Injustice and Environmental Harm in Extractive Industries and Solar Energy Policies in Indonesia

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Abstract

The rapid development of Indonesia's economy in the recent decades has accelerated the exploitation of natural resources by the extractive industries and increased carbon emissions through higher energy consumption. Additionally, the persistent enthusiasm for coal energy and the ambitious deployment of renewable energy may have led to injustices in the energy system, short-sighted corrupt practices, and environmental harm. This article examines the challenges and risks of energy source utilization and technological developments linked to coal, geothermal, and solar energy. More specifically, I focused on the following issues: domestic market obligation for coal, geothermal exploration, solar lamp distribution, rooftop photovoltaic policy, and electricity charging stations (ECS). Investigating these issues from an energy justice and a green criminology perspective allowed us to evaluate them concerning instances where injustices (to humans and the environment) have emerged and how they should be addressed. In conclusion, the article demonstrates how the marginalization of rural communities and production of environmental harm has been perpetuated by powerful figures, reinforced since colonialism, and escalated by the demands of the Global North.

Keywords

Environmental harm; energy justice; extractive industry; Indonesia; Southern green criminology.

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Introduction

The rapid development of Indonesia's economy in the recent decades has accelerated the growth of extractive industries by exploiting natural resources and increasing carbon emissions due to higher energy consumption rates. The formation of these extractive industries began in the colonial period. It intensified after World War II, particularly since the late 1960s when state corporations seized resource extraction activities to boost the Indonesian economy. Extractive industries—particularly coal, oil, and gas—generate considerable employment and a share of significant revenue for the government and corporations. However, they come with high environmental and social costs. The coal industry's environmental harm and social impacts are widely known and documented by scholars, journalists, activists, intellectuals, and concerned citizens. More recently and highly publicized, a petition against coal construction in Indonesia was endorsed by 8,221 individuals from 114 countries and 112 organizations from 34 countries to the Japanese government. It demanded them to stop financing the construction of the Indramayu coal-fired power plant. It stated that the project would produce considerable environmental pollution and destroy the livelihoods of thousands of local farmers and fishermen (Indonesia-Japan nongovernmental organization [NGOs] coalition, 2020). This project's adverse environmental impact will disproportionately affect the local community of Indramayu.

Meanwhile, the overexploitation of coal has made coal reserves decline at a fast rate and prompted the government to seek other energy sources. Based on Indonesia's coal production in 2019 of about 400 million tons, it is estimated that the coal reserves will last about 20 years, particularly for domestic use (Bappenas/National Development Planning Agency, 2019). The government prioritized coal, geothermal, solar energy in the National Energy Plan 2017–2050 to mitigate this issue. However, geothermal exploration operations also entail environmental damage. Therefore, significant questions remain about the environmental and social consequences of the government's energy policies concerning coal, geothermal, and solar energy.

This article jointly explores the following interrelated issues: domestic market obligation for coal, geothermal exploration, solar lamp distribution, solar panel policy, and electric charging stations (ECS).[1] I aimed to explore the issues of injustice and harm in energy generation and distribution through the lenses of *energy justice* and *southern green criminology*. I focused on the actions of powerful figures who facilitate the production of environmental harm and legitimize the marginalization of human groups and the Global South's natural world (Sovacool & Dworkin, 2015; Goyes, 2019). This article begins by outlining the concepts of energy justice and southern green criminology by highlighting the mainstream discussions of justice within the energy system and the particular characteristics of environmental harm in the Global South, including the role of the colonial legacy. The subsequent section presents an overview of the colonial legacy that influences the characterization of various elements of the Indonesian energy system. It also reviews how this system perpetuates inequality, led by powerful elites. The third section outlines the research methods and approaches to interviews, document reviews, and data analysis. The results section identifies the key concerns relating to justice and the environment raised in interviews and identified in the literature. The final section discusses the broader implications of the findings, namely, the application of green criminology and a justice-centered approach to energy transition studies in the Global South.

