



Accelerating Geothermal Development by Reducing Exploration Risks

CHALLENGES:

- Lack of private sector and other funding institution involvement
 - Uncertainty regarding the existence of geothermal resources
 - Lack of technical capacity to explore and assess geothermal resources
 - Expensive and time-intensive exploration phase

SOLUTIONS:

- Reduce risks associated with exploration by absorbing the costs of this phase through:
 - Insurance instruments
 - Guarantees
 - Cash or equipment contributions.
- Reduce risks associated with development by providing proof of site geothermal resources
 - Provide grant resources for technical studies and reports
 - Provide information on site potential and requirements
- Assess and invest in technical and institutional capacity for:
 - Resource exploration
 - Resource assessment
 - Coordination and information-sharing

*The risks associated with the exploration phase of geothermal development have the potential to discourage private sector and other funding institutions from supporting geothermal energy projects. To mitigate these risks, some countries participating in the **Clean Technology Fund (CTF)** under the Climate Investment Funds are developing plans to fund the exploration phase of geothermal development, thereby reducing the high uncertainty surrounding resource availability.*

The development of geothermal energy consists of several phases, including resource exploration, resource assessment, power plant development, and, ultimately, operations. The resource exploration phase includes detailed surface exploration, exploration drilling, and well testing. This phase is critical as it can confirm the existence, exact location, and potential of the geothermal reservoir, as well as the cost to access it. This phase is also expensive, costing up to \$15 to 25 million

per field or 10 percent of the capital expenditure in a new geothermal project.

The commercial value of a geothermal investment increases as the project advances from one phase to another. Due to the uncertainty regarding resource potential and subsequent advancement, private sector and other funders sometimes lack the risk appetite for becoming involved in such investments in the early stages.

LESSONS LEARNED

To address the resource risks associated with early stage geothermal development, several CTF countries have highlighted the importance of proving the existence of geothermal resources and providing detailed information on site potential and requirements. Doing so can boost investor confidence and spur investment.



Olkaria Geothermal Plant, Kenya. Photo: Nasser Brahim/CIF AU

COUNTRY EXAMPLE

Indonesia has some of the largest geothermal resources in the world, with the potential to generate 27,000MW of energy. Currently, only 1,226M (about 4.5 percent of potential resources), is considered to be exploited.

Indonesia's CTF investment plan aims to have a transformational impact on Indonesia's energy sector and the country's path towards low emissions economic development by supporting the development of 1,900MW of geothermal energy. Out of \$400 million in country allocations, Indonesia's revised CTF investment plan has devoted \$325 million in funding for geothermal development projects.

CTF funding blended with Multilateral Development Banks resources (African Development Bank, Inter-American Development Bank, World Bank, and International Finance Corporation) will enable Indonesia to mitigate exploration and exploitation risks through financial instruments, such as risk sharing and insurance, supporting interest rate buy-down to improve financial returns commensurate with risks, and developing domestic technical and managerial capacity to sufficiently accelerate program and project development.



Raditya Mahendra Yasa, Central Java, Indonesia. Photo: Flickr/Geothermal Resources Council

In a revision made to its CTF investment plan in May 2013, Mexico reallocated \$34.4 million in CTF funding to a geothermal exploration risk mitigation project. The decision was made after evaluating several other options and priorities. Mexico's geothermal exploration risk mitigation project is designed to encourage investment in geothermal energy by absorbing the costs associated with the exploration phase of geothermal development. The project includes insurance instruments, guarantees, and cash or equipment contributions to the project to face the uncertainty related to the existence, amount and quality of the geothermal resource. The project proposal also includes grant resources for technical studies and reports that provide details that clarify the existence of geothermal resources and outline site potential and requirements for further development.

LOOKING FORWARD

Programs like the CTF can serve as a catalyst to geothermal development by providing countries with the financing to absorb costs and risks associated with early stage resource exploration, as well as the opportunity to develop the capacity required to carry out their plans. In October 2013, \$115 million in CTF

funding was allocated to a new Utility Scale Renewable Energy Program. This program, which supports the Global Geothermal Development Plan launched in 2013 by the Energy Sector Management Assistance Program (ESMAP), will initially focus on facilitating private sector engagement in geothermal resource validation in CTF countries through test drilling.

The CTF geothermal program will use a variety of financial instruments, such as direct support to private sector concession holders and to local banks, to provide risk cushions that help potential investments over the exploration hurdle. It is estimated that this program could unlock up to 4GW of additional geothermal electricity in countries like Chile, Mexico, and Turkey, as well as reduce drilling costs and improve industry practice. The CTF program will also include a knowledge platform to ensure that lessons generated are shared with policy-makers, project developers, investors and other stakeholders involved in scaling up geothermal development worldwide.

THE \$5.5 BILLION CLEAN TECHNOLOGY FUND (CTF) PROVIDES MIDDLE-INCOME COUNTRIES WITH HIGHLY CONCESSIONAL RESOURCES TO SCALE UP THE DEMONSTRATION, DEPLOYMENT, AND TRANSFER OF LOW CARBON TECHNOLOGIES IN RENEWABLE ENERGY, ENERGY EFFICIENCY, AND SUSTAINABLE TRANSPORT.