

## Target

Analyze the legal status of geothermal resources in Mexico before and after the recent energy reform, proposing adaptations that allow development of low enthalpy geothermal energy projects

## Introduction

The interest of this work comes from iDEA group of the Engineering Institute of the National Autonomous University of Mexico, whose objectives are research, innovation and development of low enthalpy geothermal energy projects in Mexico. One of the barriers of the development of these projects is the non existing robust legal regime to develop such projects.

## Development

Comparison between the previous and current regulation

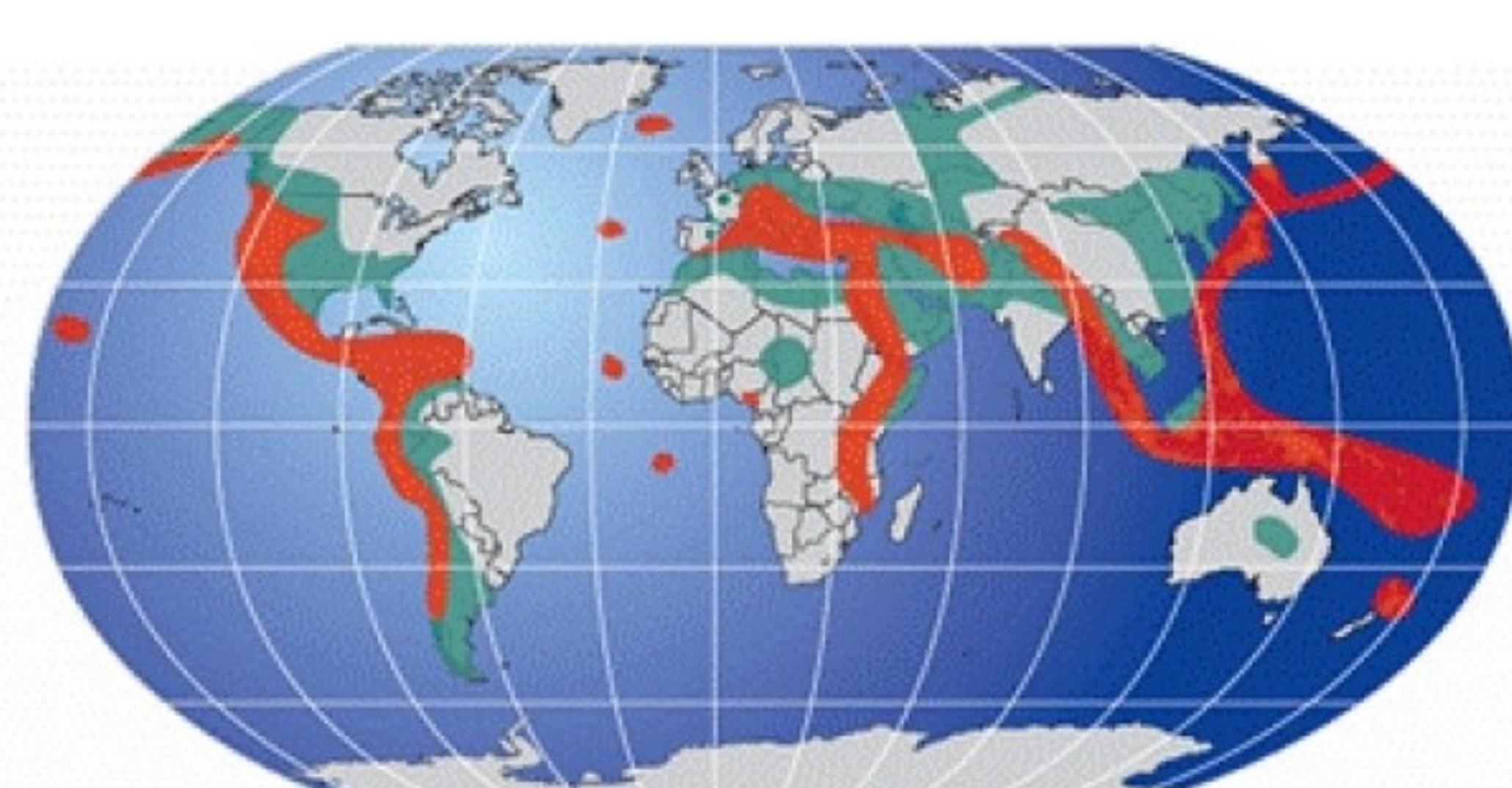
Before	After
<ul style="list-style-type: none"> <li>The use of ground water or steam above 80 °C, require the previous grant for geothermal generation and other uses. (CONAGUA)</li> <li>Low enthalpy geothermal energy is not present in the regulation</li> </ul>	<ul style="list-style-type: none"> <li>SENER will be in charge of issuing the technical or administrative provisions of a general nature.</li> <li>Three stages are proposed: reconnaissance, exploration and exploitation.</li> <li>It aims to give legal certainty to investors.</li> <li>It is proposed that exploration permits are valid for three years, renewable for another three years</li> <li>Low enthalpy geothermal energy is not contemplated</li> </ul>

