

The First Latin American Geothermal Congress: Learning from the past, assessing the present and forging the technical future of Geothermal in the region.

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Keywords: Geothermal Energy, Latin America, Regional Congress, Technical Assessment, Project Experience, Future Strategy, Capacity Building

Abstract

The First Latin American Geothermal Congress (LGC 2025) was a regional forum focused on technical aspects related to geothermal energy development within Latin America. The congress theme was 'Past, Present and Future', reviewing past experiences, discussion of present-day activity, and the formulation of a collaborative vision, whose objective is to connect the technical community and promote greater geothermal energy development in Latin America (LATAM). This paper highlights key demographics related to attendees, presents an analysis of the technical lessons learned from past efforts, and provides an assessment of the current technical capabilities, operational practices, understanding of resource potential, as well as insights into how the prevailing regulatory, economic, social and environmental frameworks are impacting geothermal deployment within the region. Finally, a shared future vision for the region is showcased, outlining technical priorities, potential collaboration and development areas, and strategic pathways needed to improve geothermal utilization in Latin America from low to high temperature applications.

1 INTRODUCTION

Latin America's immense geothermal potential is no secret; it's a defining feature of the region. Yet, despite decades of successful projects in countries such as Mexico, El Salvador, and Costa Rica, the overall geothermal potential remains untapped. Whilst world-class resources exist, a dedicated technical congress, an accessible platform to share science, technology, and engineering in Spanish, was long overdue.

The LGC 2025 was founded on the basis that technical regional cooperation will help drive development. This cooperation had to be inclusive; therefore, focus was dedicated to the integration of the next generation of experts and championing the leadership and participation of women. This was done through the application of the Women in Geothermal (WING) Core Values (<https://womeningeothermal.org/wing-core-value-awards/>) and the creation of a collaborative space where problems were discussed openly.

The LGC 2025 provided the vehicle to break that pattern; where the region's experts could come together and start building a unified Latin American geothermal community.

2 CONCEPTUAL STRUCTURE OF THE LGC 2025

"Learning from the Past, Assessing the Present, and Forging a Collaborative Future" was brought to life through the event program. Keynote presentations from regional and global leaders provided context on the direction of industry, emerging technologies, and the main drivers of development. Oral presentation sessions ranged from realities of working in Latin America, country updates, geothermal prospects and exploration, deep dives into geology, geochemistry, geophysics, direct-use, and the critical social and environmental aspects that underpin projects (Fig. 1).

Technical baseline was established and focus shifted to strategic action. Three expert panels were formulated to tackle the tough, persistent questions on (1) regulatory and social frameworks, (2) innovation without losing momentum on conventional projects, and (3) development of direct-use and GSHP systems, which brought the launching of five "Red de Acción Geotérmica" (RAG) working groups mainly RAG1 to unlock conventional potential, RAG2 to tackle financing and regulatory frameworks, RAG3 to push next-gen geothermal, RAG4 to expand geothermal beyond electricity, and RAG5 to formally create the Latin American Geothermal Association

(AGL) to boost regional cooperation. As permanent working groups, virtual meetings will be held every six months to push forward the topics and present the update at the next congress in Chile in 2028.

