e-ISSN : 2085-0441 (Online)
PCD Journal Vol 14 No. 1 (2026) - (117-166)

Clean Energy vis-à-vis Capital Extraction: Arjuno-Welirang Geothermal Development in Batu City

Dhien Favian Aryanda[1]

Received: December 8th 2025 | Accepted: June 22nd 2026 | Published: July 9th 2026

Abstract

This article examines the paradoxical aspects of the Arjuno-Welirang geothermal project in Batu City, which, due to its exploitative nature, has the potential to threaten the availability of springs. Theoretically, the study employs Social Conflict Theory (SCT) and a political economy approach to analyse how energy transition projects operate according to the logic of capital accumulation. Using a qualitative case study method involving field observations of residents' advocacy against the project in Batu City, as well as a literature review, the study finds that the Arjuno-Welirang project is deeply entrenched in the dynamics of an infrastructure alliance (comprising the state, financial institutions and corporations), which functions as a specific manifestation of a dominant social alliance. This alliance strategically utilises the narrative of a green energy transition to facilitate an extractive project that endangers the material foundation of local communities. In response, the mobilisation of Batu residents constitutes anticipatory grassroots resistance organised as a material struggle to defend their ecological commons and water resources from the monopolistic threats posed by energy capitalism.

Keywords: *Geothermal, social conflict theory, energy transition, Batu City, capital accumulation*

[1] Malang Corruption Watch. Email: dhienfavianaryanda559901@mail.ugm.ac.id

Introduction

The topic of green energy has always been a hot topic in energy politics. Indonesia, the largest energy consumer in the ASEAN with a consumption of 10.11 exajoules in 2024, and the 18th largest energy consumer in the world as of 2025, is under pressure to immediately switch to using new and renewable energy (EBT) (Dana Mitra Lingkungan, 2024; Hasiana, 2024). Indonesia's carbon dioxide (CO_2) emissions are relatively high, at around 262 million tonnes of CO_2e released in 2025, according to Kata Data. Coal is the largest contributor to carbon emissions in Indonesia, with production reaching 790 million tonnes (Ahdiat, 2025; Setiawan, 2026). This data is supported by the Emission Gap Report from the United Nations Environment Programme (UNEP), which recorded Indonesia's emissions in 2025 at 4.8 tCO_2e per capita per year, slightly 3.8% higher than 2023 record. This trend indicates that Indonesia is one of the largest emitters of greenhouse gases among G20 countries (UNEP, 2025).

This situation has serious health implications. The high levels of air pollution and the widespread respiratory infections among the Jakarta's citizens demonstrate the serious threat that carbon emissions pose to the lives of Indonesians, and reform of the energy sector is a top priority in achieving net zero

emissions. As a result, energy infrastructure projects have been designated as strategic programmes under Joko Widodo's leadership to fulfil this commitment by 2060. One such project is the construction of a geothermal power plant on Arjuno-Welirang Mountain in Batu City (hereafter referred to as Arjuno-Welirang) (Enjang, 2025a).

Plans for the geothermal power plant in Batu City date back to 2017, when the Ministry of Energy and Mineral Resources (ESDM) designated Mount Arjuno as a Geothermal Working Area. However, work on the project did not begin until 2023, when President Jokowi included the Arjuno-Welirang geothermal project in the National Strategic Project (PSN) programme. Despite extensive surveys and socialisation of geothermal development being carried out with academics from Brawijaya University, this project has been met with resistance from Batu residents. This opposition is based on a range of issues that will arise, including water scarcity and long-term environmental vulnerability after the development of the Arjuno-Welirang area, especially following the flash floods of 2021 (Wismabrata, 2021).

In addition to environmental damage, concerns have been raised about the track record of PT Geo Dipa Energi, the government's mandate holder for the geothermal power

plant construction (known as Pembangkit Listrik Tenaga Panas Bumi, or PLTPB). Geo Dipa Energi was originally a private company, established by PLN and Pertamina in 2002, with a focus on geothermal exploitation and PLTPB development. In 2011, it officially became a state-owned enterprise (SOE) when the Indonesian government and Ministry of Finance transferred 67% of its shares. Thus, Geo Dipa Energi became the government's primary promoter of geothermal energy as a new and renewable energy source (Geo Dipa Energi, 2022).

Upon investigation, the appointment of Geo Dipa Energi as the Welirang geothermal project leader has raised serious issues. Geo Dipa Energi is a company known for its involvement in legal disputes; in 2017, it was involved in a legal dispute with PT Bumigas Energi regarding the Patuha and Dieng geothermal power plant projects. Geo Dipa Energi accused Bumigas of falling to carry out construction in accordance with the 2005 contract. This non-compliance resulted in estimated state losses of up to IDR 60 billion (CNN Indonesia, 2017). Conversely, PT Bumigas Energi reported the CEO of Geo Dipa Energi, Samsudin Warsa, for allegedly committing fraud by granting a development permit to the company. The allegations made by each party were brought to the attention of

various authorities, including the Information Commission (KI), and the Corruption Eradication Commission (KPK), and ultimately resolved in court (Hamdi, 2022).

The initial dispute settlement ruling between Geo Dipa Energi and Bumigas was favour of Bumigas, as decided by the South Jakarta District Court (Pengadilan Negeri Jakarta Selatan) in 2017. This caused delays to the development on the slopes of Arjuno-Welirang. However, Geo Dipa Energi filed an appeal, which reached the Supreme Court (Mahkamah Agung), which ruled in Geo Dipa Energi's favour in 2019 (Indrawan, 2023). Undeterred, Bumigas filed another lawsuit against Geo Dipa Energi in 2022 with similar evidence, and the outcome remains unclear (Enjang, 2025b).

The two cases described above, particularly with regard to the potential damage and legal disputes, make it clear that the energy transition project at Arjuno-Welirang is fraught with complications. In this paper, the author intends to raise two main questions to begin to unravel the political-economy dynamics of the Arjuno-Welirang geothermal project. The problem formulation used in this article begins with these two questions. Firstly, how does the configuration of the political economy impact the development of the Arjuno-Welirang geothermal project? Secondly, how does the geothermal project generate

resistance from the community in Batu City?

This study uses a qualitative case study methodology. The use of a case study in the Arjuno-Welirang geothermal project aims to critically analyse two aspects: political-economy dynamics of the Arjuno-Welirang PLTPB project, and the civil resistance in Batu City opposing energy commodification through geothermal power. Data collection was conducted from December 2024 to June 2025. Two techniques were developed during this period. The first focused on the field observations of several initiatives organised by the Batu City's citizen forum (Umbul Gemulo and Kasinan), which opposed geothermal energy, such as monthly meetings and public discussions initiated by the Umbul Gemulo forum and Wahana Lingkungan Hidup (WALHI) East Java. The second technique focused on a desk study of literature, using sources such as journals, reports and online news in order to identify dynamics in the Arjuno-Welirang geothermal area.

This study is grounded in the Social Conflict Theory (SCT) and takes a political-economy approach. SCT is used to explore the political and economic formations that shape geothermal development, demonstrating how state-capital relations drive the capital accumulation and spatial expansion through the explanation of energy.

Furthermore, this framework is employed to analyse grassroots resistance to the commodification of nature. Rather than viewing community pushback as merely cultural preservation, this study frames local resistance, manifested through policy advocacy and mass action, as a material struggle. By utilising their collective identity and treating water as a political agency, the community strives to defend their living spaces and essential water resources from the monopolistic threats posed by energy capitalism.

Discussions of SCT, proposed by Karl Marx and developed by the Murdoch School, begin with the argument that state institutions and policies (including the energy transitions) do not emerge in response to climate mitigation. Rather, they are manifestations of conflicts of interest among various social forces (Carroll & Sovacool, 2010). International norms, such as Conference on Parties (COP) and Just Energy Transition Partnership (JETP), do not necessarily dictate that state institutions act as the sole regulator of energy transition policies. Rather, these norms serve as a gateway through which various dominant forces can reshape geothermal energy in accordance with capital accumulation (Hameiri & Jones, 2020).

