

# PROMOTING GEOTHERMAL DEVELOPMENT



**IDB**



# Geothermal power & our energy challenge

The Latin America and Caribbean Region has great geothermal potential, estimated up to 70GW according to the Geothermal Development Association. **Practically every country on the Pacific coastline from Mexico to Chile has sufficient resource potential to develop high temperature geothermal projects.**

Although Mexico is the fourth largest producer of geothermal electricity worldwide and Central America covers an impressive amount of its electricity requirements through geothermal plants (up to 24% in El Salvador), the potential of the region is vastly under-exploited. The 70GW estimated potential capacity alone could replace more than 21% of the current installed capacity in the Latin America and the Caribbean. No country in South America has developed any geothermal power and in the Caribbean only the French island of Guadalupe shows a gross installed capacity of 15MW.

**The good news is, this is changing:** over a dozen countries in the Latin America and Caribbean region are actively pursuing the development of new geothermal power plants in order to further reduce their dependency on fossil fuels and to shield their economies from fuel price volatility.







# Barriers to geothermal development

Despite the advantages of geothermal energy, investment in geothermal power faces several challenges due to the inherent characteristics of the power source. The main challenges are:

- **The inability to determine the geological resource ex-ante** (without drilling): A combination of geological, geochemical and geophysical surface surveys may provide information about the possible reservoir (i.e. temperature, type of fluid, areal extent) but its presence and real characteristics can only be proven by drilling slim holes or commercial wells (through well-log and well-testing analysis). Hence, large initial investments are required, without certainty of the existence or quality of the resource.
- **High initial costs** (exploration costs can reach 30% of the total project cost). Companies require very strong financial capacity, and no commercial banks are currently financing these projects in the exploration stage.
- **Long maturity periods.** Geothermal projects can take 5 to 7 years or more from resource discovery to commercial development (return on investment).
- **Lack of adequate regulatory frameworks:** lack of concessional regime to ensure exploration and development rights; difficulty to sign a Power Purchase Agreement (PPAs) and obtain resources through project finance before of assessing the resource and start with the plant construction.
- **Increased perception of risk** among developers, governments and financial institutions due to specific know-how ranging from geoscience disciplines to reservoir and drilling engineering via operation and maintenance.



# How can the IDB help?

**The Inter-American Development Bank (IDB) has been successfully designing and implementing solutions to help our partners overcome the challenges of geothermal power.** The support of the IDB combines credit operations and technical cooperation to help our borrowers promote investments in all stages of geothermal development.

The IDB offers a range of financial products and risk mitigation instruments to suit the needs of each type of project in each of its stages of development, depending on the public or private nature of the project and the final borrower. Our programs aim to jumpstart and develop geothermal projects, combining the use of private and public resources and channeling international support in the most efficient manner. In this way, the IDB offers Latin America and the Caribbean countries an opportunity to diversify their energy matrix, increasing energy security while reducing carbon emissions, contributing to a more sustainable growth path.

The IDB, through its public and private arms, can support projects through:



## **Grants to finance technical assistance:**

- Regulatory studies for the development of specific geothermal regulation or related issues such as environmental and social aspects of geothermal projects
- Prefeasibility studies, such as surface studies, hydrochemical and hydrogeological studies, electromagnetic studies, modelling
- Design of Public Private Partnership (PPP) schemes
- Capacity building in financial institutions and government agencies
- Technical evaluation of proposals
- Design of financial instruments





## *Financing & Risk Mitigation Instruments*

**2. Direct loans to governments of the Region** to develop geothermal projects, through public utilities or private players.

**3. Corporate or project finance to private developers:** For projects in advanced phases, IDB can provide a range of financial instruments for late stage exploration, production wells and cost overruns.

**4. Lines of credit to development banks to provide geothermal financing to developers:** During each and every stage of a geothermal project, the IDB facilitates the provision of structured finance tailored to each project, seeking to provide flexible financing terms aligned to the expected cash flow of the project.

**5. Access to international concessional finance, in particular climate finance.** This opens the opportunity to offer risk mitigation instruments such as loans convertible to grants, insured loans, cost-sharing schemes for the early exploration phase, loan guarantees, or insurance premiums. These instruments increase the economic viability of projects but, more importantly, sharply reduce the value at risk at the point where most developments stall (exploration and resource confirmation and field development).

