



ENVIRONMENTAL IMPACT ASSESSMENT OF GEOTHERMAL PROJECTS IN MEXICO

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ABSTRACT

The legal framework for environmental impact assessment in Mexico is the result of the evolution of Mexican law due to the internalization of international policies and the generation of scientific and practical knowledge, which allowed Mexican law to become increasingly strong and to consider the environmental impacts from a multidisciplinary approach.

The *Comisión Federal de Electricidad* (CFE) is the state company dedicated to the generation, transmission and distribution of electricity in Mexico. Currently, it has four geothermal fields in operation, Cerro Prieto, Los Azufres, Los Humeros and Las Tres Virgenes.

These projects have been conducted in full compliance with such legislation, also the changes that have been made to them have undergone assessment by federal environmental authorities, who review laws, regulations, norms and other instruments of public policy are met.

This article discusses the evolution of the Mexican environmental legal framework and its application in the development of geothermal power generation projects.

1. INTRODUCTION

The real concern of civil society in the 60's about the environmental pollution problems that some industries caused and their high costs of remediation, were a key factor for began to think, both governments and companies, to establish mechanisms to detect possible effects to the environment of development projects (INECC, 2012), prior to the meeting in Stockholm in 1972, the United States in 1970 enacted the first law concerning the protection of the environment (Arriaga-Becerra), which was adopted in some countries, including Mexico.

In México it was declared in 1971 the Federal Law to Prevent and Control Pollution, materializing the first effort which led to the legal framework on environmental impact assessment in Mexico, same that regulates the authorization of development projects in the country, such as electricity generation projects through geothermal energy.

2. EVOLUTION OF THE MEXICAN ENVIRONMENTAL LEGAL FRAMEWORK

In Mexico, before the 70's there were practically not any environmental criteria applied to the development of production processes, such as industry, although there were signs of increasing impacts in terms of air pollution and waste generation (INECC, 2000).

It was from 1971, with the issuance of the first environmental protection law - Federal law to prevent and control pollution (Carabias and Provencio, 1994) - and the establishment of the Secretariat of Environmental Improvement, attached to the Health Sector, that society and the government have tried to respond to environmental degradation processes (Quadri, 1994).

In 1972, the Stockholm Conference on the Human Environment catalysed global interest in environmental issues, to which Mexico was no stranger; however, environmental policy was limited to a public health approach and to nascent efforts by the then Ministry of Human Settlements and Public Works and Ministry of Water Resources (Quadri, 1994).

In 1972 The Secretariat for Environmental Improvement was established within the Ministry of Health and Welfare (Carabias and Provencio, 1994), then in 1973 was incorporated into the health code a chapter called environmental sanitation, and regulations were issued for control air pollution by smoke and dust, water pollution, pollution of the sea by waste and other systems that directly or indirectly were related to the control of industrial pollution (INECC, 2000).

In 1982, with the creation of the Ministry of Urban Development and Ecology and the new Federal law on environmental protection, the responsibilities are consolidated and approaches for most ambitious and comprehensive policy (Quadri, 1994), because until that time the problem was seen as a problem of general health.

In 1983 it is proposed to be reformed and added together several articles to the Federal Law on Environmental Protection to integrate norms, principles and other legal provisions relating to the conservation, protection, restoration and improvement of the environment (Carabias and Provencio, 1994).

In 1988, the issuance of the General Law of Ecological Balance and Environmental Protection laid the groundwork for linking the environment with development issues and included important environmental policy instruments, such as the assessment of environmental damage, ecological land use, the system of protected areas, ecological planning and ecological criteria in promoting development (INECC, 2000).

Since the enactment of the General Law of Ecological Balance and Environmental Protection, the CFE has had to obtain the corresponding environmental impact authorization, for hundreds of projects of generation, transmission, transformation and distribution of electricity and their associated activities.

3. CURRENT ENVIRONMENTAL LEGAL FRAMEWORK

According to the General Law of Ecological Balance and Environmental Protection (LGEEPA) (Presidency of the Republic of Mexico, 2016), environmental impact is considered as "changing the environment caused by the action of man or nature" (Article 3 Fraction XIX LGEEPA). Also, in accordance with Article 3, Section XX of the Ecology law, the Environmental Impact Statement (EIS) is: "The document in which is disclosed, based on studies, environmental impact, and significant potential that would generate a work or activity and how to avoid or mitigate it in case it is negative" (Article 3 Fraction XX, LGEEPA).

