Part III

Policy Levers and Pathways for Stakeholder and Environmental Stewardship

Chapter 6

Common Ground: Building Trust and Transparency in Indonesia's Energy Transition

Filda C. Yusgiantoro and Michael Suryaprawira
Purnomo Yusgiantoro Center

Strengthening community engagement, improving benefit sharing, and integrating next-generation geothermal will be key to creating a geothermal industry that serves all of the nation's people.

Geothermal energy development is often approached as a purely technical subject—drilling wells, installing turbines, building transmission lines. But behind the drilling rigs lies a much more complex story involving people, histories, competing interests, and long-term consequences. Geothermal is not just a matter of technology; it is also about governing land, sharing benefits, and navigating the tension between national ambition and local realities.

Regions of Indonesia rich in conventional geothermal potential often contain environmentally or culturally sensitive areas and are home to communities with diverse and overlapping backgrounds—Indigenous groups, farmers, rural communities, and local government. All of these residents have a stake in what happens when a geothermal project moves in. Each group brings its own perspective: Some see opportunity, while others fear disruption. These responses are not irrational; they are grounded in memories of past extractive projects.

Geothermal projects often also include voices from universities, nongovernmental organizations, and researchers, many pushing the boundaries of geothermal. These stakeholders are studying reservoirs and rethinking policy frameworks, training young engineers, and linking geothermal energy to broader questions of justice and sustainability.

Local governments sit at a unique intersection. They must mediate between national targets, stakeholders

LOCAL REQUIREMENTS FOR INDONESIAN GEOTHERMAL POWER PLANTS

Installed capacity up to 5 MW/unit:	1. Minimum local content on goods: 31.30% 2. Minimum local content on services: 89.18% 3. Minimum combined local content: 42.00%
Installed capacity more than 10 MW up to 60 MW/unit:	1. Minimum local content on goods: 15.70% 2. Minimum local content on services: 74.10% 3. Minimum combined local content: 33.24%
Installed capacity more than 110 MW/unit:	1. Minimum local content on goods: 16.00% 2. Minimum local content on services: 58.40% 3. Minimum combined local content: 28.95%

Installed capacity more than 5 MW up to 10 MW/unit	1. Minimum local content on goods: 21.00% 2. Minimum local content on services: 83.30% 3. Minimum combined local content: 40.45%
Installed capacity more than 60 MW up to 110 MW/unit:	1. Minimum local content on goods: 16.30% 2. Minimum local content on services: 60.10% 3. Minimum combined local content: 29.21%

Figure 6.1: Requirements for geothermal developers based on the Geothermal Act of 2014. Goods refer to steam turbines, boilers, generators, electrical, instruments and controls, plant materials, and civil and steel structure. Services refer to feasibility studies, engineering, procurement, construction, inspection services, testing, certifications, and other support services. MW = megawatts. Source: Audit Board of Indonesia. (2014). *Law number 21 of 2014 concerning geothermal energy.* Government of Indonesia; Ministry of Energy and Mineral Resources. (2025). *Performance report of the Directorate General of New, Renewable Energy and Energy Conservation (EBTKE) for 2024.* Government of Indonesia.

from various organizations, and community priorities, often with limited capacity or leverage. Yet their role can be decisive in accelerating or stalling progress.

Much of the historic, current, and planned geothermal development has focused on conventional geothermal power generation, also known as hydrothermal power. Today, emerging next-generation technologies and direct-use application development such as industrial heat and geothermal cooling systems have fewer impacts. These systems can operate at lower temperatures, closer to demand centers, and with a smaller surface footprint. Communities have more potential to benefit from geothermal resources rather than be harmed by their development. But for communities to attain these benefits, it is vital to ensure that development is transparent, inclusive, and aligned with *all* of the stakeholders involved with and affected by the installation of a geothermal system.

This chapter focuses on these people and institutions, how they engage with geothermal development, and how their roles ultimately shape the sector's future. By bringing these perspectives together, the chapter aims to offer a fuller picture of what is really at stake when we talk about geothermal—not just electrons, but equity; not just potential, but participation.

WHERE THE MONEY GOES: GOVERNING THE GEOTHERMAL DIVIDEND

As geothermal projects—including next-generation and direct-use projects—move from exploration into commercial operation, the revenues generated through royalties, taxes, and bonuses represent a form of geothermal dividend that can, if well governed, transform communities. The challenge lies in ensuring that this dividend is transparently managed and fairly allocated.

This section examines the current legal framework governing geothermal revenues and the obligations of geothermal permit holders. It also analyzes how existing mechanisms function and identifies areas where improved coordination and governance could multiply the impact of these revenues.

Legal Foundations and Permit Holder Obligations

The governance of geothermal revenues in Indonesia is rooted in Law No. 21/2014[1] on Geothermal Energy and broken down into several key regulations:

- Government Regulation No. 28/2016 on Amount and Ways to Allocate Geothermal Production Bonus[2]
- Government Regulation No. 7/2017 on Geothermal Energy for Indirect Utilization[3]
- Regulation of the Minister of Energy and Mineral Resources No. 37/2018 on Offering of Geothermal Working Areas, Granting of Geothermal Permits, and Assignment of Geothermal Business[4]
- Regulation of the Minister of Energy and Mineral Resources No. 33/2021 on Occupational Safety and Health, Environmental Protection and Management, and Geothermal Technical Principles for Indirect Utilization[5]

Power permit holders—officially recognized under Indonesia's geothermal licensing framework as *Izin Panas Bumi* (IPB) holders—carry responsibilities that extend far beyond building and running plants. The Indonesian government expects these companies to serve as agents of socioeconomic development, investing not

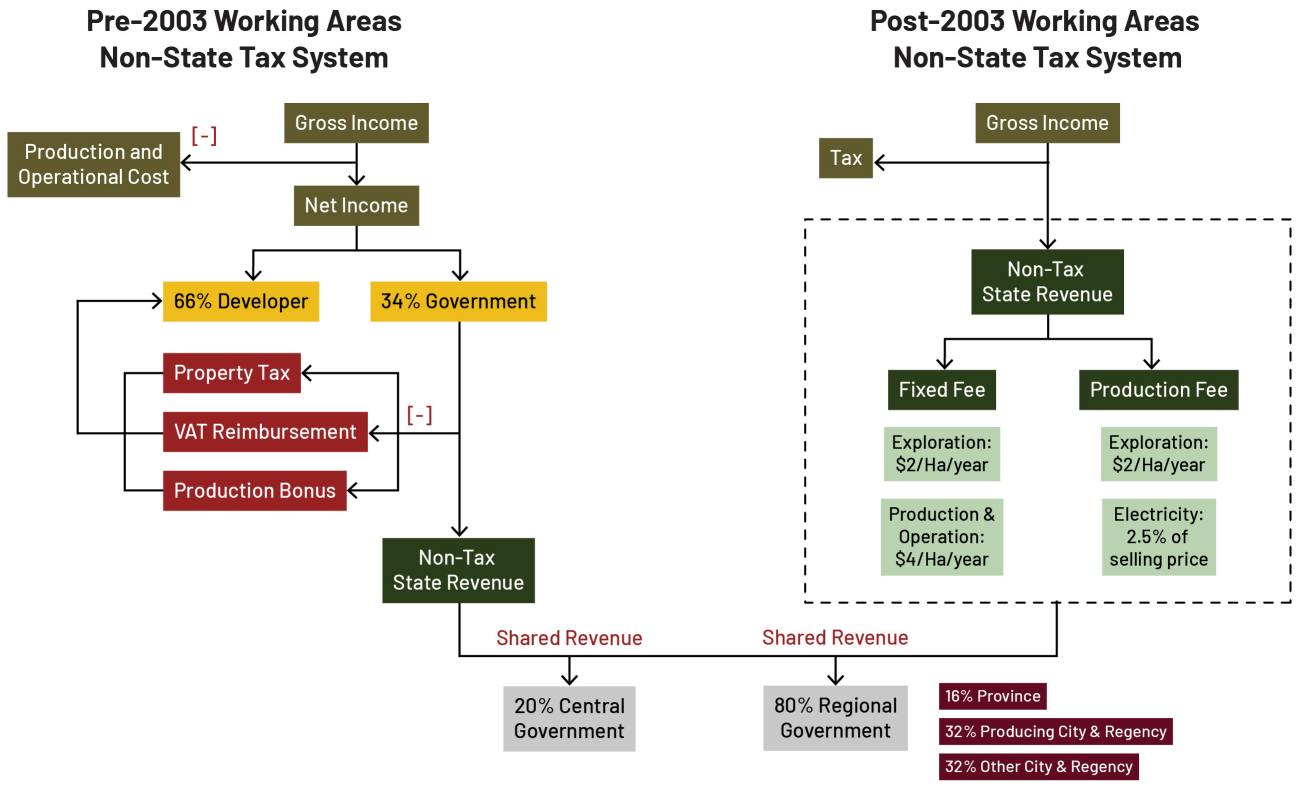

Figure 6.2: There are currently two types of Geothermal Working Areas (*Wilayah Kerja Panas*, or WKP). The first applies to plants that were running before 2003, when Law 27 was established; the second WKP is for plants that started operating after 2003. Ha = hectares; PNBP = non-tax state revenue; VAT = value-added tax; Source: Ministry of Energy and Mineral Resources. (2025). *2024 Directorate General of Renewable Energy and Energy performance report.* Government of Indonesia.