Direct uses of geothermal energy in Mexico (International Geothermal Association, 2013)

USE	INSTALLED CAPACITY	
Individual heating	0.460 MWt	4.397 TJ/year
Greenhouse warming	0.004 MWt	0.059 TJ / year
Agricultural drying	0.007 MWt	0.101 TJ / year
Bathing or swimming	155.347 MWt	4,018.229 TJ / year
TOTAL	155.818 MWt	4,022.786 TJ / year

Use of low enthalpy resources in many countries (International Geothermal Association, 2013)

Country	Capacity MWt	Annual use TJ/year
Argentina	307.5	3906.7
France	1345	12929
Germany	2485.4	12764.5
Mexico	155.8	4022.8
Norway	3300	25200
Venezuela	0.7	14
World	50583	438071

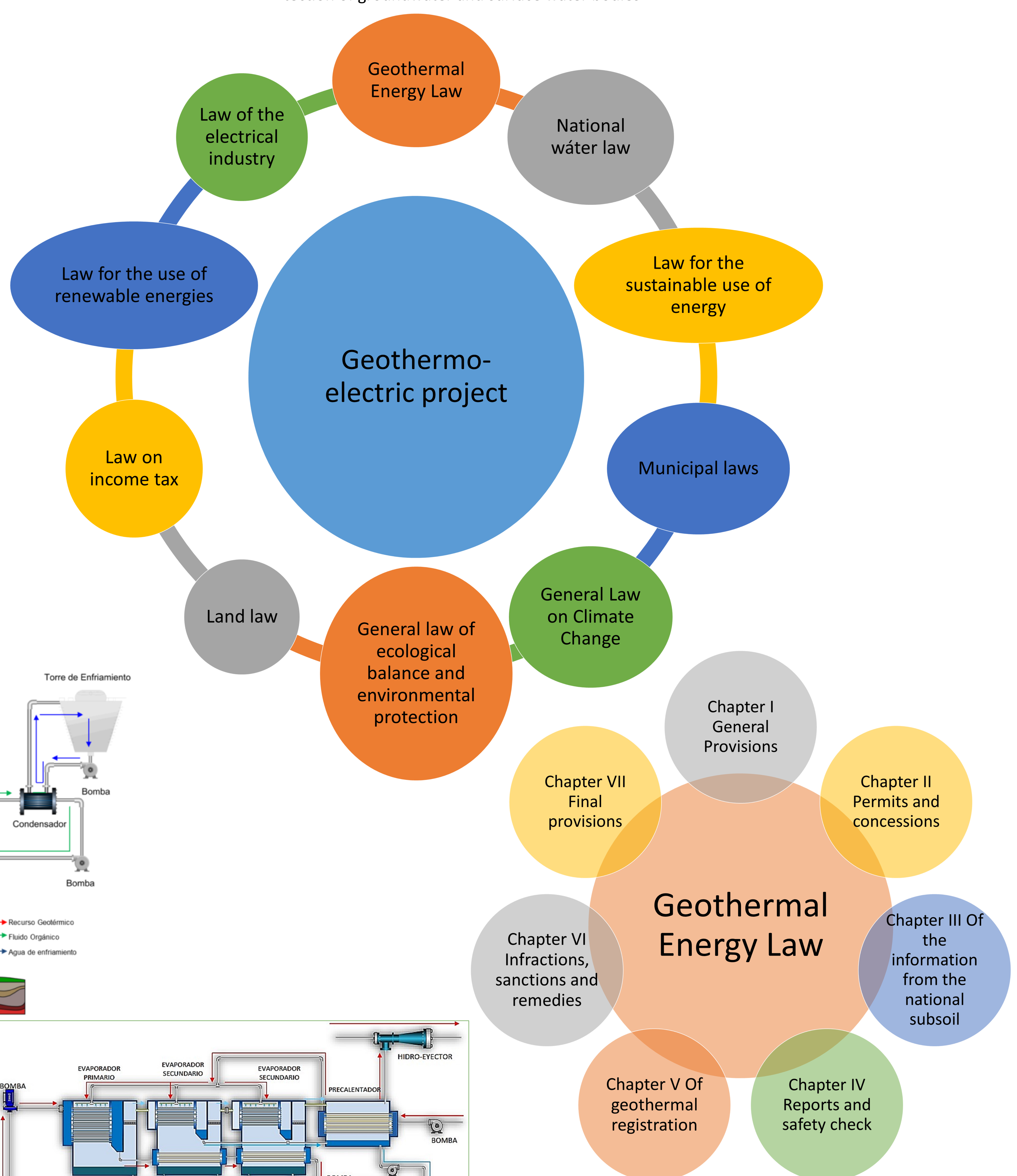
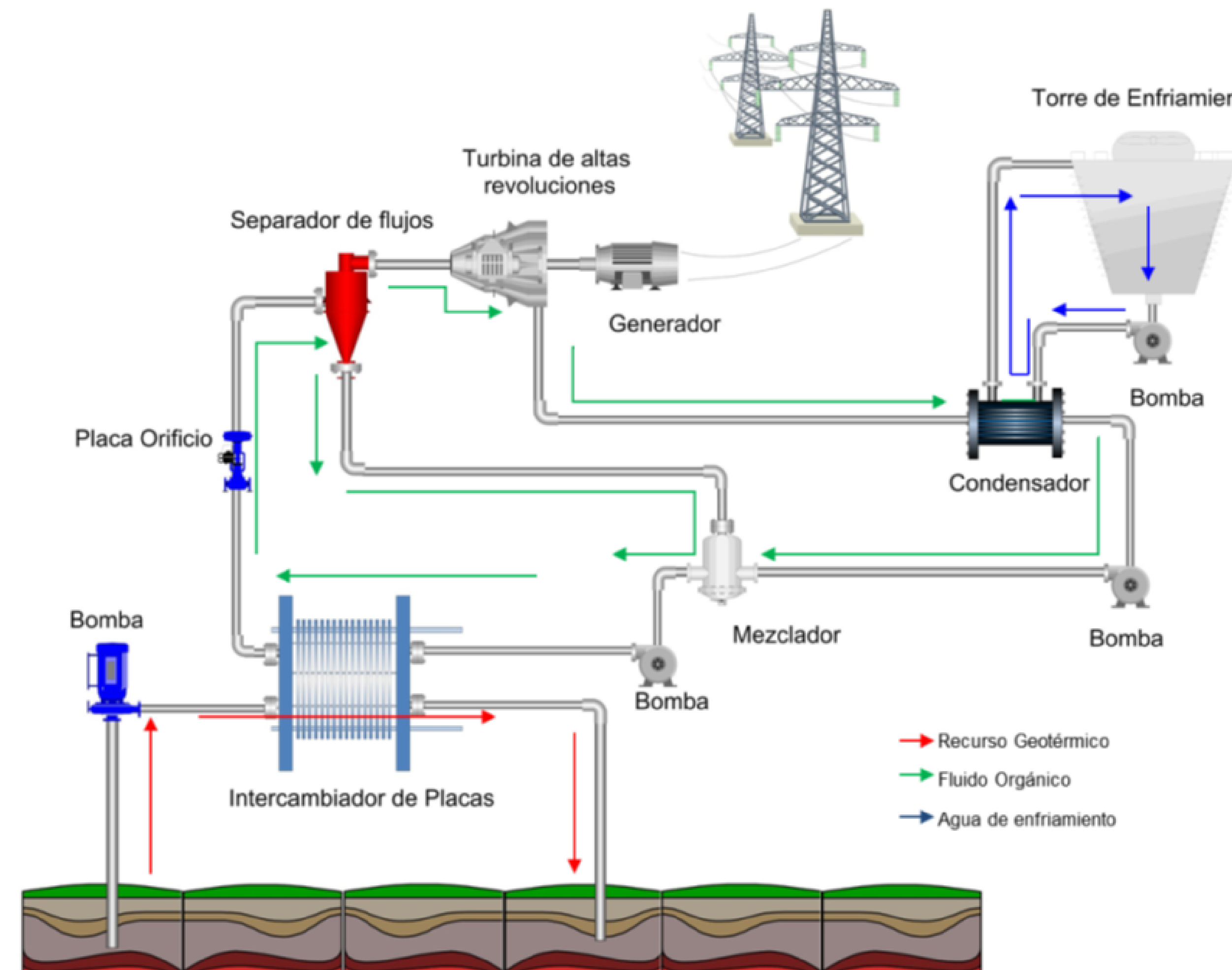


