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GEOTHERMAL TRAINING PROGRAMME



## **EIA AND PERMITTING: TIME AND COST CONSIDERATIONS**

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### **ABSTRACT**

Environment law and regulations in El Salvador provide compliance requirements of environmental protection through the environmental assessment process for industrial projects, infrastructure, among others, power generation, but in the last case, undefined size of the power plant from renewable energy sources such as geothermal and/or fossil fuels.

Time and costs for project developers, particularly for obtaining Environmental Permits or Environmental Resolutions have become legal and institutional barriers which have required more attention by clients of the Environmental Ministry (MARN).

There are specific initiatives managed by partnerships between the National Energy Council (NEC) and the German Agency for International Cooperation (GIZ) in Renewable Energy and Energy Efficiency Program in Central America (2011) and proposal to the Establishment of the System of Environmental Auto-Regulation, submitted by LaGeo-CCAD MARN in 2005, all of which to facilitate the environmental assessment process to reduce time and costs for renewable energy projects, including geothermal medium and small scale. MARN has taken concrete actions to expedite response to the developers applying Categorization Project recently extended and contemplated in the Law.

### **1. INTRODUCTION**

The environmental regulatory framework for low enthalpy geothermal projects in El Salvador is still in its incipient stage, due to the fact that the country energy plans for more than four decades were aimed at generating electricity on a large scale and at accelerated pace, therefore, geothermal development has been based mainly on the use of high enthalpy (above 180°C) resources that can compete at the same rate of electricity generation sources by either bunker or hydroelectric base.

Low enthalpy geothermal resources have not yet been explored and developed in the country, with the exception of geo-scientific studies of thermal springs and shallow wells in some areas with hydrothermal manifestations developed only for tourism.

For concessions that tap resources in the country, the developer must submit to the recent changes of the legal and regulatory framework (SIGET Agreement No. 283-E-2003) for the development of

geothermal and hydro power projects of low scale, or with the new law recently approved, Article 18 of the Law on Concessions for small developers, Agreement 460.

According to the Environment Law, electrical power plant projects, including geothermal, require full compliance with the Environmental Assessment process according to Articles 21 to 29, which are presented in the General Regulations of the Law.

Since the creation of the Environment Law in 1998, there has been improvement and re-interpretation of some loopholes in reducing the processing for all types of projects. But still, efforts to continue to remove legal barriers, cultural, social and other types on the issue of development of renewable energy, including geothermal, is being carried out for the purpose of improving the response time of the Ministry, and thus contribute to short and long term sustainable development of the country, improving the energy matrix in accordance with the energy and environmental policies widely diffused to all sectors.

This paper presents the environmental regulatory framework for electricity power projects with emphasis on “Categorization: providing environmental assessment legal framework”. Some legal recommendations are presented for industrial project applications to promote the use of renewable energies, especially the use of low enthalpy geothermal resource.

## **2. EXISTING LEGAL FRAMEWORK**

### **2.1 Concessions**

The government of El Salvador has made major revisions in the regulatory framework for geothermal development projects and concession adjustments in the past two years. Previously, the Electricity and Telecommunications Superintendence (SIGET in Spanish) based on the General Law and Regulations of Electricity provides the granting of concessions for exploration and exploitation of geothermal and hydro resources. Currently, the granting of concessions is now the responsibility of the Legislative body based on the Articles 83, 84,103,110,120 and 131 of the Constitution of the Republic.

Despite the changes of the General Electricity Regulation, SIGET will still continue to make an important role in the establishment of generation contracts, development of technical standards for verification and compliance audits required by law to developers and administration of fiscal incentives for renewable energy projects, etc.

### **2.2 Environmental Assessment (EA) process in El Salvador**

The Environmental Assessment (EA) under the Environment Law is known as the process or set of procedures that allows the state, based on an environmental impact study, the assessment of the environmental impacts that could cause on the environment during the execution of a particular work, activity or project, and also, to ensure the implementation and monitoring of environmental measures to prevent, eliminate, correct, address, offset or enhance, if necessary, these environmental impacts.

Article 21, f) of the Environmental Law requires the submission of an Environmental Impact Study on electricity generating power plants based on nuclear, thermal, geothermal, hydro, wind and tidal energy regardless of their size. However, progress in the categorization of projects as a tool for environmental analysis allows the evaluator to determine how significant the project is. This topic will be discussed in detail in section 2.2.2.