There are four main SCT concepts for analysing power relations within the Arjuno-

Welirang geothermal project. Firstly, there is the complexity of social relations. In the context of geothermal development, multiple actors do not entirely align their interests with a rigid mechanism. Instead, they negotiate their interests within that mechanism to arrange an institutional fix that favours securing access to resources (Hameiri & Jones, 2020). Secondly, social alliances, specifically operationalised as infrastructure alliances. Drawing upon Trissia Wijaya's (2021) framework, alliances formed in energy projects are not understood as a purely technical alignments for renewable energy, but as heavily politicised transnational state-capital networks.

This infrastructure alliance effectively consolidates the interests of transnational capital, SOEs and domestic elites into a cohesive governance structure (Hameiri & Scarpello, 2018). In the energy sector, this network institutionalises financial and political risks, thereby facilitating large-scale green extraction. Crucially, the alliance's primary function is to insulate foreign and elite developers from localised social and environmental pushback, thereby marginalising dissenting local communities (Wijaya, 2021).

Thirdly, there is embedded integration. Within the SCT framework, the expansion of green infrastructure is inherently tied to the integration of multi-level

actors into political-economic alliances. Embedded integration explains how transnational capital (ADB and JETP), SOEs, and local government networks consolidate their extractive interests through formal institutional and regulatory mechanisms. This concept shifts the analytical focus away from viewing the state as a neutral arbiter and instead exposes how state institutions embed global energy capital into the local regulatory landscape. This facilitates resource commodification while insulating elite developers from grassroots friction (Brenner et al., 2003; Wijaya, 2021).

Fourthly, the enclosure of ecological commons and anticipatory resistance. In order to analyse the grassroots mobilisation against this project, this study focuses on the contestation of ecological 'commons', specifically water resources in Batu City. In political economy, capital expansion often seeks to enclose public or communal natural resources for corporate extraction (Harvey, 2004; Jeffrey & Mcfarlane, 2011). This pattern is evident in the political and economic collusion that grants exploration permits and alters spatial planning (RTRW), activities that threaten the community's material livelihood, particularly with regard to the struggle for water resources rights. Therefore, the resistance organised by the Batu

community is framed as anticipatory resistance. Drawing lessons from ecological crises and water scarcity at older geothermal sites such as Dieng and Ijen, the community's proactive policy advocacy and mass actions embody a tangible struggle to safeguard their ecological foundation from the imminent threats posed by energy commodification (Fajri et al., 2023).

The SCT framework helps to assess the extent to which political-economic alliances drive the institutionalisation process of geothermal projects, providing a platform for capital accumulation amidst the growing demand for a sustainable energy transition.

Results and Discussion

Power Configuration and Institutional Arrangements inside the Arjuno-Welirang Geothermal Development

This section examines the power configuration and institutional arrangements inside the Arjuno-Welirang geothermal project by unfolding the complex social relations. To begin with, construction of the Welirang PLTPB began when the Ministry of Energy and Mineral Resources designated Arjuno-Welirang as a Mining Working Area (WKP) for geothermal exploration in 2014. This decision was made in response to the enactment of Law No. 21 of 2014 on Geothermal Energy (later

amended by Law No. 6 of 2023 on Job Creation). From the presidency of Susilo Bambang Yudhoyono to that of Joko Widodo, the focus of geothermal exploration shifted from mining to utilisation, thus providing legitimacy for exploration in the Arjuno-Welirang area. The area, which covers Mojokerto, Pasuruan, Batu City and Malang, has an estimated energy potential of 22 MW (megawatts) according to a rough estimation of energy exploitation (Amrullah, 2024).

The ESDM claims that its potential can be maximised to reach 280 MW. Thus, the plan to develop the Arjuno-Welirang geothermal capacity by 2025 will produce an output of 110 MW. In accordance with the National Grand Energy Strategy, the Arjuno-Welirang project has become a development priority in order to support the ambitious target of increasing geothermal output to 9.3 GW by 2035. This is in line with Indonesia's commitment to achieving net zero emissions, as set out in the COP30 agreement in Belém, Brazil (Ayudina, 2026). However, it should be noted that geothermal energy is part of green capitalism. This infrastructure paves the way for the commercialisation of energy, cloaked by the promise of reduced carbon emissions (Wallis, 2010). To examine the correlation between geothermal exploration in Arjuno-Welirang and

compliance with capital accumulation, two strategies were employed to negotiate support for the project: RTRW revision and land conversion to 'fix' the space.

The first issue lies in the RTRW version, where spatial planning is never positioned as a neutral mechanism. Instead, the RTRW exists as a contested arena shaped by several forces to accommodate specific agendas. Regarding the revision of the RTRW, |the Jokowi administration ratified Presidential Regulation No. 13 of 2017 concerning the National Spatial Plan, exempting geothermal exploration from the definition of mining activity and classifying geothermal energy as a natural resource. This exemption provides the legitimacy required to include the geothermal exploration agenda in every potential district or city, including the Arjuno-Welirang mountains as a potential location. Following the establishment of the WKP, spatial planning must change to accommodate the exploration of this energy source (Faisal & Muhyidin, 2024).

In the context of Batu City, efforts to amend spatial planning have been ongoing since 2020. Discussion to revise the RTRW have been inconsistent between the Batu City Government and the Batu City Regional House of Representatives (City Council). This reflects social contestations between Batu City officials and civil society

regarding the amendments, which have been treated as a political mechanism to accommodate geothermal exploration (Beritabaru, 2020). There has been no follow-up regarding the RTRW revision discourse, particularly with regard to the changes made to the 2010-2030 Batu City RTRW Regional Regulation by the Batu City Council and Mayor, which are accessible to the public. However, the revised Regional Regulation on Spatial Planning No. 7 of 2022 and Mayor Regulation No. 7 of 2024 concerning the Batu Spatial Plan 2024-2044 have been released to the public. These regulations open up opportunities for geothermal exploration in the Arjuno-Welirang and Songgoriti areas (Styawan & Indra, 2022).

In addition to the confusion surrounding the amendment to the Batu City Spatial Plan Regulation, another issue is the absence of a Strategic Environmental Assessment (KLHS). According to Purnawan D. Negara, the KLHS should be the initial guideline for revising spatial planning. This includes spatial planning in mountainous areas prone to disasters, particularly when tourism expansion and energy transition occur in upstream areas. However, rumours circulating among Bulukerto residents suggest that the KLHS was never presented to them before the proposed revision was implemented. Neither local residents nor academics concerned with this issue, such as Imam

Kushwahyono (Brawijaya University) and Purnawan D. Negara (Widayagama University), received a copy of the SEA document when the public consultation forum on this revision was held (LPM Perspektif, 2022).

The lack of SEA disclosure has raised serious concerns among several civil society groups, particularly WALHI East Java and the Umbul Gemulo Citizen Forum. These concerns have been evident in their comments on several occasions, where some residents stating at their regular meetings: "How can we guarantee that geothermal development will have a positive impact on the environment if the environmental impact assessment for Batu City is being kept from the public? This situation poses a serious threat to the sustainability of our water sources, which were previously threatened by eviction for hotel development in the 2010.[2]" These views are further linked to allegations that the RTRW revision was expedited solely to accommodate economic interests, rather than to ensure environmental sustainability.

These two statements demonstrate that RTRW amendment was not carried out in a transparent or accountable manner, and that it was also in accordance with the central government's agenda. The revision then paved the way for the establishment and exploration of the Arjuno-Welirang WKP,

[2] Field notes during routine meeting at Bulukerto Village, 22 January 2025

facing the little opposition from civil society. In 2022, The Alliance to Save Greater Malang held a peaceful demonstration at the Batu City Council building to reject the RTRW revision. They rejected the non-transparent revision of the RTRW and demanded that the Batu City Council cancel the revision (Azmy, 2022). Back then, the alliance had considerable strength, involving Umbul Gemulo and Kasinan citizens, the Malang Raya student group, and three NGOs (Malang Corruption Watch, WALHI East Java, and the Legal Aid Foundation of Malang). The main reason for their action was concern about water scarcity.

