

# GLOBAL\_GT

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## Indonesia: **FIRE BENEATH THE ISLANDS**



# Table of Contents

Indonesia: The  
World's Largest  
Untapped  
Geothermal  
Powerhouse

**04**

How Digital  
Subsurface  
Intelligence Supports  
Indonesia's  
Geothermal Future

**06**

Mapping  
Indonesia's  
Geothermal  
Heartlands

**08**

Geothermal for  
Agriculture,  
Industry, and  
Communities

**10**



→ GLOBAL\_GT REGION OF THE MONTH

# This Month's Hot Spot

## Fire Beneath the Islands

Indonesia sits on the Pacific Ring of Fire, home to some of the most powerful geothermal systems on Earth. With hundreds of volcanoes, deep tectonic activity, and one of the world's largest untapped geothermal reserves, the country holds extraordinary potential beneath its islands. Yet geothermal in Indonesia is not only a geological story - it is a national strategy for energy security, decarbonisation, and long-term resilience. This month's GLOBAL\_GT explores how Indonesia is turning volcanic heat into national infrastructure, from large-scale power generation to digital innovation and community-based direct-use systems.



# Indonesia: The World's Largest Untapped Geothermal Powerhouse



Indonesia is often described as the sleeping giant of global geothermal energy. The country holds nearly 40% of the world's geothermal potential, yet only a fraction of that resource has been developed. Few nations sit on such extraordinary natural energy wealth—and few face such urgent pressure to transform it into reliable infrastructure.

Stretching across the Pacific Ring of Fire, Indonesia's volcanic geography creates ideal conditions for geothermal development. From Java and Sumatra to Sulawesi and beyond, the country's subsurface heat offers a rare combination of scale, reliability, and domestic energy security.

## **Beyond Potential: Why Scale Matters**

Indonesia already ranks among the world's leading geothermal producers, with more than 2.3 GW of installed capacity. But compared to the size of the resource base, this is still only the beginning.

As electricity demand continues to rise and coal remains deeply embedded in the national energy system, geothermal offers something few other renewables can: stable, 24/7 baseload power. It complements solar and wind while reducing dependence on imported fuels and exposure to volatile energy markets. This makes geothermal more than an environmental solution - it becomes a strategic economic asset.



## Pertamina and the National Push

Indonesia's geothermal development is strongly shaped by national leadership, particularly through PT Pertamina Geothermal Energy.

Large-scale development programs are helping move geothermal from isolated projects toward system-level deployment.

Government targets for renewable expansion, energy independence, and emissions reduction continue to position geothermal as a central pillar of long-term planning. Investment frameworks are improving, international partnerships are growing, and technology is helping reduce development risk.

