from generators via auctions; - ASEP – National regulator runs auction system for new generation; and - Established process for new facilities permitting.

Panama has a total area of 75,420 sq. km, a population of over three million, and a per capita income of about $11,700. It is bordering both the Caribbean Sea and the North Pacific Ocean, between Colombia and Costa Rica. Panama has a coastline of 2,490 km in length.

In 2006, Panama's electricity generating capacity was divided between hydroelectric power stations, accounting for 55.3% of installed capacity, with other power stations (which mainly use Bunker C fuel) accounting for the remaining 44.7%. Total installed capacity for generating electricity was 1,663 MW in 2009, including self-powered plants connected to the Sistema Interconectado Nacional – SIN (National Interconnected Grid) (11.7%) and independent systems (0.8%). Total net generation of electricity in Panama was 5,817 GWh in 2007 while total sales amounted to 4,935 GWh .

Between 1998 and 2002 during partial privatization of the electricity sector, substantial investments were made in Panama's generating capacity, mostly in thermal power stations. This allowed the growth in total capacity to remain above the increase in maximum demand on the SIN, with aggregate rates of growth of 42.9% and 18.1%, respectively, between 1998 and 2002. The rise in oil

[19] Sources of information for this primer include: information provided by U.S. Embassy, ASEP, WTO Trade Policy Review, and CA Carbon Finance Guide, 2nd Edition, 2008.

[20] Some of statistics and estimates are estimated based country discussions and The Central American Carbon Finance Guide.

prices from 2001 onwards, however, discouraged investment in thermal power stations and between 2003 and 2006 the SIN's margin of reserve fell from 79% to 59%. The authorities have pointed out that this level of reserve margin nonetheless suffices to ensure that the SIN remains reliable.

During the period 1998-1999, the State electricity company (IRHE) was partly privatized and its generating, transmission and distribution subsidiaries were separated into different companies. The Government sold 49% and 51% of the shares of the hydroelectric and thermoelectric generating companies, respectively, to private investors. The State also owns the company EGESA, recently set up for the purpose of investing in thermoelectricity generation. Following the privatization and the new concessions granted by the State, Panama's electricity generating market now has five large generating companies (including the self-powered Panama Canal Authority) and some small generating companies. The State owns all the shares in ETESA, which has a de facto monopoly of electricity transmission; ETESA's concession contract gives it exclusive rights in the areas covered by the concession. The Government sold 51% of the shares in the three companies which share Panama's distribution market on a geographical basis. There is foreign investment in generation and distribution.

Panama is interconnected with the Central American electricity schemes through Costa Rica. Following the sector's privatization, Panama went from being a net importer of electricity to a net exporter. In July 2006, SIEPAC started to be expanded in order to create a wholesale electricity market to bring down the cost of energy and enhance the reliability of the Central American electricity grid.

Electricity rates depend on the level of consumption and the voltage. High voltage consumers (voltage exceeding 115 kV) with monthly consumption exceeding 15 kW, supplied by a distributor, pay a rate that is approximately one third of that paid by low voltage consumers (voltage not exceeding 600 V) consuming less than 15 kW monthly. In 2006, the average rate to the final consumer was $0.15/kWh, one of the highest rates in Latin America; 57% of this amount is attributable to generation, 8 per cent to transmission and 35 per cent to distribution. The authorities have indicated that the increase of around 50% in electricity rates during the period 1999-2006 reflected the rise in international oil prices over the same period.

The legal framework for the electricity sector is composed of Law No. 6 of 3 February 1997, as amended by Decree Law No. 10 of 26 February 1998 and regulated by Executive Decree No. 22 of 19 June 1998. Law No. 26 of 29 January 1996, as amended by Decree Law No. 10 of 22 February 2006, reorganized the

structure and responsibilities of the regulatory body, the Autoridad Nacional de los Servicios Públicos – ASEP (National Public Service Authority). The rules governing the wholesale electricity market are laid down in Resolution No. JD-605 of 24 April 1998. In addition, Law No. 45 of 4 August 2004 establishes an incentives scheme to promote the generation of hydroelectricity and electricity from other renewable, clean sources of energy.

The building and operation of hydroelectric and geothermal power stations, like distribution, are subject to a concessions regime. The building and operation of generating plants using other technologies, on the other hand, are subject to a licensing regime. To obtain a concession or license, the application must meet the technical requirements specified in the legislation, consisting mainly of approval of the environmental impact study by the ASEP. Concessions and licenses are given for a renewable period of 50 and 40 years, respectively. The ASEP is responsible for granting such concessions and licenses and for guaranteeing national treatment of foreign investors.

Electricity generating companies providing a public service may not participate either directly or indirectly in the control of companies distributing electricity. Likewise, distribution companies may only participate directly or indirectly in the control of generating plants when total aggregate generating capacity exceeds 15% of expected demand in their concession area. Generating companies subject to concessions (hydroelectricity) and distribution companies may not apply for new concessions resulting in participation of over 25% and 50%, respectively, in their corresponding domestic markets. The ASEP is empowered to raise these percentages when it deems necessary for the expansion of the electricity system. Under Cabinet Resolution No. 76 of 19 October 2005, the 25% participation applicable to hydroelectricity generating companies was temporarily increased to 40% (until 2012).

Law No. 6 of 1997 guarantees all operators in the electricity market non-discriminatory access to transmission networks. Transmission companies may not participate in generation, distribution or sales to large clients.

Producers (generators and self-powered) and consumers (distribution companies and large clients) buy and sell energy and power in the wholesale electricity market. In the contracts market, participants conclude medium-term and long-term contracts with guarantee of supply through free competition. Distribution companies must contract a sufficient volume to guarantee supply to their end customers for 12 months, but they do not incur any purchasing risk because the legislation guarantees that the costs of their contracts will be covered by the rates charged to end customers. In the contingency market, participants conclude

short-term contracts to dispose of surpluses or obtain supplies not envisaged in the long-term contracts.

Based on the formulas and ceilings established by the ASEP every four years, transmission and distribution companies must submit the proposed rates for the regulated services within their concession area for ASEP approval. In the case of distributors, the rates to end customers are regulated with the exception of large customers, which buy electricity from the wholesale market.

There are no restrictions on the import of electricity. Executive Decree No. 22 of 19 June 1998 provides that supplying the domestic market takes precedence over export of electricity. For example, a market operator may export energy and power if they are not subject to any commitment to other agents in the domestic market. The authorities have indicated that some of these rules may change in the future when the Regional Electricity Market under the SIEPAC framework comes into effect.[21]

Renewable Energy

Currently, Panama fuel mix is almost 50/50% between fossil fuel and renewable resources. Total installed capacity is about 1,550 MW and most of the renewable resources consist of hydro power generation. Panama has no geothermal, wind, or waste-to-energy generation. Most of the solar generation is not connected to the grid and is very limited. Panama has considerable potential for hydro, wind and geothermal energy.

Hydro

Based on CA Carbon Finance Guide information, the untapped potential for hydro is about 2,300 MW.

Based on the discussions with ASEP, there are over 400 active applications for new generation in the pipeline. Most of them represent hydro power projects. Panama's utility regulator predicts the nation will add 31 hydroelectric projects totaling 1,047 MW through 2013. 15 of the projects are under construction "with a healthy rate of progress," while the other 16 are in final design. The agency said the projects represent investment of $2 billion, giving a strong boost to the Panama economy.

[21] WTO, http://www.wto.org/english/tratop_e/tpr_e/s186-04_e.doc

Barring unforeseen setbacks, ASEP predicted that three projects of 15 MW would come on line in 2009, seven of 97 MW in 2010, eight of 364 MW in 2011, 11 of 538 MW in 2012, and two of 33 MW in 2013.

Among Panama's recent hydro power activity, the European Investment Bank said it is considering proposals to fund construction of the 29-MW Barro Blanco hydroelectric project on the Tabasara River and the three-plant, 115-MW Los Mares hydroelectric complex on the Chiriqui River.

Russian equipment supplier Energomashexport Corp. (part of LMZ group) announced a contract to supply electro-mechanical equipment for the 85-MW Baitun hydroelectric project on the Chiriqui Viejo River, while Generadora Pedregalito S.A. signed a contract to construct the 20-MW Pedregalito hydroelectric project on the Chico River.

Istmus Hydro Power Corp. commissioned its 10-MW Concepcion hydro power project in January on the Piedra River in Panama's Chiriqui Province. Meanwhile, Suez Energy Central America is building the 26-MW Gualaca, 34.8-MW Lorena, and 57.4-MW Prudencia projects on the Chiriqui River. [22]

Wind

Based on CA Carbon Finance Guide information, the untapped potential for wind is about 400 MW.

Fersa Energias Renovables SA plans to invest 700 million euros to construct two wind farms in Panama. The wind farms will have a total capacity of 400 megawatts. Fersa is negotiating with GE Energy, Gamesa, among others to import wind turbines for the project.

Geothermal

Based on CA Carbon Finance Guide information, the untapped potential for geothermal is 40MW. No active projects were identified during the visit.