GEOTHERMAL NON-TAX STATE REVENUES

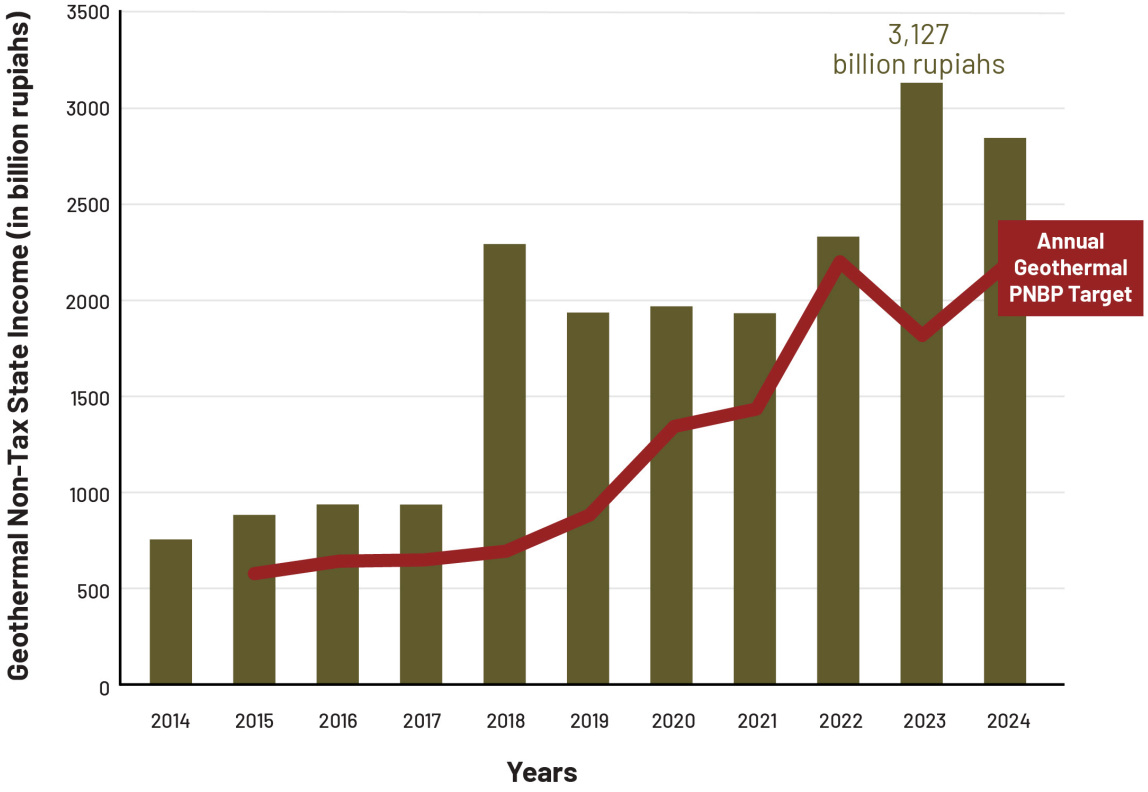

Figure 6.3: From 2014 to 2024, the geothermal sector contributed around Rp19.9 trillion or US$1.2 billion to Indonesia's geothermal non-tax state revenues. PNBP = non-state tax income. Sources: Ministry of Energy and Mineral Resources. (2025). *2024 Directorate General of New, Renewable and Energy Conservation performance report.* Government of Indonesia; Ministry of Energy and Mineral Resources. (2019). *2014–2019 performance report of the Ministry of Energy and Mineral Resources of the Republic of Indonesia.* Government of Indonesia; Ministry of Energy and Mineral Resources. (2021). *2020 performance report of the Ministry of Energy and Mineral Resources.* Government of Indonesia; Ministry of Energy and Mineral Resources. (2022). *2021 performance report of the Ministry of Energy and Mineral Resources.* Government of Indonesia; Ministry of Energy and Mineral Resources. (2023). *2022 performance report of the Ministry of Energy and Mineral Resources*. Government of Indonesia; Ministry of Energy and Mineral Resources. (2024). *2023 performance report of the Ministry of Energy and Mineral Resources.* Government of Indonesia; Ministry of Energy and Mineral Resources. (2025). *2024 performance report of the Ministry of Energy and Mineral Resources.* Government of Indonesia.

only in hardware but also in people, communities, and the broader ecosystem.[6]

IPB holders have an important obligation to support domestic industry and workforce development. They must prioritize local goods and services (the details of which can be seen in **Figure 6.1** on local requirements[7]) or, when they cannot source locally, ensure imported products and workers meet quality standards. Beyond procurement, IPB holders are expected to invest in geothermal research and development, collaborate with academic institutions, and facilitate knowledge exchange, often through joint studies, lab access, or overseas benchmarking programs to strengthen local expertise.

IPB holders have an equally vital obligation to support community development and empowerment. They must submit programs to local governments that prioritize communities near project sites, focusing on local employment, services, and essential needs such as education, health, and infrastructure.[8] They must align their programs with regional plans and implement them during a project's operational phases.

Contrary to common perception, the lion's share of Indonesia's geothermal revenues does not stay in Jakarta. Under the current revenue-sharing scheme, 80% of the revenue commonly known as Shared Revenue Funds (Dana Bagi Hasil; DBH) is allocated to regional governments.

Despite these mandates, real-world implementation has been mixed. Monitoring is inconsistent, data on outcomes are fragmented, and mechanisms for evaluation remain largely underdeveloped. Most companies and regional governments do not yet embed monitoring, evaluation, and learning systems into their efforts to support community development, making it difficult to assess effectiveness of particular activities or replicate good practices. Furthermore, governments and companies often coordinate reactively rather than strategically, causing inefficiencies and missing opportunities.

Current Revenue Streams from Geothermal Projects

The financial returns from Indonesia's geothermal sector can be significant. Once a project reaches the production phase, the local and national government begins receiving revenues through fixed and production-based fees paid by the IPB holders, as determined by their original IPB contracts. These payments are supplemented by standard tax obligations, such as property tax and value-added tax, alongside a particularly important category: non-tax state revenue. Non-tax state revenue includes fixed fees (US$2.00 per hectare for the exploration phase and US$4.00 per hectare after the Commercial Operation Date) and production fees (5% per kilowatt-hour for steam or 2.5% per kilowatt-hour from electricity), forming one of the largest and most direct fiscal returns from geothermal projects.[9] In addition, permit holders must pay administrative fees, licensing costs, and other government-imposed charges related to compliance.

Today, the government collects fees based on the plant and when it was built. **Figure 6.2** shows the differences between the two types of Geothermal Working Areas (*Wilayah Kerja Panas Bumi*, or WKP). The first WKP applies to plants that were running before 2003, when Law 27 was established; these contribute to 90% of geothermal non-tax state revenues (PNBP). The second WKP is for plants that started operating after 2003; these contribute 10% of the current non-tax state revenues.[10] Between 2014 and 2024, the geothermal sector contributed around Rp19.9 trillion or US$1.2 billion to Indonesia's geothermal non-tax state revenues (see **Figure 6.3**).[11,12,13,14,15,16]

Royalties: Who Benefits?