Energy Justice from a Southern Green Criminology Perspective

Energy justice focuses on the fair dissemination of the benefits and costs of energy services among communities and the impacts of energy decisions on marginalized populations and future generations within a holistic global system (Sovacool & Dworkin, 2015; Sovacool et al., 2017). This concept stemmed from both environmental and social justice philosophies. It is concerned with the potential ramifications of actions directly related to ecological well-being, human health, and the distributive impact of exploitative activities on people's livelihoods and well-being (Davies, 2014; Sovacool et al., 2017; White, 2013). Energy justice research also has subfields in the procedural, distributional, and recognition dimensions of justice. So far, these subfields have been applied to the community energy sector in Wales

(Forman, 2017), the oil and gas development in the Arctic (McCauley et al., 2016), and the fracking industry in England (Dunlop et al., 2021). Scholars using this approach have demonstrated that people low in the political economy suffer the most from legally sanctioned procedures for extractive industries. Schlosberg and Carruthers (2010) provided evidence from the Americas, Muir and Booth (2012) from Canada, and Colchester and Chao (2011) from Southeast Asia. Correspondently, Ruggiero and South (2013) asserted the public policies for solving environmental and economic problems could be criminogenic, giving rise to corruption and illegal markets. Therefore, energy justice requires highlighting issues of environmental justice *and* social justice, which can be achieved using the perspective of green criminology. Admittedly, although giving priority to the "fairness" in the energy system, purely human-centered approaches (e.g., the original version of *energy justice*) tend to ignore the ecological context, where human and non-human species are marginalized and victimized.

Discussions on crimes committed against ecosystems, human beings, and non-human beings are included within the green criminology conceptual framework (Brisman, 2014). Green criminology also exposes the uneven nature of power and wealth distribution between the north and south. This north–south imbalance is at play in the overconsumption of environmental products in the north at the expense of environmental destruction in southern countries (Goyes, 2019). It forms a rationale for defining southern green criminology as "the science that is attentive to the dynamics and context of the Global South and grows out of the epistemological power of the marginalized, impoverished and oppressed" (Goyes, 2019:11). In other studies, southern green criminology was characterized as paying attention to the uneven distribution of political and economic power (Goyes & Franko, 2019), the colonization and exploitation of the south (Goyes, 2021), and the power imbalances that have privileged the Global North over the Global South (Carrington et al., 2018a). Therefore, Goyes (2019:55–56) stated that "a Southern green criminology can further decolonial aims and thus aid the science that challenges ecological discrimination." Conceiving Southern green criminology this way draws attention to the ways historical structures and consumer culture give political superiority to powerful groups. This phenomenon is evidenced in various regulatory processes that have systematically produced environmental harms when serving the interests of the powerful (see Heydon, 2019, for a study of Canada; see White, 2013, for a study of Australia). Importantly, southern green criminology has identified the harmful actions against marginalized communities as instances of (neo)colonialism (Mondaca, 2017; Goyes, 2021; Weis, 2019) and capitalism (Lynch et al., 2018; Ruggiero & South 2013).

Energy justice and southern green criminology perspectives complement each other in various ways concerning their central concerns regarding the disclosure of injustices and harms in public policies and the marginalization of some people by the dominant group (Sovacool & Dworkin, 2015; Goyes, 2019). Both southern green criminology and energy justice have recognized the problem of inequalities and injustice by focusing on the extractive sector. Scholars applying both theoretical frameworks also denounce the lack of representation of southern voices into debates of environmental and energy injustice (Carrington et al., 2019; Lacey-Barnacle et al., 2020). This article applies energy justice and southern green criminology by investigating and clarifying the injustices and environmental harms found in the case studies, the systemic nature of these harms, and the concrete ways they operate. The discussion now turns to the structure of the energy system to demonstrate the application of these frameworks to this article's subject. The structure disproportionately benefits national politicians and large corporations in Indonesia while limiting community well-being and threatening rural people's access to natural resource-based activities.