Opportunities for U.S. Firms[23]

Panama's economy, which soared a record 11.5% in 2007 and an estimated 9% in 2008, is based primarily on a well-developed services sector, accounting for

[22] "Panama to develop 31 hydro projects of 1,047 MW by 2013", www.hydroworld.com
[23] Some of the discussion in this section is based on 2009 Panama Commercial Guide published by U.S. Department of Commerce

about 80% of GDP. However, economic growth is expected to slow to 4-6% in 2009 in light of global economic conditions and their impact on Panama's service based economy. Services include the Panama Canal, banking, the Colon Free Zone, insurance, container ports, and flagship registry. Manufacturing and mining account for roughly 14% of GDP. Agriculture, forestry and fisheries make up about 7% of GDP.

Anchoring growth is the $5.25 billion multi-year Panama Canal expansion program already underway. The global credit crunch threatens multiple big-ticket residential, commercial and tourism projects, including a large twelve billion dollar oil refinery.

Select investment and construction continues with approximately $1 billion in electrical generation facilities along with select port improvements. Panama has potential for growth in the areas of electric power generation, health care services, port services, land development, road construction, water distribution and purification, telecommunications, and tourism.

The United States is Panama's most important trading partner, with about 30% of the import market, and U.S. products enjoy a high degree of acceptance in Panama. However, international competition for sales is strong across sectors. Panama's imports increased in 2008 by 18% over 2007 to a total of $8.1 billion.

Panama's demand for electricity is growing by approximately 50 MW per year. The growth of the construction sector has generated a steady demand for electricity in the last 5-7 years. This growth is expected to continue during the next few years driven by the projected increase in low cost housing construction and the implementation of a number of infrastructure projects, including the expansion of the Panama Canal. The Panamanian market is very receptive to U.S. electrical power equipment. Its high quality, durability, competitive prices, quick delivery and service capability, are the main factors behind this preference. Price and quality are the main factors in selecting equipment suppliers, followed by after sale service, which includes technical assistance.

Competitors come principally from Sweden, Italy, Brazil, Germany and England. Panama has no particular standards and regulations for power generation equipment. All U.S. made equipment is readily accepted in Panama.

Electric power systems market in 2008 was estimated at $76 million. Imports from U.S. in this market segment amounted for over 50%. The market offered opportunities for both hydroelectric generators, especially small and medium size plants, thermo electric generators, and controls.

Financing Options

The IDB has financed several studies and projects related to renewable energy. Total value of the loans provided to energy projects in the past years is $140 million. The Consultants met with IDB in Panama. Major meeting takeaways were:

- Bank is open to funding RE projects in Panama and in the Region. Up-to-date, most RE projects being funded were hydro power related;
- Bank thinks that the private developers are very knowledgeable in Panama and projects proposed to IDB are well screened in general;
- Hydro development is significantly impacted by the indigenous population buy-in;
- The Bank does not see significant applications in wind, mostly smaller size hydro power;
- Wind power may not have enough incentive yet;
- The Bank cooperated with number of private and government funding institutions (such as EIB, JBIC, China Development Bank);
- Interested in funding smaller off-grid generation projects;
- IDB seems to be fairly comfortable with Panama regulation and permitting process.

The World Bank (IBRD) also has funded a number of small social-sector-oriented projects. Panama became a member of the World Bank's Multilateral Investment Guarantee Agency in 1997. The Panamanian government has pursued financing from International Financial Institutions for a number of infrastructure and social sector investment projects.

The IDB has been the only Multilateral Development Organization with an office in Panama. Last year the World Bank announced the opening of an office in Panama.

U.S. Export-Import Bank provides political and equipment procurement guarantees for projects in Panama. Ex-Im Bank offers a range of financing solutions for U.S. exporters and their international customers. Ex-Im Bank assists exporters by guaranteeing term financing to creditworthy international buyers, both private and public sector, for purchases of U.S. goods and services. With Ex-Im Bank's loan guarantee, international buyers are able to obtain competitive term financing from lenders when financing is otherwise not available or there are no economically viable interest rates on terms over one-to-two years. Ex-Im

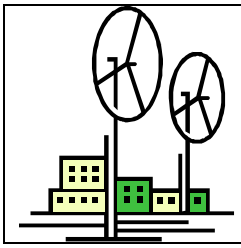
Bank offers flexible financing options and repayment terms and no limits on transaction size. Medium-term and long-term financing is available.

CDM financing can contribute to facilitating the implementation of renewable energy projects, even though with current low CER prices the additional benefit may not be as decisive for individual projects. Of specific interest could be the generation of CERs through small-scale projects in the hydro power, wind and landfill gas sector. CDM projects in general can be unilateral, i.e. they may be realized without the participation of stakeholders from Annex I countries, as for the purchasing of CERs. Carbon credits could in this case be "banked" by the plant owner and sold on the carbon market, when prices are more attractive.

Latin America was a pioneer and precursor of the CDM projects in the carbon finance business. When the CDM became operational in 2003, six of the nine first project methodologies approved by the CDM Executive Board were from Latin American projects. For example, the CDM portfolio of Panama contains 108 projects of which 94 projects are renewable energy projects. The majority of these projects are associated to hydroelectricity. It is also the leading form of renewable energy existing in Panama up to now. Thirty two of the renewable energy CDM projects have obtained the letter of approval by ANAM. The implementation of these RE-CDM projects will avoid 3.8 million CO2 ton per annum. According to the UNEP/RISOE project pipeline database, Panama has five CDM projects registered by the CDM executive board, one more project requested registration and two more that are in the stage of validation by the Designated Operational Entity (DOE). All of them are hydroelectric projects. The credit buyer of three registered projects is Unión Fenosa (Spain) which is also the owner of the two Panamanian distribution companies.

Panama Projects

Project 18 – Pedregal Power 20-40 MW Wind Project



Type: Wind	Name: Undetermined Location
Size: 20-40 MW	Project Sponsor: Pedregal Power

Project Background

Pedregal Power Company (PPC) is in early investigative stages of developing one and possibly two wind projects. While most of the company focus up-to-date was on conventional thermal generation, the company management sees an opportunity in the development of the renewable power projects. Wind projects are of major interest to the company.

PPC is currently reviewing Panama wind map of 5-6 locations with the intention to initiate a detailed wind mapping at 3 sites. PPC is also reviewing these sites for land purchase or lease.

Preliminary economic investigations performed by the company verify the economy of scale for profitable wind farm with average wind speed in Panama to be in the 20-40 MW range.

PPC does not have any preference for the wind turbines, therefore, open to dialogue with all manufacturers.

Project Sponsor's Capabilities and Commitment

Pedregal Power Company is a Panamanian limited liability company (sociedad de responsabilidad limitada), organized in November 1999. The Company shares were originally owned 100% by El Paso Corporation (U.S.). Curently, the company owned 55.00% by Basic Energy Group, 11.89% by Burmeister & Wain Scandinavian Contractor A/S (BWSC), 11.89% by Industrialiseringsfonden for Udviklingslandene (IFU), and 21.22% by Inkia (Panama Generation) Ltd.

The company is the current Owner of 53.53 MW diesel-fired plant. The Company sells electricity and electrical generating capacity to local distribution companies under the terms of purchase power agreements, as well as through spot market sales within Panama and to other countries in Central America. The construction

of this plant started in December 2001 and was completed within a year. During its construction, Pedregal generated up to 330 jobs, most of them assigned to inhabitants of Pacora. The plant started operations on January 11th 2003, and currently employs 38 diesel engine Panamanian experts. There are 4 employees assigned to the management part.

It is worth pointing out that this plant was voluntarily built with no need of a prior bid, which goes to show investors' trust in the Panamanian regulatory frame, macroeconomic conditions and social stability.

On the other hand, Pedregal Power Company is the first plant ever in the history of Central America to obtain a non-recourse category financing and with no need of a prior energy and power purchase-and-sale agreement.

This Power Plant has three state-of-the-art technology diesel engines built by the German company Man B&W Diesel. Such engines use Bunker C fuel and also have the state-of-the-art technology regarding low emissions to the environment. Besides, the project abides by the strict environmental rules of the World Bank and the National Environmental Authority of Panama.

PPC Investment Partners include:

Basic Energy

Basic Energy is a junior development company serving the mining, oil, and gas production industry. Basic is responsible for plan development, joint venture project development, construction and project startup including maintenance operations. Activities also include development of projects for independent power production, cogeneration and waste to energy. Established in February 1989, the original company name was TSI Southeast, Inc. specializing in the planning, development and construction of cogeneration medical waste to energy facilities. TSI began operating under the trade name of Basic Energy in 1991 and formally changed its name to Basic Energy in 1992. In 1999 Basic started a transition into Planning, Development and Construction within the mining and petroleum industry.

Inkia Panama Generation Ltd.

Inkia Energy is an international company of energy, specialized in the electrical generation. They are focus in the operation of assets and the development of electrical generation projects in Latin America. It is a company that, in the identification of solutions sustainable energetic, takes into account economic,

social and environmental factors, investing in clean and efficient technologies and operating its power stations with the highest standards of the industry. The portfolio of Inkia Energy actually counts with 1,015 MW of net capacity, diversified in 7 power stations in 6 countries. Additionally, the group is developing projects by more than 1,000 MW hydroelectric and thermal in the region.