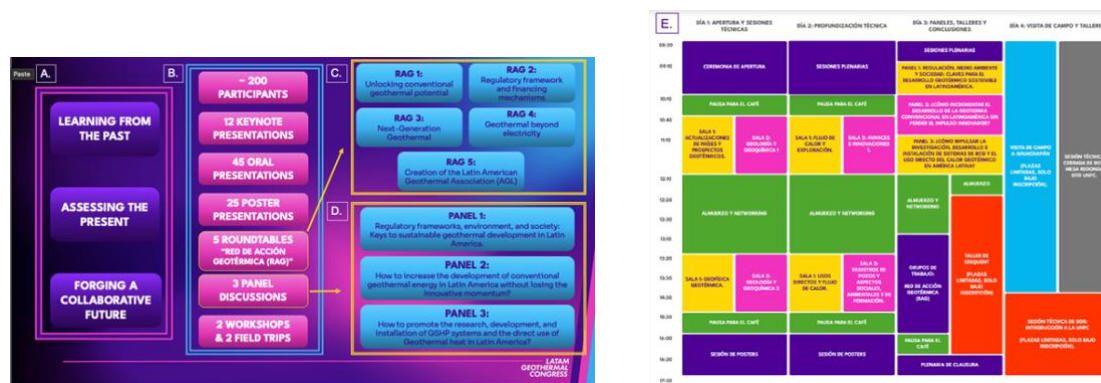


Figure 1. The conceptual and logistical structure of the LGC-2025 and the detailed four-day congress schedule.

2.1 The congress by the numbers

For a first-of-its-kind technical congress in the region, the event was a success, convening around 200 participants from 19 countries (Figure 2). Most of the Latin American participants was complemented by key experts from around the globe (Table 1, Fig. 2).

Building an inclusive and balanced community was a core principle, not only a broad representation of all aspects of industry and academia, but also the meaningful participation and contribution of youth and women. Active support through initiatives like scholarships provided to members of Women in Geothermal (WING). Similarly, discounted registration was afforded to students and young professionals to enable participation. Communication and engagement with the LATAM national geothermal associations ensured that they were informed and encouraged their members to participate.

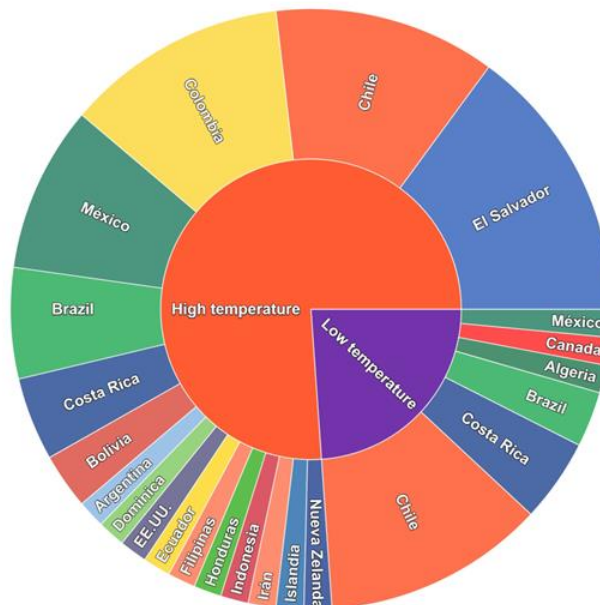


Figure 2. LGC 2025 Paper Submissions by Resource Temperature and Country

This diversity of the papers was reflected in the 67 abstracts submitted, which were distributed into 45 oral presentations, and 22 poster presentations. This technically focused participation was the foundation upon which all the strategic outcomes of the congress were built, with a healthy mix of participants from industry, academia, government, and a vital contingent of students. As a result, the congress drew participants from half of all Latin American countries, and women made up 40% of all attendees.

The majority of works focus on Evaluating the Present, with High Temperature applications dominating the research landscape. The technical categorization shows a pronounced concentration in Research and

Development, while Applications and Uses represent a secondary interest. Notably, Technology and Engineering, Environmental and Social Impact and Policies and Regulations receive significantly less attention, indicating the field's current prioritization of technical solutions over regulatory and sustainability considerations. Future-oriented research constitutes about one-third of the total, whereas historical analysis remains the least explored temporal perspective (Table 1, Figure 3).

Table 1. LGC 2025 Paper Submissions by Temporal Perspective, Resource Temperature, and Technical Category.