The Distribution of Power and Inequality in the Indonesian Energy System

The Indonesian energy system is highly regulated and centralized into a national distribution network. This is, in part, a legacy of colonialism, impacting current patterns of power and wealth inequality in the postcolonial Indonesian state (Booth, 1998). According to the Constitution, the state has the right to manage natural resources—this privilege originated in the Dutch colonial-era principle of "domein" (Robertson-Snape, 1999). The domein principle asserts the right of the colonial power to rule, own, and manage land and restrict community access to land. Specifically, article 33, point 3 of the Constitution

states, "the land, the waters and the natural riches contained therein shall be controlled by the state and used to the greatest prosperity of the people." This point refers to the state (through its representatives), who hold the responsibility to protect the common good from others who seek to undermine it. In Indonesia, this mandate has been exploited to legitimize an authoritarian style of government that rejects opposition (Robertson-Snape, 1999). Accordingly, the energy system's centralization has incepted and sustained an oligarchy lead by political elites and is manipulated by economic groups with vested interests. The European colonization also introduced the first urban-rural divide in the archipelago. The Dutch introduced economic centralization on the island of Java, while the rest of the archipelago remained relatively "undeveloped" (Booth, 1998). Today, Java is home to the capital city of Jakarta and remains the most populated island, home to 150 million people or more than half of the country's population (National Statistics Indonesia [BPS], 2021). Consequently, the rural and urban divisions increase the inequality both within and between provinces. Suryadarma et al. (2012) made clear there are not large inequalities in income, education, and healthcare access between regions in Indonesia. However, these inequalities are present within urban and rural areas. In terms of electricity access, the rural areas have the least developed electricity infrastructure, evidenced by a lower electrification ratio than urban areas (BPS, 2021). There are focused government efforts to address energy security concerns in rural areas by implementing community-based renewable energy projects (Fathoni et al., 2021). While such circumstances have supported the efforts to address inequality, challenges remain in providing reliable electricity access for the rural population. Several regulatory reforms have allowed a greater role of the private sector and civil society in the energy system to promote renewable energy (i.e., solar panel policy). However, breaking the control of the state and fossil fuel hegemony is inconceivable (Setyawati, 2021).

Several barriers hinder democratic participation in developing energy policies and the establishment of less environmentally detrimental energy production practices. First, despite the democratic reformation[2] in 1998, free speech in Indonesia is subject to restrictions (Pearson, 2010). Defamation provisions in the Criminal Code for slander invoke higher penalties if the person is a public official. Further, journalists who breach the code law face up to six years of imprisonment and a fine of up to IDR 1 billion (around USD 100,000). Human Rights Watch states that elite groups and individuals can use this law to silence criticism or allegations of corruption, fraud, or misconduct made against the government or individuals with political power (Pearson, 2010). For instance, in 2019, a palm oil company filed a lawsuit against an environmental activist in West Kalimantan for engaging in protests and claiming the company had polluted the nearby river (Hidayat, 2019). Currently, the case is still under review. If found guilty, the activist will face imprisonment of up to three years. Regarding energy production alternatives, there is currently a prohibition against the PLN (Perusahaan Listrik Negara/State Electricity Company) purchasing renewable power at prices higher than conventional coal power. This prohibition is regulated by the domestic market's obligation to cap coal prices sold by the power producers to PLN (Asian Development Bank [ADB], 2020). This policy interferes with the competitiveness of renewable energy investments, making the power sector dependent on coal. Third, the renewable energy development priorities laid out in the National Energy Plan are on geothermal and solar energy. However, the development of these energy sources affects rural livelihoods concerning environmental degradation due to geothermal operations in forest areas.

This article explores the tension between globally relevant environmental activism and localized cultural traditions[3]. It presents the results of an exploratory study on environmental activists' voices and perspectives within their specific sociocultural context in Taiwan and Japan, between 2015 and 2019. A wide-encompassing view of who environmental activists are is taken: they can be defined, following Parkin's (2010: 1) definition of "positive deviant," as "a person who does the right thing for sustainability, *despite* being surrounded by the wrong institutional structures, the wrong processes and stubbornly uncooperative people." To further clarify what counts as environmental activism in this article, a tentative typology of different positions regarding environmental issues is proposed. This article scrutinizes the idea that in some sociocultural contexts in Taiwan and Japan, speaking up is discouraged, as it threatens the harmony of the community (Li 2013; Tao et al. 2009). In contrast, I show that instead of struggling to harmonize their own values with cultural expectations, the activists interviewed tended to gain a strong

sense of purpose through moral protest—that is, protest triggered by moral indignation. In Taiwan and Japan, still today, activists can face high social risks. To support and learn from each other strategies to move from confrontation to commonness, environmental activists often build a "community of activism," partly through online social networking.

