

# Low-carbon transitions in West Sumatra, Indonesia: gender and equity dimensions

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## Introduction

Deep reductions in greenhouse gas (GHG) emissions are critically needed to address climate change (IPCC 2018). Transitions away from fossil-fuel towards low-carbon energy systems, such as those relying on renewable-energy technologies, provide opportunities for reducing GHGs. These transitions can further address some of the environmental effects of fossil-fuel extraction, processing, and use, such as declines in water and air quality (UCS 2016).

However, energy planners also need to prioritize gender equality and social equity considerations to achieve sustainable transitions. Inequalities embedded in fossil-fuel production systems can persist in their replacements, if women and other marginalized groups are still excluded from decision-making and from the benefits of an energy transition (ENERGIA 2019). The design and deployment of renewable energy systems occur in contexts defined by social inequities. Literature on gender and low-carbon energy transitions affirms that these transitions may at times shift inequities from one system to another rather than eliminate them (Lawhon and Murphy 2012; Ahlborg 2017). In some cases, socio-technical changes brought on by renewable-energy electrification can even destabilize social order (Ahlborg 2017).

To explore how gender equality and social equity issues evolve in an energy-transition reality, we conducted case studies in West Sumatra, Indonesia. Like many developing and middle-income countries, Indonesia is grappling with questions of energy security and electrification for its own citizens in an economy reliant on an uncertain coal market (Atteridge et al. 2018). But in the context of addressing climate change, Indonesia distinguishes itself as one of the world's greatest carbon emitters, ranking 4th globally in 2015 (Dunne 2019). It is also the world's 5th largest producer of coal, and it relies heavily on its coal export market (BP 2019). Interventions to promote energy-system transitions and equity in Indonesia could have dramatic consequences globally, due to the scale of Indonesia's contribution to climate change. There are some signs that Indonesia is on the path to an energy transition evinced by Indonesia's Nationally Determined Contributions (NDC) commitment to reduce 29% of its emissions by 2030 (Government of Indonesia 2016) and the establishment of a Low Carbon Development Initiative to promote sustainable and low-carbon development (Indonesian Ministry of Development Planning 2019).

We selected West Sumatra, a province on the Indonesian island of Sumatra, as a subnational case for a number of reasons. These include the high renewable-energy generation potential, the diversity of possible renewable-energy sources, an established partnership with Andalas University allowing greater access to local stakeholders, and the presence of the Minangkabau matrilineal ethnic group. The aim of this brief is to draw lessons using real-world examples from West Sumatra that highlight gender and social equity concerns of low-carbon transitions. This brief is informed by an unpublished literature review on wider issues of energy development in Indonesia.

The findings are based on focus group discussions and key informant interviews with community members, provincial energy authorities, non-government organizations, and the private sector to understand perceptions around renewable-energy projects. We selected four renewable-energy development sites in West Sumatra as transition examples: two geothermal projects, coded as SEML and HDE to maintain their anonymity; one micro hydro project<sup>1</sup> (World Bank 2009); and an oil palm company for biofuel that also uses waste as biomass for its own energy production, coded as BSS. We conducted 20 key informant interviews with 25 informants and 6 focus group discussions involving 26 men and 27 women.

<sup>1</sup> Micro hydropower capacity is less than 100 KW as defined by IFC (International Finance Corporation 2015)

## Uneasy transition to renewable energy in Indonesia

In its first NDC Report the Government of Indonesia committed to reducing GHG emissions by 29%, potentially up to 41%, by 2030 with assistance from the international community (Government of Indonesia 2016). A large part of this reduction will have to come from the energy sector, the second largest contributor of GHG emissions in the country (Dunne 2019). Planned interventions in the energy sector at the national level are found in the National Energy Policy or *Kebijakan Energi Nasional* (Government of Indonesia 2014) and the National Energy Master Plan or *Rencana Umum Energi Nasional* (Government of Indonesia 2017), which included ambitions to reach 23% renewable energy in the national energy mix by 2025 and 31% by 2050 (IRENA 2017).