However, as the action was seen as a 'passing breeze', the demand was never followed up until now. In addition, the weakening of the civil consolidation to reject the RTRW cancellation meant that their resistance did not prompt the government to review this revision. The RTRW revision then paved the way for greater capital expansion. Since the RTRW changes were implemented in 2022, land conversion in Batu City has become increasingly unstoppable. According to a statement by the Head of Bulukerto Village in 2023, the conversion of green areas into housing has occurred more frequently in the Arjuno-Welirang mountainous region. This clearly violates the RTRW regulations, which state that green areas cannot be converted into tourist areas (Wicaksana, 2024).

This phenomenon shows that the problem lies not only in the implementation, but also in the power relations behind the revision of the RTRW to create flexibility in land ownership. Amidst the growing demand for tourism, Harvey demonstrated that the flexibility of land permits, predominantly utilised by a selected few businessmen, is being used to build residential areas as a means of maximising profit from the tourism sector, while simultaneously reducing areas dedicated to water source conservation in the long term (Harvey, 2004).

Land conversion for tourism is not directly related to geothermal infrastructure. However, the flexibility in land conversion provided by the RTRW gives Arjuno-Welirang strong legitimacy and ample space in the in long-term. To begin with, permits for the operation and construction of the PLTPB were granted to ensure the sustainability of geothermal exploitation activities. On 11 April 2017, a new geothermal development permit was granted to Geo Dipa Energi in accordance with the Minister of Energy and Mineral Resources Decree No. 1748, opening up the exploration permit to Geo Dipa Energi. Since then, Geo Dipa Energi, the ESDM and academics from the Faculty of Natural Sciences and Engineering at Brawijaya University have continued to conduct exploration activities (Qatrunnada et al., 2024; Yurika, 2021).

In terms of academic involvement, one of the leading figures in support of geothermal exploration is Professor Sukir Maryanto. He has been advocating for geothermal exploration in Batu City since 2017 in order to utilise renewable energy. The establishment of the Centre for Volcanology and Geothermal Studies at Brawijaya University is a testament to this, and the work of the researchers there indirectly demonstrates that the intervention of various social forces, including academia, will be necessary to support geothermal exploitation in the future. The presence of an epistemic community provides further justification for the state and corporations to exploit the hidden energy inside Arjuno-Welirang (Yusnia & Kristanti, 2022).

Apart from academic intervention, another prominent force to be reckoned with is corporations, especially Geo Dipa Energi. As the corporation responsible for operating the Dieng geothermal, Geo Dipa Energi has been mandated to lead the Arjuno-Welirang project since 2017. Consequently, Geo Dipa became SOE and now operates independently in infrastructure development and geothermal management. Every geothermal project undertaken by Geo Dipa receives financial support from various stakeholders (Geo Dipa Energi, 2022).

On the one hand, financial support from national

institutions is provided by PT Sarana Multi Infrastruktur (PT SMI) through a green fund scheme. Since 2020, PT SMI has been mandated by the Ministry of Finance to provide loans for green infrastructure development, particularly geothermal projects, in order to support the SDG target of increasing clean energy use by 2023 (PT SMI, 2025a). As of December 2024, PT SMI had disbursed loans amounting to IDR 33.45 trillion to 94 climate-related projects. These loans were also intended for the Arjuno-Welirang project, accelerating the exploration process and construction auction through the Geothermal Resource Risk Mitigation (GREM) scheme (PT SMI, 2025b; Silfia, 2025).

Meanwhile, the involvement of the ADB and the World Bank in funding this project reflects financial support from international institutions. In 2017, the ADB provided USD 200 million to fund Arjuno-Welirang geothermal exploration, with the potential to increase electricity production to 189 MW (ADB & The World Bank, 2015). In addition, the World Bank disbursed USD 120 million for Welirang WKP exploration in 2021. This assistance continued until 2023 to enable the geothermal exploration to continue until the power plant is fully operational without bearing the risks of failure through Clean Technology Fund scheme.

Thus, it is clear how the combination of national and international funding is allocated to Geo Dipa Energi to secure exploration until 2030. The multi-year financing scheme has two advantages. Firstly, this financing can cover the substantial costs incurred by the government for geothermal development (Yurika, 2021). Geothermal development could cost more than IDR 2 trillion. The second advantage is the existence of an infrastructure alliance comprising PT SMI, Geo Dipa, the ADB and the World Bank, which shows that state support for geothermal expansion is in line with the capital obtained once energy conversion is carried out. The intervention of the ADB and the World Bank illustrates their interest in redirecting the financial burden from corporations (both SOEs and private companies) to international institutions, which opens up a path for capital extraction in environmentally sensitive regions, as argued with Carroll (2010) in the context of market-led environmentalism.

The Infrastructure Alliance and Ecological Enclosure within the Arjuno-Welirang Geothermal Area

The existence of geothermal energy is inextricably linked to infrastructure alliances and their critique. Geothermal has become a political arena in which conflicts of interest

arise from the dominant alliance. Since the capital accumulation embedded in geothermal energy, which requires large amounts of funding and a long implementation period, the conflicts within the infrastructure alliances of this project raise several issues. Firstly, there is the marketisation of energy in geothermal. The construction of the Blawan-Ijen geothermal power plant, for example, illustrates the concept of 'double alchemy' in action, involving the extraction of capital and the creation of new energy spaces during the energy transition (Mezzadra & Neilson, 2019).

Natural resources, especially geothermal, will be extracted and converted into energy. This energy will generate financial wealth for companies and the state. For example, the conversion of 100-200 MW of electricity generated by geothermal energy can add billions of rupiah to the state coffers. Additionally, the energy generated is monetised to generate capital returns for international financial institutions or to fund project expansion in other countries (Operacz et al., 2025).

All of this is made possible by de-risking scheme, which utilises state budgets or international loans to fully fund geothermal exploration. This grants corporations the flexibility to extract and convert the energy source into an economic commodity. In the context of geothermal

energy, the World Bank, through its Geothermal Resource Risk Mitigation program, provides financial and technical assistance to PT SMI to support geothermal financing. Funding ranges from USD 300,000 to USD 40 million over 10 years (Siahaan et al., 2023; The World Bank, 2025).

The Ministry of Finance, through Minister of Finance Regulation No. 62 of 2017, mandated PT SMI to manage the Geothermal Sector Infrastructure Financing (PISP). This provided funding for loans and equity investments for geothermal exploration, while assuming the failure risk (Kementerian Keuangan, 2017). In 2025, it secured a geothermal resource risk mitigation facility, with funding allocated from USD 645 million for technical assistance and USD 6.5 million for capacity building. This enabled PT SMI to prepare, operate and manage the GREM facility (Asnawi, 2025).

Through the GREM and de-risking, the benefits provided by the World Bank primarily support corporations instead of local communities due to the centralisation of de-risking fund for high-risk exploration activities (Inchauste & Victor, 2017). If corporations cause environmental damage through their exploration activities, this scheme does not provide holistic socio-economic compensation for the community. Furthermore, corporations' minimal accountability is limited to

charity funds akin to CSR. However, if the exploration is profitable, PLN will be the primary stakeholder in the energy monetisation scheme, purchasing electricity to meet national energy consumption needs—a scheme that benefits geothermal corporations. This centralises the profits generated for the capitalist class, whether the state or international corporations (Lochery, 2022).

Secondly, there are the economic losses suffered by local communities. The exploitation of clean energy generates profits for the state and corporations, but also causes economic losses due to dispossession and land grabbing (Harvey, 2004). The Center for Law and Economic Studies (CELIOS) report on the Blawan-Ijen PLTPB operation noted that the Macan hamlet community lost IDR 100 million per hectare of cabbage farmland to PT MEDCO's geothermal development. In addition, the seizure of 20 hectares of land from this community could result in losses of up to IDR 2 billion per year (Utomo & Husnudin, 2025).