Figure 1 presents graphically the major entities involved in the environmental assessment process which includes the project developer, MARN and the civil society, Furthermore, three global stages are part of the process.

Stage a) *Initial Environmental Assessment*, where the Ministry is lead agency and analyzes the magnitude of the project presented in the Environmental form. Likewise, field inspection is undertaken where the project is located.

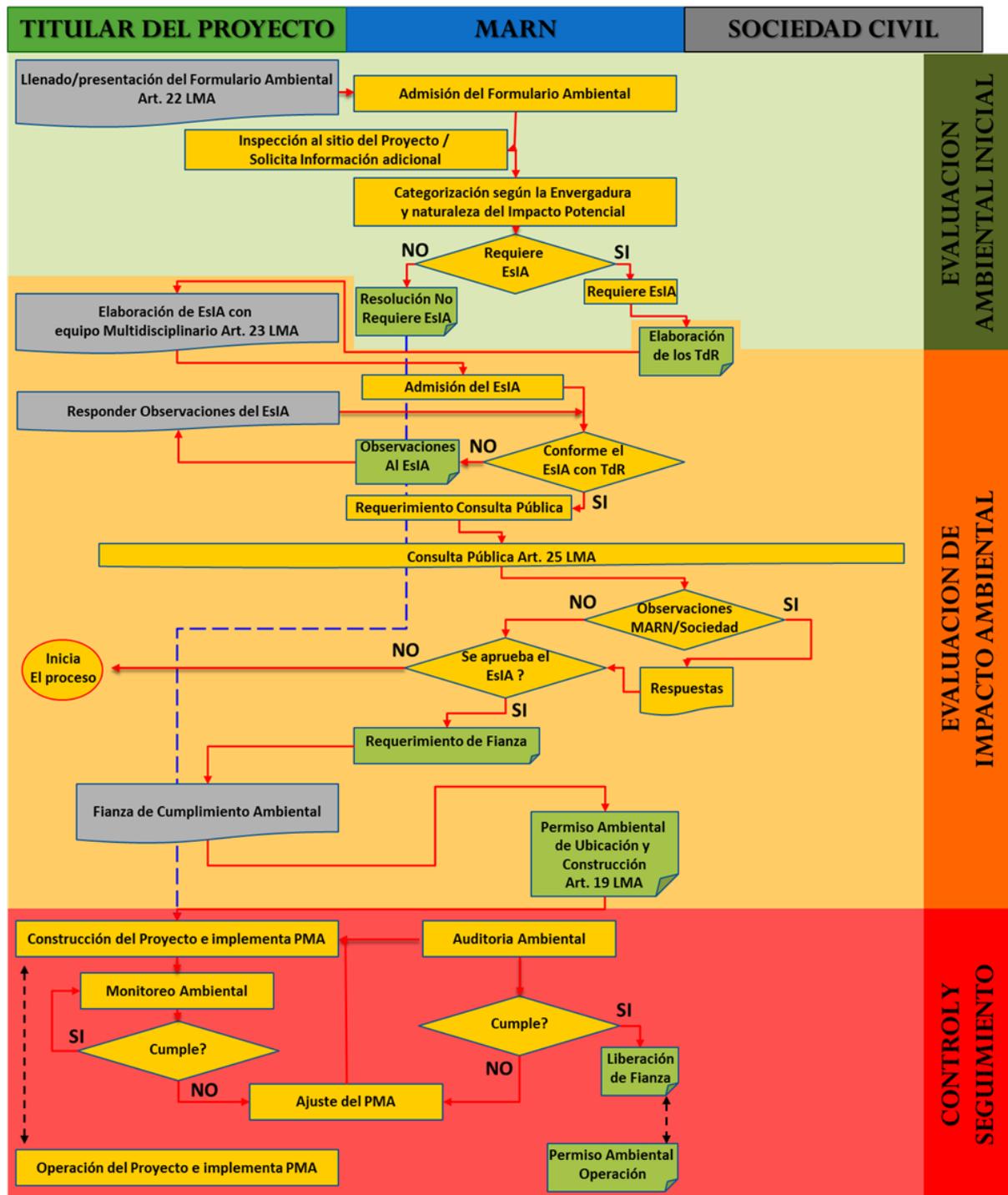


FIGURE 1: Environmental Assessment process for geothermal projects

At this stage, the MARN Categorization criteria applied determines whether or not the project requires an Environmental Impact Study (EIS). If so, then MARN sends to the developer terms of reference (TOR) for them to prepare. The TOR are instruments designed to define the content and approach to adopt the EIS and ensure that resources (time and money) are allocated to the acquisition of the information needed for decision-making and not just an excessive research.

