GLOBAL_GT

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Driving the Transition:

Türkiye and the Silk Road Corridor

IGA INTERNATIONAL GEOTHERMAL ASSOCIATION

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This Month's Hot Spot

From Potential to Deployment

Geothermal energy is no longer a question of possibility, it is a question of execution. While technology advances and leading markets demonstrate strong momentum, many regions still face the same challenge: turning proven potential into real projects on the ground.

This edition brings together key perspectives shaping that transition - from innovation and country leadership to the launch of the Geothermal Policy Lab. Together, they point to one clear message: the future of geothermal depends on how effectively we align technology, investment, and policy into a system that delivers.

TÜRKIYE'S GEOTHERMAL BACKBONE:

Western Anatolia and Beyond: Türkiye's Structured Geothermal Maturity

By Ayhan Erten, Bozzetto Group

Türkiye's geothermal industry has evolved from early exploration into a technically mature and geographically diversified energy sector. Today, it presents not a collection of isolated fields, but a structured multi-tier ecosystem anchored in Western Anatolia and expanding across Central and Eastern provinces.

This evolution reflects reservoir understanding, engineered production management, and integrated heat utilization - hallmarks of a developed geothermal market.

The Western Anatolian Power Belt

The backbone of Türkiye's geothermal electricity generation lies within the Büyük Menderes and Gediz graben systems of Western Anatolia. Provinces such as Aydın, Denizli and Manisa form a continuous geological and operational belt.

Aydın hosts some of the country's most productive high-enthalpy reservoirs, supporting commercial-scale power plants with established reinjection systems and optimized production strategies.

Denizli, including the historic Kızıldere area, demonstrates long-term operational experience and integration of geothermal power with industrial heat applications.

Manisa, particularly the Salihli–Alaşehir axis along the Gediz Graben, extends this high-enthalpy corridor eastward. Active drilling and clustered plant development highlight scalable growth potential within a proven geological framework.

Together, these provinces anchor Türkiye's geothermal electricity capacity and demonstrate repeatable development capability rather than isolated success.

Operational and Engineering Discipline

A defining characteristic of Türkiye's geothermal fields — particularly in Western Anatolia — is the structured management of production wells through artificial lift systems.

Many high-temperature reservoirs are operated using Electric Submersible Pumps (ESP) to stabilize flow rates, manage wellhead pressures, and maintain consistent feed conditions for surface power plants. This reflects a shift from reliance on natural artesian flow toward engineered production control.

Reinjection practices, scaling management, and clustered field development further underline operational maturity. These are not experimental systems; they are engineered geothermal production environments designed for long-term sustainability.

Direct-Use Leadership and Heat Economy Integration

Beyond electricity, Türkiye demonstrates strength in large-scale direct-use applications.

In Afyonkarahisar, geothermal energy supports extensive district heating networks, greenhouse cultivation, and thermal tourism infrastructure. The province exemplifies integrated heat economies where geothermal resources anchor urban heating, agricultural output, and health tourism.

Similarly, Tokat highlights the role of geothermal heat in agricultural productivity and rural economic development, particularly through greenhouse operations.

These provinces illustrate cascade utilization principles — maximizing value by sequentially using geothermal heat across multiple applications.

Eastern Expansion and Long-Term Potential
Eastern Anatolia represents Türkiye's expansion frontier.

In Erzurum, geothermal district heating plays a significant socio-economic role in cold-climate urban areas.

Ağrı, particularly around the Diyadin area, contains geothermal manifestations currently focused on direct-use and tourism, with ongoing exploration evaluating broader development opportunities.

While not yet major power-generation centers, these provinces contribute geographic diversification and long-term growth optionality.

A Multi-Tier Geothermal Structure
Türkiye's geothermal landscape can be understood in three tiers:

- Tier 1 – Mature Power Generation Belt
  - Aydın – Denizli – Manisa

- Tier 2 – Scalable Direct-Use & Heat Economies
  - Afyonkarahisar – Tokat – Central Anatolian provinces

- Tier 3 – Eastern Development Frontier
  - Erzurum – Ağrı and surrounding regions