Burmeister & Wain Scandinavian Contractor A/S (BWSC)

BWSC is a company registered in Denmark and is part of the Mitsui Group. It operates globally in project development: (i) as investor, (ii) contractor in Engineering and Construction and (iii) contractor in the Operation and Maintenance of thermo electrical plants. BWSC has interests in Central America, the Caribbean, Europe, Africa, the Middle East and Asia. The investment in Pedregal Power Company is the first ever in Central America.

Industrialisation Fund for Developing Countries (IFU)

IFU was established in 1967 by the Dutch Parliament, as a self-managed fund intended for promoting economic activities in developing countries, through joint ventures with Dutch companies. IFU partners in commercially viable businesses through their own capital and/or loans. As a rule, IFU must not exceed the Dutch partner's capital. IFU has been operating for over 30 years in a wide range of investments in joint ventures, both at a large and small scale. IFU is prepared to share their experience by serving as consultant during the planning and the initial phases of investment projects. Once the project has been developed, IFU becomes a member of the Board of Directors. Over the years, IFU has participated worldwide in more than 450 general partnerships in 71 developing countries, with investments that amount to nearly $700 million.

Implementation Financing

PPC plans to fund new project via its partner Inkia Energy. The company was established in 2007 to manage Israel Corp's electricity business portfolio in Latin America. It has corporate headquarters located in Lima, Peru and presence in 8 Latin American countries. It has a diversified and balanced portfolio of hydro, fuel oil and natural gas power generation, electricity distribution, and marine fuel terminal.

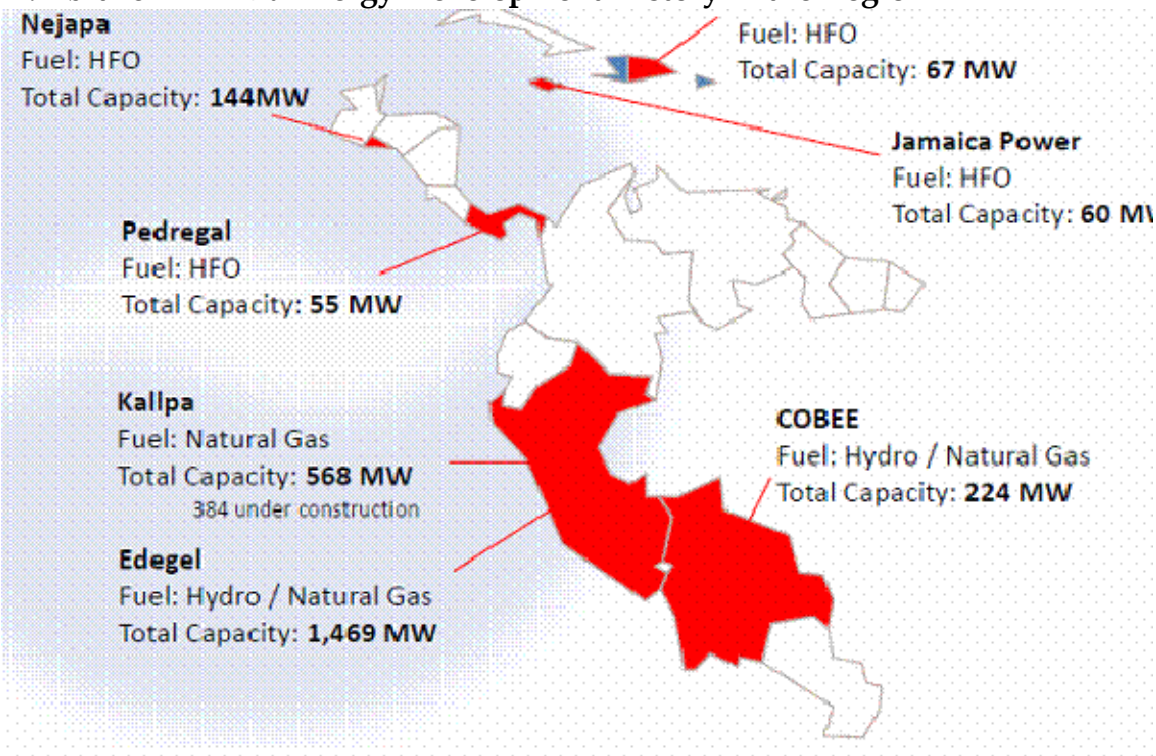
Israel Corporation has strong income statement (Exhibit 18-1) and balance sheet to fund the development of 20-40 MW wind farm.

Exhibit 18-1 – IC Financial Data

Million US$	2007	2006
Consolidated Revenues	10,711	6,313
Consolidated Net Income	166	192
Shareholders Equity	1,495	1,333
Market Cap.	7,800*	
Credit Rating (S&P Maalot)	AA (Israel)	

Inkia Energy has a proven record of developing energy projects in the region as shown in Exhibit 18-2.

Exhibit 18-2 – Inkia Energy Development History in the Region



Company	Participation	Net Capacity acc. to Participation	Plant Availability	Capacity Factor
Kallpa	100%	184 MW	100%	27%
Edegel	14%	206 MW	97%	63%
COBEE	100%	224 MW	93%	57%
Nejapa	87%	125 MW	91%	62%
CEPP	97%	65 MW	93%	70%
Pedregal	21%	12 MW	100%	82%
Jamaica P.	16%	10 MW	N/A	N/A
Total / Weighted Average		**826 MW**	**96%**	**60%**

U.S. Export Potential

The wind project major components include wind turbine, tower, balance of plant equipment, and interconnection equipment.

Several major U.S. and international manufacturers produce major equipment for wind turbines in the U.S. for domestic and regional markets.

Average cost of the on-shore wind project is around $2,000/kW. In case of 20 MW project the total will be around $40 million, if which about 75% or $30 million will be wind turbine cost, and the rest would be balance of plant, interconnection, and soft costs. U.S exports that can be expected in the purchase of the main wind turbine equipment are at 75% of the total project cost. At the same time, it should be noted that wind manufacturers from Europe, Canada, Brazil, India, China, and Japan can compete for projects in Central America. Therefore, any wind project can be completely sources outside of the U.S.

However, U.S. in 2008 alone has installed over 4,000 MW of new wind capacity bringing the total to over 22,000 MW. Based on AWEA data[24] over 50% of these wind turbines were manufactured in the U.S.

Major wind turbine manufacturers in the U.S. include:

[24] American Wind Energy Association ▪ 3rd Quarter 2008 Market Report

- Clipper (Cedar Rapids, Iowa);
- Vestas Americas (Portland, Oregon and production facilities in Colorado);
- GE Energy (Tehachapi, California and production facility in Pensacola, Florida)
- Suzlon Wind Energy Corporation (Chicago, Illinois and production facilities in Pipestone, Minesota)
- Gamesa (Langhorne, PA with production facilities in Fairless Hills, PA)

Regionally, Vestas has provided 71 wind turbines to Costa Rica with total capacity of 50 MW and 24 turbines to Jamaica with total capacity of 21 MW.

Recently, Suzlon has entered into is Brazil through a contract signed with – SIIF Energies do Brazil Ltda. The project is poised to double Brazil's current installed capacity of 200 MW.

In 2008, Gamesa broke into the Venezuelan market with the installation of 100 MW in what will be the country's first wind farm. Gamesa also installed 65 MW of wind turbines in Dominican Republic in 2007.

GE Energy is currently negotiating several new contracts in the CA region. Details of these contracts are still confidential.

Foreign Competition and Market Entry Issues

Following international companies are world leaders in wind power equipment.

- Vestas (Denmark)
- Enercon (Germany)
- Gamesa (Spain)
- Acciona (Spain)
- Siemens (Germany)
- REpower (Germany)
- Mitsubishi (Japan)

The foreign competition is very strong in the wind power equipment market. However, Central America is traditionally services from local (i.e., South and North America) suppliers. Several major international companies have major manufacturing facilities in U.S. and Canada. It should be noted that regionally, Brazil and Mexico are considered highly yielding markets for wind projects. Therefore, many international suppliers have plans to initiate assembly and manufacturing facilities there.

Projects in Central America will be driven by economic factors and long freight for wind equipment is not favoring European and Japanese manufacturers. At the same time, U.S. based manufacturers are currently having difficulty keeping up wit the internal U.S. equipment demand and may not be that interested in small procurements from Central American countries. Planned expansion of Vestas plants in Windsor and Pueblo, CO; and GE Energy plants in Schenectady, NY and Memphis, TN should permit these companies increased supplies to Central America.

Developmental Impact

This project will yield significant economical and technical benefits locally to Panama as well as regionally due to the reduction of greenhouse gas emissions.

Infrastructure - The Panama Government estimates its demand for electricity will increase dramatically over the next 10 years. To meet a 5-7% annual increase in demand, Panama needs to drastically increase its electric generation capacity and expand its energy sources.

Assuming 30 MW of wind being built, the project will be able to provide power to roughly over 45,000 households.