Methods

The case studies discussed below provide an examination of the benefits and justice outcomes produced by energy-related activities sanctioned by existing laws and regulations. The case studies each fall under one of the following energy source classifications:

a. Coal (one of the main fossil fuels used in Indonesia)
b. Geothermal (a renewable energy source)
c. Solar (also categorized as renewable energy)

The discussion is divided between three different technologies:

I. Solar lamp distribution
II. Solar panels
III. ECS

There are several reasons these energy sources have been chosen for analysis. Both coal and geothermal are extractive industries located in forest areas and largely investigated as drivers of deforestation (ADB, 2020). Coal-based power is considered a cheap option, although it has high environmental costs (Atteridge et al., 2018). The reliable alternative is geothermal, the only renewable energy that can effectively substitute coal to provide baseload generation (Jayawardena et al., 2014). However, environmental and financial costs are associated with geothermal development, primarily impacting local communities in project areas. According to the National Energy Plan, solar energy is another option considered by the government to meet the increasing demand for energy in an environmentally responsible way. New regulations, including solar panel policies, are paving the way for Indonesia's efforts to scale up solar energy generation to reach a capacity of 6.5 gigawatts by 2025.

This article uses a qualitative methodology, combining 16 interviews with elites *and* street vendors with a documentary analysis. Snowball sampling was used to identify appropriate participants for the elite interviews due to the sensitivity of the issues and complexity of the government's decision-making process (Biernacki and Waldorf, 1981). Most interviews took place while I was conducting three months of fieldwork at the Ministry of Energy and Mineral Resources from January to March 2019. Notably, this type of interview can pose problems concerning the validity of the data. Further, there are ethical considerations, such as identity protection (Berry, 2002). I attempted to minimize these problems by using a data triangulation technique (Arksey and Knight, 1999). In this research, I triangulated three sample groups and supplemented the data with government reports, news, and research. The elite interviewees were separated into three groups: government (the Ministry of Energy and Mineral Resources, state electricity company PLN, and National Energy Board), private sector (the Indonesian Solar Panel Module Association), and academia (the PLN Foundation School of Engineering). Eight elite interviews were conducted over two years between March 2019 and March 2021. Five interviews were conducted in person, while three were conducted via an online chat video/audio platform. Government participants were drawn from various divisions of the Ministry of Energy and Mineral Resources. The private sector category included a representative from the solar panel association, whose interview was fundamental for this research due to the limited quantity of solar energy policy reports. The data on coal and geothermal developments were collected from the government and academia groups and the available literature.

For the ECS case study, I used stratified sampling to obtain a representative sample of the target population to prevent sampling bias (Onwuegbuzie & Collins, 2007). In this case, the target population was street

vendors, the intended user base for ECS. I began by identifying the locations of the charging stations in Jakarta. Following this, I conducted a field visit to determine the average number of street vendors using the stations daily. I selected Jakarta as the location for my case study as it is home to the largest street vendor communities in Indonesia and where ECS were first established. The capacity of the ECS is around 5 kilowatt-hours, and each one can be used by a maximum of four persons simultaneously. Three sites and eight interviewees were selected for interviews after direct observation of the charging stations. They were determined based on street vendor occupancy and their utilization of the stations. All interviews were transcribed, and the transcripts were subjected to the stages of critical discourse analysis proposed by Fairclough (2001:96). This analysis focuses on "the role of discourse in the production and reproduction of power abuse or domination of some groups of people over others." The names and positions of interviewees remain anonymous to ensure confidentiality.