CELIOS and WALHI have recorded losses to agricultural activities amounting to IDR 230 billion in the second year of operation of the Wae Sono geothermal power plant in East Nusa Tenggara, due to reduced water availability. These losses, in turn, have triggered greater inequality in Wae Sono, as evidenced by an inequality ratio of 0.7

in the second and third years, because the PLTPB does not provide alternative livelihoods for the local population once it begins operating. This is connected to the flow of profits from the Wae Sono PLTPB to the state and the international corporations operating behind it (Jamil, 2023; Jemadin, 2024).

The community's losses also stem from the aforementioned de-risking implementation, whereby geothermal development projects funded by international aid have resulted in greater losses than benefits. From a financial perspective, the international loans provided by the World Bank are ultimately repaid through the national budget (APBN). Recorded in the debt burden for the fourth quarter of 2025, this reached USD 431.7 billion (IDR 7,271 trillion) for energy development, including geothermal (Setiaji, 2026). This means that the Indonesian public will have to bear this debt long term. In addition to the debt burden, the benefits of geothermal electricity are subject to further disparities. Geothermal output is monopolised by PLN for integration into the national grid, meaning that the distribution of geothermal electricity operates in a top-down manner. As a result, residents living near geothermal sites do not directly benefit from geothermal energy, and the right to energy is once again commodified for the

provider's profit (Hartami & Karjoko, 2025).

Thirdly, issues have also been raised regarding the composition of Geo Dipa Energi's management. Several members of the board of commissioners are suspected of holding multiple positions, leading to significant conflicts of interest. Research by the Indonesian Forum for Budget Transparency (FITRA) shows that several Geo Dipa Energi commissioners also hold strategic positions in government ministries. The Ministry of Finance has the highest number of cases of dual positions. Two of these individuals are Heri Setiawan and Tio Serepina Siahaan. Heri Setiawan, for example, serves as Director of State Financial Risk Management at the Ministry of Finance and also holds the position of commissioner at Geo Dipa Energi (FITRA, 2023).

Conversely, Tio Siahaan, the Legal Bureau Chief at the Ministry of Finance, has served as a Geo Dipa Energi commissioner since 2023. The presence of two Ministry of Finance officials within Geo Dipa Energi's organisational structure highlights a potential conflict of interest in geothermal management. This phenomenon of dual positions has the potential to result in a repeat of the corruption case at the Dieng geothermal power plant in 2016, particularly given that the Ministry of Finance now dominates geothermal exploration instead of the Ministry of SOE (now

Danantara), following a change in Geo Dipa Energi's status as a SOE under the direct command of the Ministry of Finance (ICW, 2023).

This project is not only plagued by a conflict of interest, but also by allegations of corruption. The dispute over geothermal development for Dieng and Patuha remains unresolved and has implications for the growing corruption allegations surrounding the Dieng geothermal project. This dispute is contested by PT Bumigas and Geo Dipa Energi. Bumigas accuses individuals from the KPK and the Attorney General's Office (Kejagung) of colluding with Geo Dipa Energi to eliminate competitors in these two projects. Khreshna, as Bumigas' representative, suspects that the KPK and Kejagung used bribes and shady transactions to influence the District Court's decision in the previous case. A report on this alleged maladministration was addressed to the Ombudsman, who was asked to investigate alleged violations of legal procedure and bribery by the KPK and Kejagung. Although the evidence for these allegations is unclear, this case has set a bad precedent for geothermal projects (Siregar, 2022).

The myriad problems surrounding geothermal energy have a significant impact on the future of the Welirang PLTPB. Over the past four years, progress in the

Arjuno-Welirang development has focused on field surveys and outreach activities conducted by Geo Dipa in collaboration with Brawijaya University. Their involvement has not been limited to seismic monitoring, but has also included geothermal exploration (I. Fajar, 2020). The involvement of intellectuals, particularly Professor Sukir Maryanto and the Centre for Volcanology and Geothermal Studies at Brawijaya University, shows how academic critics, of environmentally unfriendly development have shifted their position to become 'intellectual craftsmen'. One reasons for this shift is that the material incentives obtained from this project (fees, commissions, and power networks) are more lucrative than rejecting it, which offers no incentives whatsoever. As a result, this position negates their inherent role as civil intellectuals, transforming them into actors who shape public perception of the benefits of geothermal energy (Kusman, 2019).

In addition to exploration activities, the ESDM has launched an expanded auction for the Arjuno-Welirang WKP—particularly the Songgoriti area—in order to support PLN's 2025-2034 Electricity Supply Business Plan (RUPTL). The auction was launched at the 11th Indonesia International Geothermal Convention & Exhibition (IIGCE) to encourage investment in geothermal financing. The

auction signals that geothermal development will intensify in the coming years (Gurky, 2025). Thus, it is possible that geothermal exploration will expand beyond the Arjuno-Welirang area to other regions between the mountain ranges of Batu City. However, excessive water extraction could have fatal consequences for the residents of Batu City.

The first issue is the availability of spring water. Excessive extraction of water from geothermal sources can lead to shortages in mountainous areas and threaten local residents. Since 2009, WALHI East Java has recorded a drastic decline in water sources, from 111 to 58. The main causes are land use change and deforestation, with the expansion of tourism in Batu City making this decline inevitable. If the Arjuno-Welirang geothermal plant operates at full capacity, it is possible that the water sources in Batu City will be completely depleted, given that the drilling and construction capacity of PLTPBs can reach 4,536 litres of water per minute (Medco Energi Geothermal, 2023). The second issue is the water quality. Geothermal conversion produces dangerous waste, such as sulphur and toxic sludge.

This waste is a by-product of the extraction of water sources with a high sulphur content, which is then heated by turbines. Uncontrolled waste content renders the soil unproductive for agriculture,

as experienced by residents of Muara Laboh in West Sumatra. In addition, heating these turbines produces hot steam, which kills the surrounding vegetation. Thus, the steam from these turbines makes the area vulnerable to deforestation and rising temperatures (WALHI, 2025).

It is predicted that water scarcity in Batu City will become even more severe when the Welirang Geothermal Power Plant begins operating. The losses incurred will not only affect the economic, causing crop failure and unemployment, but will also lead to an environmental crisis for the citizens of Greater Malang for years to come (Puspita, 2024). Prior to the geothermal energy threat, Batu City had faced the threat of privatisation of its water sources. One example is the Umbul Gemulo spring in Bulukerto Village, which was threatened with eviction to make way for the construction of the Rayja Hotel in 2016. When rumours of the eviction spread, the residents of Bulukerto panicked that their long-standing water source would be depleted.

The threat of water sources eviction did not only occur in Gemulo. The Kasinan water source was also threatened. This threat arose in connection with the discussion about the construction of the Alas Kasinan (Alaska) Tourism project in 2020, where Alaska would be projected as an artificial tourist attraction equivalent to Jatim Park.

There are concerns that the construction of Alaska will involve cutting down many trees in the Kasinan valley, and that operating the various rides at Alaska will consume large amounts of water. Consequently, the completion of Alaska would lead to forest destruction and water scarcity (AO, 2023).

Countering the Infrastructure Alliance: Community Mobilisation against Geothermal Expansion

The aggressive expansion of the transnational infrastructure alliance inevitably triggers pushback from the global-local interface. This is reflected in Batu City's community action to preserve Arjuno-Welirang and oppose the construction of geothermal construction. Arjuno-Welirang is the lifeblood of Batu City and holds deep significance for the local community. Their action is not merely as a cultural or symbolic preservation, but a material struggle to protect the ecological commons. Aris, a resident and activist from Bulukerto, noted that 'the abundance of water sources in Bulukerto is a blessing from God, bestowed upon Batu City as the headwaters of the Malang Raya region. This abundance is also a legacy from our ancestors, and we, as the next generation, have a duty to preserve this resource for our children and grandchildren. However, alongside the massive growth of tourism and economic development in Batu City, this

abundance, in turn, brings threats. These threats come from various directions, ranging from large-scale hotel construction to recent geothermal developments (Interview with Aris, Bulukerto activist, 14 March 2025).