Contrary to common perception, the lion's share of Indonesia's geothermal revenues does not stay in Jakarta. Under the current revenue-sharing scheme, 80% of the revenue commonly known as Shared Revenue Funds (*Dana Bagi Hasil*; DBH) is allocated to regional governments, while the central government retains 20% of non-tax state revenues.

The 80% is intended to reward and support regions that host geothermal infrastructure and often bear the environmental and social impacts. The allotment also represents a significant commitment to decentralization.

Take the Kamojang Geothermal Power Plant in the Bandug Regency in West Java Province. Of the 80% that goes to the West Java government:

- 16% goes to West Java Provincial Government.
- 32% goes to Bandung City Government.
- The remaining 32% is distributed evenly to the other 26 cities or regencies in West Java.

Figure 6.4 shows the 13 provinces with the highest amount of geothermal shared revenue.[17]

All that said, while the allocation of money is measurable, its ultimate use is much more difficult to trace. Indonesia lacks a unified, transparent framework to tie these geothermal revenues to a broader development strategy. Most funds—whether from central taxes or regional levies—are absorbed into general budgets. Once pooled, these revenues are

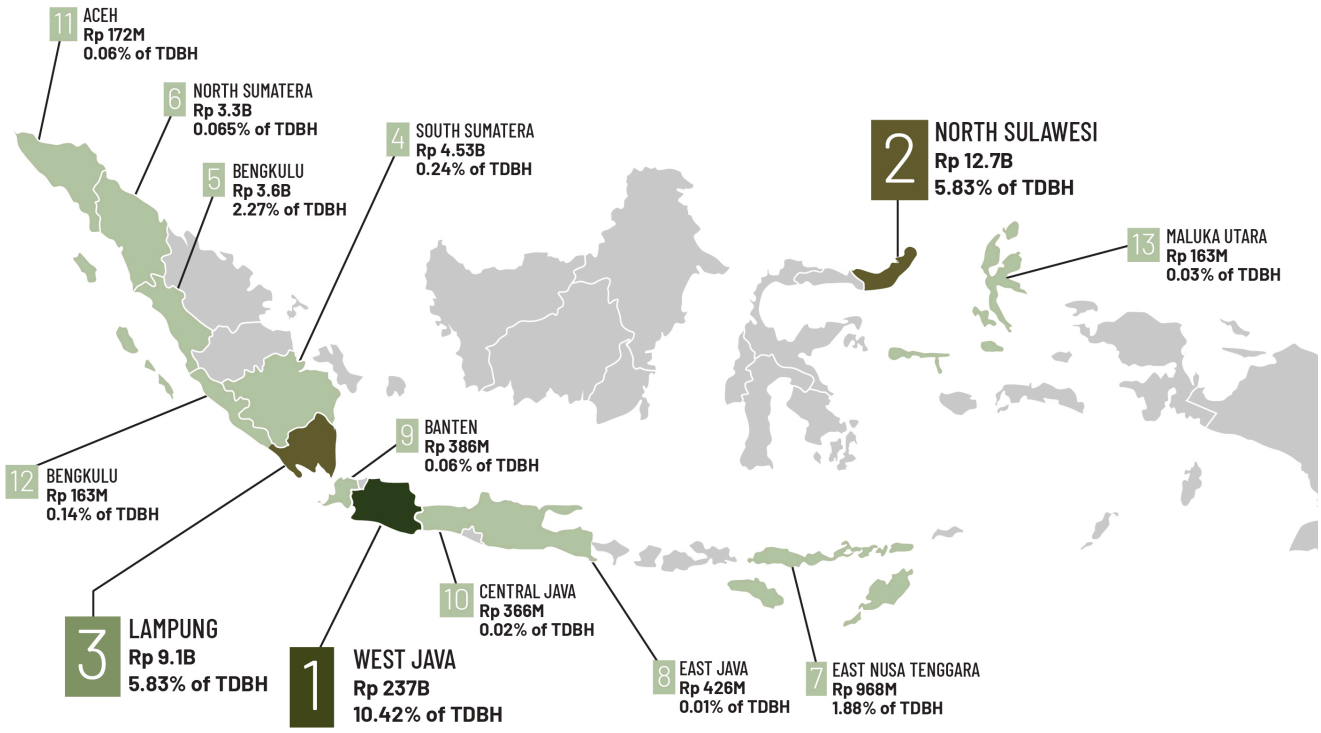

Figure 6.4: Geothermal provincial shared revenue funds (DBH) in 2024 and its percentage of total DBH (TDBH). Source: Directorate General of Fiscal Balance, Ministry of Finance of the Republic of Indonesia. (2023). *Details of the allocation of the General Allocation Fund and Revenue Sharing Fund for fiscal year 2024.* Government of Indonesia. Processed by Purnomo Yusgiantoro Center.

difficult to isolate, monitor, or evaluate regarding their specific contributions to geothermal-affected regions.

Without those tracking mechanisms, geothermal revenues risk becoming just another line item, rather than a development tool. As a result, local communities may see the steam from the power plant but not the benefits of the fiscal dividend, trapping geothermal-rich areas in the paradox of energy wealth and underdevelopment. In other words, while the revenue is shared, its impacts currently are invisible and untraceable to the host communities.

For geothermal to fulfill its promise as a source of clean energy and local prosperity, introducing a dedicated geothermal revenue management framework that has transparent spending requirements and participatory planning mechanisms would go a long way toward rebuilding trust between communities, companies, and the state. See Policy Recommendation #9 in Chapter 7, "Turning Potential into Power: A Policy Blueprint for Indonesia's Geothermal Transformation," for further details.

THE PEOPLE: MAJOR STAKEHOLDERS AND IMPACTED COMMUNITIES

Rural and Low-Income Communities

The development of geothermal energy in Indonesia is frequently framed in terms of geology, finance, and policy. However, the social dimensions that shape perceptions of projects are just as important. Geothermal expansion is not just a source of clean energy; it is a social process that intersects with land tenure systems, cultural values, local livelihoods, and public trust.

In future development models, direct-use geothermal could provide more tangible and less intrusive benefits for local communities. Supplying clean, affordable heat for processing, agriculture, and community services or providing cooling for buildings and tourism can align geothermal activity more closely with local economic priorities.

Indonesia's geothermal potential is among the highest in the world, yet its deployment remains uneven. In several regions—from North Sumatra to East Nusa Tenggara—projects have faced strong community resistance, ranging from peaceful protests to full project suspension (see **Figure 6.5**). Understanding where and why these tensions have emerged with past development can help with the design of more inclusive and sustainable projects going forward.

Social conflict in geothermal development rarely arises from a single trigger.[18] Instead, it is often the result of technical, environmental, economic, and cultural concerns left unaddressed in early project phases. Research conducted by the Purnomo Yusgiantoro Center (PYC) reveals these concerns tend to emerge around four core issues: land tenure ambiguity and insufficient consultation; perceived environmental risk; economic displacement and limited local benefit; and cultural and spiritual impacts.

Land Tenure Ambiguity and Insufficient Consultation

In many project areas, those with customary land systems (*wilayah adat*) often feel their rights and claims are overlooked. These systems involve land originally owned by Indigenous people who have resided on the land for thousands of years. Developers might receive official permits from the government to operate on the land, but residents may not recognize the legitimacy of these authorizations if they were not consulted in the process. This disconnect has caused locals to mistrust developers and oppose their projects.[19]

Perceived Environmental Risk

Communities frequently raise concerns about the use and safety of natural resources, particularly water and air quality. Drilling operations, fluid discharge, and accidental emissions are potential threats to health, agriculture, and ecosystems. Even when these risks are low or well managed, poor communication can heighten public anxiety. (See Chapter 8, "Keeping Geothermal Green: Safeguarding Nature and Communities in a New Era of Growth.")