Findings and Analysis

The Political Dimension, Environmental Harms, and Social Implications of Coal Mining

Coal operations are important to national and regional economies. In 2017, coal mining accounted for around 1.8% of Indonesia's Gross Domestic Product (GDP) (BPS, 2017). It also provides development and employment opportunities for regional economies. Based on Law No. 33/2004 and Government Regulation No. 55/2005, regional governments receive 80% of the revenue derived from natural resources. The coal industry is inextricably linked to Indonesian politics, especially concerning the role that financial contributions play in election campaigns. Released four days before the presidential election, the documentary Sexy Killers exposed the coal industry's influence on the campaigns of both presidential candidates (Sasono, 2020). Even though the documentary does not contain direct allegations of political corruption during the election, it certainly shows how deeply interconnected the coal industry is with Indonesian political elites. Atteridge et al. (2018) also reported it is "common knowledge" that politicians own or financially benefit from coal mining operations, making them prone to corruption. In 2016, the Governor of Southeast Sulawesi was arrested for indiscretions relating to issuing mining licenses (Jakarta Post, 2017). Later, in 2019, the Indonesian Corruption Eradication Commission (KPK) announced that the former Cirebon Regent was suspected of money laundering and bribery related to the coal-fired power project.

The expansion of coal mining operations in Indonesia has had significant implications for physical and social environments. Between 2010–2016, deforestation in the coal mining areas of East Kalimantan occurred at a rate of 223,830 hectares per year (Kartikasari et al., 2018). This deforestation contributed to carbon emissions, increasing air pollution, with significant health consequences for local habitats and human residents. The environmental degradation accompanying coal mining is also a matter of growing concern for the communities surrounding the mines. For example, Juniah et al. (2012) suggested that the rise of respiratory illness among residents of the Muara Enim District of South Sumatra is linked to regular incidences of toxic dust from the neighboring large open-cut coal mine. Meanwhile, Koplitz et al. (2017) estimated that air pollutants from coal power plants are linked to 7,480 premature deaths annually. There is also a lack of regulatory oversight regarding disused mining pits, leading to numerous accidental deaths, mainly of children (Gokkon, 2017). Coal mining operations also paid less attention to the land ownership and management by the local communities, leading to various social conflicts. Susanto and Nurdianti (2021) analyzed the conflict between residents of Wonorejo Village and the Adaro coal company. They identified that the government had failed to ensure social protection for the community against a large corporation by tolerating land grabbing, intimidation, and other criminal acts by the coal company. They also noted that the expansion of coal mining had, directly and indirectly, damaged the income structure of village residents as rubber farmers. Similarly, Siswanto et al. (2021) reported persistent conflicts between Long Lanuk Village residents and the coal mining company regarding land boundaries and procedural fairness.

Current energy policies support coal utilization above other cleaner energy sources. For PLN, it is cheaper to buy electricity from coal than from renewable energy sources due to the domestic market obligation

policy. This policy caps the sale price of coal to PLN and limits any price increases that may occur (regulated in the MEMR Decree No. 78 K/30/MEM/2019). Moreover, Omnibus Law No. 11/2020 asserts automatic mining permit extensions, avoiding the need for companies to undergo complex bureaucratic processes to obtain renewal permits. As one interviewee stated:

> Coal is more often used than renewables because it is deemed more cost-effective and reliable than renewables. The take-off price of renewables by PLN is higher than that of coal (staff of Ministry of Energy and Mineral Resources).

The Marginalization of Local Communities and Green Crimes in Geothermal Operations

Part of the efforts to secure energy supplies and move away from fossil-based fuels is geothermal exploration, often entailing a marginalization of local communities and significant biodiversity loss. Recently, five people (all farmers and children from Sibanggor Julu village) died from exposure to toxic gases caused by nearby geothermal drilling by Sorik Marapi Geothermal Power (Karokaro and Syahni, 2021). Despite the suspension of geothermal operations, the gas pollutants continue to put people's health at risk, primarily children living in places such as Sibanggor Julu. Tulungen et al. (2021) documented the pollution caused by the geothermal industry in the Tompaso district, where pollutants found in the air and nearby wells caused the productivity of rice and agricultural crops to decline. Additionally, land-use changes have caused a reduction in water resources around the site and a loss of reservoir water. Zufar and Azami's (2021) reported similar pollution cases in Gunung Slamet, where the water has become murky, disrupting the livelihoods of local communities from tofu production and fisheries.