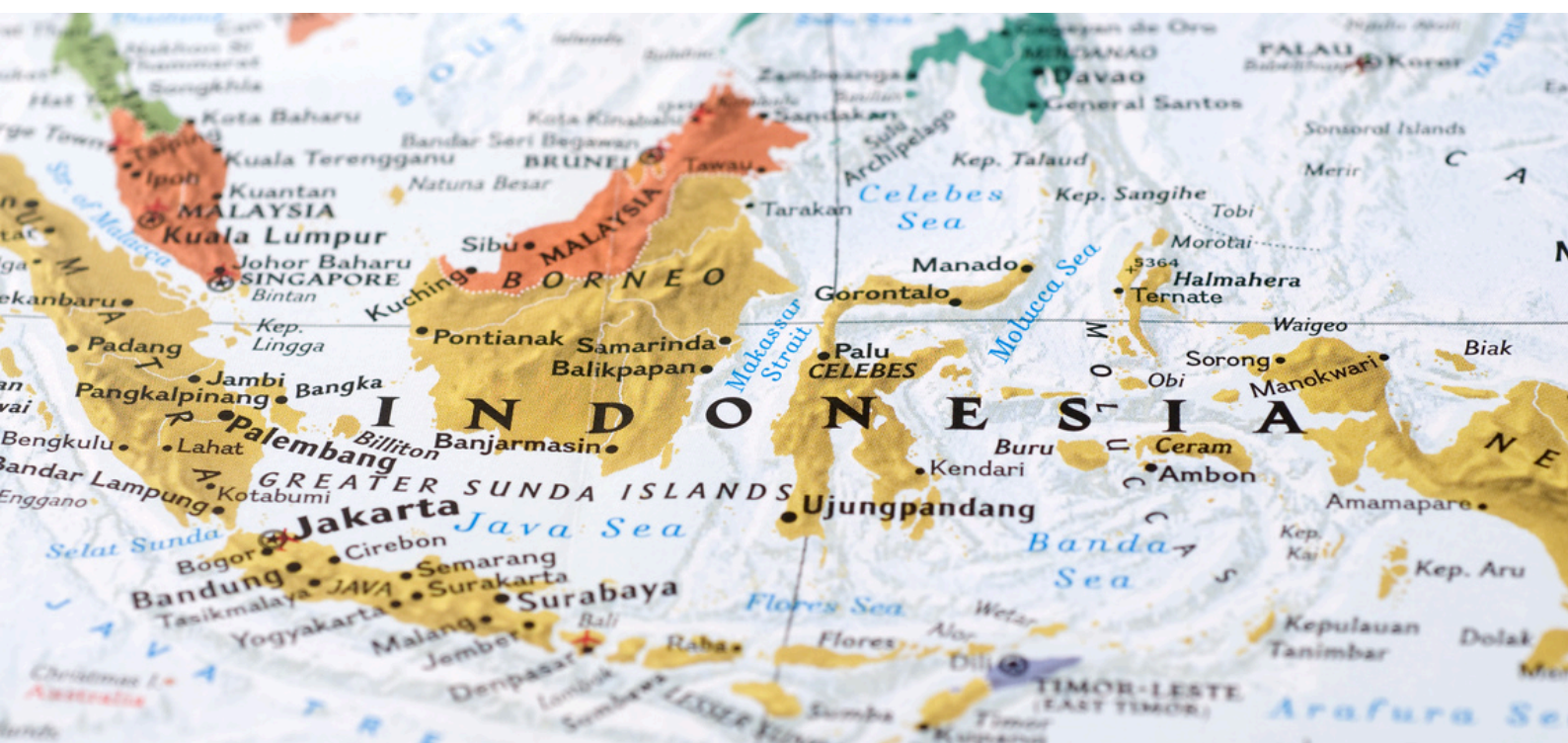
The question is no longer whether Indonesia should lead in geothermal - but how fast it can scale.