Economic Displacement and Limited Local Benefit

Geothermal projects may be perceived as extractive rather than inclusive if residents are not offered meaningful employment, capacity building, or revenue-sharing mechanisms. Many geothermal sites are located in rural farming regions, where residents rely on plantations or rice paddies for their income. Land acquired for drilling infrastructure often takes that land out of the hands of those residents. Although compensation may be offered, it rarely offsets the full economic and social impact for local residents, especially when residents cannot transition into new roles within the project. This mismatch between economic disruption and employment opportunities often complicates community acceptance.[20]

Cultural and Spiritual Impacts

Geothermal zones are frequently located near or within culturally significant landscapes. Construction in or around sacred sites, ancestral forests, or burial grounds can trigger resistance that is deeply rooted in local identity and tradition. A developer's failure to acknowledge or adapt to these sensitivities can rapidly erode public support.

For example, PT Pertamina Geothermal Energy and Bali Energy Limited began developing the Bedugul Geothermal Power Plant in the 1990s at the Buyan-Bratan volcanic complex in Bali. The companies were permitted to do this development, but strong public opposition rooted in religious beliefs halted the project. Many Balinese Hindus consider the mountains—

COMMUNITY ISSUES ASSOCIATED WITH GEOTHERMAL ELECTRICITY PROJECTS IN INDONESIA

No.	Project	Location	Time	Community Concern
1	Tabanan (PT Pertamina Geothermal Energy and Bali Energy, Ltd.)	Bali	Aug. 2005	**Cultural:** Disturbance to a sacred place due to project activities **Environmental:** Water source scarcity and contamination; disruption of ecosystem preservation
2	Mount Rajabasa (PT Supreme Energy)	Lampung	May 2013	**Cultural:** Disturbance to several historical places (forts) **Environmental:** Water source scarcity and contamination **Economic:** Erase the occupation of the surrounding community
3	Tangkuban Perahu (PT Tangkuban Perahu Geothermal Power)	West Java	Nov. 2013	**Environmental:** Water source scarcity and contamination; man-induced natural disasters (floods and landslides)
4	Sorik Marapi (PT Sorik Marapi Geothermal Power)	North Sumatera	Dec. 2014	**Environmental:** Disruption of ecosystem preservation; drilling risk to the community (H_2S and blowout)
5	Mount Ciremai (PT Chevron Geothermal Indonesia)	West Java	March 2015	**Environmental:** Water source scarcity and contamination; community health
6	Baturaden (PT Sejahtera Alam Energy)	Central Java	Nov. 2016-Oct. 2017	**Environmental:** Disruption to forest ecosystem and water source contamination; man-induced natural disasters (floods and landslides) **Economic:** Disruption of the occupation of the surrounding community; threat to natural tourism attractions
7	Sokoria (PT Sokoria Geothermal Indonesia)	East Nusa Tenggara	Feb. 2017	**Economic:** Untransparent land acquisition mechanism
8	Mount Talang (PT Hitay Daya Energy)	West Sumatera	Nov. 2017	**Environmental:** Water source scarcity and contamination; earthquake induced by drilling activity; potential failure of geothermal power plant development **Economic:** Limiting the local agricultural potential
9	Mount Lawu (PT Pertamina Geothermal Energy)	Central to East Java	Jan. 2018	**Cultural:** Disturbance to a sacred place due to project activities **Environmental:** Disruption of ecosystem reservation due to infrastructure preparation; scarcity of water sources **Economic:** Minimal benefit to the community from geothermal projects
10	Kaldera Danau Banten (PT Sintesa Banten Geothermal)	Banten	March 2020	**Environmental:** Disruption of ecosystem preservation
11	Bittuang (Government drilling)	South Sulawesi	Jan. 2021	**Cultural:** Disturbance to customary lands (*wilayah adat*) **Economic:** Erase the local plantation area **Environmental:** Water source scarcity
12	Tampomas (PT Wijaya Karjya Jabar Power)	West Java	March 2021	**Environmental:** Water source scarcity and soil fertility issue; man-induced natural disasters (seismicity from drilling)
13	Dieng (PT Geo Dipa Energi, existing GWA)	Central Java	Jan. 2022	**Environmental:** Risk to the nearby village; drilling risk to the community (H_2S and blowout)
14	Wae Sano (Government drilling)	East Nusa Tenggara	Feb. 2022	**Cultural:** Disturbance to local village and traditional houses complex **Environmental:** Risk to nearby villages; water source scarcity and contamination. **Economics:** Limiting the local agricultural potential

Figure 6.5: Community issues in Indonesia associated with geothermal electricity projects, based on historic references. Source: Fadhillah, F. R., Al Asy'ari, M. R., Bagaskara, A., Valley Vie Vanda, D., Adityatama, D. W., Purba, D., Katmoyo, R., Djandam, A., & Gurning, L. (2023). Challenges in getting public acceptance on geothermal project in Indonesia. In *Proceedings, 48th Workshop on Geothermal Reservoir Engineering*. Stanford, CA, United States.

SOCIAL CHALLENGES ORGANIZED BY GEOTHERMAL PROJECT STAGE

Geothermal Project Stages	Activities	Potential Impact	Potential Community Concerns and Perceptions
Preliminary and Survey	• LiDAR survey • Field mapping • Data and sample collection • Geophysics stationing • Early infrastructure survey and geohazard	• Small-scale land clearing • Trespassing on local land • Disturbing local activities • Raising community curiosity	• Relatively neutral perception • Field sampling can disturb the local community's daily activities since those activities are associated with water resources, local tourism, and sacred places.
Infrastructure Preparation and Drilling	• Detailed infrastructure and geotechnical survey • Land acquisition • Massive land clearing • Civil work and heavy equipment mobilization • Water supply gathering • Rig deployment and removal • Drilling and well testing	• Deforestation • Changes of local occupation • Soil material pollution • Area disturbance • Social acculturation with the foreign workers	• Fear of wild animals entering villages and ecosystem disruption • Unfair land acquisition process • Equipment mobilization that disturbs local activities • Air and noise pollution • Dirty road and dust pollution • Loss of water sources due to drilling activities • Loss of occupation • Cultural disruption • Fear of H_2S and blowout events
Construction Phase	• Detailed infrastructure and geotechnical survey • Land acquisition • Massive land clearing • Civil work and heavy equipment mobilization • Steam Gathering System (SAGS) construction	• Deforestation • Soil material pollution • Area disturbance • Social acculturation with the foreign workers	• Air, water, and noise pollution • Dirty road and dust pollution • Loss of occupation • Foreign workforce affecting public perception (replacement of the current position and alter those areas' social values/cultural disruption)
Production Phase	• Electricity generation • Make-up well drilling • Workover • Heavy equipment mobilization	• Social acculturation with the foreign workers • Changes in local occupation • Sound pollution • Water contamination from geothermal fluid	• Loss of occupation • Induced earthquakes and landslides • Replacement of the current position and altering of those areas' social values

Figure 6.6: Social challenges organized by geothermal project stage. Source: Fadhillah, F. R., Al Asy'ari, M. R., Bagaskara, A., Valley Vie Vanda, D., Adityatama, D. W., Purba, D., Katmoyo, R., Djandam, A., & Gurning, L. (2023). Challenges in getting public acceptance on geothermal project in Indonesia. In *Proceedings, 48th Workshop on Geothermal Reservoir Engineering*. Stanford, CA, United States.

especially in the Bedugul area—sacred. The thought of drilling into these spiritually significant sites sparked widespread rejection from local communities, environmental groups, the provincial government, and religious councils.[21] Religious institutions in many parts of Indonesia greatly influence local communities, even more than local or regional governments.

A HEALTHIER PARTNERSHIP AHEAD

In Indonesia, geothermal projects rise or fall based on their social license to operate (SLO) granted by host communities, not by regulators. The primary "grantors" are nearby residents: landowners and farmers, customary tribal (*suku adat*) groups, village heads and councils, religious leaders, women's groups, youth

PROBLEM AND SOLUTION, SIMPLY STATED

The aim is practical: Spell out who does what by when, with verifiable indicators and a standing grievance pathway so commitments survive leadership changes and carry through from exploration to operations. Here are the four most frequent pain points and the moves that reliably de-risk them.

Land Tenure Ambiguity and Insufficient Consultation

- **Problem:** The overlooking of *wilayah adat* rights and claims.
- **Potential solution:** Adopt free, prior, and informed consent with participatory mapping that legally records customary boundaries and co-signs land-use agreements with *adat* leaders. Establish a standing community liaison forum and grievance mechanism, with independent mediation for disputes.