Aris's statement implies that water sources are an integral part of life for the people of Bulukerto. Within the SCT framework, water is analysed not merely as a cultural and spiritual symbol, but as the fundamental material basis for local agriculture and livelihoods, which are not solely positioned as an economic commodity to be bought and sold. The community's narrative regarding ancestral heritage provides them with a means of political agency with which to contest the institutional enclosure of their ecological commons. Disruption to water sources in Bulukerto, such as the geothermal project or previous privatisation attempts in 2016, directly threatens the survival of the community and will trigger an unavoidable class-based ecological conflict in Greater Malang for years to come.

Responding to the water depletion and ecological disaster threat, the residents of Bulukerto and Kasinan have proactively organised community resistance. This resistance is a strategic struggle to challenge the attempt by the state-capital alliance to commodify their crucial water resources under the guise of a green transition.

Generally speaking, there are two forms of anticipatory resistance. The first involves forming forums to strengthen collective action vis-à-vis state power and capital. Examples of this include the Umbul Gemulo Community Forum for Spring Water Conservation (FMPMA) and the Kasinan Community Forum. Through these forums, they are raising awareness among residents about the importance of preserving spring water. The methods used are quite diverse. In the Kasinan area specifically, the Kasinan Forum consistently carries out reforestation around Coban Kasinan by planting young seedlings to restore the area's natural vegetation (Rahmadhani, 2023). The Kasinan Forum also distributes water management through HIPAM (Drinking Water Users Association).

The water quotas distribution from HIPAM is proportional, ensuring that daily consumption does not exceed 20–30 litres. However, Udin acknowledged that HIPAM is currently limited to the Kasinan subdistrict, as attempts to expand HIPAM throughout Batu City require permits and intervention from the local government. Furthermore, HIPAM's distribution capacity is not yet as extensive as that of Among Tirto's or the Regional Water Supply Company (PDAM), which raises questions about HIPAM's expansion into areas adjacent to the Arjuno-

Welirang range. Nevertheless, this self-managed system demonstrates how environmental stewardship begins with collective water source management. The community recognises that equitable water distribution prevents excessive exploitation by corporations or the state. Thus, HIPAM is maintained for that purpose (Interview with Ahmad Syaifuddin, Kasinan Village Officials, 7 April 2025)

This forum also took part in a symbolic action. Organised by Kasinan residents, it took place at the Batu City Council and conveyed the key message of rejecting the construction of Alaska. This was followed by a hearing with the Batu City Government, where an agreement was signed to stop the construction of Alaska. This hearing also involved the 'Gebrak' alliance, comprising various civil society groups such as WALHI East Java, Malang Corruption Watch (MCW), Sindikat Aksata, and LBH Surabaya Pos Malang. Combined with the overwhelming rejection, the hearing succeeded in stopping the construction of Alaska (Richa, 2020). This small victory achieved by the Kasinan Forum's resistance movements proves that local community-centred movements are better able to push for the halting of projects like Alaska by leveraging their status as political actors in Kasinan.

On the other hand, the FMPMA has also made a significant contribution to the

movement against geothermal energy. Previously, in 2014, FMPMA and Walhi East Java filed a lawsuit against PT Panggon Sarkarya Sukses Mandiri (PSSM), the developer. They won the lawsuit against the hotel construction permit when the Malang District Court upheld the sentence against the developer. Although the litigation process was fraught with twists and turns, including the Supreme Court rejecting both parties' appeals, the Batu City Government ultimately decided to halt the hotel construction, enabling Umbul Gemulo to survive (Firman, 2017). In addition to legal action, the FMPMA also staged a long march to the House of Representatives and the President, as well as holding symbolic protests at the Batu City Council. These actions aimed to reject the eviction of Umbul Gemulo. The cancellation of the plans to convert the spring into a hotel was a small victory in their defence of the spring against the threat of extractivism. However, their struggle is not yet over (J. Fajar, 2014).

In the face of threats to seize the water source for energy conversion, preserving Umbul Gemulo is crucial for the survival of Batu City citizens. In response to this new threat, Batu City residents continue to fight to unite in rejecting geothermal energy. Since January 2025, WALHI East Java and MCW have consistently supported FMPMA and Kasinan

residents in disseminating information criticising geothermal energy, which can be understood as a counter-hegemonic strategy. By emphasising the irreplaceable value of their water resources, the community is constructing shared knowledge of the fact that the geothermal project is a manifestation of green capitalism, and that the politicisation of legal instruments (RTRW and PSN) has been used to strip citizens of sovereignty over their living spaces for the sake of capital accumulation. Information has been disseminated through social media content and zine publications, with the assistance from student groups such as Sindikat Aksata, PPMI (Indonesian Student Press Association) in Malang City, and Area Baca Selasa (Dhewy & Pertiwi, 2024).

This agenda goes beyond constructing a shared class consciousness that counters the capitalist logic of the infrastructure alliance within the geothermal sector. Politically, this united movement also summoned Nurrochman, the Batu Mayor and Didik, the Batu City Council chairman for the period 2024-2029, to appear. This summons created public pressure on the Batu City government to cancel geothermal development (Styawan, 2025). In conclusion, these actions reflect how civil society is working together to defend environmental sustainability in the context of the transition

to green energy. Furthermore, resistance from Batu citizens regarding the ongoing concession auction for this project continues, making it essential to sustain and escalate these efforts.[3]

Most recently, the demonstration by residents of Tretes in March 2026 served as a collective wake-up call. Although the demonstration took place on the opposite side of the mountain slope, specifically in the Tretes District of the Pasuruan Regency, the community alliance known as the Gerakan Masyarakat Peduli Hutan (Gema Duta) condemned the conversion of approximately 22.5 hectares of forest area into residential land. This commercialisation will damage the Arjuno-Welirang ecosystem, which is already under threat from geothermal activity (Rinanda, 2026).

However, the movement to reject geothermal energy also faces challenges that are no less daunting. In order for this movement to survive, the civil society alliance in Batu City must overcome two major challenges. Firstly, they must recruit supporters from outside Bulukerto and Kasinan. Opposition to geothermal tends to be stronger in areas that are geographically close to the source of the geothermal activity. Conversely, it takes time for communities living in downstream areas to show solidarity in opposing geothermal mining because

[3] Field notes during WALHI & FMPMA meeting at Bulukerto & Kasinan Village, 17 June 2025

they do not directly experience its impacts.

Thus, the grassroots base needs to be expanded through campaigns and discussions throughout Batu City to raise awareness of geothermal energy (Fadhillah et al., 2023). Secondly, there is pressure from the state. Although the Arjuno-Welirang geothermal project's PSN status has not been revoked by the Prabowo regime, expansion of this project will involve coercive (security forces) and hegemonic (propaganda and aid) forces. This will result in any resistance to geothermal being crushed by the authorities in the future.

To anticipate this, the existing campaigns and discussions must be reinforced by setting-up community forums in each region (Puspita, 2024). These forums must have the capability to take legal action and engage in political activities (e.g. hearings and lobbying), so that each member has the skills and courage to defend their water sources. In addition, each forum should build alliances with other civil society networks and maintain the consistency of the movement through monthly meetings. This will help to maintain strength and develop measured advocacy steps, as demonstrated by the Save Slamet Alliance (Santoso & Kusumasari, 2019). Although their journey is not yet complete, this resistance movement continues to be consistent.

To sum, the collaboration between the Batu residents (Umbul Gemulo and Kasinan forum) and civil society organisations such as WALHI East Java, MCW, and LBH represents the formation of a counter-alliance designed to challenge the dominant transnational infrastructure network. This counter-alliance challenges the strategy of selectivity by providing legal defence, conducting independent environmental assessments and staging mass actions. Through this coordinated struggle, the grassroots movement aims to break through the insulation provided by institutions to protect elite developers and reclaim public sovereignty over the ecological commons (Azmy, 2025).

