

Mobilizing Central American Geothermal Resources to Ensure Resilience, Independence, Competitiveness, & Food Security

1 BACKGROUND

Geothermal energy is a renewable energy resource with low GHG emissions and a base load capacity that is not impacted by climate change (while hydroelectricity, common throughout the region, can be impacted by reduced rainfall). This makes it an attractive energy source with a high availability factor, especially in active seismic regions. Its main application in Central America is for electrical power generation, yet there remains large untapped potential across a variety of applications for this powerful resource.

Geothermal energy plays an important role in the implementation of international action plans and agreements to combat climate change. It also helps secure the needs of national governments to ensure energy independence, competitiveness, and security of supply. Furthermore, some of the direct uses of geothermal energy, such as agro-industrial applications that use low enthalpy zones and waste heat to dry harvested crops, create positive externalities for related issues like food security.

Despite this wealth of benefits, development is often underfunded. This can partially be attributed to the high capital costs of the initial exploratory phases of geothermal resources: data collection, its interpretation, site selection, exploratory drilling, and the building of infrastructure to support a successful well. Each stage of this process has unique risks involved, and as a result it can be difficult to attract private or multilateral equity in the initial phases of geothermal development. Once a well is successful, the subsequent operation and maintenance costs are lower, resulting in lower marginal costs of electricity produced for the consumer. This can positively impact the competitiveness of local industries that require high energy consumption, as a significant portion of their input expenses are electricity costs. What is needed then is a generous government support regime in the initial phases of exploration, which will be more than repaid with the dividends of greater energy independence, competitiveness, security, and positive externalities to other industries.

The potential benefits are substantial, as Central America holds some of the world's most promising geothermal resources. According to a report released by the World Energy Council in 2016, in terms of installed capacity, El Salvador and Costa Rica lead the region with over 200 MW each, while Nicaragua has 155 MW installed, and Guatemala has 49 MW installed.¹ Each nation is among the top 10 globally in terms of the share of geothermal energy in their electricity mix.

Yet sufficient untapped resources remain, and not only for electricity generation. Geothermal resources can also be used for industrial energy processes involving heat through direct use. The direct use of geothermal energy is especially appropriate for agricultural processing, which enhances food security and economic productivity for local populations.

Worldwide, different types of agricultural direct uses of geothermal energy are common: aquaculture (fish farming and algae production), agro-industrial processes (e.g. drying of products, pasteurization), and soil heating (of open-field plant root systems) are just a few.

¹ https://www.worldenergy.org/wp-content/uploads/2017/03/WEResources_Geothermal_2016.pdf

Considering that in some developing economies, as much as half of all food produced is lost post-harvest, partly due to a lack of affordable energy for food processing,² the investment in geothermal resources can be an important strategy to boost food security. According to FAO estimates this could increase food availability by up to 20% if implemented extensively on global scale.

Given these possibilities, it is clear that there remains a large amount of unused potential for geothermal in the region. In electricity generation alone, it is estimated that geothermal power could satisfy nearly double the region's predicted electricity demand through 2020. Unfortunately, the expansion of geothermal energy in the region is hampered by several barriers:

- A lack of adequate policies and regulations for the use and development of geothermal resources.
- The lack of adequate procedures to resolve environmental and social issues in places where proven resources exist.
- The lack of adequate information systems for relevant exploration data.
- The lack of structured data regarding resources and the capacity to interpret them.

The German Cooperation, financed by BMZ, supports SICA and its Central American member countries to build the foundation for a wider deployment of geothermal energy. We recognize that a fundamental part of this is the collection of data on under-utilized geothermal resources using well-established principles, such as the UNFC geothermal specifications for geothermal resources.³ In cooperation with IRENA and SICA, we aim to put into discussion the utility of geothermal energy beyond power generation. During our session we would like to discuss some insights discovered by different countries in the region, with topics including the role of climate change in electricity generation, the possibilities of geothermal energy to create climate resilience of societies, the benefits to food security of direct use, and the requirements, challenges, and necessary future steps needed to ensure geothermal energy remains an affordable and profitable energy source in Central America.

Main objectives:

- Visualize how geothermal energy can be decisive for ensuring resilience, independence, competitiveness, and security.
- Foster a regional dialogue on geothermal for power generation and direct uses.
- Articulate challenges and possible solutions for the expansion of geothermal energy use in Central America.

² <http://www.fao.org/documents/card/en/c/045ca001-4849-43b7-8dc6-e99635ddb5ea/>

³ <https://www.unece.org/energy/welcome/areas-of-work/unfc-and-sustainable-resource-management/applications/energyseunfc-re/unfc-and-geothermal-energy.html>

2 TARGET AUDIENCE

- Ministries or Secretariats of Energy from Central America
- Geothermal electricity generation companies

3 DRAFT AGENDA

- **Welcoming remarks (10 minutes) GGA SICA?**
- **GGA Initiative: Presentation (20 minutes) TBC**
- **Panel: Mobilizing Central American Geothermal Resources for Ensuring Resilience, Independence, Competitiveness and Security**
 - SEN from Honduras: *Is geothermal an option to improve competitiveness and independence?*
 - SNE from Panamá: *Is there space in the energy agenda of Panama to include geothermal energy? Will it create resilience on climate change?*
 - INDE from Guatemala: *Is climate change impacting electricity generation? What will be the role geothermal plays in combatting this, in both electricity generation and direct uses?*
 - MEM from Nicaragua: *Discuss the current situation and role of information in supporting geothermal development in Nicaragua.*
 - ICE from Costa Rica: *Are there ways in which geothermal energy and its products might have positive externalities for food security?*
 - LaGeo from El Salvador: *How does geothermal help increase security of supply and grid resilience?*
- **Moderation: SICA (Werner Vargas)**
- **Q&A (20 minutes):**
 - For Honduras, Guatemala, Panamá: Is geothermal being considered as an option to create resilience, competitiveness and security? What is needed to boost geothermal use?
 - Are you including in your energy agendas the direct use of geothermal energy? Why or why not? What is missing? Is geothermal energy in your country contributing to the Zero Hunger SDGs to achieve food security and improve nutrition while promoting sustainable agriculture?
 - For ICE: What should be the role of the public sector? In this context, what is a successful set-up of governmental information management?
 - As countries like Kenya and their experience have shown (Ngugi 2012), government funding can often play a critical role in the resource exploration phase of geothermal development. Once a resource is proven and its economic viability verified, multilateral and private lenders will often step up to the plate. But

what can we tell regional government about the returns on investment of funding research into initial resource maps, etc.?

- The successful development of a geothermal project requires the right institutional framework, as well as coordination and consultation amongst relevant stakeholders. Do you feel that is broadly present in the region? How could it be improved?
- Can geothermal energy help the competitiveness of the Central American countries?
- What can be done to accelerate the deployment of geothermal projects in low-enthalpy areas, including for non-power applications?
- What are the possible strategies to incentivize the cascading use of residual heat from geothermal power plants for non-electricity purposes?
- What is the role of regulation in simplifying the process of attracting private investors for non-power projects?
- Are there dedicated and stream-lined procedures in place for small-scale projects?
- What are the capacities needed to accelerate the use of geothermal energy for food production and preservation?
- Closing Remarks (5 minutes)