Protests by local communities against geothermal power plant development have occurred in various parts of the country. Some have been met with repression. Between 2017 and 2020, protests have taken place in the communities of Solok (West Sumatra province), Wae Sono (East Nusa Tenggara province), Gunung Slamet (Central Java province), Pangalengan (West Java province), and Sibanggor Julu (North Sumatra) (indicated by squares in Figure 1). An eyewitness of a protest in Solok said that the authorities used violence to quash the demonstration (Yolanda et al., 2021). The protesters in Gunung Slamet also had a violent confrontation with the authorities (Cipto, 2017). In their various regions, these protesters demanded an end to geothermal operations in their area, citing the loss of forest cover and livelihoods due to the development of geothermal facilities. Figure 2 illustrates the locations of forests in Indonesia based on 2018 data (indicated by shades of green). It can be observed when comparing Figure 1 with Figure 2 that geothermal facilities are mostly located in the forested areas of Indonesia. As noted by a government representative:

> Environmental issues relating to renewable energy infrastructure are mostly concerned with geothermal power plant development located in the forest conservation areas.

Figure 1. Map of geothermal power plants at various stages in Indonesia. Source: Gatra (2021;2017), Jatam (2021), Yolanda et al. (2021), Cipto (2017).

Figure 2. Map of forest cover in Indonesia in 2019. Source: Ministry of Environment and Forestry Regulation No. P.41/MENLHK/SETJEN/KUM.1/7/2019 on National Forestry Plan year 2011–2030

A representative from the Ministry of Energy and Mineral Resources confirmed that communities living in protected forest areas often protested geothermal power plant development:

> We (the government) met resistance from local communities that feel their livelihoods are obstructed by geothermal power plant development. For example, a geothermal facility is planned to be built on Sumatra island. This social protest is not easy to contain.

However, these large-scale geothermal developments in Indonesia cannot be said to affect particular rural populations as a whole. In actuality, the poor and marginalized communities in these rural areas bear the highest social and environmental costs of the developments. This is especially evident when considering the victims of these environmental crimes: the farmers in Sibangor Julu and fishermen of the Gunung Slamet. As their livelihoods are deeply interconnected with nature, they have sought to defend their land and resist endeavors likely to contaminate their sources of income. Despite these concerns, the government continues to promote geothermal energy development. An interviewee from the Ministry of Energy and Mineral Resources revealed that fiscal incentives (e.g., tax deductions and funding for geothermal investments) were introduced to attract private investments. Further expansion of geothermal power plants can cause problems that may disproportionately affect local communities.

The Justice Dimension and Social Implications of Solar Energy Policies

Solar energy is renewable and a cleaner energy source readily available in Indonesia, which has a tropical climate and relatively even temperatures year-round. Solar power is usable energy generated from the sun, meaning its utilization relies directly on weather conditions. The potential of solar energy is between 4.5 kWh /m^2/day to 5.1 kWh/m^2/day, with an average of 4.8 kWh/m^2/day in Indonesia (Ministry of Energy and Mineral Resources, 2015). The Ministry of Energy and Mineral Resources has several programs to maximize the potential of renewable energy; all have substantial economic and environmental impacts on vulnerable segments of society. The distribution of solar lamps to residents of rural villages was introduced by the government and NGOs, with support from the private sector. Between 2017–2018, the Ministry of Energy and Mineral Research distributed energy-saving solar lamps to the provinces of West Papua (83 villages or 70,847 recipients), Papua (610 villages or 6,408 recipients), and Maluku (23 villages or 2,807 recipients), targeting residents of rural villages with no access to electricity connections, or services. Phillips' corporate social responsibility programs collaborated with the NGO Kopernik to improve the lives of rural populations by distributing solar home lighting systems (Kopernik, 2020). This program contributed to a rise in the electrification rate in rural villages. Indeed, the national rate increased to 98.3% in 2018 from 66% in 2016. However, it appears unlikely that it will lead to a long-term solution for electricity access. As one interviewee observed:

> One of the largest barriers to achieving the electrification target is providing electricity access to communities living on remote and rural islands. Based on the assumption that every citizen has the right to electricity access, solar lamp distribution, for now, is the most feasible solution to fulfill that right (staff of the Ministry of Energy and Mineral Resources).