Global Geothermal Energy potential  
(Universidad Politécnica de Baja California, 2011)

**This reform has several objectives as shown below, some of them are really ambitious:**

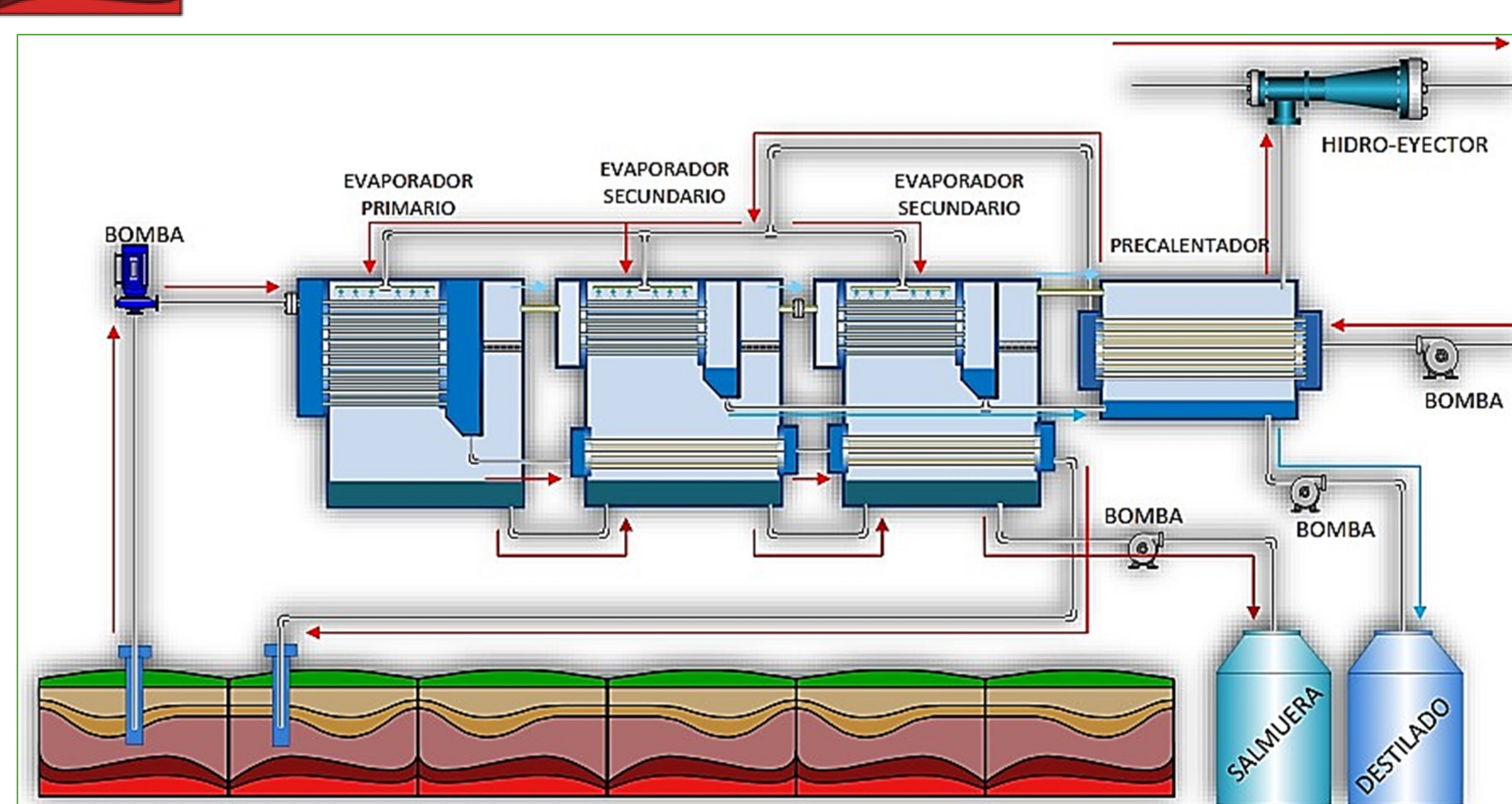
Modernize and strengthen, not privatize Pemex and the Federal Electricity Commission as a productive Mexican companies.