Perceived Environmental Risk

- **Problem:** Community concern over the use and safety of natural resources.
- **Potential solution:** Publish baseline and ongoing air and water data via a real-time dashboard, verified by third-party auditors, and co-design an emergency response plan with regular community drills. Use plain language and commit to stop-work thresholds tied to monitored indicators.

Economic Displacement and Limited Local Benefit

- **Problem:** Perception of geothermal as extractive rather than inclusive.
- **Potential solution:** Implement a Livelihood Restoration Plan that includes training and local hiring targets, supplier development for village small and medium enterprises, and time-bound income-bridge payments until new jobs mature. Allocate a community benefit or revenue-sharing fund, and support climate-smart agriculture to intensify remaining farmland.

Cultural and Spiritual Impacts

- **Problem:** Geothermal construction in or around sensitive cultural or natural environments that can erode public support.
- **Potential solution:** Conduct a Cultural Heritage Impact Assessment with authorities, and create thoughtful buffers to protect certain regions; redesign or relocate assets where needed. Formalize access protocols, observance of rituals and ceremonies, and co-management of sacred landscapes in a written pact.

organizations, and local small and medium enterprises. The grantors judge projects on concrete basics: fair land access and compensation, local hiring and suppliers, mitigation of drilling impacts, transparency, and benefit-sharing that matches village priorities. If developers align community programs with local development plans and forums and meet local content expectations early and continuously, projects can avoid protests and stoppages.[22]

Tribal groups are important grantors of SLOs. Because there are more than 1,300 distinct Indigenous cultures in Indonesia, geothermal prospects often sit on or near Indigenous lands (*wilayah adat*), which these groups have managed for generations.[23] Choices about where to place roads, drilling pads, pipelines, and ponds can affect access to forests and springs, disturb sacred places, and change the daily routines of adat communities.

These communities usually have clear social rules even when their land is not fully certified by the state. Leadership can include adat councils, clan heads, respected elders, women's groups, youth, and religious figures. Livelihoods often depend on forest products; small farms; fisheries; and seasonal work tied to springs, groves, or hunting lands. Culture is tied to places, too—burial grounds, ritual trees, caves, and walking routes—so projects should plan buffers around these areas. (For more about how impacts change through the various phases of a project, see Chapter 8, "Keeping Geothermal Green: Safeguarding Nature and Communities in a New Era of Growth.")

Indonesia's rules already offer entry points to manage wilayah adat so they co-exist with geothermal sites. The country's constitution recognizes implicit rights for some people, or *Masyarakat Hukum Adat* (the formal name for suku adat), and serves broader public interests. The country's environmental law requires an Environmental Impact Assessment (EIA), which includes assessing social impact and handling grievances. Customary areas can be recognized through regional regulations and participatory mapping, and wilayah adat can be formalized under forestry rules. Geothermal licensing and its implementing regulations require engagement and community programs and promote local procurement. If developers deal with these issues early, explain plans clearly, and set up fair benefits, projects run smoothly and trust grows on both sides. At the end of a project's life, communities will care about how well developers restored the sites and whether they kept their promises.

But the SLO arena is also shaped by more than local communities. Developers should use Indonesia's legal framework as living, site-specific processes, in turn co-producing baselines with universities and provincial environmental agencies, publishing monitoring data, and running a credible grievance mechanism. They must also capture commitments by local governments into memoranda of understanding and update the memoranda at each phase. When SLO weakens, delays arise via EIA challenges, permit bottlenecks, and reputational hits; recovery requires facilitated mediation among regulators, independent experts, and community representatives to reset expectations and timelines and restore long-term acceptance.

The status of wilayah adat in Indonesia has four categories: newly registered, registered, verified, and certified. These land status categories hold varying levels of legal protection—certified areas are fully protected from external use, verified areas are formally acknowledged and awaiting certification, and registered or newly registered areas require any prospective business activity to be reconfirmed with the Indigenous Territory Registration Agency before proceeding. **Figure 6.7** shows the percentage of locations in each category, their total land area, and their geographic relation to geothermal resources.

One effective way to build social license in geothermal development is to prioritize direct-use applications that bring clear, early benefits to suku adat communities. Many sustain their livelihoods through farming, forest product harvesting, and artisanal fishing, activities well suited to low- and medium-temperature geothermal heat. Farmers could use geothermal energy to dry crops like coffee or rice more quickly and consistently, improving product quality and reliability. Fishing families could use it to dry fish or seaweed where refrigeration is limited. Community-scale systems could also provide cold storage or ice for harvests, expanding market access. (See Chapter 4, "Beyond Electricity: Thermal Energy Demand and Direct

LOCATIONS OF INDONESIAN WILAYAH ADAT OVERLAID WITH GEOTHERMAL POTENTIAL

Figure 6.7: Locations of Indonesian wilayah adat on Indonesia's Geothermal Potential, and associated land area for each wilayah adat category. Source: Indigenous Territory Registration Agency. (n.d.). *Land registration map and status*. Government of Indonesia; Project InnerSpace. (2025). *Subsurface Favorability WOA* [Data Layer], Global module. *GeoMap*.

Subsurface Favourability Weighted Overlay Analysis

- Power generation
- Potential power generation
- District heating/cooling
- Low-temperature industrial heating/cooling
- Residential heating/cooling

Newly registered	7.279.906,09 Ha	23,03%
Registered	15.922.265,08 Ha	50,37%
Verified	5.957.573,61 Ha	18,85%
Certified	2.453.158,99 Ha	7,76%
Total	**31.612.903,77 Ha**	**100,00%**

Use Potential," for further insights.) By integrating geothermal heat into local industries without requiring large infrastructure, these applications offer a practical path to strengthen adat economies and improve rural livelihoods in a sustainable, community-driven way.[24]

Equally important is how these projects are developed. Direct-use systems can be designed in partnership with suku adat leadership to respect sacred sites and traditional land use. Unlike power plants, they require little heavy machinery, and their locations can be flexible, reducing the risk of displacement or disruption.[25]

Past geothermal projects have shown how industrial-scale development can damage ancestral areas and undermine livelihoods. A community-led approach, by contrast, centers on mutual benefit and local decision-making. Communities can guide where and how heat is used and share in the services and income it generates. This early collaboration fosters trust, builds local capacity, and makes geothermal technology more familiar and less feared. By honoring suku adat governance and pursuing direct-use applications that fit local needs, future projects can become a source of pride and empowerment rather than conflict.

STATE ACTORS IN INDONESIA'S GEOTHERMAL DEVELOPMENT

Regulatory Stakeholders

Indonesia's geothermal permitting and delivery run through several state actors whose mandates often intersect. The Ministry of Energy and Mineral Resources leads, but progress in any field depends on how well the ministry's decisions line up with environmental approvals, investment licensing, economic coordination, and local government processes.[26]

1. **Ministry of Energy and Mineral Resources (MEMR)—Lead regulator**
   MEMR is the sector anchor and can act through various sub-agencies.[27] Through the Directorate General of New Renewable Energy and Energy Conservation (NREEC), MEMR sets policy, plans and tenders WKPs, and supervises permits from exploration to exploitation. Through the Geological Agency, it supplies resource mapping, geoscience data, and hazard information. Through the Directorate General of Electricity, it handles grid codes, interconnection standards, and coordinates with Perusahaan Listrik Negara (PLN), the state electricity company, on dispatch and Power Purchase Agreement (PPA) technicalities. In practice, MEMR's choices shape a project's bankability and timeline from the first survey to the Commercial Operation Date.

2. **Ministry of Environment (MoE)—Environmental responsibilities**
   MoE oversees environmental impact management (such as EIAs), environmental management and monitoring reviews, and safeguards for biodiversity and watersheds.

3. **Ministry of Forestry (MoF)—Forest land use responsibilities**
   MoF governs forest area access and issues Forest Area Borrow-to-Use Permits (PPKH) when wells, pads, or pipelines intersect protection or production forests. Because many prospects sit within or near forest zones, the timing and scope of the decisions by MoE and MoF often determine whether site preparation and drilling can start on schedule.

4. **Ministry of Investment (MoI)—Licensing gateway and investor facilitation**
   MoI runs the Online Single Submission (OSS) system that issues business identification numbers and aligns risk-based licenses with ministerial approvals. For geothermal developers and engineering, procurement, and construction contractors, OSS status needs to match MEMR and MEF progress to avoid permitting gaps that stall procurement and financing. MoI also coordinates investment incentives and helps resolve licensing conflicts across ministries, making it an important interface for new entrants and projects seeking expansion.