While the distribution of solar lamps allows households to have light, perhaps the most striking shortfall is the neglect shown toward the right of these citizens to have reliable electricity access. Another issue raised in the discussions about solar lamp distribution was the downside of the environmental waste produced. An interviewee from the solar panel industry association noted that solar lamp waste contains several hazardous constituents, including those from lithium-ion batteries. The government does not currently have specific rules covering solar lamp disposal. Consequently, the rural communities that benefited from solar lamp technology are more likely to be disadvantaged by environmental problems in the future. This is evident regarding the lack of formal waste collection services in rural regions, poor environmental monitoring processes, and toxic pollutants from solar lamp waste. Without formal solutions, this seriously threatens the regions' ecosystems and the well-being of their rural communities.

Additionally, the government intends to accommodate technological advances in renewable energy by introducing Ministry of Energy and Mineral Resources Regulation No. 49/ 2018 on Rooftop Photovoltaic Solar Systems. This policy allows customers of the state electricity company, PLN, to install solar panels at home, connect to the PLN national grid, and export excess energy to PLN with an export rate valued at 65% of the normal electricity tariff (in other countries, such as Malaysia, the export rate value is 100%). This much-anticipated regulation has drawn criticism from potential users of solar panels and the solar panel industry association. Based on a survey of 987 respondents, Setyawati (2020) indicated consumer issues in adopting solar panel systems under this scheme, such as high capital costs, long-term return on investments, and a lack of information. The researcher also identified institutional issues, such as the limited role of PLN and the absence of government financing mechanisms. The reduction in potential profitability of solar panels makes this scheme less attractive than schemes in other countries, where customers can apply for various benefits, such as free solar system installations in Italy or a solar bonus scheme in addition to the export net tariff in Australia. The absence of financial incentives or government subsidies for installers of solar panels makes the technology unaffordable for most Indonesians. The average monthly income in February 2020 was USD 10 in the agricultural sector, USD 11 in the non-agricultural sector (e.g., laborers), USD 42 (for small stall owners), and USD 106 (for office workers) (BPS, 2020). Overall, the national average net monthly income was USD 42, less than the national average per capita expenditure of USD 84 per month (BPS, 2020). The absence of financing or subsidies for solar panels means that people are required to pay upfront for the photovoltaic systems at the cost of USD 2,700 or a salary of five years. Further, as with solar lamps, the government has yet to regulate the safe disposal of solar waste. This makes the communities living near waste disposal sites and industrial areas (e.g., industrial usage of solar panels) more prone to environmental hazards associated with the dumping of solar panel waste in landfills. Therefore, the Indonesian solar panel policy is an example of an attempt to take a one-size-fits-all approach to energy transition in a country with heterogeneous geography and population, thereby increasing the likelihood of policy failure.

Discussion and Conclusion

One definition of injustice within green criminology is the "mistreatment of one of the beings by the hand of the other or the existence of inappropriate guiding principles that lead to systematic unequal treatment" (Goyes, 2019:24). The cases analyzed can be categorized as an injustice to the communities surrounded by coal and geothermal facilities, applying this terminology. First, there is an uneven distribution of energy and environmental goods among Indonesian communities (Sovacool & Dworkin, 2015). Such inequality can be connected to the structures left by colonial times (Goyes, 2019) and the demands of global capitalism (Ruggiero & South, 2013). Southern scholars posit that colonial legacies are key factors shaping the economic and political dynamics of current social and environmental harms (Goyes, 2021). This idea aligns with the dynamics of marginalization, accompanied by equally systemic injustice, impacting nearly