Stage b) *Environmental Impact Assessment* is for project developers advised to prepare the EIS, a document that allows objectively the analysis of the environmental impacts of their activities, supported by scientific information; predicts and evaluates these impacts (+/-) that can be generated during the project construction/operation. Also included in this study are measures for mitigation (Environmental Management Program and corresponding monitoring, which includes the implementation, effectiveness and validation of environmental measures). The Environmental Management Program requires payment of an Environmental Guarantee equivalent to the amount of all environmental measures to be carried out in the project environmental feasibility.

Subsequently, the EIS is submitted to public consultation process where the project is summarized and publicize for three days in a local newspaper of the country. Simultaneously, the document should be available on the website of MARN and physically shown in the Municipality where the project is located. If there are no complaints from the public that the project may cause a negative effect on their health, then MARN can grant the Environmental Permit (PA) to the developer, but the PA does not exempt them from other related authorizations or permissions to ensure the implementation of the project.

The process ends with stage c) *Control and Monitoring*, where the developer is audited by MARN to determine the compliance stipulated in the conditions of the Environmental Permit, and the release of the Environmental bond. At this stage also, the Municipal Environmental Units and social organizations play a key role in the Environmental Audit and Inspections.

### **2.2.1 Categorization of geothermal resource project utilization**

Categorization is based on Article 22 of the Environmental Law where the final part states that the Ministry categorizes the activity, work or project, according to size and nature of the potential impact", which in turn is based on the list of activities, work or projects requiring a study on Environmental Impact, according to Article 21.

It should be noted that the scope of an activity, work or project refers to the size, volume or extension, and the nature of the potential impact is related to the sensitivity of the site or condition of the environment where it is required to construct and the type or nature of activity, work or project to be undertaken.

More important are the specific objectives of Categorization, namely:

- Strengthen the technical criteria used in the process of environmental assessment activities, works or projects;
- Introduce to the developer of activities, works or projects these technical criteria under which the Ministry will evaluate the environmental documents, whether Environmental form, Environmental Impact Assessment, Environmental Management Program, etc.; and
- Reduce the discretion of the official of the Ministry of Environment, responding to the needs with the efficiency and effectiveness in the analysis of environmental impact assessment in order to promote sustainable development.

According to the categorization, the document presented by the Ministry of Environment and Natural Resources is divided into two groups:

**Group A**, called "activities, works or projects with low potential environmental impact" where the developer of the activity, work or project should not submit environmental documentation.

**Group B**, known as "activities, works or projects with minor and moderate or high environmental impact potential" where the developer of the activity, work or project must submit environmental documentation.

This group is divided into two categories; the first one is addressed to minor projects with low potential environmental impact (B1) and the second one, those with moderate or high potential (B2) environmental impact. As a result of the environmental assessment by the Ministry, category B1, as part of the resolution, the project will not require preparation of an Environmental Impact Study.

According to technical criteria for categorization, if the project is B2 category, then it must prepare an Environmental Impact Study, which should be given approval. As an example, Figure 2 presents the criteria for determining the category B1 and B2 for an activity or geothermal project.

