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THE GEOTHERMAL ENERGY IN THE GLOBALIZATION PROCESS

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ABSTRACT

The trend toward globalization by international power and energy companies have led geothermal power production to change the scheme, adjust its activities to meet the legal regulatory framework and try to be competitive in the electricity market. The privatizations in Central America are at different stages of development. Guatemala had privatized the distribution of electricity, yet energy production is not subject to privatization. Geothermal production which is at an early stage with two geothermal plants located at Amatitlán geothermal field and Orzunil I power plant, have had experience during this first year the in the new environment of the electricity market. Some of these aspects are considered and a plan to increase the geothermal production in the country is included, as well as their case history. The projection of the geothermal energy in the context of globalization is taken into account and the mechanisms to increase the options to develop geothermal energy by private investors.

1. INTRODUCTION

Globalization has allowed an increasing integration process to the world but it has produced economical, financial and environmental onstraints in the rich and the poor countries.

Latin America has during the last years been in a profound political and economical reforms. This represents for many countries a fundamental departure from a political and economic model that has prevailed for a half century. As part of their macroeconomic reform efforts, Latin American governments have examined the structure, function and performance of their utility sectors and they were well advised to reevalute their infrastructure sectors given their enormous importance in supporting economic growth and social well being. This recent economic reform is changing the way in which electric power and other infrastructure sectors are owned and operated. The energy sectors had been in most cases national and a natural monopoly. Governments throughout Latin America assumed the multiple roles of owner, operator, and regulator a combination of roles that has proved to be unsustainable. A large number, if not most countries have embarked on the difficult process of energy sector reform. The pioneer effort in the electric reform was in Chile (1982), followed by Argentina (1991), Perú (1992), Colombia (1994, Bolivia (1994).

An energy reform has been made in Central America, initiated in El Salvador, followed by Guatemala and Panamá. Some other Central American countries are imitating their processes.

The signing of the final peace accord on December 1996, finished the country's 36 year-civil war. As part of the peace process, the government is committed to increase the spending on infrastructure expansion and social and economic development programs. Guatemalan population is increasing the demand for electricity and the Government had been required to assist this demand, increasing the generation, transmission and distribution of electric energy, given to the sector a new legal framework on November 1996, known as General Electricity Law.

2. REGULATION OF THE ELECTRICITY SECTOR IN GUATEMALA

2.1 General Features

On November 15, 1996, the Congress of the Republic of Guatemala passed the General Electricity Law with the purpose of establishing the main norms for the development of transmission, commercialisation, distribution and generation activities in the electricity sector. Subsequently, on March 21, 1997, the Ministry of Energy and Mines issued the Regulations for the General Electricity Law. The objective of this new regulation can be summarised in the following points:

- That the electricity industry be developed in an open and competitive environment where it is possible to have prices which reflect cost-efficiency;
- That electricity service to customers is provided under good quality conditions and that customers can benefit from prices resulting from a competitive market; and
- That the electricity industry in Guatemala is able to integrate itself within the Central American regional market.

The basis of the restructuring process is the vertical and horizontal segmentation of generation, trading, transmission and distribution activities. It is necessary to clarify that, although the same company cannot participate at the same time in generation and/or transmission and/or distribution activities, an individual or a firm can simultaneously participate as shareholders in generation, transmission and/or distribution companies. However, distributors can only have an installed generation capacity of up to 5 MW.

Generation and commercialisation activities are organised in an electricity wholesale market giving open access to new participants and open frontiers for wholesale markets of other countries. Income generation through imports benefits the market by increasing competition and ensuring supply for end users. In turn, the opportunity to export generation surpluses increases the size of the market to which domestic generators have access. In this way, an open-border regime increases market size and permits taking advantage of better prices within the region. It also gives access to other countries' surpluses and increases the utilisation factor of installed capacity through sales to other countries.

The market allows competition at two different levels:

- In generation, competitive wholesale prices obtained within a centralised supply and operation system in which, local or foreign generators can participate; and
- In the commercialisation of demand, where large non-regulated users can choose their supplier freely.

Users with a demand greater than 100 KW are considered Large Users and, as such, they have the right to choose their electricity supplier, whether generator or trader, from the distributor to whom the distribution network belongs. The activities of the demand set requirement to be a Large User can be modified by the Commission.

Monopolies in networks, distribution and transmission are specifically regulated. There are established rates, a code of rights and obligations for users and quality standards. The law provides open access to transmission and distribution networks for physical access to the market and for energy transactions. Failure to provide non discriminatory, open access by transporters or distributors may result in suspension of the authorisation to provide such service.

Tolls to be paid by agents for use of the transportation system, transforming substations and distribution facilities are also regulated. Tolls will reflect the average cost of capital and operation of economically adapted transportation systems.

Detailed regulations for transport and distribution services are defined by means of technical norms issued by the Commission that have to be adjusted pursuant to the General Electricity Law and its Regulating articles.