Human Capacity Building -- The proposed power plant will have significant job creation impact as well. The construction of the plant will require temporary manpower, both skilled and unskilled, with a maximum of 100 qualified persons at any one time during peak of construction. Preference will be given to hiring qualified local residents.

Operations phase employment opportunities will be made available for technical, administrative, and security people during the commercial operation phase. There will also be need for a number of personnel at the plant.

Other - The implementation of this Project will affect the energy mix of the country, injecting every year near 70GWh of renewable energy to the national system and avoiding the emission of 54,000 tons of CO2. It allows project to apply for registration under the Clean Development Mechanism (CDM) and trade with Certified Emission Reduction Credits (CER). In addition, the project will save the country annually over $4 million of fuel imports for thermoelectric plants (70,000 BBL of Bunker).

The proposed project can be considered a rural electrification project. The remote location will strengthen the electricity grid and reduce transmission losses. It will also provide more power to be distributed in the area where more electrification is desired.

Environmental Considerations

The project is expected to have a significant positive effect on the environment. Currently, large thermal plants are considered to be major sources of air pollution in Panama. Due to the nature of the technology, the proposed wind power plant has no emissions. Noise implications are typical of the wind project. The Project Sponsor indicated interest in remote locations, away from local villages. The construction of plant should not have any major impact on the environment, however the appropriate environmental assessment study will be required if the Project Sponsor decides to pursue World Bank or any other international lending agency funding.

Among anticipated other positive impacts are:

- Substitution of fossil energy with renewable wind;
- No air emissions; and
- Limited exposure to lubricants and other potential water and soil contaminants.

Potential negative impacts are:

- Noise;
- Flora and Fauna conditions due to rotating equipment;
- Sound pollution during construction; and
- Heavy equipment transit.

Follow-up and Further Information

The proposed project is in early development stages. The Project Sponsor indicated interest in cooperating with U.S. companies for project preparation (feasibility and investment studies, EIA, cost estimating), project design and engineering, and EPC contracting.

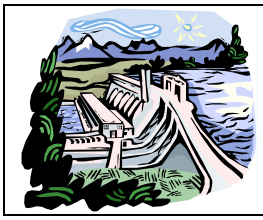
Interested parties are encouraged to contact the Project Sponsor for more information and further cooperation steps.

Inkia Panama
Nicolás Becerra, Director
Phone: 507-263-0397
Fax: 507-263-3943
P.O. Box 832-2271 WTC
Panama, Panama
E-mail: nbecerra@inkiapanama.com

and

PEDREGAL POWER COMPANY
Eduardo de la Guardia, General Manager
Phone: 507-263-0397
Fax: 507-263-3943
P.O. Box 832-2271 WTC
Panama, Panama
E-mail: edelaguardia@pedregalpower.com

Project 19 –PanAm 29 MW Barro Blanco Hydro Project

	**Type: Run-on-river hydro**	**Name: Barro Blanco Hydro Project**
	Size: 29 MW	**Project Sponsor: PanAm**

Project Background

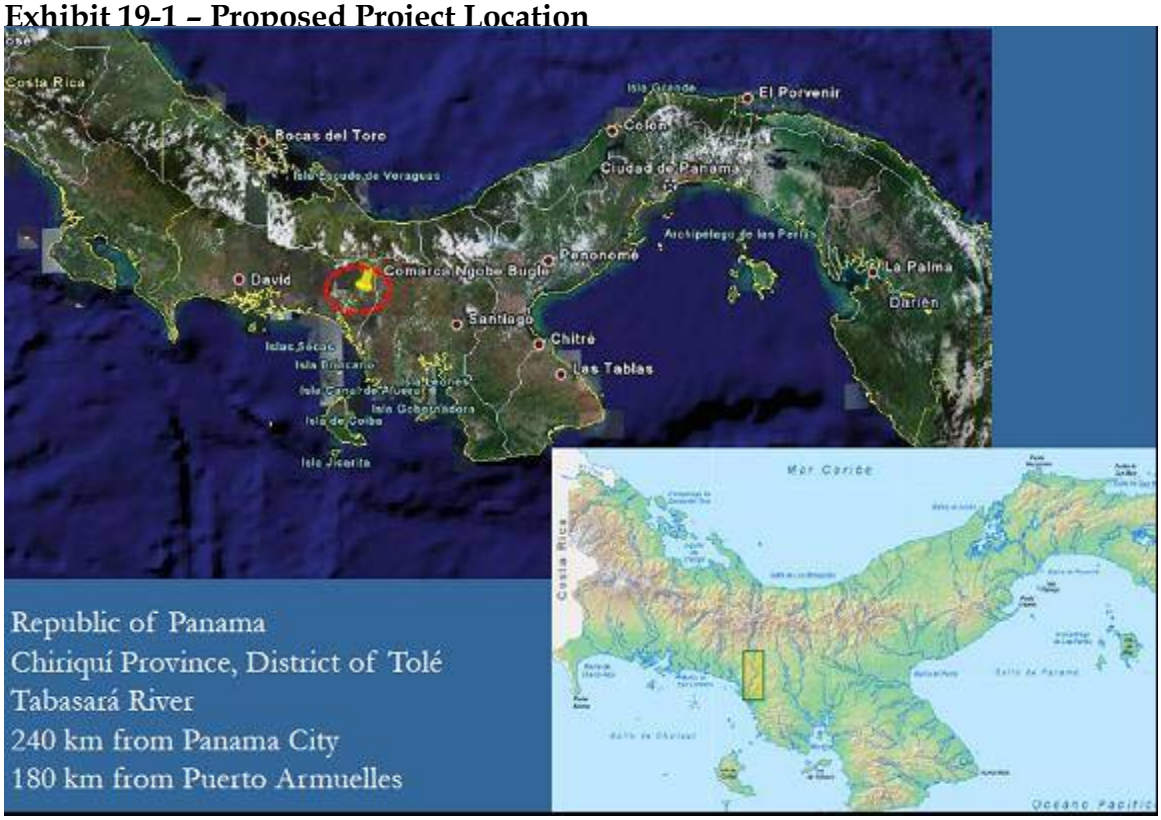
On January 2007 the Autoridad Nacional de Servicios Públicos of Panama cancelled for lack of development progress, 15 hydroelectric concessions previously awarded. The concessions totaled 185 MW of power generating capacity. They decided to submit these newly cancelled concessions to a public tender for their award. Genisa participated, won and paid the amount of $750,000 for the concession rights to develop the Barro Blanco hydro project located on the Tabasara River in Panamá.

The proposed project will have a reservoir and roller compacted concrete dam. Reservoir will be 103 mts above sea level. 30-year average flow of 51 m3 per second was utilized for the design calculation. The rainfall collected on the Ngobe Bugle mountain region converges at the Tabarasara River. Project will have a gross maximum head of 36.6 mts and installed capacity of 29 MW. Preliminary design envisions the utilization of two (2) Kaplan (13.5 MW) and one (1) Francis (2 MW) turbines with efficiency of 93% (at full charge).

Significant progress has been done on the project preparation activities up-to-date. Request for Concession Contract to ANSP has been awarded. Request for EIA approval from ANAM has been awarded. Elaboration of Hydrological Study has been completed. Request for Water Concession Contract to ANAM is currently in progress. Request for Power Generation License to Regulating Agency is currently under execution. Request for Interconnection to Etesa Substation is in progress. Site Survey and Land Purchases are mostly completed. Carbon Emissions Reduction application and certification are under preparation.

Location of the proposed project is provided in Exhibit 19-1.

Exhibit 19-1 – Proposed Project Location



Project Sponsor's Capabilities and Commitment

Generadora del Istmo S.A. (Genisa) is a special purpose vehicle incorporated in Panama created for the ownership, development and operation of the Barro Blanco (BB) hydro project. This company will receive project development support from its sister companies PanAm Generating Ltd. and Luz y Fuerza de San Lorenzo S.A. de C.V.

PanAm (www.panam.com.pa) was created in 1999 for the development and operations of power generating projects in Panama. Through this years PanAm has acquired vast experience in the Energy Commercial Contracts Market (PPA`s) and the Market of Opportunity (Spot Market) both domestic and regionally. It owns and operates 96 MW Wartsila thermal power plant. PanAm delivers approximately 13% of the energy demand in Panama. Constitutes an approximately 7% of firm generating capacity installed in Panama. PanAm counts with a team of 80 highly skilled professionals

Luz y Fuerza de San Lorenzo S.A. de C.V. (Lufussa) was created for the development and operations of power generating projects in Honduras in 1994.

It owns and operates three power plants with an installed capacity of 389 MW, a fuel terminal and corresponding 14 km oil pipeline and a 117 km power transmission line. Lufussa counts with a team of 350 highly skilled professionals.

GENISA, forms part of the PanAm and Lufussa power generating group, and will count on the 15 years of experience these companies have in the development of greenfield power generation projects in the Mesoamerican region. Genisa will have all the support of both company's existing technical and administrative teams and their previous experiences working on the design, procurement, construction, maintenance, operations and marketing of power generation projects with differing technologies.