5. **Coordinating Ministry for Economic Affairs (CMEA)—Cross-ministerial coordination**
   Geothermal projects frequently involve trade-offs between forestry rules, grid readiness, pricing policy, and local development plans. CMEA convenes the relevant ministries to align decisions and, where needed, escalates cases into the national priority pipeline. Effective coordination in this area can convert sequential approvals into parallel tracks with clear service-level agreements.

6. **Local Governments (Provinces, Regencies, and Cities)—Host authorities and day-to-day gatekeepers**
   Local governments translate national decisions into workable site access and community acceptance. They manage spatial planning alignment, chair EIA commissions at the regional level, issue construction and location permits, facilitate land acquisition, and coordinate community development so benefits reach adjacent villages. They also receive and program geothermal revenue shares. Capacity, experience, and public trust at the local level often determine whether operations proceed smoothly or face repeated delays.

Several other agencies have critical roles in Indonesia's geothermal development framework.

The Ministry of National Development Planning directs the implementation of national and sectoral development plans, aligning geothermal expansion with broader economic, spatial, and low-carbon growth strategies under Indonesia's National Long-Term Development Plan

(see Chapter 2, "Powering the Transition: Indonesia's Geothermal Market"). This ministry also coordinates donor support and climate finance mechanisms that often underpin geothermal investment readiness.

The Ministry of Home Affairs and Regional Governments ensures that geothermal activities align with provincial and district governance structures, providing regulatory oversight on regional planning, land administration, and public information processes that affect local permitting and community engagement. Its coordination with regional governments is particularly important for land designation, spatial planning, and licensing at the subnational level.

The Ministry of Finance formulates and implements fiscal policies that directly influence geothermal project viability—covering state budgeting for infrastructure, taxation incentives, customs treatment for imported equipment, and management of public-private risk. The ministry's instruments, including guarantees and blended-finance schemes, are essential to de-risk early-stage exploration and attract private investment into the geothermal sector.

Taken together, the mandates of these various agencies create a chain of decisions rather than a single permit: A WKP must be planned and awarded, licenses aligned in OSS, environmental and often forest clearances secured, grid access confirmed, and local permissions and benefits established (**Figure 6.8**). The order and timing of those steps—and how handoffs are managed between groups—largely determine whether a project advances smoothly or stalls. As noted in Chapter 7, "Turning Potential into Power: A Policy Blueprint for Indonesia's Geothermal Transformation," targeted fixes include, for example, OSS dashboards that mirror sectoral status in real time and structured support to local governments for EIA review, land processes, and community development and empowerment initiatives.

THE LOCAL EXPERTS: INDONESIA'S INNOVATION STAKEHOLDERS

Indonesia has many experts who understand the unique landscape of geothermal, as discussed in this section.

State Research Agencies—National Research and Innovation Agency (BRIN)

BRIN sets the national research and development agenda and runs labs, pilot plants, and consortia that turn ideas into field-ready solutions.[28] Priority areas include exploration geoscience, drilling, reservoir modeling, surface systems, and direct-use applications. BRIN also handles national intellectual property (in coordination with the Directorate General), standardization with industry partners, and technology transfer—bridging the technology readiness gap so developers can de-risk early wells and lower the levelized cost of energy.[29] Despite being the main research and innovation agency, BRIN is impacted by the nation's budget and currently is short on funding. As BRIN and universities refine national research and development priorities, incorporating direct-use geothermal research such as heat network design, absorption cooling, and industrial symbiosis models can help prepare Indonesia to lead in next-generation geothermal deployment. These efforts could link geothermal research to industrial policy, workforce training, and regional innovation hubs.

Energy and Utility Companies

Pertamina Geothermal Energy (PGE)

PGE is a subsidiary of PT Pertamina (Persero), Indonesia's main non-electricity energy state-owned enterprise. PT Pertamina anchors Indonesia's domestic operating base. It sets de facto norms for contractors, lenders, and insurers on well design, lost-circulation control, brine handling, separation pressures, and make-up well strategy. Because PGE operates a large, diverse portfolio, it can pilot improvements and scale what works across fields, pushing sector learning curves down and availability factors up. Pertamina generally collaborates pragmatically with foreign engineering, procurement, construction and management firms, original equipment manufacturers, and technical advisers while enforcing local content requirements and standard procurement rules, so global know-how blends with local supply-chain growth.

INSTITUTIONAL FRAMEWORK FOR GEOTHERMAL GOVERNANCE IN INDONESIA

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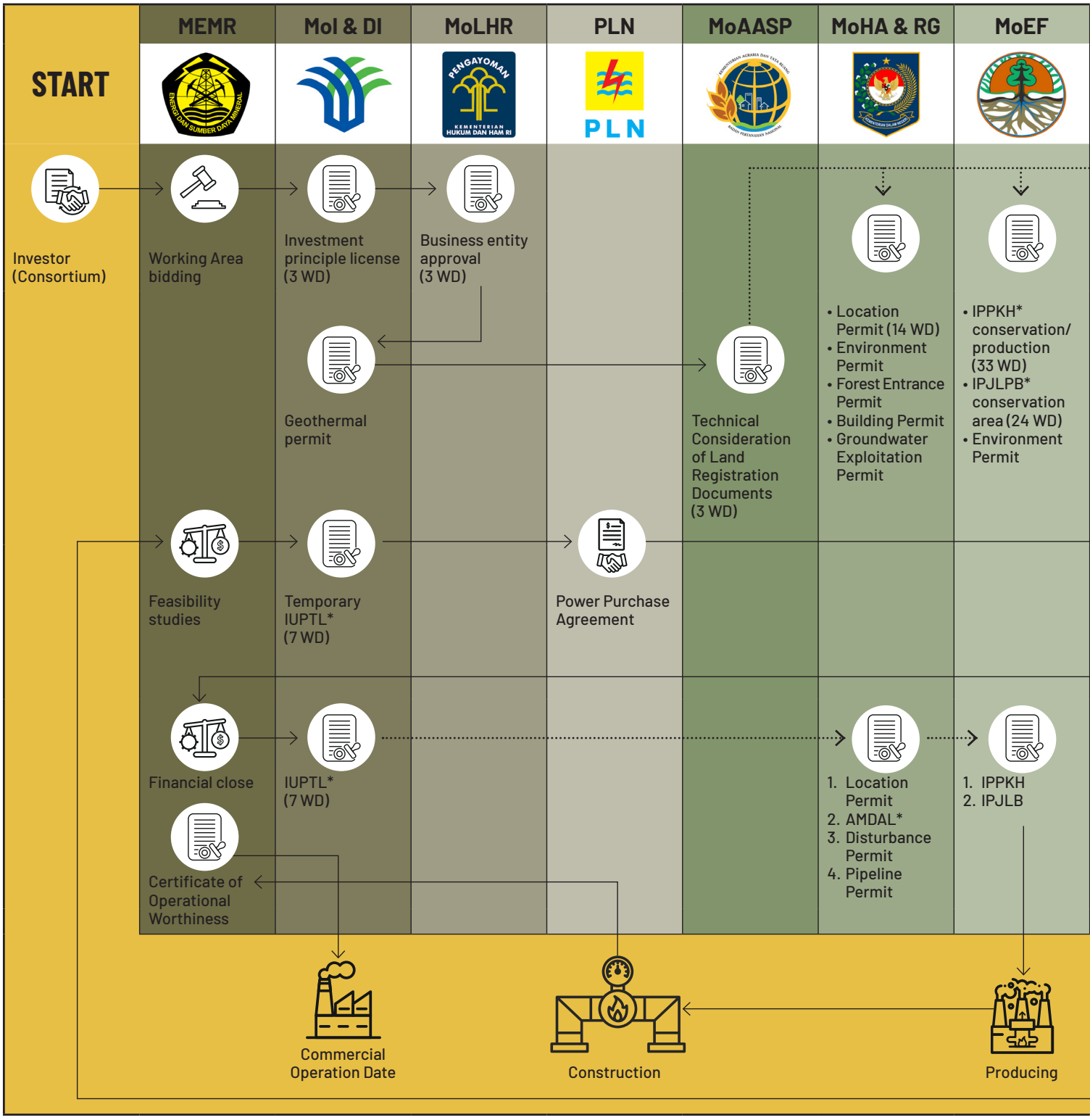