2.2 Regulatory and Controlling Bodies

Ministry of Energy and Mines

The Ministry of Energy and Mines (MEM) is the governmental body in charge of enforcing the General Electricity Law and its Regulating articles; formulating and co-ordinating policies, preparing particular plans, which are not compulsory for all participants; and issuing authorisations to provide distribution, transmission and generation services.

National Commission for Electric Energy

Comisión Nacional de Energía Eléctrica (CNEE) is an autonomous body which acts as regulatory agent for the electricity sector in general. Its main responsibilities comprise: (I) controlling the enforcement of law and regulating articles, (II) controlling service provision, supervising accomplishment of regulations in force and protecting the users' rights, (III) defining tariffs subject to regulation, (IV) establishing technical norms and ensuring their compliance, (V) preventing anti-competitive behaviours, monopolies and discrimination among the participants, and (VI) imposing penalties based on non compliance with the provisions contained under the regulatory framework.

Administrator of the Wholesale Market

The Administrator of the Wholesale Market (AMM) is the one responsible to ensure transparency and objective operation of the wholesale market. It has the responsibility of centrally programming the safety and quality of the network´s operation; carrying out economic supply and mananging the resources by minimizing operational cost, including failure costs, according to generation offers and within the restrictions imposed by transmission network and service quality requirements.

The General Electricity Law led to the creation of three independendent enterprises within INDE (Instituto Nacional de Electrificacion) for the provision of the different services:

- EGEE (Empresa de Generación de Energía Eléctrica) (Generation)
- ETCEE (Empresa de Transporte y Control (Transmission)
- EDEE (Empresa de Distribución de Energía Eléctrica) (Distribution)

The distribution company was divided into two companies covering the Eastern and the Western region of the country, and sold their shares on May 1999 to the private sector (Unión FENOSA, ACEX, S.A.) to encourage competition, within Guatemala's electricity sector, favour market development within the country and facilitate regulation.

3. ENERGY GENERATION

Access to generation is free and no authorisation is required. There is no need of authorisation, license or permit to install or operate generation plants. However, hydroelectric plants and others using public resources need to have a specific authorisation from the Ministry when the installed capacity is greater than 5 MW and its duration may not exceed 50 years. To carry out feasibility studies for hydroelectric or geothermal plants a 1 -year temporary license is issued.

The law sets out application and awarding procedures for authorisations, temporary or permanent, through a Ministerial Agreement containing rights and obligations for the awardee and the nation. Within the 30 days following authorisation, the Ministry and the awardee shall enter into a contract to include the conditions established under the Ministerial Agreement, that is, the rights. and obligations regime for both parties.

To be connected to SIN and operate within the system, the Generator shall comply with all technical requirements provided by the norms which ensure compliance with quality and safety standards corresponding to the network operation.

On the other hand, before starting the operation, generating plants require an authorisation from the Environmental National Commission (CONAMA). In order to obtain such an authorisation, the Generator shall submit an appropriate environmental impact study.

4. GEOTHERMAL ENERGY PRODUCTION

In Guatemala generation is carried out by a number of private companies and INDE. Among the private companies are large international firms such as Enron, Guatemala, Generating Group (GGG-Constellation), and other local generators, which together produced 48% of total generation in 1997. EGEE (INDE) produced the remaining 52% of the total electricity in the country. By the end of 1998 private generators produced almost 58% of the country's electricity. (Figure 1).

Amatitlán Geothermal Plant

The first geothermal plant is located at Amatitlan (5MW) geothermal field and started operation on November 1998 and is a minimum part of the total generation but significant to be the first in the country of this type.

The geothermal power plant at Amatitlán is a backpressure turbine of 5 MW installed under a three year contract with ICA (Civil Engineers Associated) and CFE (Comisión Federal de Electricidad) from Mexico,. It produces electricity to the country national grid, evaluating the potential of the geothermal reservoir and the behavior of the two production wells in the area.

The steam is provided by the two productive wells AMF-1 and AMF-2.

Orzunil Geothermal Plant

INDE has contracted Ormat to construct and operate a 24 MW power plant at Zunil since 1993 and they started building in August 1995. Due to different situations ORZUNIL has had to delay to startup of the plant, but these problems have now been solved and the date to initiate operations is set for August 1999. INDE will be responsible for operating the wells, the steam supply system and in providing the steam to the power plant, as well as to reinject the waste fluid. The intention is to connect the directional wells (ZD-1 to 3) as well as wells ZCQ-3 and 6 to the power plant.

The country's total geothermal energy production by the end of 1999 is estimated to be gradually increasing with the addition of Orzunil, up to total by the middle of 2000 of 24 MW. (Figure 2).

5. OPTIONS TO PARTICIPATE IN GEOTHERMAL PROJECTS

The regulatory framework is clear and any investor is free to participate. There are 13 geothermal areas identified in the country with some feasibility and prefeasibility studies (FIGURE 3) where they can participate.
The options to private participation are free and INDE is interested to have a joint venture, a coparticipation or an agreement to continue the geothermal development.