Genisa board of directors took the decision to invest in Panama because of the following major reasons:

- Country seems to have clear and transparent market rules;
- Strong commitment to promoting foreign direct investment;
- Panama's current and expected economic growth;
- PanAm Generating's existing asset base in the country and management know-how and experience in the energy sector;
- Panama is integrated to the Central American Interconnection Transmission Line; and
- Board of Directors believes and promotes the investment in alternative energy sources.

Implementation Financing

The proposed project Investment Plan estimates project costs at $95 million (or at $3,300/kW). Project is planned to be financed via 25% equity investment ($23.75 million) and 75% bank financing ($71.25 million).

The proposed bank financing terms include:

- Bank Financing Required: $71.25 million;
- Loan Prepayment Term: 15 years;
- 3 yrs grace period +12 yrs for repayment;
- Interest Rate: To be negotiated;
- Genisa seeks fixed interest rate alternatives;
- Payment Schedules Capital & Interest Payable Quarterly;
- Proposed Guarantees: Mortgage over all Barro Blanco assets, including land, equipment, plus an irrevocable assignment of future Power

Purchase Agreement that can be subscribed with any of the electric distribution companies or large private customer.

Due the manageable amount of the bank financing required Genisa suggests that the number of participating financing institutions be limited to 2 to 3 banks. They believe this is an efficient financing arrangement and will save both structuring time and financial costs for the project.

U.S. Export Potential

Most of the export potential for the implementation of this project is in the procurement of hydro power turbines, substation equipment, instrumentation and control systems, and construction and engineering services. The overall estimated project cost is about $95 million for 29MW plant. U.S. exports could be as much as $42 million (45%) level.

The Project Sponsor provided the Consultant with summary estimates, which were developed during the pre-feasibility effort. Consultant believes that these estimates are reasonable and in line with own estimate.

A number of U.S. firms can supply the equipment:

Hydro Turbines:

- Canyon Hydro;
- Voith Siemens Hydro Power Generation;
- American Hydro Corporation;
- The James Leffel & Co.;
- North American Hydro;
- GE Energy Hydro.

In addition to equipment suppliers, U.S. engineering companies may be interested in EPC or task design contracts. Services suppliers potentially include:

- Black and Veatch;
- MWH Global;
- Shaw Group (Stone and Webster);
- USR (Washington Group);
- HydroWest International;
- PB Power.

The Consultant has contacted major equipment manufacturers and confirmed their interest in providing hydro turbines for small scale projects in Central America. Manufacturers confirmed their past international experience and their comfortable position in supply logistics. They identified price/quality parameters as being a major driver for equipment selection in the region.

Foreign Competition and Market Entry Issues

In general, U.S. manufacturers are considered to be competitive in the design, manufactue, and implementation of the proposed project scope. However, significant competition is expected to U.S. companies in Central America.

Major foreign competitors in the hydro power energy market include amongst others:

- Toshiba (Japan)
- Voith Siemens (Germany);
- Sulzer Hydro Ltd. (Switzerland);
- Moller Undenas Turbin AB (Sweden);
- Wasserkraft Volk AG – WKV (Germany);
- Alstom (France);
- Pompes RITZ France SAS (France);
- CITIC Heavy Machinery Company Ltd. (China);
- Andritz VA TECH Hydro (Austria);
- Bouving Fouress Limited (India);
- Dongfang Electric Corporation (China);
- Harbin Power Equipment Company (China);
- Norcan Hydraulic Turbines Inc. (Canada);
- Kharkov Turbogenerator Plant "Turboatom" (Ukraine); and
- LMZ (Russia).

Developmental Impact

Infrastructure -- The Project will be used to provide power at competitive prices and reduce the grid's dependence on expensive petroleum-based power. The project is expected to be about 29 MW. The project will be able to provide power to roughly over 50,000 households.

Human Capacity Building -- The proposed power plant will have significant job creation impact as well. The construction of the plant will require temporary manpower, both skilled and unskilled, with a maximum of 100 qualified persons at any one time during peak of construction. Preference will be given to hiring qualified local residents.

Operations phase employment opportunities will be made available for technical, administrative, and security people during the commercial operation phase. The average number of personnel envisioned at the plant will be 14.

Other - Assuming 76 GWh of electricity produced by hydro plant instead of coal, for example, the CO2 avoided emissions estimated at 60,000 tons per year.

The proposed project can be considered a rural electrification project. The remote location will strengthen the electricity grid and reduce transmission losses. It will also provide more power to be distributed in the area where more electrification is desired.

Environmental Considerations

The project is expected to have a significant positive effect on the environment. Currently, large thermal plants are considered to be major sources of air pollution. Due to the nature of the technology, the proposed hydro power plant has no emissions. Implementation of the hydro power plant (HPP) is estimated by the Consultant to result in annual savings of about 30,000 tons of coal and associated 60,000 tons of CO2 emissions. The construction of the plant will require the appropriate environmental assessment study. The study is also required if the Project Sponsor decides to pursue any international lending agency funding. The study will address all major issues associated with the construction of a hydro power facility of this size, such as flooding, resettlement, migratory fish control, archeological surveying, water quality, and other issues.

Among anticipated other positive impacts are:

- Conservation and mitigation measures in the river basin;
- No alteration of agricultural lands;
- Forestry conservation;
- Training, regarding environmental issues, provided to locals;
- New tourist and recreational activities;
- Life quality improvement for local communities due to new incomes; and

- Social commitment regarding education, health and production of goods.

Potential negative impacts are:

- Natural river flow alteration;
- Flora and Fauna conditions, of a specific area, modified due to the new reservoir;
- Sound pollution during construction; and
- Heavy equipment transit.

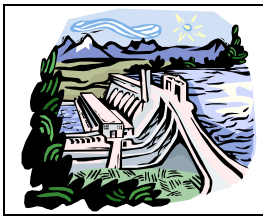
Follow-up and Further Information

The proposed project still does not have funding and still requires some development work. The Project Sponsor indicated interest in cooperating with U.S. companies for project preparation, project design and engineering, and EPC contracting.

Interested parties are encouraged to contact the Project Sponsor for more information and further cooperation steps.

Aldo C. Lopez
Executive Vice President
PanAm Generating, Ltd.
Capital Plaza Bussines Center Building
Ave. Costa del Este y Paseo Roberto
Motta, Piso 14, Oficina 1401
Telephone (507) 265-4685
Fax (507) 265-4688
E-mail: a.lopez@panam.com.pa

Project 20 –PanAm 4 MW Cerro Viejo Hydro Project

	**Type: Run-on-river hydro**	**Name: Cerro Viejo Hydro Project**
	Size: 4 MW	**Project Sponsor: PanAm**

Project Background

Fifteen previously awarded hydroelectric concessions were cancelled in January 2007 by ANSP for lack of development progress. The concessions totaled 185 MW of power generating capacity. ANSP decided to submit these newly cancelled concessions to a public tender for their award. Genisa participated and won concession rights to develop the Cerro Viejo hydro project located on the Corita River in Veraguas Province in Panamá.

The proposed project is at very early conceptual stage. The initial pre-feasibility study envisions the utilization of one Kaplan (4 MW) turbine and run-on-river configuration.

Project includes 89 m length and 15 m height (to the crest) Dam, a right margin scour outlet, discharge channel, charge chamber and machinery house. The drain area is about 97 km2 and has an average flow is about 6.50 m3/s.

As compared to the previous PanAm project, no significant progress has been done on the project preparation activities up-to-date.

Project Sponsor's Capabilities and Commitment

Generadora del Istmo S.A. (Genisa) is a special purpose vehicle incorporated in Panama created for the ownership, development and operation of the Barro Blanco (BB) hydro project. This company will receive project development support from its sister companies PanAm Generating Ltd. and Luz y Fuerza de San Lorenzo S.A. de C.V.

PanAm (www.panam.com.pa) was created in 1999 for the development and operations of power generating projects in Panama. Through this years PanAm has acquired vast experience in the Energy Commercial Contracts Market (PPA`s) and the Market of Opportunity (Spot Market) both domestic and

regionally. It owns and operates 96 MW Wartsila thermal power plant. PanAm delivers approximately 13% of the energy demand in Panama. Constitutes an approximately 7% of firm generating capacity installed in Panama. PanAm counts with a team of 80 highly skilled professionals

Luz y Fuerza de San Lorenzo S.A. de C.V. (Lufussa) was created for the development and operations of power generating projects in Honduras in 1994. It owns and operates three power plants with an installed capacity of 389 MW, a fuel terminal and corresponding 14 km oil pipeline and a 117 km power transmission line. Lufussa counts with a team of 350 highly skilled professionals.

GENISA, forms part of the PanAm and Lufussa power generating group, and will count on the 15 years of experience these companies have in the development of greenfield power generation projects in the Mesoamerican region. Genisa will have all the support of both company's existing technical and administrative teams and their previous experiences working on the design, procurement, construction, maintenance, operations and marketing of power generation projects with differing technologies.