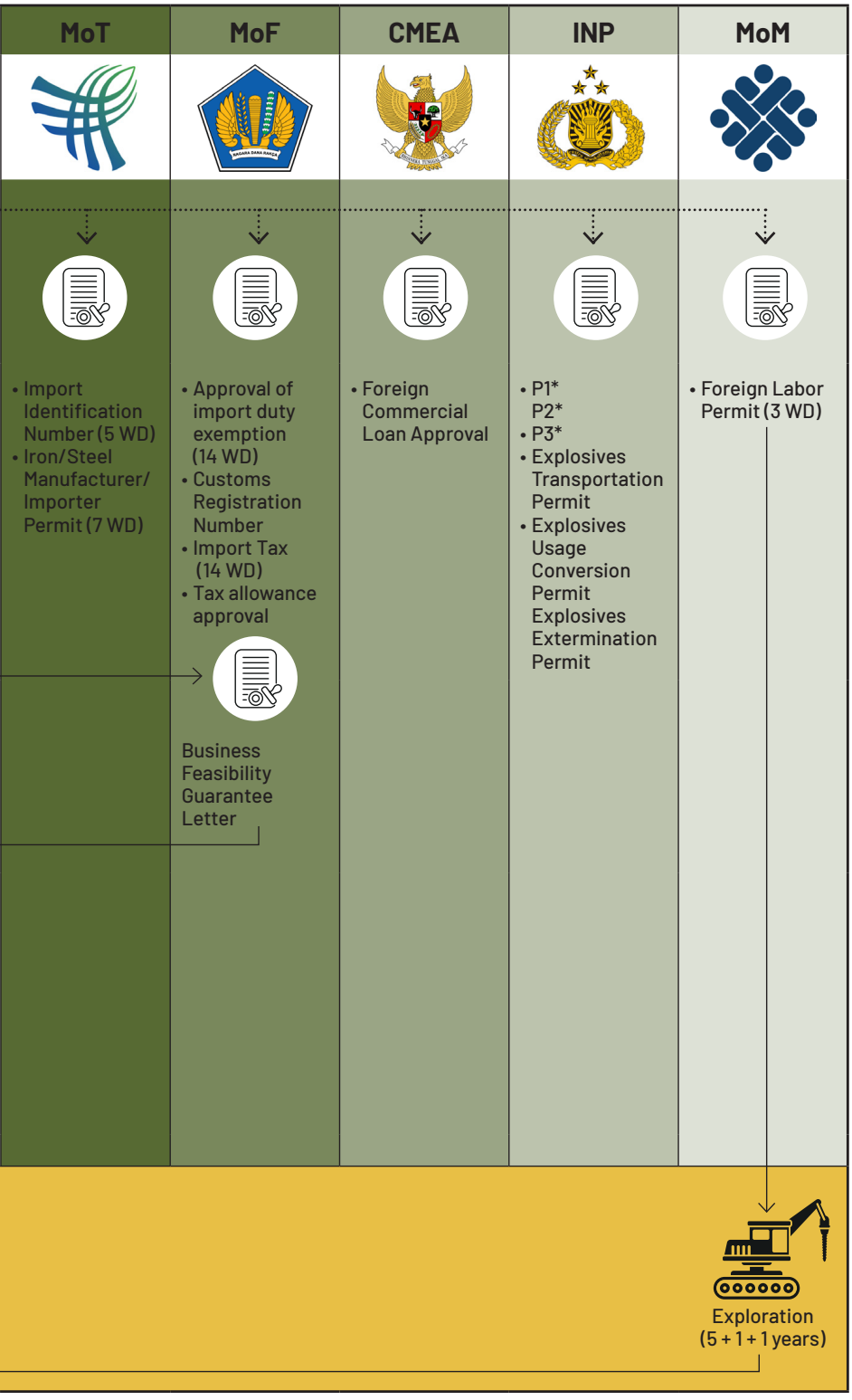

Business Process

Open Bidding of Geothermal Working Areas

Note:

→ Finish-to-Start Process

⇢ Parallel Process

Ministries Abbreviations:

MEMR	Ministry of Energy and Mineral Resources (KemenESDM)
MoI & DI	Ministry of Investment and Downstream Industry
MoLHR	Ministry of Law and Human Rights (Kemenkumham)
PLN	State Electricity Enterprise (Perusahaan Listrik Negara)
MoAASP	Ministry of Agrarian Affairs and Spatial Planning (KemenATR/BPN)
MoHA & RG	Ministry of Home Affairs & Regional Governments (Kemendagri dan Pemda)
MoEF	Ministry of Environment and Forestry (KemenLHK)
MoT	Ministry of Trade (Kemendag)
MoF	Ministry of Finance (Kemenkeu)
CMEA	Coordinating Ministry for Economic Affairs
INP	Indonesia National Police (POLRI)
MoM	Ministry of Manpower (Kemnaker)

Ministry names written in red have been changed or divided into several ministries since October 2024.

Permits Abbreviations:

IPPKH	Borrow-to-Use Forest Area Permit
IPJLPB	Geothermal Environmental Services Utilization Permit
P1	Use of Remaining Explosives Permit
P2	Purchase and Use of Explosives Permit
P3	Possession, Control, and Storage of Explosives Permit
IUPTL	Electricity Supply Business License
AMDAL	Environmental Impact Assessment

Figure 6.8: Interactions between ministries and agencies in Indonesia related to geothermal energy. WD = working days. Source: Ministry of Energy and Mineral Resources. (2018). *Doing business in geothermal*. Government of Indonesia; processed by Purnomo Yusgiantoro Center.

Perusahaan Listrik Negara (PLN)

PLN is Indonesia's state-owned electricity company tasked with the generation, transmission, and distribution of power across the archipelago. It effectively holds a monopoly on electricity distribution in Indonesia while also coordinating with independent power producers to meet national demand. It operates under full government ownership via the Ministry of State-Owned Enterprises and plays a central role in implementing the country's electricity planning.

Three important stages at PLN influence a project's destiny:

1. First, a geothermal electricity project needs to be included in PLN's Electricity Supply Business Plan (ESBP), a 10-year roadmap for developing generation, transmission, and distribution assets.[30] (The ESBP is required by statute; it is also referred to as the RUPTL.) In practice, PLN is the only entity that issues a comprehensive RUPTL, and it covers the majority of the electric grid. (There are a few other licensed operators in specific business areas such as industrial parks, but these cover only limited territories.[31]) If a geothermal project is not listed in PLN's RUPTL, it means the capacity is not needed or prioritized in the near term for the region. Being left out of RUPTL effectively stalls a project's progress. Conversely, when a project is included in RUPTL, it signals that PLN has forecasted a need for the capacity and gives developers a green light to proceed.[32]

2. The second stage is proving the grid can accept and deliver a project's power. As the sole owner-operator of Indonesia's transmission and distribution networks, PLN conducts the interconnection studies; designs any required upgrades or connections; and sets technical requirements, the timeline for grid enhancements, and the allocation of interconnection costs. The process is tightly linked to system planning in the RUPTL, which pairs generation additions with planned transmission reinforcements. Developers may propose connection plans, but PLN reviews, approves, and often dictates the needed reinforcements via a feasibility study that includes the grid interconnection study.[33] This step is critical because excellent geothermal energy resources can still stall if the nearest grid node is weak or distant, forcing major upgrades that delay schedules or undermine project economics.[34] Practically, this second stage determines when and how the plant can connect: PLN sets the technical specs, clarifies who pays for which interconnection elements, and coordinates the Commercial Operation Date (COD), or the point at which the project's commercial terms take effect and bankability is proven with transmission readiness.

3. The final pivotal step with PLN is negotiating the PPA and carrying out the project through commissioning to COD. In the PPA, the tariff structure and key performance requirements are fixed, and the tariff typically applies from COD for the full contract term—commonly between 25 years and 30 years, with geothermal frequently at the upper end.[35] PPAs codify availability targets, dispatch obligations, curtailment rules, remedies and penalties, and the COD deadline with liquidated damages for delay.[36] Recent regulations aim to standardize terms, but as the sole buyer, PLN retains substantial negotiating leverage, making a balanced, bankable PPA essential for financial close.