Temporal Perspective	#	Temperature	#	Technical category	#
Learning from the Past	7	High	51	Research and Development	40
Evaluating the Present	38	Low	16	Environmental and Social Impact	4
Shaping the Future	22			Applications and Uses	12
				Technology and Engineering	6
				Policies and Regulations	5

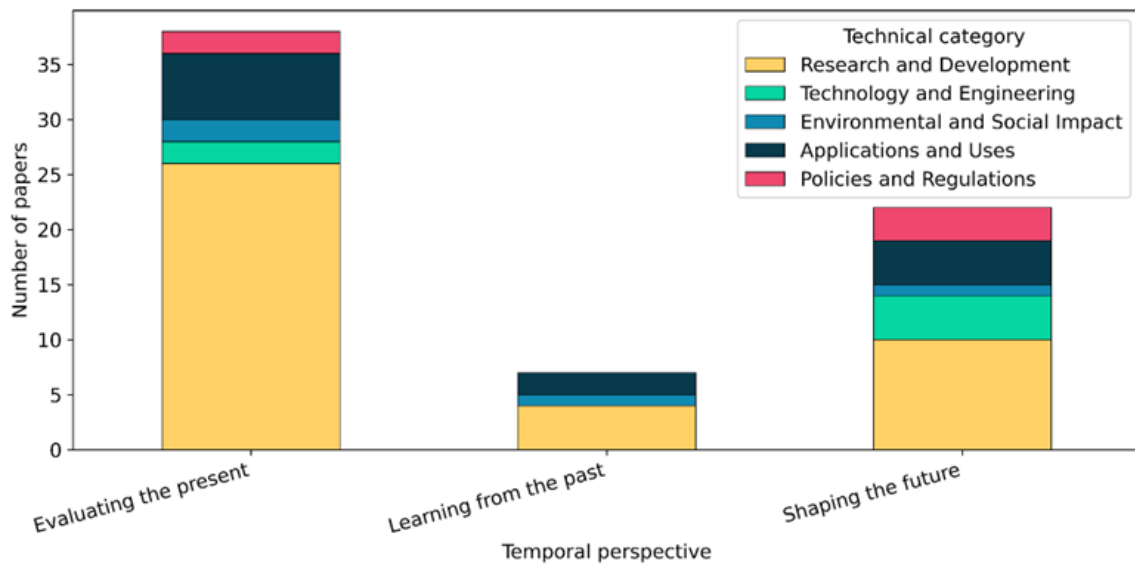


Figure 3. LGC 2025 Paper Submissions by Temporal Perspective, Resource Temperature, and Technical Category

3 LOOKING BACK: LEARNING FROM PAST EFFORTS

Due to its location along the Pacific Ring of Fire, the high-temperature geothermal resources in Latin American countries have been associated with the Quaternary volcanic activity. Three main active volcanic segments are located where the subducting slab dips about 30°; the Northern Volcanic Zone (NVZ), the Central Volcanic Zone (CVZ); and the Southern Volcanic Zone (SVZ). Areas where the dip is nearly horizontal account for the volcanic gaps, such as those between the NVZ and the CVZ (The Peruvian Flat Slab) and between the CVZ and the SVZ (The Pampean Flat Slab) (Ramos et al., 2002).

The estimated potential for geothermal electricity generation in Latin America exhibits considerable disparity in the literature, with figures ranging from hundreds of MW (e.g., Lahsen et al., 1988; Aravena et al., 2016; Alfaro et al., 2021) to tens of thousands of MW (Lahsen et al., 1986; Barberi et al., 2023). This contrasts sharply with the installed capacity, which currently stands at only about 1,800 MW (Gutiérrez-Negrín, 2024). Geothermal electricity production in the Latin American region currently represents approximately 11% of global output, 16 GW (Castillo-Reyes et al., 2024). México stands out as the regional leader in geothermal electricity production with an installed capacity of 1,001.9 MW (Castillo-Reyes et al., 2024). The strategic importance of this resource is even more pronounced in Central America, where countries like El Salvador, Nicaragua, and Costa Rica rely on it for a significant share of their electricity demand (Moya-Rojas P., 2025). Specifically, geothermal power accounts for 24.9% of electricity in El Salvador, 20.8% in Nicaragua, and 14.6% in Costa Rica (Rojas M.E., 2022), underscoring its role as a cornerstone of their energy matrices. The geothermal potential of South America, however, remains largely untapped. Progress in electricity generation has been limited, with Chile's 83 MW

(Morata and Arancibia, 2025) representing the only significant capacity, alongside smaller pilot initiatives in Argentina and Colombia.