Genisa board of directors took the decision to invest in Panama because of the following major reasons:

- Country seems to have clear and transparent market rules;
- Strong commitment to promoting foreign direct investment;
- Panama's current and expected economic growth;
- PanAm Generating's existing asset base in the country and management know-how and experience in the energy sector;
- Panama is integrated to the Central American Interconnection Transmission Line; and
- Board of Directors believes and promotes the investment in alternative energy sources.

Implementation Financing

The cost of the project is estimated at $14 million (similar to Barro Blanco at $3,300/kW). Similar to Barro Blanco, project is planned to be financed via 25% equity investment and 75% bank financing.

Barro Blanco project layout included following financing terms. The proposed Cerro Viejo Hydro Project will most likely follow the same pattern.

- Bank Financing Required: $10.5 million;
- Loan Prepayment Term: 15 years;
- 3 yrs grace period +12 yrs for repayment;
- Interest Rate: To be negotiated;
- Genisa seeks fixed interest rate alternatives;
- Payment Schedules Capital & Interest Payable Quarterly;
- Proposed Guarantees: Mortgage over all project assets, including land, equipment, plus an irrevocable assignment of future Power Purchase Agreement that can be subscribed with any of the electric distribution companies or large private customer.

U.S. Export Potential

Most of the export potential for the implementation of this project is in the procurement of hydro power turbines, substation equipment, instrumentation and control systems, and construction and engineering services. The overall estimated project cost is about $14 million for 4MW plant. U.S. exports could be as much as $7 million (45%) level.

The Project Sponsor provided the Consultant with summary estimates, which were developed during the pre-feasibility effort. Consultant believes that these estimates are reasonable and in line with own estimate.

A number of U.S. firms can supply the equipment:

Hydro Turbines:

- Canyon Hydro;
- Voith Siemens Hydro Power Generation;
- American Hydro Corporation;
- The James Leffel & Co.;
- North American Hydro;
- GE Energy Hydro.

In addition to equipment suppliers, U.S. engineering companies may be interested in EPC or task design contracts. Services suppliers potentially include:

- Black and Veatch;
- MWH Global;
- Shaw Group (Stone and Webster);

- USR (Washington Group);
- HydroWest International;
- PB Power.

The Consultant has contacted major equipment manufacturers and confirmed their interest in providing hydro turbines for small scale projects in Central America. Manufacturers confirmed their past international experience and their comfortable position in supply logistics. They identified price/quality parameters as being a major driver for equipment selection in the region.

Foreign Competition and Market Entry Issues

In general, U.S. manufacturers are considered to be competitive in the design, manufactue, and implementation of the proposed project scope. However, significant competition is expected to U.S. companies in Central America.

Major foreign competitors in the hydro power energy market include amongst others:

- Toshiba (Japan)
- Voith Siemens (Germany);
- Sulzer Hydro Ltd. (Switzerland);
- Moller Undenas Turbin AB (Sweden);
- Wasserkraft Volk AG – WKV (Germany);
- Alstom (France);
- Pompes RITZ France SAS (France);
- CITIC Heavy Machinery Company Ltd. (China);
- Andritz VA TECH Hydro (Austria);
- Bouving Fouress Limited (India);
- Dongfang Electric Corporation (China);
- Harbin Power Equipment Company (China);
- Norcan Hydraulic Turbines Inc. (Canada);
- Kharkov Turbogenerator Plant "Turboatom" (Ukraine); and
- LMZ (Russia).

Developmental Impact

Infrastructure -- The Project will be used to provide power at competitive prices and reduce the grid's dependence on expensive petroleum-based power. The

project is expected to be about 29 MW. The project will be able to provide power to roughly over 50,000 households.

Human Capacity Building -- The proposed power plant will have significant job creation impact as well. The construction of the plant will require temporary manpower, both skilled and unskilled, with a maximum of 50 qualified persons at any one time during peak of construction. Preference will be given to hiring qualified local residents.

Operations phase employment opportunities will be made available for technical, administrative, and security people during the commercial operation phase. The average number of personnel envisioned at the plant will be 5.

Other - Assuming 11 GWh of electricity produced by hydro plant instead of coal, for example, the CO2 avoided emissions estimated at 8,000 tons per year.

The proposed project can be considered a rural electrification project. The remote location will strengthen the electricity grid and reduce transmission losses. It will also provide more power to be distributed in the area where more electrification is desired.

Environmental Considerations

The project is expected to have a significant positive effect on the environment. Currently, large thermal plants are considered to be major sources of air pollution. Due to the nature of the technology, the proposed hydro power plant has no emissions. Implementation of the hydro power plant (HPP) is estimated by the Consultant to result in annual savings of about 5,000 tons of coal and associated 8,000 tons of CO2 emissions. The construction of the plant will require the appropriate environmental assessment study. The study is also required if the Project Sponsor decides to pursue any international lending agency funding. The study will address all major issues associated with the construction of a hydro power facility of this size, such as flooding, resettlement, migratory fish control, archeological surveying, water quality, and other issues.

Among anticipated other positive impacts are:

- Conservation and mitigation measures in the river basin;
- No alteration of agricultural lands;
- Forestry conservation;
- Training, regarding environmental issues, provided to locals;
- New tourist and recreational activities;

- Life quality improvement for local communities due to new incomes; and
- Socail commitment regarding education, health and production of goods.

Potential negative impacts are:

- Natural river flow alteration;
- Flora and Fauna conditions, of a specific area, modified due to the new reservoir;
- Sound pollution during construction; and
- Heavy equipment transit.

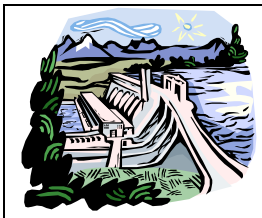
Follow-up and Further Information

The proposed project is in early development stages and requires significant development work. The Project Sponsor indicated interest in cooperating with U.S. companies for project preparation, project design and engineering, and EPC contracting.

Interested parties are encouraged to contact project the Project Sponsor for more information and further cooperation steps.

Aldo C. Lopez
Executive Vice President
PanAm Generating, Ltd.
Capital Plaza Bussines Center Building
Ave. Costa del Este y Paseo Roberto
Motta, Piso 14, Oficina 1401
Telephone (507) 265-4685
Fax (507) 265-4688
E-mail: a.lopez@panam.com.pa

Project 21 – ACP 48 MW Alto Chagres Hydro Power Plant

	**Type: Run-on-river hydro**	**Name: Alto Chagres Hydro Power Plant**
	Size: 48 MW	**Project Sponsor: Panama Canal Authority**

Project Background

Panama Canal Authority (ACP) proposes to use the waters of the Chagres River, upstream of the reservoir Alhajuela, through the construction, maintenance and operation of a hydroelectric power station with a regulation dam and with an installed capacity of 48 MW. The project is formed by a dam, spillway, water intake, pressure pipe, machine house with three Francis turbines on the bank of the river, designed to make the turbinated water flow to the Panama Canal Alhajuela (Madden) reservoir, substation, transmission line and access road.

The energy produced by the project will be for consumption of the ACP and the sale of surplus energy to the national electricity market of Panama.

The proposed project will consist of three (3) Francis turbines of 16 MW connected to synchronous generators with a total capacity of 48 MW. It will have a 115 kV substation located 200 meters from the station and a transmission line of 115 kV will be connected to the national electric system through the infrastructure and transmission line closest to the project with the capacity of transporting the energy produced by the hydroelectric power plant. Possible connection points to the electric national grid are Madden Substation or Calzada Larga Substation.

ACP has prepared Preliminary Environmental Assessment of Hydroelectric Project Alto Chagres in September 2008.

The main elements that comprise the Alto Chagres Hydroelectric Project include:

- A rolling compacted concrete dam and ancillary works necessary at the site of Río Chico,
- A spillway with gates of the required size to protect the dam against the probable maximum over flood,

- Installation of temporary diversion of the river, including two culverts that will be converted and incorporate to the facility for reducing the level of the river in case of emergency, and
- An electric generating plant with capacity of 48 MW that also will be used to regulate water inflow to Alhajuela Lake.

Based on pre-feasibility investigations, the dam has a reservoir with a gross capacity of 530 million cubic meters at elevation 210, which is the maximum level of supply. The volume between Elevation 210 and Elevation 155 will be 450 million cubic feet. Therefore, the dead volume can pick up 100 years of sediment deposition. The area of the reservoir at full supply level is 13.9 square kilometers.

The dam will be built with a concrete mix of cement with average aggregate from a quarry located upstream of the site along Chico River near its confluence with the Chagres river. The dam is approximately 140 meters in height, from the deep excavation of the foundations to its crest. A ramp spillway gates will be located in the center-left portion of the dam. Water download at the probable maximum flood is 6,300 m^3 / s using an overload of 2.9 meters above the maximum level of supply. Six radial gates will handle the control, each one of 8 meters wide by 12 meters in height. A spillway will discharge flood flows into a pond built of adequate rock excavated previously at Elev.63 approximately 200 meters downstream from spillway.