## From Volcanoes to Global Leadership

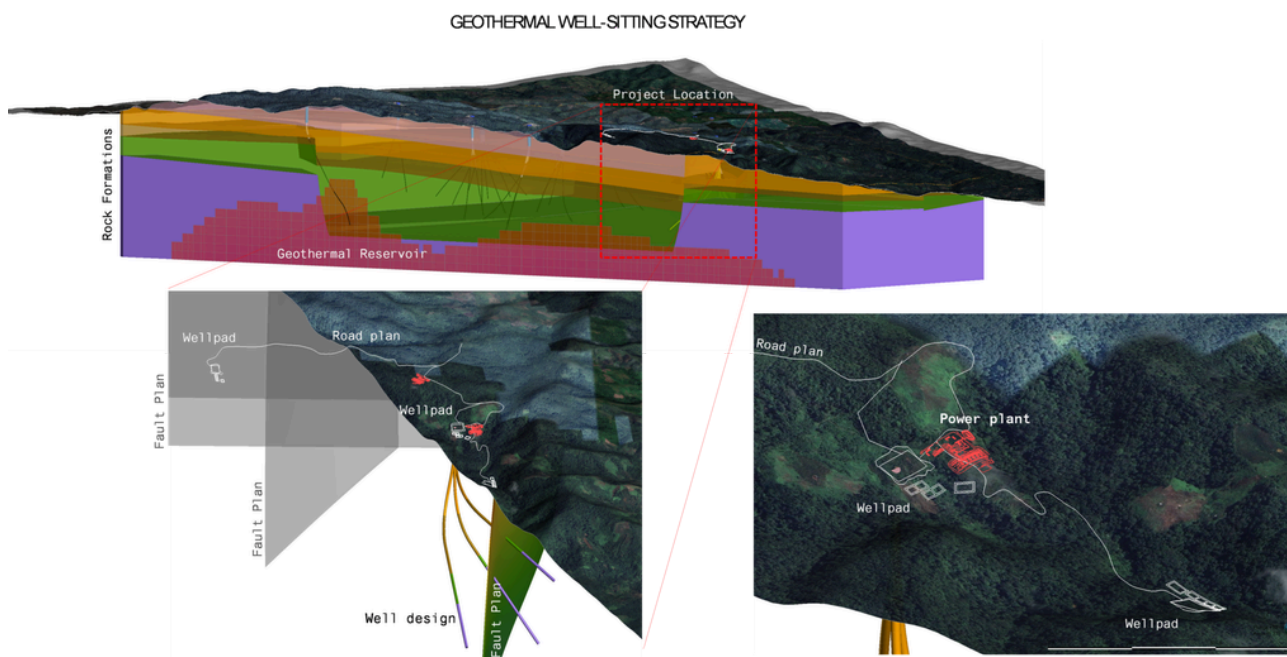
Indonesia's geothermal future reaches beyond national borders. Success here would influence global geothermal confidence, supply chains, financing models, and regional expertise across Southeast Asia.

Few countries can shape the global geothermal conversation as strongly as Indonesia. The resource is there. The demand is there. The momentum is building.

What happens next may define not only Indonesia's energy transition - but geothermal's role in the world's wider clean energy future.



# How Digital Subsurface Intelligence Supports Indonesia's Geothermal Future



Geothermal projects do not fail because of a lack of heat - they fail because of uncertainty.

In Indonesia, where some of the world's richest geothermal systems lie beneath complex volcanic terrain, reducing subsurface risk is one of the most important factors in accelerating development. Drilling is expensive, exploration carries uncertainty, and confidence in reservoir behaviour can determine whether a project moves forward or stalls.

This is where digital subsurface intelligence becomes critical.

## Better Data, Faster Decisions

Seequent's recent work with PT Pertamina Geothermal Energy demonstrates how advanced modelling can transform geothermal development from a high-risk exploration challenge into a far more confident investment pathway.

Using integrated geological and reservoir modelling, teams were able to better understand subsurface structures, improve reservoir predictions, and strengthen drilling decisions before major capital was committed.

The result: lower uncertainty, faster workflows, and stronger long-term project confidence.

## Powering 60,000 Homes

The project supported a geothermal development scheme capable of powering approximately 60,000 homes, helping establish a benchmark for sustainable geothermal delivery in Indonesia.

Rather than treating exploration, modelling, and operations as separate stages, the approach created a connected workflow - from early reservoir understanding through to production planning. This improves both technical performance and investor confidence.