PLN's role also extends to pre-COD testing and ongoing operational compliance. In short, this third stage—finalizing the PPA and achieving COD—locks in the project's economic and operational regime: Tariff and tenor are fixed from COD, while the PPA and grid code set the reliability, availability, and dispatching obligations that ultimately determine whether the project is financeable and operable at scale.

Private Independent Power Producers

Private developers (e.g., Medco, Star Energy, Barito Renewables) bring capital discipline, delivery speed, and specialist capabilities in drilling, reservoir surveillance, binary/Organic Rankine Cycle retrofits, and digital optimization. These companies join a project via WKP tenders from MEMR, acquisitions of stakes in existing projects, or partnerships with state holders. The teams that break through usually

pair deep experience with robust balance sheets and strong local partners who can navigate permitting, land acquisition, and community engagement.

However, several consistent pain points consistently arise in Indonesia's geothermal development:

- Front-loaded exploration risk: expensive wells that ultimately lack necessary resources
- Sequential permitting processes (e.g., EIA, forest access, local approvals) that stretch schedules
- Tariff-cost gaps and prolonged Power Purchase Agreement negotiations that complicate financing, create grid constraints, or cause curtailment without clear make-up energy provisions
- Foreign exchange and interest rate exposure over long construction periods
- Local content requirement compliance for critical equipment

Clearer PPAs that value flexibility, concurrent permitting processes, and more transparent data-sharing will allow independent power producers to streamline work and focus on areas such as greenfield exploration and slim-hole pilots, brownfield optimization, and binary retrofits. Competition should push the levelized cost of energy down, expand domestic vendor bases, and deliver a steadier cadence of midsize additions that elevate geothermal's role as both baseload and balancing power. Together, Pertamina's scale and standards, PLN's planning and commercial rules, and independent power producers' specialization and agility create the feedback loops that govern cost, schedule, and reliability. When these players align, exploration risk falls, financing closes faster, and commissioning becomes more predictable.

Research-Intensive Public Universities and the Programs They Can Support

Programs	Public Universities
Subsurface science, drilling engineering, fluids and chemistry, environmental systems	Bandung Institute of Technology, Gadjah Mada University, University of Indonesia, Sepuluh Nopember Institute of Technology, Bogor Agricultural University
Industry-embedded curriculum to bridge the classroom to the field	Universitas Pertamina
Well engineering, drilling management, production operations, finance, social research, policy	National Development University "Veteran" campuses, Trisakti University, University of Indonesia (economics and public policy faculties), Prasetiya Mulya University, Bina Nusantara University, Padjadjaran University, and Gadjah Mada University

Sources: Faculty of Mining and Petroleum Engineering. (n.d.). *Master's program in geothermal engineering*. Institut Teknologi Bandung; Department of Geological Engineering. (n.d.). *Geothermal Research Center (GRC)*. Gadjah Mada University.

Equally important is the hands-on workforce that keeps plants running and schedules on track. As explained in Chapter 5, "Deploying the Workforce of the Future: The Role of Indonesia's Oil and Gas Workforce and Institutions," polytechnics and vocational institutions—such as MEMR's Energy and Mineral Polytechnic "Akamigas" in Cepu, or other major institutes under the Ministry of Education, Culture, Research, and Technology, along with secondary vocational training programs in electrical, plumbing, welding, and instrumentation—should be mobilized via coursework, site rotations, and competency-based credential programs aligned to geothermal job standards. MEMR

training centers and the Ministry of Manpower's Vocational Training Center can deliver micro-credentials for drill crews; rig mechanics; electricians; welders; health, safety, and environment officers; and instrumentation technicians, ensuring local hires are work-ready for exploration, construction, and operations and maintenance.

And to make the ecosystem truly work, regulatory stakeholders, state research agencies, energy and utility companies, private independent power producers, and universities should operate as a single ladder: shared "living lab" sites near WKP, joint curricula co-designed with developers and original equipment manufacturers, credit transfer between diploma and degree tracks, and incubators that back entrepreneurs in direct-use applications (e.g., process heat for agro-industry, cold storage, district heating for tourism). With this integrated approach, Indonesia can produce the engineers, analysts, and tradespeople needed to scale geothermal from exploration to grid-reliable operations.

CONCLUSION

Community consultations across Indonesia echo a simple message: Build geothermal *with* people, not for them. Engagement must be continuous and two-way so that suku adat communities, village governments, women and youth groups, and local small and medium enterprises feel included and respected. A fracture in these relationships can stall a project and sour the pipeline for years. Many of the concerns raised in this chapter arise from hydrothermal projects near sensitive areas; these are less applicable to next-generation systems or direct-use heat and cooling. The following practical considerations aim to encourage positive, durable collaboration on all types of geothermal development. Some are explored in more detail in Chapter 7, "Turning Potential into Power: A Policy Blueprint for Indonesia's Geothermal Transformation."

CONSIDERATIONS TO ENCOURAGE DURABLE COLLABORATION

1. **Strengthen co-governance with host communities.** Uphold meaningful participation and free, prior, and informed consent for wilayah adat; provide early technical assistance, translation, facilitation, and grant-writing support so communities can participate as equal partners.

2. **Create a provincial/community geothermal fund.** Define the share of non-tax geothermal revenues (PNBP Panas Bumi) and corporate obligations into predictable, multiyear funding for host areas—allocated through participatory village planning, with public budgets and outcome-based contracts.

3. **Prioritize community development.** Offer grants for youth groups, cooperatives, and women-led enterprises to participate in upskilling training; micro, small, and medium enterprise upgrades; and local services that align with plant needs and regional development plans.

4. **Streamline permitting into a single critical path.** Appoint a lead agency, require pre-application scoping (e.g., land/forest status, water, grid, pricing), shift to parallel approvals with time-bound service-level agreements, and provide a shared OSS tracker with automatic escalation when timelines slip.

5. **Integrate land, environment, and grid decisions early.** Utilize a "single map" data set, standardize benefit-sharing clauses, and secure early interconnection studies with PLN to minimize redesigns, de-risk timelines, and enhance bankability.

6. **Make local content deliver real capability.** Pair local content requirements and targets with vendor development, accredited training, and BRIN–university–industry consortia; earmark a portion of geothermal revenues for research and development, testing services, and workforce pipelines.

7. **Publish what matters and fix it fast.** Establish transparent Monitoring-Evaluation-Learning dashboards, independent social audits, and credible grievance mechanisms with time-bound remedies so results are visible, comparable, and improvable.

8. **Align finance with risk and speed.** Implement targeted steps to reduce the financial risk tied to meeting social license to operate and local content milestones, and reward on-time permitting performance with fiscal incentives.

9. **Prioritize anchor offtakers and direct-use hubs.** Target industrial parks, data centers, tourism zones, cold-storage and water facilities, and defense sites such as border posts and defense installations to convert heat into local jobs and durable demand.

10. **Pilot, learn, and replicate.** Launch pilot projects, evaluate them and ensure information is transparent, then scale the model across provinces with clear roles for MEMR, the Ministry of Environment and Forestry, the Ministry of Investment and Downstream Industry, PLN, and local governments.

11. **Build the talent pipeline.** As discussed in Chapter 5, "Deploying the Workforce of the Future: The Role of Indonesia's Oil and Gas Workforce and Institutions," MEMR and Ministry of Education, Culture, Research, and Technology should establish a national geothermal talent coalition that unites research universities, polytechnics, and the Ministry of Manpower's Vocational Training Center into a single ladder—WKP living labs, joint original equipment manufacturer and developer curricula, co-ops, micro-credentials, and credit transfer—to supply the workforce needed to scale geothermal from exploration to grid-reliable operations.

12. **Expand geothermal beyond power.** Expand the definition of geothermal development beyond power generation to include direct-use applications and geothermal cooling. Establish pilot programs and clear policy frameworks to support these applications as part of Indonesia's industrial decarbonization and community energy strategies.

These actions can turn geothermal projects into visible community progress, shorten project timelines, and build Indonesian capability. They will make geothermal both a reliable source of heat and power and a generator of fair opportunity wherever the resource heat is found.

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