The facilities for river diversion during construction will have pockets or cofferdams upstream and downstream of the dam site and two channels of 7 meters by 7 meters located on the side of the riverbed. The channels will be used for flood control during construction, monitoring the percentage of the initial volume of the reservoir, and evacuate the reservoir in an emergency. Reducing the water level will be achieved through the use of the spillway and one of the diversion channels. For an emergency drain, a tower with a hole 4 by 4 meters will be built in front of the dam. Two gates of 3 meters wide and 4 meters high will be installed at Elev. 115.

The intake consists of a vertical shaft and a horizontal tunnel leading to the station of the plant, which contain three (3) Francis turbines of 16 MW connected directly to synchronous generator with installed capacity of 48 MW. Will have a 115 kV substation located 200 meters from the power generating station and a transmission line of 115 kV will be connected to the national electric system through the infrastructure and transmission line closest to the project with capacity to transport the electric energy produced by the project. For the operations of the Hydro power plant a SCADA system will be used for monitoring and remote operation of the project, same as for instrumentation,

security & lighting, and drainage. Exhibit 21-1 provides the proposed location of he project.

Exhibit 21-1 – Project Location

Based on pre-feasibility study, following information is provided:

Hydrology:

- 3.250 mm average annual rainfall
- Average flow 30.2 m³ / s

Storage facilities:

- Drainage area: 414 km ²
- Maximum normal water El. 210 m
- Initial volume (rounded): 530 MMC
- Surface area of water: 13.9 km ²
- Minimum level of water El. 155 m
- Usable Volume: 450 MMC
- The crest elevation: 216 m
- Crest length: 915 m
- River bed elevation: 86 m
- Elevation of the foundation: 76 m
- Hydraulic Height: 130 m

- Structural Height: 140m
- Volume of concrete (rounded): 1,900,000 m^3
- Gates of the Spillway: Six of 12 meters high and 8 meters wide
- Length of the crest of the Spillway: 63m
- Elevation of the spillway crest of 198 m
- Maximum Input Flow: 9.940 m^3 / s

Project Sponsor's Capabilities and Commitment

The Panama Canal Authority (ACP) is the entity of the Government of Panama established under Title XIV of the National Constitution with exclusive charge of the operation, administration, management, preservation, maintenance, and modernization of the Canal, as well as its activities and related services, pursuant to legal and constitutional regulations in force, so that the Canal may operate in a safe, continuous, efficient, and profitable manner (www.pancanal.com).

Organic Law of June 11, 1997, furnishes the ACP with legislation for its organization and operation. Because of its importance and uniqueness, the ACP is financially autonomous, has its own patrimony, and the right to administer it.

An Administrator and a Deputy Administrator head the ACP under the supervision of an 11-member Board of Directors. The Administrator is the highest-ranking executive officer and legal representative of the Authority, and is responsible for its administration and the implementation of the policies and decisions of the Board of Directors. The Administrator is appointed for a seven-year term, and may be re-elected for an additional term.

The appointment of the 11 members of the Board of Directors is made as follows:

- Nine directors are appointed by the President of the Republic of Panama with the consent of the Cabinet Council and ratification by an absolute majority of the members of the Legislative Assembly.
- One director is designated by the Legislative Branch, and may be freely appointed or removed thereby.
- The President of the Republic designates one director, who shall chair the Board of Directors and have the rank of Minister of State for Canal Affairs. The Canal Affairs Minister attends Cabinet Council meetings, having the right to voice and vote.

The members of the first Board of Directors were appointed for overlapping terms to ensure their independence from the country's administrations. The

Panama Canal constitutes an inalienable patrimony of the Republic of Panama; therefore, it may not be sold, assigned, mortgaged, or otherwise encumbered or transferred. The legal framework of the Panama Canal Authority has the fundamental objective of preserving the conditions for the Canal to always remain an enterprise for the uninterrupted service of the maritime community, international trade, and the Republic of Panama.

Implementation Financing

At this stage of the study, the cost of the project implementation is estimated at $150 million. The financing structure is not yet defined. ACP will most likely be interested in 50% equity funding (similar to other projects funded that way). Alternatively, ACP may choose to fund the project using its balance sheet, which is pretty healthy.

Most of the multilateral banks are expected to be interested in providing debt portion of the funding due to already significant commitments for the Canal Expansion Project. Implementation financing of these types of projects has been discussed by Consultant with CABEI, IDB, and the WB. All organizations were familiar with ACP and have provided positive feedback on the possibility of new project funding for them.

U.S. Export Potential

Most of the export potential for the implementation of this project is in the procurement of hydro power turbines, substation equipment, instrumentation and control systems, and construction and engineering services. The overall estimated project cost is about $150 million for 48MW plant. U.S. exports could be as much as $65 million (45%) level.

The Project Sponsor provided the Consultant with summary estimates, which were developed during the pre-feasibility effort. Consultant believes that these estimates are reasonable and in line with own estimate.

A number of U.S. firms can supply the equipment:

<u>Hydro Turbines:</u>

- Canyon Hydro;
- Voith Siemens Hydro Power Generation;

- American Hydro Corporation;
- The James Leffel & Co.;
- North American Hydro;
- GE Energy Hydro.

In addition to equipment suppliers, U.S. engineering companies may be interested in EPC or task design contracts. Services suppliers potentially include:

- Black and Veatch;
- MWH Global;
- Shaw Group (Stone and Webster);
- USR (Washington Group);
- HydroWest International;
- PB Power.

The Consultant has contacted major equipment manufacturers and confirmed their interest in providing hydro turbines for small scale projects in Central America. Manufacturers confirmed their past international experience and their comfortable position in supply logistics. They identified price/quality parameters as being a major driver for equipment selection in the region.

Foreign Competition and Market Entry Issues

In general, U.S. manufacturers are considered to be competitive in the design, manufactue, and implementation of the proposed project scope. However, significant competition is expected to U.S. companies in Central America.

Major foreign competitors in the hydro power energy market include amongst others:

- Toshiba (Japan)
- Voith Siemens (Germany);
- Sulzer Hydro Ltd. (Switzerland);
- Moller Undenas Turbin AB (Sweden);
- Wasserkraft Volk AG – WKV (Germany);
- Alstom (France);
- Pompes RITZ France SAS (France);
- CITIC Heavy Machinery Company Ltd. (China);
- Andritz VA TECH Hydro (Austria);
- Bouving Fouress Limited (India);

- Dongfang Electric Corporation (China);
- Harbin Power Equipment Company (China);
- Norcan Hydraulic Turbines Inc. (Canada);
- Kharkov Turbogenerator Plant "Turboatom" (Ukraine); and
- LMZ (Russia).

Developmental Impact

Infrastructure -- The Project will be used to provide power at competitive prices and reduce the grid's dependence on expensive petroleum-based power. The project is expected to be about 48 MW. The project will be able to provide power to roughly over 80,000 households.

Human Capacity Building -- The proposed power plant will have significant job creation impact as well. The construction of the plant will require temporary manpower, both skilled and unskilled, with a maximum of 200 qualified persons at any one time during peak of construction. Preference will be given to hiring qualified local residents.

Operations phase employment opportunities will be made available for technical, administrative, and security people during the commercial operation phase.

Other - Assuming 150 GWh of electricity produced by hydro plant instead of coal, for example, the CO2 avoided emissions estimated at 115,000 tons per year.

Increasing the availability of water resources of the watershed of the Panama Canal for drinking water, safe and efficient crossing of vessels from ocean to ocean through the canal, hydro generation power and flood control through the management of flood increases of Chagres River.

Reduce sedimentation, preserve the volume of the reservoir water of Lake Alhajuela and have regulated inflow of water to Alhajuela Lake.

After completion of the project, the performance of the water supply system for the Panama Canal will increase approximately by 400 million cubic meters per year, with a reliability of 99.6%. This is equivalent to approximately 5.3 additional daily lockages.

Environmental Considerations

The project is expected to have a significant positive effect on the environment. Currently, large thermal plants are considered to be major sources of air pollution. Due to the nature of the technology, the proposed hydro power plant has no emissions. Implementation of the hydro power plant (HPP) is estimated by the Consultant to result in annual savings of about 57,000 tons of coal and associated 115,000 tons of CO2 emissions. The construction of the plant will require the appropriate environmental assessment study. The study is also required if the Project Sponsor decides to pursue any international lending agency funding. The study will address all major issues associated with the construction of a hydro power facility of this size, such as flooding, resettlement, migratory fish control, archeological surveying, water quality, and other issues.

Among anticipated other positive impacts are:

- Conservation and mitigation measures in the river basin;
- No alteration of agricultural lands;
- Forestry conservation;
- Training, regarding environmental issues, provided to locals;
- New tourist and recreational activities;
- Life quality improvement for local communities due to new incomes; and
- Social commitment regarding education, health and production of goods.

Potential negative impacts are:

- Natural river flow alteration;
- Flora and Fauna conditions, of a specific area, modified due to the new reservoir;
- Sound pollution during construction; and
- Heavy equipment transit.

Follow-up and Further Information

The proposed project is in early development stages and requires significant development work. The Project Sponsor indicated interest in cooperating with U.S. companies for project preparation, project design and engineering, and EPC contracting.

Interested parties are encouraged to contact the Project Sponsor for more information and further cooperation steps.