Thus, the objectives of the environmental impact assessment are to identify the effects that a project can cause on the environment; estimate the magnitude of effects; and preventing the effects on the environment and avoid or minimize (Quintana-Valtierra, 2009).

To summarize, Quintana explains that then the instrument available to the State for the implementation of the general policy of ecology, is the assessment of the environmental impact of works or activities under federal jurisdiction, which may cause ecological imbalances or exceed the limits and conditions set forth in the regulations and the Mexican official standards issued by the Federation to maintain ecological balance and protect the environment.

Specifically, the environmental impact assessment is the process through which the Ministry of Environment and Natural Resources (SEMARNAT) establishes the conditions to which the performance of works and activities are subject, in order to avoid, reduce or offset its effects negative environmental.

Currently the Mexican environmental legal framework is composed of a series of laws, regulations, standards and international treaties that must be observed in the development of projects of the Comisión Federal de Electricidad (CFE, 2007), and between which are the following:

Laws

- General Law of Ecological Balance and Environmental Protection (LGEEPA);
- General Law of Sustainable Forestry Development;
- General Law for the Prevention and Management of Waste;
- National Water Law; and
- Federal Tax Law on Water.

Regulations

- General Law of Ecological Balance and Environmental Protection regulations in the areas of:
 - Environmental Impact Assessment;
 - Registration Pollutant Release and Transfer Prevention and Control of Atmospheric Pollution;
 - Environmental Protection Against Pollution from Noise Emission;
 - Protected Natural Areas;
 - Ecological Management;
- Regulations of the National Water Act;
- Regulation for the Land Transport of Hazardous Materials and Waste Management;
- Regulation of the Law on Monuments and Archaeological, Artistic and Historic Zones; and
- Regulations of the General Law of National Assets for the Use and Development of the Territorial Sea, Waterways, Beaches, Federal Maritime Terrestrial Zone and Land Reclaimed from the Sea.

Mexican official norms

There are 82 official Mexican norms (NOM) published by SEMARNAT (in addition to those published by the Ministry of Communications and Transport related to the transport of waste and hazardous materials and the Ministry of Health related to air quality. These norms correspond to various topics as water (4), atmosphere (28), fuels (2) natural resources (27), waste (10), noise (4) and environmental impact (7) (CFE, 2007).

3.1 Environmental impact assessment of geothermal projects in Mexico

As we have seen, the environmental legal framework that involves development projects in Mexico is quite broad and complex; however, the only government agency with the ability to assess and resolve in favor or against the project is the Ministry of Environment and Natural Resources.

The Ministry of Environment and Natural Resources, and considering the stipulated in the LGEEPA, receives the environmental impact statement, which consists of 15 chapters in which explains what is the project that is being requested, -in the case of a geothermal project this ranging from drilling a well to the construction of power plants- where it plans to build the project, the environmental system presented at the site of interest, positive and negative impacts that are anticipated to occur by development the project and what activities or works to be undertaken to mitigate, minoritised or prevent damage to the environment will be taken.

Subsequently, the Secretariat will issue its decision within the next 60 days, which can be accepted, rejected or accepted conditionally (a set of criteria that the petitioner must comply and show to the environmental authority).

The Comisión Federal de Electricidad has exploited geothermal resources in the country since the early 70's so the environmental impact assessment was not mandatory, however, the desire that the company is fully regularized in environmental matter, lead to the assessment of environmental impact statements for projects of Cerro Prieto and Los Azufres, same that were authorized without any problem and are currently generating clean energy.

Once the projects are authorized in environmental impact, the company is required to follow up the programs proposed to ensure that the possible negative effects are mitigated, and that no side effects occur by the operation of the projects.

In the case of geothermal projects operated by the CFE, it has never had trouble getting environmental resolutions for development projects, which speaks of experience and commitment to the CFE in developing projects that do not conflict with the environment and which in turn are potentiators of economic development.

4. CONCLUSIONS

- The environmental legal framework is the result of the evolution of Mexican law due to the internalization of international policies and the generation of scientific and practical knowledge.
- This framework is very broad and complex.
- The environmental impact assessment is the tool available to the Mexican state to evaluate and determine that development projects do not endanger the environment.
- The environmental impact does not end with the authorization of the project but is required to follow up on the commitments made.
- Must comply with programs to prevent the project will generate negative effects that endanger the health of the ecosystem, and thus ensure that the project is environmentally viable.

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