During the congress, several factors affecting geothermal development were identified across different countries. These include the level of government support, where it is an advantage if geothermal is part of a state utility; uneven policy frameworks across the region; the high cost of exploratory drilling; technical and financial risk; social challenges and community acceptance; and environmental management to minimize negative impacts.

4 ASSESSING PRESENT POTENTIAL AND CAPABILITIES

4.1 Technical toolkit: What expertise and technology do we have in the region versus what do we consistently need to import?

An assessment of the region's technical capabilities reveals a mix of established expertise and areas requiring external support. While there is a consistent need to import certain advanced technologies, particularly for deep drilling and power plant manufacturing, the region has developed significant in-house capabilities. A few key areas of established regional expertise include:

- **Reservoir Management and Power Plant Operation:** Decades of continuous operation in countries such as Mexico, El Salvador, and Costa Rica have cultivated deep technical expertise across the lifecycle of conventional high-enthalpy systems. This includes significant regional experience in reservoir engineering, particularly the implementation of sustainable production and reinjection strategies to ensure long-term field viability. Furthermore, there is a well-established knowledge base in power plant operations and maintenance (O&M), which is fundamental for optimizing asset performance and ensuring grid reliability.
- **Technical expertise in heat pumps:** Significant regional expertise exists in the application and deployment of geothermal heat pumps, particularly for direct-use applications in commercial and residential settings.
- **Database heatflow in Brazil:** The development of a national heat flow database in Brazil serves as a model for systematic resource assessment at a country-wide scale, providing crucial data for preliminary exploration.
- **Favorable map of thermal springs in SICA region:** A comprehensive map of thermal springs has been developed for the SICA (Central American Integration System) region, which acts as a foundational tool for identifying promising areas for both high- and low-enthalpy geothermal development.
- **Advanced knowledge of United Nations Framework Classification for Resources (UNFC) In Costa Rica and El Salvador:** Advanced knowledge and practical application of the United Nations Framework Classification for Resources (UNFC) are present in countries like Costa Rica and El Salvador, demonstrating a sophisticated approach to resource evaluation and project risk assessment.
- **Chemical inhibition of wells:** The region possesses established technical expertise in managing reservoir chemistry, including the application of chemical inhibition techniques to prevent scaling and ensure the long-term productivity of geothermal wells.

4.2 Resource knowledge: what are we researching?

A significant asset for the region is its human capital. LATAM possesses well-trained technical people from the universities and from companies in the geothermal sector, including geologists, geochemists, and engineers with direct project experience. The categorization of affiliations included in the congress reveals a strong academic and research-oriented profile among participants, with universities and academic centers constituting the predominant category. This academic dominance is complemented by a significant presence of private sector entities, including geothermal consulting firms and energy companies alongside specialized associations such as the Mexican, Colombian and Ecuadorian Geothermal Associations. The landscape is further diversified by state entities like Brazil's National Observatory, training programs like the UNESCO-sponsored GRÓ initiative, and independent consultants, collectively illustrating a geothermal community where research institutions lead engagement while industry practitioners and specialized organizations provide crucial applied expertise.

5 A SHARED VISION FOR THE FUTURE

The LGC-2025 was designed to be more than a retrospective. Its ultimate goal was to convert discussion into a concrete, forward-looking plan. Having analyzed our past efforts and assessed our present capabilities, the congress culminated in its most critical phase: forging a shared, regionally informed vision for the next decade. The roadmap detailed in this section aims at synthesizing the technical presentations, expert panels, and strategic RAG working groups that defined the event. It represents our community's collective agreement on where we need to focus: our most pressing technical priorities, the specific pathways for effective collaboration, and a strategic expansion of geothermal beyond electricity into direct-use applications.

5.1 Pathways for collaboration

One of the clearest takeaways from every discussion was that our biggest weakness has been a lack of organized teamwork. Good ideas and expertise are scattered across the region, but we haven't had a real structure to connect them. The congress was designed to fix that, producing two concrete pathways for us to finally start working together and unify our region.