Conclusion

Overall, this article concludes that the Arjuno-Welirang geothermal project is a concrete manifestation of the clean energy paradox within the framework of SCT. According to SCT, this development is not merely as an effort to mitigate climate change, but rather the result of the contestation of interests among social forces, with state policy functioning as a tool to facilitate capital accumulation. A collaboration between the state, PT Geo Dipa Energi, and international financial institutions such as the ADB and the World Bank works to redefine the extraction of natural resources as a legitimate green transition agenda.

This discussion on the development of the Arjuno-Welirang geothermal project shows that its realisation relies heavily on the integration of multi-level actors. This integration demonstrates how transnational capital, SOEs, and local elites consolidate their interests through formal institutional arrangements. This integration is operationalised through regulatory mechanisms, most notably the opaque revision of Batu City's RTRW and the project's designation as a PSN. Rather than viewing these policy shifts as mere administrative procedures, the SCT perspective frames them as political and economic instruments designed to integrate global energy capital into the local landscape. By altering the spatial regulations, the infrastructure alliance successfully incorporates its extractive agenda into the state's legal framework, thereby ensuring that transnational and elite developers are legally permitted to exploit ecologically sensitive areas for the purpose of capital accumulation.

This study emphasises how the infrastructure alliance prioritises national energy agendas and transnational capital over local ecological security. By presenting the Arjuno-Welirang geothermal project as a pilot for national green energy strategy, the alliance effectively institutionalises its inherent

risks. Consequently, the potential burden of ecological degradation and public debt is shifted onto the public, while the dominant capitalist class secures future monetary gains from energy monetisation. Recognising these projected trajectories, the community's mobilisation is driven by material evidence of water crises at older geothermal sites such as Dieng and Ijen. These historical precedents provide the material foundation for Batu City's proactive resistance, uniting residents in rejecting a model of energy capitalism that threatens the long-term sustainability of their living spaces.

In conclusion, the residents of Batu City are engaged in pivotal anticipatory resistance, directly challenging the hegemony of energy capitalism and capitalist resource extraction. The community's strategies, which deploy their collective identity regarding water as a form of political agency alongside counter-advocacy and mass mobilisation, constitute a profound material struggle to reclaim sovereignty over their ecological commons. Ultimately, this study demonstrates that a just energy transition cannot be achieved while renewable energy policies are weaponised by a transnational infrastructure alliance to facilitate green capital accumulation. This subordinates ecological sustainability and public safety to the imperative of corporate profit.

References

ADB, & The World Bank. (2015). *Unlocking Indonesia's* Geothermal Potential (1st ed.). Manila: Asian Development Bank.

Ahdiat, A. (2025, July 9). Batu Bara, Sumber Emisi Terbesar Indonesia dalam Skenario Transisi Energi 2025-2034. *Katadata*. Retrieved from https://databoks.katadata.co.id/lingkungan/statistik/686e412d3e328/batu-bara-sumber-emisi-terbesar-indonesia-dalam-skenario-transisi-energi-2025-2034

Amrullah, K. (2024, August 7). ESDM Bangun Instalasi Energi Geothermal di Gunung Arjuno-Welirang yang Mencapai 160 Megawatt. *Radar Batu*. Retrieved from https://radarbatu.jawapos.com/kota-batu/2324947504/esdm-bangun-instalasi-geothermal-di-gunung-arjuno-welirang-yang-mencapai-160-megawatt

AO, W. (2023, March 26). Kisah Warga Gemulo dan Kasinan Menjaga Mata Air di Kota Batu. *Kabar Trenggalek*. Retrieved from https://kabartrenggalek.com/kisah-warga-gemulo-dan-kasinan-menjaga-mata-air-di-kota-batu

Asnawi, A. (2025, December 4). Dana Mitigasi Risiko Panas Bumi Hanya ke Korporasi? *Mongabay*. Retrieved from https://mongabay.co.id/2025/12/04/kemana-dana-mitigasi-risiko-panas-bumi-mengalir/

Ayudina, S. (2026, January 15). Indonesia Urges Global Investment in Underused Geothermal Sector. *ANTARA News*. Retrieved from https://en.antaranews.com/news/399965/indonesia-urges-global-investment-in-underused-geothermal-sector/

Azmy, U. (2022, February 22). Aliansi Gelar Aksi Protes Perubahan Perda RTRW Kota Batu Perda RTRW Kota Batu. *Tugu Malang*. Retrieved from https://tugumalang.id/aliansi-selamatkan-malang-raya-gelar-aksi-protes-perubahan-perda-rtrw-kota-batu/

Azmy, U. (2025, June 5). Proyek Geotermal di Kota Batu Dianggap Ancam Lingkungan Hidup. *Tugu Malang*. Retrieved from https://tugumalang.id/proyek-geotermal-kota-batu-dianggap-ancam-lingkungan/

Beritabaru. (2020, August 13). WALHI Jatim Minta Hentikan Perubahan RTRW Kota Batu. *Berita Baru*. Retrieved from https://jatim.beritabaru.co/walhi-jatim-minta-hentikan-perubahan-rtrw-kota-batu/

Brenner, N., Jessop, B., Jones, M., & MacLeod, G. (2003). State Space in Question. In N. Brenner, B. Jessop, M. Jones, & G. MacLeod (Eds.), *State/Space: A Reader* (1st ed., pp. 1–27). Malden, MA: Blackwell Publishing. doi.org/10.1002/9780470755686

Carroll, T., & Sovacool, B. (2010). Pipelines, Crisis and Capital: Understanding the Contested Regionalism of Southeast Asia. *The Pacific Review*, 23(5), 625–647. doi.org/10.1080/09512748.2010.522248

CNN Indonesia. (2017, June 23). Geo Dipa Berpotensi Merugi Rp 60 miliar. *CNN Indonesia*. Retrieved from https://www.cnnindonesia.com/ekonomi/2017062317394-85-223845/geo-dipa-berpotensi-merugi-rp60-m.

Dana Mitra Lingkungan. (2024, December 16). Sektor Penyumbang Emisi Karbon Terbesar di Indonesia 2024. *Dana Mitra Lingkungan*. Retrieved from https://dml.or.id/sektor-penyumbang-emisi-karbon-terbesar-di-indonesia-2024/.

Dhewy, A., & Pertiwi, S. P. (2024, August 18). Edisi Kemerdekaan: Perempuan Muda Atasi Krisis Iklim dan Lingkungan (2). *KONDE*. Retrieved from https://www.konde.co/2024/08/edisi-kemerdekaan-perempuan-muda-atasi-krisis-iklim-dan-lingkungan-2/

Enjang. (2025a, February 25). Daftar Lengkap 13 Titik Potensi Panas Bumi di Provinsi Jawa Timur. *Berita Geothermal*. Retrieved from https://beritageothermal.com/daftar-lengkap-13-titik-potensi-panas-bumi-di-provinsi-jawa-timur/

Enjang. (2025b, July 6). Direktur PT Bumigas Energi Minta Perlindungan Presiden Prabowo, Klaim Dirugikan Surat KPK hingga Tersingkir dari Proyek Panas Bumi. *Berita Geothermal*. Retrieved from https://beritageothermal.com/direktur-pt-bumigas-energi-minta-perlindungan-presiden-prabowo-klaim-dirugikan-surat-kpk-hingga-tersingkir-dari-proyek-panas-bumi/

Fadhillah, F. R., Asyari, M. R. Al, Bagaskara, A., Vanda, D., Adityatama, D., Purba, D., … Gurning, L. (2023). Challenges in Getting Public Acceptance on Geothermal Project in Indonesia. In F. R. Fadhillah, M. R. Al Asyari, A. Bagaskara, D. Vanda, D. W. Adityatama, D. Purba, … L. Gurning (Eds.), *48th Workshop on Geothermal Reservoir Engineering* (Vol. 1, pp. 1–15). Stanford, CA: Stanford University Press. Retrieved from http://pangea.stanford.edu/ERE/db/GeoConf/papers/SGW/2023/Fadhillah.pdf