- Have a greater supply of energy at better prices.
- Ensure international standards of efficiency, transparency and accountability.
- Effectively combat corruption in the energy sector.
- To promote development with social responsibility and protecting the environment.
- Lead the Mexican energy sector to boost development.
- Reduce financial, geological and environmental risks in the exploration and extraction of oil



Low and medium enthalpy  
Projects

- Flash Evaporation Binary Cycle
- Modular Geothermal Desalination Unit
- Geothermal Food Dehydrator



Proposals for improving the regulation:

Once that the support from the Secretary was solicited regarding the issue of regulation of low enthalpy geothermal resources, and after receiving the trade DGEL / 211/589/2015, it is considered that there are still some important aspects to consider in the present regulation, which are listed below.

- Concession of Project, not the concession of geothermal fields.
- Support of several applications in a geothermal area.
- Financial security for investors.
- The geothermal resource is considered as a different resource of water.
- Reinjection and reinjection incentives

## Conclusions

The recent reform enacted, focuses on the promotion of competitiveness of the sector through a new architecture of the national energy sector reform, that will promote the following activities:

- Encouragement of private investment in Mexico
- Increasing competitiveness in the energy sector
- Geothermal energy law aims to publicize this energy and encourage its use
- Reduce greenhouse gas emissions

Geothermal energy law currently regulates the activities of prospecting, exploration and exploitation of geothermal resources for the use of power generation, but despite lack of regulation for projects of low and medium enthalpy, the initiative to talk to members of the Secretary was taken. The secretary -approval procedures were known and how the incentives will work for the development of geothermal projects were clearer.

Leaving aside the problem of the lack of regulation, other aspect that turns equally important is the fact that the research done in university laboratories is not tied to the objectives of the current energy market, therefore it is required that this research stays not only in research articles, but in the application field.

Another point is that the Mexican geothermal industry has been focused on the technical side and if we want to invest in order to develop and promote renewable energies, it is urgent to visualize the industry under a technical-trade balance, that is, as a profitable business.

As a final point it can be considered that the reinforcement of the sector and the augmenting of openness to private initiative is a strategy of the Federal Government which can result in many benefits for the Mexicans.