First, we officially launched the Latin American Geothermal Association (AGL). This isn't just another acronym; it's the formal, unified organization we've needed for years to represent the region, act as a central hub for our community, and give us a single, strong voice on the international stage.

Second, we established the Geothermal Action Network (RAG) as the technical engine of the AGL. The RAG is our answer to making sure the conversation doesn't stop when the congress ends. The five working groups are committed to meeting virtually every six months to push their specific topics forward. This creates a rhythm of accountability and ensures we're not just talking but actively building momentum and delivering real progress between each congress. The RAG groups will present the technical advancements at the next LGC to be held in Chile in 2028.

6 BUILDING THE COMMUNITY: A FOCUS ON PEOPLE

6.1 Investing in the next generation and championing women

To ensure the long-term health and dynamism of the sector, specific actions were taken to build an inclusive community. Initiatives were deployed to support female leadership, including the active role of Women in Geothermal (WING) on the organizing committee, the provision of WING scholarships, and the implementation of speaker policies to ensure diverse representation. While these initiatives established a strong baseline, it was recognized that further efforts are required to enhance female leadership opportunities in future events.

Simultaneously, a focus was placed on investing in the next generation of geothermal professionals. Discounted registration was afforded to students and young experts to lower barriers to entry. Proactive communication and engagement with national geothermal associations across Latin America ensured that their members, particularly early-career individuals, were informed and encouraged to participate. These targeted actions were crucial for fostering a diverse and sustainable talent pipeline for the region.

6.2 Fostering a collaborative network

Beyond formal inclusive measures, the congress was intentionally designed to facilitate networking and deepen professional relationships. The program integrated dedicated networking sessions, poster presentations, and informal discussion periods during coffee breaks and lunches, providing ample opportunities for interaction. These platforms were vital for connecting experts who had previously worked in isolation, allowing them to share experiences and build rapport.

Crucially, technical discussions were structured as collaborative exercises rather than passive presentations. The expert panels and, most notably, the formation of the "Red de Acción Geotérmica" (RAG) working groups, served as forums for active debate on shared regional challenges. In these sessions, participants engaged directly with one another, transforming abstract discussions into tangible, collaborative work plans. This emphasis on active participation fostered a strong sense of collective ownership and resulted in the formation of a cohesive regional network. The strong professional relationships built during the congress are evidenced by the immediate and widespread commitment of participants to join the newly formed Latin American Geothermal Association (AGL) and to continue their work through the RAGs.

7 CONCLUSION: FROM A CONGRESS TO A COMMITMENT

The First Latin American Geothermal Congress was founded to serve as a vehicle for regional integration, shifting the geothermal sector from a history of isolated efforts toward a unified and actionable strategy. The framework of the congress, as detailed in this paper, was designed to facilitate a systematic process: an assessment of past successes and failures, an evaluation of present technical capabilities, and the formulation of a concrete, forward-looking plan for the next decade.

The transition from discussion to commitment was formalized through the establishment of three key pillars. First, the creation of the Latin American Geothermal Association (AGL) provides the formal, long-term organizational structure required for regional cohesion and a unified voice. Second, the Geothermal Action Network (RAG) was established to serve as the technical engine for this work, creating a mechanism for accountability and ensuring continuous progress on specific challenges. Finally, the San Salvador Declaration (<https://tinyurl.com/mu6dj4yk>, Figure 4) codifies the shared principles and strategic direction of the community, serving as a formal commitment to cooperation, sustainable and people-centered development, and inclusion. It represents a clear call to action for regulators, industry, academia, and the community to fulfill their specific roles in driving geothermal forward.

With these structures in place, this paper serves as a clear signal to the international geothermal community that a unified technical roadmap and a collaborative framework now exist for Latin America. The LGC-2025 therefore represents a definitive starting point for an organized, cooperative, and sustained effort to realize the geothermal potential of the region.



Figure 4. A visual summary of the San Salvador Declaration

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