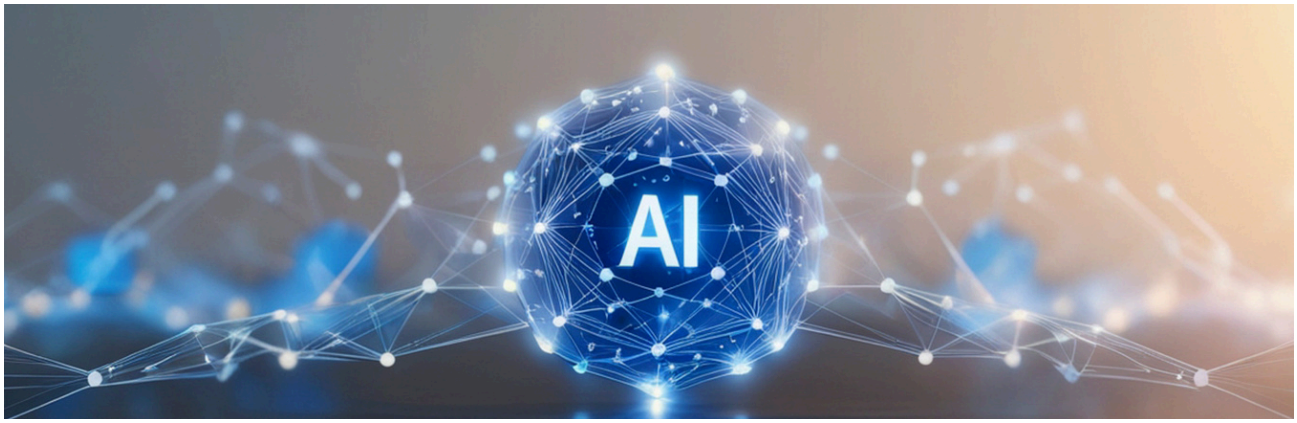
This tiered structure reflects technical progression: from high-enthalpy electricity clusters to optimized heat networks and emerging exploration zones.

Conclusion: A Technically Mature Geothermal Market
Türkiye's geothermal evolution is defined not only by installed capacity, but by structured reservoir management, artificial lift integration, reinjection discipline, and multi-application heat utilization.

Western Anatolia provides the production backbone.
Central provinces demonstrate scalable heat integration.
Eastern regions represent future development pathways.

Taken together, Türkiye now stands as a technically mature and geographically diversified geothermal market — an engineered system built on repeatable expertise and expanding opportunity.

From Years to Days: How AI Is Redefining Geothermal Modelling in Türkiye



Geothermal development has always been a game of uncertainty. Reservoirs are complex, subsurface data is incomplete, and modelling takes time - often years. But in Türkiye, that paradigm is shifting fast. A new generation of digital tools is transforming how geothermal systems are understood, simulated, and ultimately developed.

From Complexity to Clarity

Understanding a geothermal reservoir has traditionally required building detailed numerical models and running countless simulations to predict behavior over time. This process is not only computationally heavy, it is slow.

In fast-moving markets like Türkiye, where drilling programs and investment decisions need to keep pace with opportunity, time becomes a critical constraint. This is exactly where digitalization is starting to change the game.

10 Million Scenarios, 10 Days

In a recent project by Flux Energy, advanced modelling workflows powered by AI and high-performance computing enabled a breakthrough: 10 million reservoir scenarios simulated in just 10 days. What would previously have taken years of iterative modelling was compressed into a timeframe that aligns with real project development cycles.

Instead of testing a limited number of assumptions, operators can now explore a vast range of possible reservoir behaviors - quickly identifying optimal strategies for production, reinjection, and long-term field management.

This is not just faster modelling. It is fundamentally better decision-making.

Reducing Risk Where It Matters Most
Geothermal projects carry significant upfront investment and geological risk. Decisions made early—well placement, production strategy, reinjection design—can define the economic success of a project for decades.

AI-driven modelling allows developers to move from reactive analysis to proactive optimization.
Rather than asking “what will happen?”, operators can now explore “what is the best possible outcome?” across thousands or even millions of scenarios. This dramatically reduces uncertainty and provides a stronger foundation for investment decisions.