| Criterios                       | Grupo B   |  |
|---------------------------------|---|--|
|                                 | Categoría 1   | Categoría 2  |
| Localización                    | <ul style="list-style-type: none"> <li>▪ Dentro del sistema campo-planta dentro del área concesionada.</li> <li>▪ Fuera de áreas naturales protegidas y sus zonas de amortiguamiento, sitios de valor cultural.</li> </ul>                        | <ul style="list-style-type: none"> <li>▪ Fuera del sistema campo-planta dentro del área concesionada.</li> <li>▪ Dentro de áreas naturales protegidas, sus zonas de amortiguamiento y/o sitios de patrimonio cultural.</li> </ul>                    |
| Emisiones atmosféricas          | <ul style="list-style-type: none"> <li>▪ Hasta 100 Ton CO<sub>2</sub>/día.</li> <li>▪ Hasta 10 Ton H<sub>2</sub>S/día.</li> </ul>   | <ul style="list-style-type: none"> <li>▪ Más de 100 Ton CO<sub>2</sub>/día.</li> <li>▪ Más de 10 Ton H<sub>2</sub>S/día.</li> </ul>  |
| Área                            | <ul style="list-style-type: none"> <li>▪ Hasta 3 Ha. Si se encuentra fuera del sistema campo-planta dentro del área concesionada.</li> <li>▪ Hasta 5 Ha. Si se encuentra dentro del sistema campo-planta dentro del área concesionada.</li> </ul> | <ul style="list-style-type: none"> <li>▪ Más de 3 Ha. Si se encuentra fuera del sistema campo-planta dentro del área concesionada.</li> <li>▪ Más de 5 Ha. Si se encuentra dentro del sistema campo-planta, dentro del área concesionada.</li> </ul> |
| Cobertura vegetal               | Menor de 30 árboles/Ha., con DAP igual o mayor de 20 cm.  | Mayor de 30 árboles/Ha., con DAP igual o mayor de 20 cm.   |
| Vías de acceso                  | No requiere apertura de caminos (utiliza accesos existentes, los mejora o amplía) o requiere la apertura de vías de hasta 500 m. de longitud si se encuentra dentro del sistema campo planta con Permiso Ambiental.                               | Requiere apertura de vías en áreas fuera del sistema campo-planta o requiere apertura de vías de más de 500 m. de longitud dentro del sistema campo-planta.  |
| Volumen de material de desalojo | Hasta de 10,000 m <sup>3</sup> por plataforma.  | Más de 10,000 m <sup>3</sup> por plataforma  |
| Pendiente                       | Hasta 30%.  | Más de 30%   |

FIGURE 2: Technical Criteria for the categorization of a geothermal project

### 2.2.2 Cost and length of time in the EA process

Time and costs associated with the EA process vary and are controlled by external variables that do not depend directly from the projects if the study is structured with good quality with reference to TOR. It can affect the evaluation process due to political situation, the technical evaluation of the project, the technical knowledge in geothermal and different stages of implementation. Table 1 presents considerations of cost and time for geothermal power projects based on LAGEO's experience.

TABLE 1: Time and Costs estimated for geothermal project implementation managed by LaGeo, SA de CV

| ACTIVITY/PROJECT  | PHASE OF GEOTHERMAL PROJECT CYCLE                 | PERIOD IN PROCESS | LAGEO STAFF COSTS* | EXTERNAL STAFF COSTS ** |
|---|---|-------------------|--------------------|-------------------------|
| C.W & Drilling of 2 wells in CHI-4 Pad                            | Chinameca Prefeasibility (Deep exploration)       | 6                 | \$16,600           | -                       |
| C.W & Drilling Wells on 4 Pads in Chinameca Geothermal Field      | Chinameca Feasibility                             | 40                | \$108,000          | \$18,000                |
| C.W & Mechanical Works for Binary Cycle 2 Berlin Geothermal Field | Development of Berlín Geothermal Field            | 27                | \$72,900           | \$18,000                |
| C.W & Drilling of 4 wells in SV-5 (SV-5 A,B,C,D)                  | San Vicente Prefeasibility (Deep Exploración )    | 8                 | \$21,600           | -                       |
| C.W & Drilling of one additional well on AH-35 (D) Pad            | Operation & Maintenance of Ahuachapán Power Plant | 8                 | \$21,600           | -                       |
| O.C y mecánicas de la interconexión AH-34/AH-16, C.G.AH           | Operation & Maintenance of Ahuachapán Power Plant | 9                 | \$24,300           | \$20,500                |

\* Cover direct and indirect costs of one person/ month

\*\* Cover payment for professional services in preparation of the study during 3 months

As mentioned above, Table 1 shows that the time of response does not depend on status or significance of project impacts, but to the discretion of the technical reviewers of the Ministry.

### 3. STRATEGIES AND PROPOSALS FOR IMPROVING EA PROCESS

Developers of power projects still experience legal barriers that do not allow them to act towards a clear process for exploration and exploitation of renewable natural resources. The origin of the conflict of interest is heightened from the policy of decentralization of electricity market created in 1998, which was established apart from the other institutions involved in the sector; hence some gaps arise, confusing the developer of power projects.

For more than ten years of an institutional framework for renewable energy development, several initiatives have emerged to contribute to the efficiency and effectiveness of government services in terms of administrative processes.