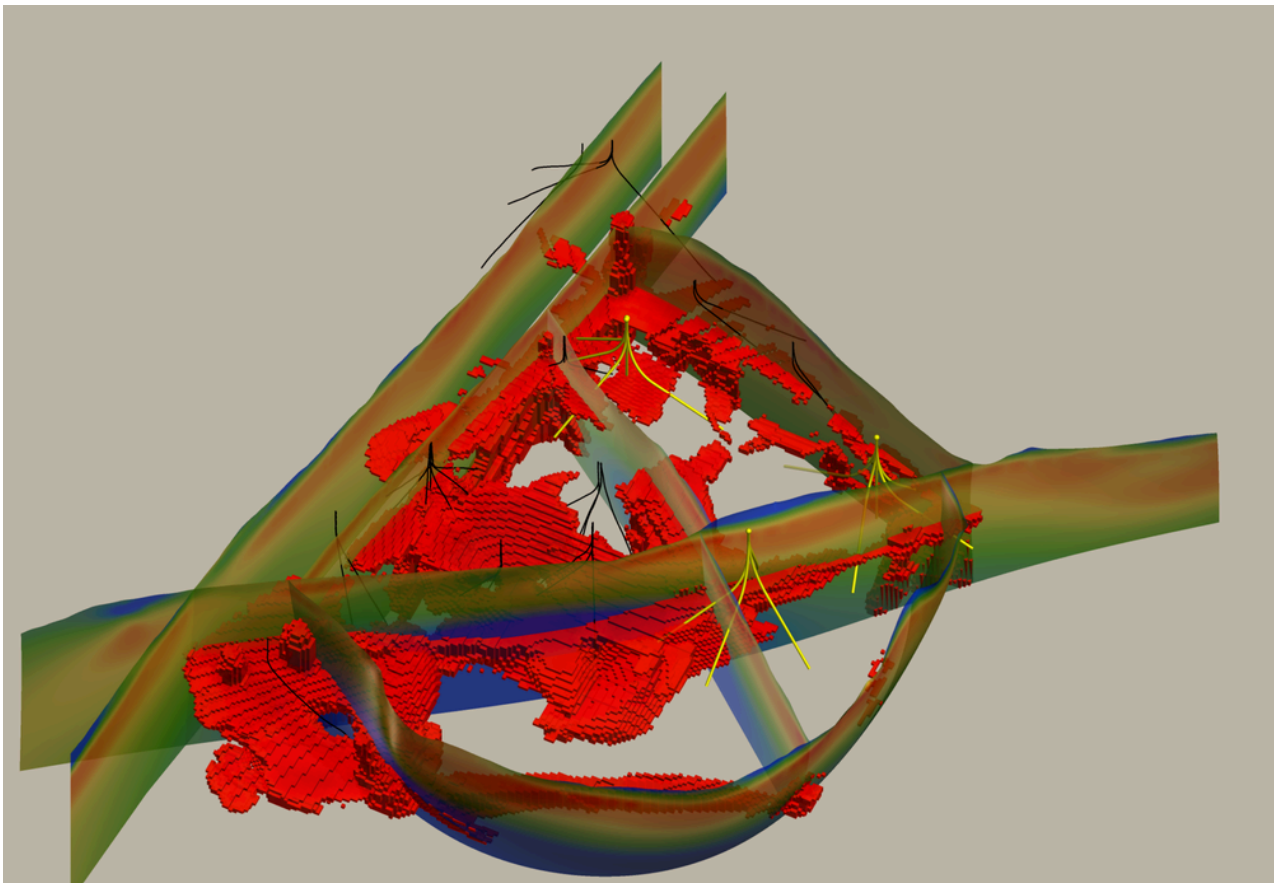
## Digital Tools as Scale Enablers

For countries like Indonesia, the challenge is not proving geothermal exists—it is scaling it fast enough to meet national energy goals.

Digital tools help close that gap. Better reservoir understanding reduces drilling risk. Faster scenario testing improves operational planning. More accurate subsurface models support stronger financing decisions.

As geothermal moves from pilot projects to national infrastructure, digital intelligence becomes part of the energy system itself.

Indonesia's geothermal future will still be built through wells, turbines, and power plants - but increasingly, it begins with data.



# Mapping Indonesia's Geothermal Heartlands



Indonesia's geothermal story is often told as a single national success - but in reality, it is a network of very different regional opportunities. Across the archipelago, geothermal development follows the country's volcanic geography, with each island offering its own combination of resource potential, infrastructure readiness, and development priorities.

From the mature power fields of Java to the frontier systems of Sulawesi, Indonesia's geothermal future is not one market - it is many.

## **Java: The Operational Backbone**

Java remains the center of Indonesia's geothermal industry. As the country's most densely populated island and economic engine, it combines strong electricity demand with some of the most developed geothermal resources in the region.

Major fields such as Wayang Windu, Darajat, Salak, and Kamojang have become symbols of Indonesia's geothermal maturity. These long-operating projects demonstrate how geothermal can move from exploration to reliable baseload generation at national scale.