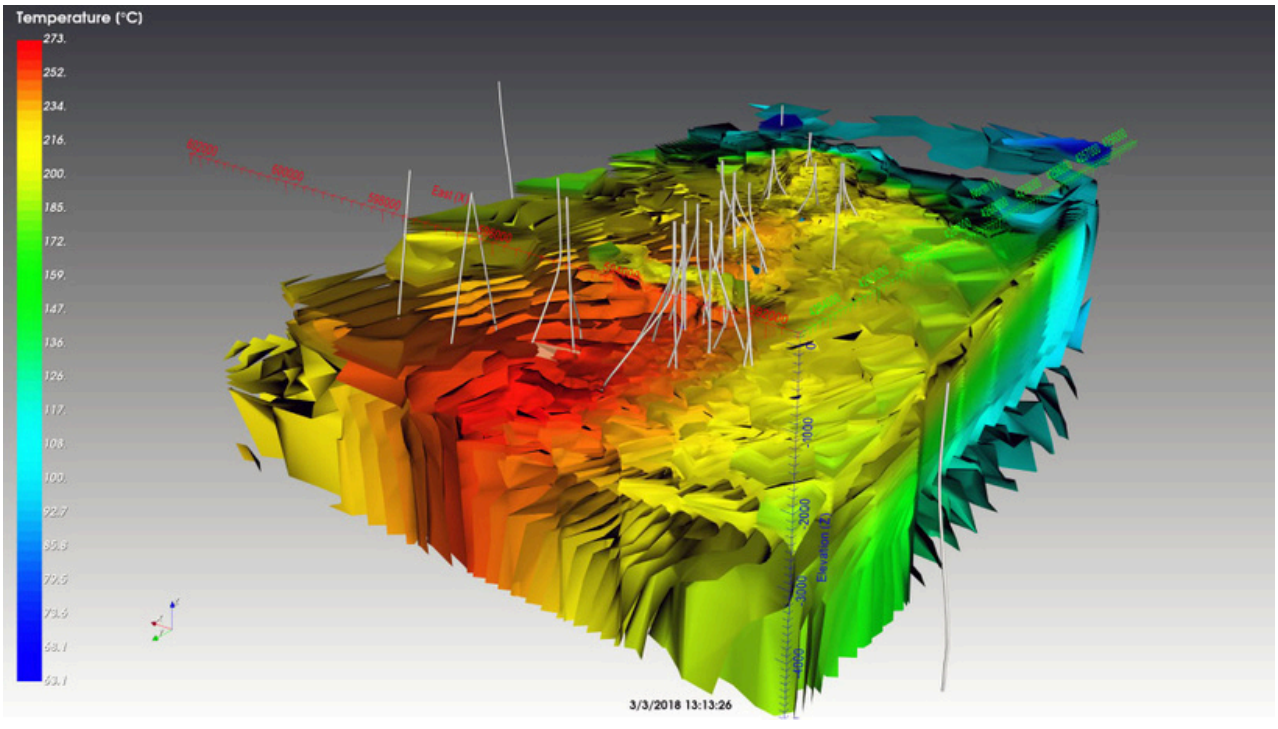
Türkiye as a Digital Testbed
Türkiye’s geothermal sector, with its high activity, clustered developments, and strong operational base, provides an ideal environment for deploying and scaling these technologies. The combination of active drilling programs, mature fields, and a need for continuous optimization creates the perfect conditions for digital tools to deliver real impact.

In many ways, Türkiye is becoming a testbed for the future of digital geothermal development.

The Bigger Picture
What we are seeing here goes beyond a single project. It signals a broader shift: geothermal is moving from a resource-driven industry to a data-driven one.

As AI, cloud computing, and advanced subsurface modelling continue to evolve, the ability to understand and optimize reservoirs will no longer be limited by time or computational constraints.
And in a sector where uncertainty has always been the biggest challenge, that changes everything.

Key Takeaways
- AI enables millions of reservoir simulations in days instead of years
- Faster modelling leads to better, data-driven decisions
- Risk is reduced at the most critical project stages
- Türkiye provides an ideal environment for digital geothermal innovation
- Geothermal is transitioning into a data-driven industry



From Potential to Deployment: Why Policy Is Geothermal's Missing Link

Across the global energy landscape, geothermal energy holds a unique position. It is reliable, renewable, and capable of delivering both baseload power and direct heat. The resource base is vast, and technological capabilities continue to advance at pace.

And yet, despite these advantages, geothermal deployment remains uneven and, in many regions, significantly below its potential. This gap is not primarily a question of resource availability or technical feasibility. Increasingly, it is a question of system readiness.