Some institutional policy to improve the EA process and the electricity sector initiatives are shown in the following.

### **3.1 Environmental Auto Regulation System**

Proposal prepared by LaGeo and CCAD and submitted to MARN in 2005, among other objectives presented are:

- Standardize criteria regarding quality requirements with environmental and social impact, under conditions of transparency, sustainability, monitoring and control in the context of geothermal projects and the operation of geothermal power plants;
- Streamline business processes and procedures and overcome legal gaps between requirements and MARN- SIGET;
- Promote better compliance with predetermined standards for achieving environmental policy goals in El Salvador; and
- Promote the development of culture on the importance and promotion of the exploitation of this kind of energy source.

### **3.2 Proposal Incentive Renewable Electric Generation Resources**

The Summary Progress Report (2007) UNDP / GEF project which concluded that the main barriers to investment are more of administrative nature. Among them are:

- It is proposed to establish specific and brief MARN rules for granting environmental permits for power plants below 5 MWe to reduce the participation of many technical specialists, focusing only to those areas with greatest environmental impact;
- It is proposed that public consultation be carried out together with the opposing groups on the projects; and
- Remove the bail application for projects where mitigation of environmental impacts is integrated into design system for generation and should be budgeted for implementation.

### **3.3 Proposal prepared by GIZ-CNE**

The consultancy with partnership of GIZ-CNE June/13 is known as “Entry Barriers to Low Enthalpy Geothermal Projects in El Salvador and Proposed Solutions”. The main purpose of the study is to establish strategies to facilitate the implementation of low-enthalpy geothermal projects within the appropriate socio-economic and climatic conditions in El Salvador, such as industrial, commercial or residential applications. As entry barriers to the use of this resource, the following were identified:

- Lack of a legal framework to regulate the quick granting of concessions at low enthalpy geothermal projects for generation of electricity; and
- Lack of environmental legal framework to regulate and facilitate the exploitation of low enthalpy geothermal resources.

### **3.4 Energy Policy in El Salvador**

The National Energy Council (NEC) issued the El Salvador Energy Policy for 2010-2014, which established as one of its principles, diversification of the energy matrix towards sustainable development and proper integration with other sectors. One of its objectives is to strengthen the institutional and legal framework to promote, guide and regulate the development in the energy sector. Diversification of the energy matrix and the promotion of renewable energy sources comprise the following key concepts:

- Design appropriate policy framework for the development that encourages private investment and to ensure energy supply to end users;
- Identify the national potential of renewable energy through different studies to determine the potential and allow proper planning of new projects; and
- Ensure benefits for communities involved and affected by projects of renewable generation, contributing to energy sustainability of the country.

The last proposal issued by the NEC is to have greater aperture to help improve the administrative processes and procedures for the investment of energy projects. The organizational structure of the Council, represented by the Ministers of Environment and Economy, is facilitating the institutional decision to give quality service to public and private user.

#### 4. RECOMMENDATIONS

Considering the application of environmental legal framework of the electricity sector, it should be made possible the implementation of renewable energy projects and especially the strengthening of management processes for the use of low enthalpy geothermal energy. The following recommendations are given:

Make proposals where the developers agree with the renewable energy projects, including geothermal high, medium and low enthalpies.

- The coordination should be handled by the National Council of Energy through civil participation (private schools, public schools, academes, non-governmental organizations, municipalities, etc.). All involved and interested parties should contribute on the efficient management processes without personal interests and compliance with the existing legal framework.
- That rightful institutions ensure legal compliance of the regulatory framework for the power sector, and must establish administrative processes and procedures considering the time and costs for developers and policy-state projects as well as strategies to rescue legal framework credibility.
- For the proposal in 3.3, a summary is prepared by GIZ and CNE, where in the introductory part of the original document presents a list of geothermal applications of low enthalpy in El Salvador by type of industry, however, there are barriers evaluated as lack of a legal framework to regulate the quick granting of concessions at low enthalpy geothermal projects, other than power generation activities. Secondly, the response time for obtaining permits is longer, thus delaying the start of the project and the return on investment; and the risk in obtaining financing. In this regard, it is worth reviewing the implementation of the Categorization of Environmental Law to Environmental Resolution included in the EA process, where no processing will be required by the Ministry for the Group A, which could also be applied to agro-industrial projects and residential-commercial sectors.

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