Faisal, A. B., & Muhyidin, A. (2024). Inkonsistensi Peraturan Daerah Rencana Tata Ruang Wilayah Kota Batu sebagai Konsekuensi Rezim Semi Sentralisitik. *FisiPublik: Jurnal Ilmu Sosial Dan Politik*, 9(1), 33–46. doi.org/10.24903/fpb.v9i1.2862

Fajar, I. (2020, July 31). Respon Walhi Jatim Pembangunan PLTP Arjuno-Welirang. *Tagar*. Retrieved from https://www.tagar.id/respon-walhi-jatim-pembangunan-pltp-arjunowelirang

Fajar, J. (2014, July 23). Kisah Sukses Warga Batu Malang Selamatkan Sumber Mata Air. *Mongabay*. Retrieved from https://mongabay.co.id/2014/07/23/kisah-sukses-warga-batu-malang-selamatkan-sumber-mata-air/

Fajri, H., Halawa, H. S., & Wahyuni, N. (2023). Non-state Actor's Strategy in Advocating the Movement to Reject Development. *Journal of Public Administration Studies*, 8(2), 10–17. doi.org/10.21776/ub.jpas.2023.008.02.2

Firman, T. (2017, July 3). Warga Sumber Mata air Kota Batu Melawan Pembangunan Hotel. *Tirto*. Retrieved from https://tirto.id/warga-sumber-mata-air-kota-batu-melawan-pembangunan-hotel-crSi

FITRA. (2023). Anggaran Negara Dilahap Para Pejabat yang Merangkap. *SEKNAS FITRA*. Retrieved from https://seknasfitra.org/anggaran-negara-dilahap-para-pejabat-yang-merangkap/

Geo Dipa Energi. (2022). Tentang Kami: Geo Dipa. *Geo Dipa*. Retrieved from https://www.geodipa.co.id/tentang-kami/

Gurky, R. (2025, November 20). Govt Opens Tender for Songgoriti Geothermal Working Area. *Petromindo*. Retrieved from https://www.petromindo.com/news/article/govt-opens-tender-for-songgoriti-geothermal-working-area

Hamdi, I. (2022, October 7). Saling Gugat dalam Proyek PembangkitListrik Panas Bumi. *TEMPO*. Retrieved from https://www.tempo.co/politik/saling-gugat-dalam-proyek-pembangkit-listrik-panas-bumi-832617/.

Hameiri, S., & Jones, L. (2020). Theorising Political Economy in Southeast Asia. In T. Carroll, S. Hameiri, & L. Jones (Eds.), *The Political Economy of Southeast Asia: Politics and Uneven Development under Hyperglobalisation* (4th ed., pp. 31–66). Cham, Switzerland: Palgrave Macmilllan. doi.org/10.1007/978-3-030-28255-4

Hameiri, S., & Scarpello, F. (2018). International Development Aid and the Politics of Scale. *Review of International Political Economy*, 25(2), 145–168. doi.org/10.1080/09692290.2018.1431560

Hartami, A., & Karjoko, L. (2025). Ketimpangan Akses dalam Wilayah Kerja Panas Bumi (WKP). *J-CEKI: Jurnal Cendekia Ilmiah*, 4(6), 2096–2100. doi.org/10.56799/jceki.v4i6.11626

Harvey, D. (2004). The 'New' Imperialism: Accumulation by Dispossession. *Socalist Register*, 40(1), 63–87. doi.org/10.3917/amx.035.0071

Hasiana, D. (2024, June 20). Konsumsi Energi di Asean: Pertumbuhan RI Kalah dari Singapura. *Bloomber Technoz*. Retrieved from https://www.bloombergtechnoz.com/detail-news/41320/konsumsi-energi-di-asean-pertumbuhan-ri-kalah-dari-singapura

ICW. (2023). Rangkap Jabatan Komisaris dan Dewan Pengawas Badan Usaha Milik Negara: Kegagalan pemerintah mengelola konflik kepentingan. *ICW*. Retrieved from https://antikorupsi.org/id/rangkap-jabatan-komisaris-dan-dewan-pengawas-bumn-kegagalan-pemerintah-mengelola-konflik

Inchauste, G., & Victor, D. G. (2017). *The Political Economy of Energy Subsidy Reform* (1st ed.). Washington, D.C., United States of America: The World Bank.

Indrawan, R. (2023, January 26). Pengembangan Panas Bumi Dieng dan Patuha Berpotensi Mangkrak akibat Intervensi Oknum Pimpinan KPK. *Dunia Energi*. Retrieved from https://www.dunia-energi.com/pengembangan-panas-bumi-dieng-dan-patuha-berpotensi-mangkrak-akibat-intervensi-oknum-pimpinan-kpk/

Jamil, M. (2023). Poco Leok Mencekam: Pemerintah dan PLN Mobilisasi Aparat Keamanan untuk Perluasan Operasi Tambang Geothermal. *JATAM*. Retrieved from https://jatam.org/id/lengkap/poco-leok-mencekam-pemerintah-dan-pln-mobilisasi-aparat-keamanan-untuk-perluasan-operasi-tambang-geothermal

Jeffrey, A., & Mcfarlane, C. (2011). Rethinking Enclosure: Space, Subjectivity and the Commons. *Antipode*, 44(4), 1247–1267. doi.org/10.1111/j.1467-8330.2011.00954.x

Jemadin, S. (2024). Dilemma of Geothermal Development in Flores Manggarai: Blessing or curse? *JISORA*, 7(2), 34–45. doi.org/10.36624/jisora.v7i2.170

Kementerian Keuangan. (2017). *Peraturan Menteri Keuangan No 62 Tahun 2017 tentang Pengelolaan Dana Pembiayaan Infrastruktur Sektor Panas Bumi pada Perusahaan Perseroan Sarana Multi Infrastruktur*. Jakarta, Indonesia: Kementerian Keuangan.

Kusman, A. P. (2019). *The Vortex of Power: Intellectuals and Politics in Indonesia's Post-Authoritarian Era* (1st ed.). Singapore: Palgrave Macmilllan.

Lochery, E. (2022). Situating Extraction in Capitalism: Blueprints, Frontier Projects, and Life-Making. *The Extractive Industries and Society, 11(May)*, 101–137. doi.org/10.1016/j.exis.2022.101137

LPM Perspektif. (2022, May 30). Pembangunan di Kota Batu Berdampak Negatif untuk Lingkungan. *Perspektif*. Retrieved from https://lpmperspektif.com/2022/05/30/pembangunan-di-kota-batu-berdampak-negatif-untuk-lingkungan/

Medco Energi Geothermal. (2023). *Geothermal Power Plant Project Ijen Bondowoso Environmental and Social Impact Assessment (ESIA) Study*. Jakarta, Indonesia. Retrieved from https://policycommons.net/artifacts/18287213/geothermal-power-plant-project-ijen-bondowoso/19187685/

Mezzadra, S., & Neilson, B. (2019). *The Politics of Operations: Excavating Contemporary Capitalism (1st ed.)*. Durham, NC: Duke University Press. doi.org/10.1215/9781478003267

Operacz, A., Bielec, B., Operacz, T., & Zachora-buławska, A. (2025). Dilemma of Spent Geothermal Water Injection into Rock Masses for Geothermal Potential Development. *Energies, 18*(15), 1–21. doi.org/10.3390/en18153922

PT SMI. (2025a). *Kerangka Kerja Pendanaan Berkelanjutan untuk Kegiatan Penghimpunan Dana PT SMI melalui Penerbitan Obligasi, Medium-term Notes (MTN), Pinjaman Bank, Sukuk & Fasilitas Pembiayaan Syariah, dan Sumber Pendanaan Berkelanjutan Lainnya*. Jakarta, Indonesia. Retrieved from https://www.ptsmi.co.id/cfind/source/files/sustainable-funding/kerangka-kerja-pendanaan-berkelanjutan-pt-smi.pdf