every facet of life for some rural communities in Indonesia. Northern influences were evident in the practice of resource exploitation that occurred throughout the colonial period. From the outset, infrastructure development was concentrated in certain parts of the country, excluding the rural population from the early stages of Indonesia's development. Acknowledging the needs of the rural population has recently become more prominent in renewable energy policies. However, marginalization continues, as some significantly poorer and less advantaged citizens are exposed to higher air, water, and soil pollution close to coal mining and geothermal exploration sites. Curbs on freedom of speech have constrained the rights of non-state actors to voice their environmental concerns. The foreign financing of various coal projects in Indonesia demonstrates, from a green criminological perspective, what Lynch et al. (2018) call victimization "within the context of the global capitalist treadmill of production." This argument also reflects Sovacool & Dworkin's (2015) recognition of uneven developments in capitalist societies within countries on a global scale. The natural resource exploitation demanded by capitalist economies is informed by neocolonial logic from the north to the south (Goyes, 2021). In this case, the drive for development in the west has created a global capitalist system in which exploitative industries are rampant in countries in the Global South.

In response to the scarcity of cases that apply theories of energy justice and southern green criminology in the Global South (Lacey-Barnacle et al., 2020; Carrington et al., 2019), this article demonstrates how injustice and the marginalization of rural communities have been reinforced since colonialism and escalated by the demands of the Global North. This article also adds a more nuanced understanding of the context and shape of environmental crimes and justice in the Global South by applying these perspectives to some extractive industries in the energy sector and solar energy policies in Indonesia. This article demonstrates how the main concerns of energy justice and southern green criminology—marginalization and victimization—affect one another in various ways. These include the uneven opportunities for energy access and the disproportionate distribution of environmental risks, economic benefits, and social impacts associated with some aspects of the energy sector, as illustrated by the case studies.

While marginalization and victimization are evident in the cases of coal, geothermal, solar lamp distribution, and solar panel utilization, there is one socially and environmentally positive form of energy distribution: ECS. ECS are electricity facilities developed by the government to provide safe electricity connections for public use, particularly street vendor communities. Users can purchase electricity and connect directly to the ECS without having to register with the state electricity company, PLN. The first ECS was launched in Jakarta. ECS is one of the government programs to assist street vendors in conducting business activities in designated public places (e.g., markets or parks). Before these stations were established, the vendors were dependent on illegal connections, retrieving electricity from unauthorized extensions from the power lines of nearby houses. The facilities have become an integral part of street vendors' livelihoods. Although some of the ECS use solar panels to generate electricity, the respondents participating in this study did not understand solar energy or its environmental benefits compared with fossil-based energy sources, indicating low awareness of environmental matters in this targeted group:
I do not know about renewable energy. I just use it (ECS facilities) and I only know about my everyday livelihood (Respondent #5 in Dakota park, operating for 5 years).

When the solar panels used in ECS have reached their end of life, they are recycled to construct newer charging stations. The state electricity company, PLN, intends to make ECS more environmentally friendly and sustainable by implementing a recycling strategy. Unlike other solar energy policies, such as solar panels and solar lamps, this policy has received acceptance from the community. The community and environmental benefits of ECS are a clear illustration of the possibility to find better solutions and address energy inequality when the goal is inclusivity rather than economic or political profiting. Both the identification of the social and ecological harms generated by coal and geothermal energy and the positive evaluation of ECS illustrate the value of expanding southern green criminology. This is to generate knowledge about environmental harm contextually attuned to the realities of the Global South and useful in constructing more just societies.

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[1] ECS are stand-alone public power systems, where anyone (not limited to customers of the state electricity company, PLN) can purchase electricity using buying power tokens from convenience stores, an Automated Teller Machine (ATM), or internet/phone banking. The development of ECS is regulated by the Minister of Energy and Mineral Resources Regulation No. 13/2020. According to an interview with a PLN representative in June 2020, the development of ECS is a high priority for the government. They will supply electricity to street vendors operating in designated public places.

[2] The reformation was a period when authoritarian president Suharto resigned, and the country underwent a time of transition to democracy.

[3] A previous version of this article was presented at the *International Conference on Multicultural Democracy*, on May 11-12, 2018 in Fukuoka, Japan, and benefited from the comments of the participants at the conference. I am deeply grateful to all the interviewees and to the active members of Kiko Network and Green Action, two environmental advocacy NPOs in Japan, for letting me take part in discussions and meetings. This article also greatly benefited from the inputs of two anonymous reviewers and of the special issue editors.

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