The net positive environmental impact that geothermal energy has is another option to take into account to finance the geothermal projects. Through the Kyoto Protocol, the industrialized countries are required to reduce their gas emissions or to finance mitigation projects in the developing countries.

Central America has the oportunity to present mitigation projects through a regional level, it includes ssuch aspects as clean energy and renewable energy, in which the Geothermal Energy applies to be certified as a clean generation energy. The advantages to use geothermal energy over use of conventional fossil fuels are well known.

On the IV Hemispheric Conference of Ministers of Energy, held in New Orleans in the last week of July 1999, the mitigation of the gas emissions and the use of clean energy in the hemisphere was an important issue and a joint statement about them was made by the representatives of all the participants countries.

The importance to motivate the industrialized countries to finance geothermal projects and to find the mechanism to implement them is a goal to be achieve in the following years.

Guatemala established an Office to Joint the Implementation, which is in charge of these type of negotiations. The Amatitlan power plant and Zunil are in process to apply for a certification of clean and sustainable energy generator.

At present INDE has a proposal to the Ministry of Energy and Mines to sustain the renewable energy projects by means of charging the thermal producers per Kw/h produced a bonus to sustain the projects. The option is a pioneer in this sector so it has to be considered and represents the powering of the development of these type of natural resources.

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REFERENCES

Internal Report (1998): Geothermal Development in Guatemala, Instituto Nacional de Electrificación –INDE-, September Unidad de Desarrollo Geotérmico.

Report: National Economic Research Associates, Energy Reform and Privatization in Latin America prepared for Inter-American Development Bank.

Report (1998): Labor Memories 1998, INDE Corporation, Instituto Nacional de Electrificación, 1998. Gerencia de Planificación.

Interview: INDE's Chairman Board of Directors, Eng. Rodolfo Santizo Ruiz, Guatemala City.

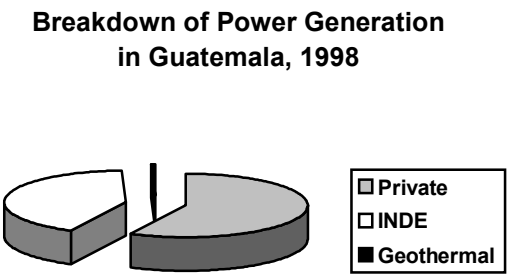

Figure 1. Breakdown of Power Generation in Guatemala (1998)

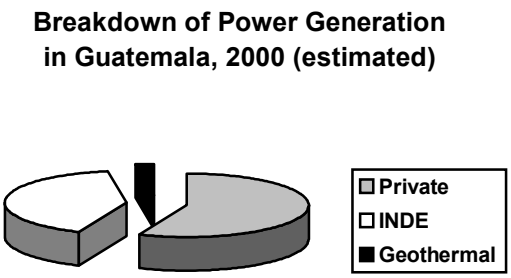

Figure 2. Breakdown of Power Generation in Guatemala (2000)

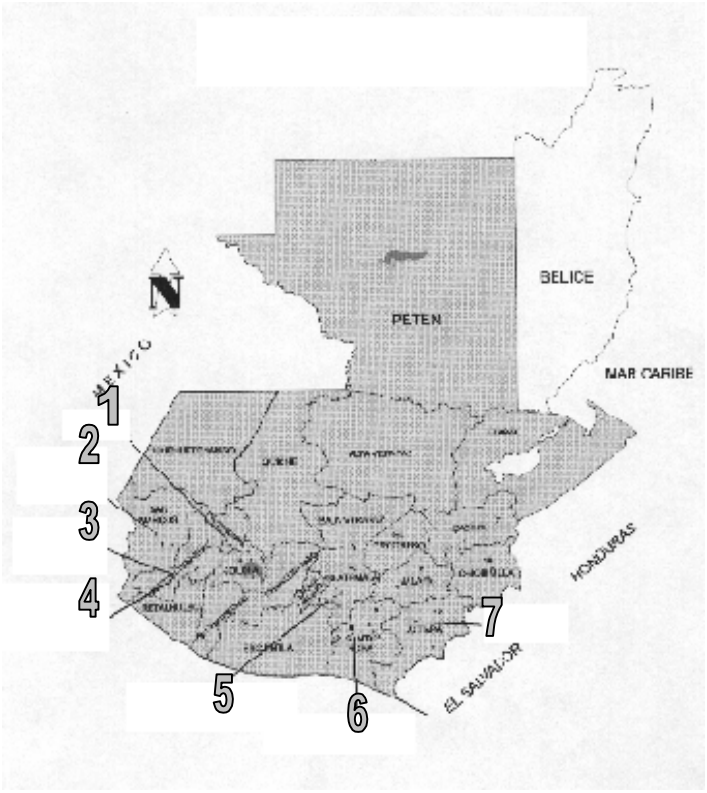

Figure 3. Guatemala's areas of geothermal studies

Feasibility Studies in

3 Zunil I
5 Amatitlán

Prefeasibility Studies in

1 Totonicapán
2 San Marcos
4 Zunil II
6 Tecuamburro
7 Moyuta