PT SMI. (2025b). *Mewujudkan Keuangan Berkelanjutan yang Bermanfaat Meretas Jalan*. Jakarta, Indonesia. Retrieved from http://ptsmi.co.id/cfind/source/files/sustainability-report/sustainability-report-pt-smi-2024.pdf

Puspita, L. (2024, December 4). Proyek Geothermal di Batu: Jangan Sampai Mata Air menjadi Air Mata. *Project Multatuli*. Retrieved from https://projectmultatuli.org/proyek-geothermal-di-batu-jangan-sampai-mata-air-menjadi-air-mata/

Qatrunnada, S. R., Satmoko, Y. C., & Adli, F. F. (2024). Peranan Pemerintah Daerah dalam Transisi Energi Berkeadilan: Review Literatur dan Pembelajaran bagi Jawa Timur. In E. L. Dewi, P. Simamora, & H. Hanif (Eds.), *Bunga Rampai Transisi Energi Berkeadilan Buku 2* (2nd ed., pp. 21–40). Jakarta, Indonesia: The Habibie Center. Retrieved from https://www.habibiecenter.or.id/img/publication/Bunga Rampai Energi 2.pdf

Rahmadhani, E. (2023, March 25). Catatan Peringatan Hari Air, Kilas Balik Perjuangan Warga Gemulo dan Kasinan dalam Menjaga Mata Air. *Malang News*. Retrieved from https://malangnews.id/2023/03/25/catatan-peringatan-hari-air-kilas-balik-perjuangan-warga-gemulo-dan-kasinan-dalam-menjaga-mata-air/

Richa, I. (2020, September 25). Demi Menjaga Mata Air, Wisata Alaska di Kota Batu Akhirnya Diberhentikan. *Tulungagung Times*. Retrieved from https://tulungagung.jatimtimes.com/baca/224573/20200925/022000/demi-menjaga-mata-air-wisata-alaska-di-kota-batu-akhirnya-diberhentikan

Rinanda, H. (2026). Penolakan Keras Warga saat Hutan di Tretes mau Dibangun Real Estate. *Detikjatim*. Retrieved from https://www.detik.com/jatim/berita/d-8421066/penolakan-keras-warga-saat-hutan-di-tretes-mau-dibangun-real-estate

Santoso, P. F., & Kusumasari, B. (2019). Key Elements of Environmental Justice in the Geothermal Power Plant Resistance Movement. *JURNAL POLITIK, 5*(1), 65–94. doi.org/10.7454/jp.v5i1.1019

Setiaji, H. (2026, February 18). Utang Luar Negeri Indonesia Naik jadi Rp7.271 Triliun. *Bloomber Technoz*. Retrieved from https://www.bloombergtechnoz.com/detail-news/99892/utang-luar-negeri-indonesia-naik-jadi-rp7-271-triliun

Setiawan, V. N. (2026, January 8). Tak Lagi Rekor, Produksi Batu Bara RI di 2025 Capai 790 Juta Ton. *CNBC Indonesia*. Retrieved from https://www.cnbcindonesia.com/news/20260108120519-4-700653/tak-lagi-rekor-produksi-batu-bara-ri-di-2025-capai-790-juta-ton

Siahaan, M. F., Septiani, G. A., Purba, D., & Paripurna, A. (2023). Geothermal Exploration Project De-risking: Discussion on Various Schemes. *In 48th Workshop on Geothermal Reservoir Engineering* (pp. 1–12). Stanford, CA: Stanford University Press. Retrieved from https://pangea.stanford.edu/ERE/db/GeoConf/papers/SGW/2023/Siahaan2.pdf

Silfia, I. (2025, February 27). PT SMI Biayai 94 Proyek terkait Iklim dengan Komitmen Rp 33 Triliun. *ANTARA News*. Retrieved from https://m.antaranews.com/berita/4678037/pt-smi-biayai-94-proyek-terkait-iklim-dengan-komitmen-rp33-triliun

Siregar, V. H. (2022, October 27). Guna Pembuktian – Oknum Pejabat Kasus Proyek PLTP Dieng Mesti Dikonfrontasi. *INews*. Retrieved from https://bekasi.inews.id/read/196905/guna-pembuktian-oknum-pejabat-kasus-proyek-pltp-dieng-patuha-perlu-dikonfrontasi

Styawan, W. E. (2025, August 1). SPPG di Umbul Gemulo Dibatalkan: Tetapi Masih Ada Ancaman Eksploitasi Lain. *WALHI Jatim*. Retrieved from https://walhijatim.org/2025/08/01/sppg-di-umbul-gemulo-dibatalkan-tetapi-masih-ada-ancaman-eksploitasi-lain/

Styawan, W. E., & Indra, P. (2022, October 10). Catatan Kritis WALHI Jawa Timur: Kebijakan Tata Ruang Kacau telah Mengundang Bencana di Kota Batu. *WALHI Jatim*. Retrieved from https://walhijatim.org/2022/10/10/catatan-kritis-walhi-jawa-timur-kebijakan-tata-ruang-kacau-telah-mengundang-bencana-di-kota-batu/

The World Bank. (2025). *Indonesia Geothermal Resource Risk Mitigation Project (GREM)* (P166071). Washington, D.C., United States of America.

UNEP. (2025). *Emission Gap Report 2025: Off Target, Continued Collective Inaction Puts Global Temperature Goal at Risk*. Nairobi, Kenya. doi.org/10.59117/20.500.11822/48854

Utomo, W. T., & Husnudin, M. (2025). *Menambang Solusi Palsu: Polemik JETP dalam Kasus Proyek Geothermal Ijen*. Jakarta, Indonesia. Retrieved from https://celios.co.id/mining-false-solutions-the-controversy-of-jetp-in-the-ijen-geothermal-project/

WALHI. (2025). *Catatan Kritis Satu Tahun Pemerintahan Prabowo: Konsolidasi Oligarki, Ambruknya Keadilan Ekologis, dan Terancamnya Keselamatan Rakyat*. Jakarta, Indonesia. Retrieved from https://www.walhi.or.id/rapor-merah-satu-tahun-pemerintahan-prabowo-gibran-oligarki-semakin-terkonsolidasi-keadilan-ekologis-ambruk-rakyat-jadi-tumbal

Wallis, V. (2010). Beyond "Green Capitalism." *Monthly Review*, 61(09), 32–48. Retrieved from https://monthlyreview.org/articles/beyond-green-capitalism/

Wicaksana, Y. (2024, March 30). Alih Fungsi Lahan Hijau di Kota Batu Masih Marak, dari Sawah jadi Bangunan-Bangunan Ini. *Radar Batu*. Retrieved from https://radarbatu.jawapos.com/kota-batu/2324497039/alih-fungsi-lahan-hijau-di-kota-batu-masih-marak-dari-sawah-jadi-bangunan-bangunan-ini

Wijaya, T. (2021). Conditioning a Stable Sustainability Fix of 'Ungreen' Infrastructure in Indonesia: Transnational Alliances, Compromise, and State's Strategic Selectivity. *The Pacific Review*, 35(5), 1–32. doi.org/10.1080/09512748.2021.1884123

Wismabrata, M. (2021, November 7). Tragedi Banjir Bandang Kota Batu Malang 7 Warga Tewas dan 33 Rumah Warga Terendam. *Kompas*.com. Retrieved from https://regional.kompas.com/read/2021/11/07/120656678/tragedi-banjir-bandang-kota-batu-malang-7-warga-tewas-dan-33-rumah-terendam

Yurika. (2021, October 21). Geo Dipa Bor Arjuno Welirang pada 2023. *Dunia Energi*. Retrieved from https://www.dunia-energi.com/2023-geo-dipa-energi-lakukan-pengeboran-wkp-arjuno-welirang/

Yusnia, F., & Kristanti, L. (2022, February 17). Kiprah Prof Sukir Maryanto di Bidang Ilmu Vulkanologi dan Geothermal. *Kumparan*. Retrieved from https://kumparan.com/tugumalang/kiprah-prof-sukir-maryanto-di-bidang-ilmu-vulkanologi-dan-geothermal-1xWYfdCWc2Y/full