Through the use of these instruments, the IDB supports projects in all stages of development to access financing, relieving the pressure on capital that investors currently face and removing the main barrier of the industry.

Phase	Activity		Estimated budget (in US\$)	Probability of success
Surface Exploration	surface exploration		1-1.5M	10%
Deep Exploration	exploratory drilling	two commercial wells	10-13M	25%
	confirmation drilling	two commercial wells	10-13M	40-50%
Engineering & Construction	production drilling	19 wells: ten commercial; four production; three injection; two contingency	55-65M	85%
	plant engineering gathering design	engineering	1-2M	90%
	construction	civil work US\$8-10M gathering US\$7-10M plant US\$80-85 M	US\$95-105M (around US\$2.1M per MW)	95%
Operation & Maintenance			US\$175-200M for a 40MW Power Plant	100%





## Mexico

The Geothermal Financing and Risk Mitigation Program will channel resources from the IDB, the Clean Technology Fund and the Mexican Government to private developers for different stages of geothermal development, including exploration. The US\$120M Program will support the development of 300MW of capacity, the avoidance of 33 MTons CO<sub>2</sub>. Technical assistance under the Program includes regulatory support, technical due diligence, capacity building and facilitation of PPP schemes.

## Guatemala

Supporting the Energy Ministry in the overcoming of physical and institutional barriers to the utilization of geothermal energy through initiatives to increase the competitiveness of this type of energy and the development of a knowledge base and institutional framework that encourages investment in the sector.

## Nicaragua

Financing with US\$30.3 M the construction of the second unit (36 MW of net capacity) of San Jacinto-Tizate geothermal plant.

## Costa Rica

The IDB has had a long-term engagement (since late 70s) in the support of the geothermal development of the country. The IDB financed Unit I and III of Miravalles geothermal field (more than US\$100M loan in the 80s and 90s) and supported the Instituto Costarricense de Electricidad to strengthen its capacity to manage the design, execution and operation of geothermal projects.

## El Salvador

The IDB provided US\$215M resources for (1) the development of the Berlin geothermal field through the construction of a 55MW power plant and (2) the operation and maintenance in Ahuachapan geothermal field to stabilize the geothermal energy production. Other relevant activities include the establishment, in collaboration with the Nordic Development Fund, National Energy Council, University of El Salvador and LaGeo, a geothermal training center that will enable the LAC countries to develop their capacities to efficiently exploit this renewable energy source (US\$2M grant).

## Peru

Strengthening the institutional capacity and regulatory framework for the promotion of renewable energy projects, including geothermal projects.

## Colombia

IDB channeled own and Global Environment Facility resources (around US\$3.5M grant) to facilitate surface exploration, pre-investment and EIA related studies in the Macizo Volcanico del Ruiz geothermal field. IDB and CTF resources will be deployed to finance the first geothermal plant of the country.

## Chile

Geothermal Risk Mitigation Program (MiRiG). US\$50 M CTF funds and IDB ordinary capital to finance the first geothermal plant in the country and in South America.

## Caribbean

The IDB is working with several countries in the Eastern Caribbean with high geothermal potential in the establishment of a geothermal fund for exploration and development, using IDB and CTF resources and building up partnerships with other donors such as JICA.



# Our value added

The IDB can provide access within the Latin American and Caribbean region to sources of international climate finance, such as the Global Environment Facility (GEF), the Nordic Development Fund and the Climate Investment Funds (CIFs).

Also, by partnering with other donors and organizations, it can leverage funding and combine efforts in the most efficient manner, supporting both public entities as well as private developers. For example, since 2012 the IDB has been making a joint effort with Japan International Cooperation (JICA) in the promotion of geothermal development under the “Co-finance for Renewable Energy and Energy Efficiency” (CORE) framework . Currently, the IDB is supporting efforts of international donors to create a Geothermal Development Facility for Latin America.

The IDB is further supporting its borrowers through the provision of advisory services to strengthen and complement the line of financing products. By enabling a thorough understanding of the technology alternatives, and a strong institutional capacity within an investor friendly regulatory framework, IDB services may contribute to unlocking the potential of this proven technology.

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