A Structural Challenge

Geothermal projects operate at the intersection of multiple domains: energy, subsurface resource management, water systems, environmental regulation, and regional planning. Each of these areas is typically governed by different authorities, frameworks, and timelines.

As a result, even well-prepared projects can face delays due to:

- fragmented permitting processes
- unclear regulatory responsibilities
- misalignment between national and regional authorities
- limited institutional experience with geothermal development

These challenges are not unique to one country or region. They are systemic.

While other renewable technologies have benefited from relatively streamlined regulatory pathways, geothermal often requires navigating a more complex institutional landscape. This complexity slows down development — not because solutions are unavailable, but because systems are not yet fully aligned to support them.

From Dialogue to Implementation

Recognizing this gap, the International Geothermal Association (IGA) has initiated a new format: the Geothermal Policy Lab.

The concept is deliberately practical.: Rather than focusing on presentations or high-level discussions, Policy Labs are designed as working environments. They bring together policymakers, regulators, industry representatives, and financial stakeholders to address specific bottlenecks in real-world contexts.

The aim is not to restate known challenges, but to clarify roles and responsibilities, identify regulatory gaps, align stakeholders around actionable pathways, and translate experience into transferable frameworks. In this sense, Policy Labs function less as events and more as structured problem-solving platforms.

Gran Canaria as a Living Case

The upcoming Policy Lab at GSIS 2026 in Gran Canaria illustrates this approach. The Canary Islands present a compelling case: strong geothermal potential, clear strategic interest in reducing energy dependency, and a growing recognition of the role geothermal could play in a diversified energy mix.

At the same time, development has been limited. The reasons are not rooted in a lack of ambition, but in the complexity of governance structures. Responsibilities are distributed across multiple administrative levels, and regulatory pathways are not always clearly defined for geothermal applications.
This makes Gran Canaria more than a host location. It becomes a practical test environment for exploring how policy frameworks can evolve to better support deployment.

The insights generated are expected to extend beyond the islands themselves, offering relevance for other regions facing similar structural challenges.

Scaling the Approach: From GSIS2026 to COP31

The Policy Lab in Gran Canaria is not an isolated initiative. It forms part of a broader effort to build continuity and scale. A subsequent Policy Lab is planned in connection with COP31 in Türkiye - a country that has demonstrated how rapidly geothermal development can progress when enabling conditions are in place.

Over the past two decades, Türkiye has moved from limited installed capacity to becoming one of the leading geothermal markets globally. This transformation has been driven not only by resource availability, but by a combination of policy clarity, investment frameworks, and sustained institutional commitment. Positioning a Policy Lab in this context allows for a shift in focus: from identifying barriers to understanding and replicating success factors.

Policy as Enabling Infrastructure

One of the key insights emerging from this work is the need to reconsider how policy is framed within the energy transition. Policy is often perceived as a constraint: a set of rules that projects must navigate. In practice, it functions more like infrastructure.

Just as physical infrastructure enables the generation and distribution of energy, policy frameworks enable projects to move from concept to implementation. Where these frameworks are clear, consistent, and aligned, development accelerates. Where they are fragmented or uncertain, progress slows.

Treating policy as infrastructure implies a more proactive approach:

- designing frameworks with deployment in mind
- testing them in real-world conditions
- refining them based on practical experience
- enabling knowledge transfer between regions

Connecting Technology, Markets, and Systems

The broader context for these efforts is reflected across the GLOBAL_GT initiative. Technological innovation continues to expand what is possible in geothermal development. At the same time, countries with established markets demonstrate what can be achieved when investment and policy environments are aligned.

The remaining challenge lies in connecting these elements into coherent systems that can be replicated and scaled. Policy Labs are one mechanism to support this process - not as standalone interventions, but as part of a longer-term effort to strengthen system readiness across regions.

Looking Ahead

As the global geothermal community moves toward the World Geothermal Congress 2026 in Calgary, the focus is increasingly shifting from potential to delivery. Events will continue to play an important role in bringing stakeholders together. However, translating dialogue into deployment requires formats that go beyond discussion.

The Geothermal Policy Lab is an attempt to meet that need — by creating spaces where challenges can be addressed collectively, and where solutions can be developed with implementation in mind. In a sector defined by long project timelines and high upfront investment, this shift from conversation to coordination may prove to be one of the most important steps toward accelerating global geothermal deployment.

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