Java's advantage lies not only in geology, but in infrastructure. Transmission networks, industrial demand, and financing ecosystems make project delivery faster and more bankable.

## Sumatra: Scale and Untapped Opportunity

If Java represents maturity, Sumatra represents scale.

The island hosts vast geothermal potential, particularly along the volcanic spine that stretches from Aceh in the north to Lampung in the south. Large reservoirs remain underdeveloped, offering major opportunities for future power generation and direct-use applications.

Projects in North Sumatra and South Sumatra continue to attract attention as the government seeks to balance regional development with national renewable targets.

For developers, Sumatra offers one of the strongest long-term geothermal growth stories in Southeast Asia.

## Sulawesi: The Frontier Market

Sulawesi represents the next frontier.

While geothermal development here is less mature, the island's tectonic complexity and active volcanic systems create strong exploration potential. Combined with growing industrial demand—particularly around mining and processing hubs - this makes Sulawesi strategically important for the next wave of geothermal investment.

In frontier regions like this, geothermal is not only about electricity. It can support industrial heat, local energy resilience, and regional economic development where conventional energy infrastructure remains limited.

### One Country, Many Pathways

Indonesia's geothermal strength lies in this diversity.

Java shows what mature geothermal power systems can deliver. Sumatra offers scale for the next generation of projects. Sulawesi demonstrates how geothermal can support frontier development and industrial growth.

Together, these regions prove that Indonesia's geothermal future is not built around a single flagship project - it is built across an entire volcanic nation.

From island to island, the same story repeats: beneath the surface, the opportunity is enormous. ■



# Geothermal for Agriculture, Industry, and Communities



In Indonesia, geothermal is often discussed through the lens of electricity generation—megawatts, turbines, and power plants feeding the national grid. But some of the most immediate and impactful opportunities lie beyond electricity, in the direct use of heat itself.

Across the archipelago, geothermal energy can support agriculture, food production, industrial processing, tourism, and community resilience. In many cases, these applications require lower temperatures, lower investment, and deliver faster economic returns than large-scale power generation.

This is where geothermal becomes not just an energy source, but a local development tool.

## Heat for Food and Agriculture

Indonesia's agricultural economy offers strong opportunities for direct-use geothermal systems. Geothermal heat can support greenhouse cultivation, crop drying, aquaculture, and food processing – reducing energy costs while improving productivity and year-round reliability. In volcanic regions where geothermal resources are close to farming communities, this creates a natural connection between subsurface energy and local livelihoods.

For rural communities, geothermal can strengthen both food security and economic resilience without requiring major grid infrastructure.

## **Industrial Heat and Economic Value**

Many industrial processes require heat rather than electricity. Food manufacturing, textiles, mineral processing, and other industries often depend on expensive fossil-based thermal energy. Geothermal heat offers a cleaner and more stable alternative.

By replacing diesel, coal, or gas for process heat, industries can reduce emissions while improving long-term cost predictability. In regions where mining and manufacturing are growing rapidly, geothermal can become part of industrial competitiveness—not just sustainability policy.

This is especially relevant for islands such as Sulawesi, where industrial development and geothermal potential increasingly overlap.

## **Communities Built Around Heat**

Indonesia also has a long cultural connection to geothermal through hot springs and thermal tourism. Across Java, Bali, and Sumatra, geothermal waters have supported local wellness economies for generations.

This creates opportunities far beyond tourism. District heating for public buildings, hospitals, schools, and community facilities can use the same local heat resource to improve resilience and reduce fuel dependence. These projects may be smaller than utility-scale power plants, but their local social impact is often far greater.

## **From Resource to Everyday Infrastructure**

Direct-use geothermal reminds us that the value of geothermal is not measured only in megawatts. It is measured in warmer homes, more efficient farms, stronger local businesses, and communities less dependent on imported fuels.

Indonesia's geothermal future will certainly include large power plants—but it will also be built through greenhouses, factories, schools, and small municipal systems where heat is used directly, efficiently, and close to where people live. That is where geothermal becomes visible in everyday life - and where its value becomes impossible to ignore. ■



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