Boris Zachrisson
División de Energía
Manager
Panama Canal Authority (ACP)
Administration Building of the Panama Canal
Balboa, Corregimiento Ancón, Republic of Panama.
Tel.: (507) 272-4469
Fax: (507) 272- 6899
e-mail: bzachrisson@pancanal.com

List of U.S. Companies Interested in Renewable Projects in Central America

Manufacturers

Gregory Snyder
Regional Manager
Voith Hydro Inc.
Marketing
760 East Berlin Road
17408 York (PA), United States
Office 717-792-7137
Fax 717-792-7884
Mobile 717-891-3423
Gregory.Snyder@Voith.com
http://www.york.voithhydro.com

Eric Melander
Canyon Hydro
5500 Blue Heron Lane
Deming, WA 98244
Tel. 360-592-5552
eric.melander@canyonhydro.com

GE Energy (Hydro)
Hydro Refurbishment and Parts
Frank.Garwatoski@ge.com
Hydro Control Systems (new and refurbished)
Yvan.Bouchard@ge.com

GE Energy (Wind)
Charles E. Parsons
Regional Director
Latin America
7600 Corporate Center Drive
Suite 600
Miami, FL 33126
Tel. 305-593-4710
Cell. 305-322-3911
charles.parsons@ge.com
www.gepower.com

Doug Miller, P.E.
Managing Director, International
American Hydro Corporation
135 Stonewood Road
P.O. Box 3628
York, Pennsylvania, 17402
Phone: 717-755-5300
Fax: 717-755-5522
dmiller@ahydro.com

Anthony V. Strayhorn
Sales Applications Engineer
AE&E-Von Roll, Inc.
302 Research Drive
Suite 300
Norcross,GA 30092
Tel. 678-687-0481 (mobile)
Tel. 678-987-7827 (office)
Anthony.Strayhorn@aee-vonroll.com

Rick Holmes
Sales Manager
INDEECO
425 Hanley Industrial Court
St. Louis, MO 63144
www.indeeco.com
Tel. 314-644-4305 x 231
Fax 314-644-5332
Email: rholmes@indeeco.com

Sunovia Energy Technologies
Craig Hall, Co-founder
Sunovia Energy Technologies, Inc.
6408 Parkland Drive
Suite 104
Sarasota, FL 34243
Tel. 941-751-6800
info@sunoviaenergy.com

Developers

Ron Bruce
Senior Vice President and Partner
WindJET Energy Corp.
Tel. 507-6798-1349
Skype Contact - ron.bruce007
ron.bruce@comcast.net

Christian Beyer
Chief Marketing Officer
Diversified Energy International
Tel. 303-359-4793
christian.r.beyer (SKYPE)
Alternative Energy Solutions for Emerging Markets
cbeyer@energy-intl.com

Dr. J. Thomas (Tom) Morrow, PE
President & CEO
Green Energy 1, Inc.
tmorrow@greenenergy1.com

James W. Taylor, Jr.
President
Taylor Biomass Energy, LLC
336 Neelytown Road
Montgomery, NY 12549
Tel. 845-457-4021 ext. 226
Cell 914-755-6868
Fax 845-457-1917
jim@taylor-recycling.com
www.taylorbiomassenergy.com

Dan Christensen
CMI
7633 South Union Park Avenue
Midvale, UT 84047
Tel. 801-599-4322 cell
Tel. 801-572-2408 office
commercialmortgage@earthlink.net

Richard Warren
CEO
rwarren@bfwgas.com

Steve Ihnot, CFO
Mesoamerica Energy
Tel: 506-2209-7950
Fax: 506-2209-7957

Juan José Lao Martin
President
Non-traditional Environmental Waste Solutions of Latin America (NEWS)
phone 506-8384-8490
jjlao@gruponews.net and
jjlaom@gmail.com

Edgard Cifuente Velasquez
Project Developer
Energy International Inc.
1983, N.W. 88th Court, Suite 304
Miami FL 33172 USA
Tel. 305-593-5085
ecifuentes@enintco-epc.com

Consultants/Engineers

Al Ferrer
Vice President,
Power Consulting
Burns and Roe Enterprises, Inc.
800 Kinderkamack Road
Oradell, NJ 07607
Tel. 201-986-4179
aferrer@roe.com
www.roe.com/

Bruno Trouille, Vice President
MWH Natural Resources
175 West Jackson Boulevard
Chicago Illinois 60604
Tel. 312-831-3197
E-Mail: bruno.trouille@mwhglobal.com

Marc J Rogoff, Ph.D.
Project Director
SCS Engineers
Tel. 813-621-0080 / 810-5547
mrogoff@scsengineers.com
www.scsengineers.com

David Walden
Bioenergy Program Officer,
Winrock International
2121 Crystal Drive, Suite 500
Arlington, VA 22202
Tel. 703-302-6500
Fax: 703-302-6512

Judy Siegel
President,
Energy & Security Group
1850 Centennial Park Drive, Suite 105
Reston, Virginia 20191
Tel. 703-689-4670
Fax 703-689-4427

Advanced Engineering Associates International, Inc.
1707 L Street, NW – Suite 725
Washington, DC 20036
Tel: 1-202-263-0601; Fax: 1-202-955-9082
E-mail: smaia@aeai.net / www.aeaiinc.com
185 Alewife Brook Parkway, Suite 400
Cambridge, MA 02138
Tel.1-617-868-0018, x22;
Fax: 1-617-868-0818
E-mail: Ranjan@aeai.net

Ignacio Rodriguez
Partner
PA Consulting Group
4601 N Fairfax Drive, Suite 600
ArlingtonVA22203
USA
Tel. 571-227-9446
ignacio.rodriguez@paconsulting.com

Kevin Keller
Practice Leader Trasportation Environmental Services
HDR, Inc.
4435 Main Street, Suite 1000
Kansas City, MO 64111-1856 USA
Tel. 816-360-2753,
Cel.:913-638-2571
Fax. 816-360-2777
kevin.keller@hdrinc.com
www.hdrinc.com

Michael Murphy
DTA (acquired by HDR)
Director of Renewable Energy Alternative Technologies Hydro Wind Tidal Wave
970 Baxter Boulevard, Suite 31
Portland, ME 04103-5346 USA
(207)775-4495(207)775-1742
Michael.E.Murphy@hdrinc.com
www.hdrinc.com

Other (Legal and Professional Associations)

Rick Lammers, General Manager
Arctas Capital
1330 Post Oak Boulevard,
Suite 1375
Houston, TX 77056
USA
Tel. 713-513-7120
Fax: 713-513-7123
Email: info@arctas.com

Jay M. Gutierrez
Partner, Practice Group Leader
Morgan, Lewis & Bockius LLP
Tel. 202-739-5466
jgutierrez@morganlewis.com

Jorge Kamine
Counsel
Skadden, Arps, Slate, Meagher & Flom LLP
Washington, D.C. Office
Tel. 202-371-7263
Fax: 202-661-8343
jorge.kamine@skadden.com

Mark Lambrides
Division Chief Climate Change, Energy & Natural Hazards
Organization of American States Department of Sustainable Development
1889 F Street, NW, Washington, DC 20006
Tel. 202-458-6261
Fax. 202-458-3560
mlambrides@oas.org

Peter Parsons
Davis Wright Tremaine, LLP.
Suite 2200, 1201 Third Avenue
Seattle, WA 98101-3045 USA
Tel. 206-757-8120;
Cel.: 206-618-2144
Fax 206-757-7120
peterparsons@dwt.com
www.dwt.com

American Wind Energy Association (AWEA)
1501 M Street NW
Suite 1000
Washington, DC 20005
Tel. 202-383-2500
Fax 202-383-2505
windmail@awea.org

Latin America Wind Energy Association
Av. Terranova 1091 - 2, Guadalajara, Mexico
Tel: +52 33 38178300
Fax: +52 33 38178758
info@lawea.org

Scott Hennessey
Manager for Climate and Energy Markets
Solar Energy Industries Association
575 7th Street, NW, Suite 400, Washington DC 20004
shennessey@seia.org

Tom Nicholas
Regional Director
Solar Electric Power Association
1220 19th Street, NW, Suite 401, Washington, DC 20036-2405
Tel. 202-559-2029
tnicholas@solarelectricpower.org

Geothermal Resources Council (GRC)
Curt Robinson Ph.D., Executive Director
2001 Second Street, Suite 5, Davis, CA 95617-1350
Tel. 530-758-2360
Fax 530-758-2839
E-mail crobinson@geothermal.org

Geothermal Energy Association
Karl Gawell, Executive Director
209 Pennsylvania Avenue SE, Washington, DC 20003
Tel. 202-454-5264,
Fax 202-454-5265
E-mail gea@geo-energy.org

Solid Waste Association of North America (SWANA)
1100 Wayne Avenue - Suite 700
Silver Spring, Maryland 20910
Tel. 800-467-9262
Fax: 301-589-7068
http://swana.org

National Hydropower Association
25 Massachusetts Ave., NW, Suite 450
Washington, DC 20001
Tel. 202-682-1700
Fax: 202-682-9478
help@hydro.org