Despite the need for emissions reductions in the energy sector, Indonesia's economy remains heavily dependent on fossil-fuel extraction. For example, between 2014 and 2016, the central Government's revenue from fossil-fuel production averaged US\$ 16 billion per year, forming 13.6% of its total revenue during that period (Braithwaite and Gerasimchuk 2019).

In West Sumatra, the transition to a low-carbon economy is complicated by Indonesia's revenue-sharing schemes that vary across different fossil-fuel types and different levels of government. Generally, the central Government receives a greater share of oil and gas revenue than provincial governments, while provincial governments receive a greater share of revenue from coal than the central Government. For instance, the central Government retains 69.5% of oil revenue and 84.5% of gas revenue, though it only captures 20% of mining land rent and 20% of coal royalties. The remainder is distributed to different subnational entities (Agustina et al. 2012; Braithwaite and Gerasimchuk 2019). There is resistance to changes in the system as subnational governments intend to retain a portion of the revenue generated in their territory (Agustina et al. 2012). As such, deep economic and political interests in the fossil-fuel sector prevent system changes.

Yet, while political interests resist a transition, the long-term sustainability and economic viability of fossil-fuel exploitation is problematic. Based on 2018 figures, Indonesia's total proven coal reserves<sup>2</sup> were estimated at 37,000 million tons or 3.5% of global coal reserves (BP 2019). However, reliable estimates suggest those proven reserves will last for only 60 years at the current rate of extraction (Braithwaite and Gerasimchuk 2019). Similarly, oil production trends have declined since the 1990s due to oilfields reaching, and passing beyond, peak production (US EIA 2015; IPA 2019).

In contrast, there are no shortages of sustainable energy sources in Indonesia, and the Master Energy Plan has committed to increasing renewables in the energy mix. At the same time, the lack of sufficient fiscal incentives, such as tax breaks and price subsidies, combine with resistance from fossil-fuel suppliers to stifle growth in renewables. For regions like Sumatra and Kalimantan, where significant amounts of fossil fuels are produced, economic diversification away from fossil fuels is challenging (Braithwaite and Gerasimchuk 2019). Likely for these reasons, Sumatra relies heavily on fossil fuels, which accounted for over 80% of the 9.9 MW of installed capacity in 2014 (IRENA 2017), despite having a renewable-energy generation potential of 196.2 GW, greater than any other geographic area in Indonesia (Table 1).

Lastly, the narrow scope of energy policymaking prevents holistic changes to energy systems. For instance, the National Energy Policy is focused on reaching close to 100% electrification by 2020, as some parts of Indonesia remain without electricity (Government of Indonesia 2017). In 2018, the electrification rate in West Sumatra Province was 91.72%, still below the national electrification rate of 98.05% (Harris 2018). Electrification rates are just one type of goal in the big picture of energy planning. Other aspects of user needs – for availability, to provide people with high quality and sufficient energy resources; for affordability, to cover all people including women and the poor; and for sustainability, to ensure that energy services are not depleted too quickly – are



The community-led micro hydro plant in South Solok district. © MAY THAZIN AUNG

<sup>2</sup> Coal reserves are considered quantities that can be recovered in the future from known reservoirs under economic and operating conditions (BP 2019)

Table 1: Sumatra Renewable Energy Theoretical Generation Potential

Types of energy source	Scale of production (GW)
Large hydropower (> 10 MW)	15.6
Small hydropower (< 10 MW)	5.7
Geothermal	12.9
Bioenergy	15.6
Solar	137.1
Wind	1
Tidal	8.3
<b>Total</b>	<b>196.2</b>

Source: adapted from IRENA 2017

important goals of responsible energy planning (Sovacool and Dworkin 2014). Such goals can be realized through regard for sociological aspects of energy transitions, a conclusion derived from examination of our case studies.



The South Solok micro hydroplant provides electricity for 85 households and water for irrigation. © YONARIZA

## A. Gender considerations in an energy transition

The literature on energy and gender demonstrates several supply-side issues. These include effects of energy pricing and subsidies on household costs and priorities; challenges to gendered land tenure and water use rights in view of infrastructure development; fairness and equity in land compensation schemes; equal and inclusive participation in environmental impact assessments and in resettlement action plans; and entrepreneurial opportunities for the poor, both women and men (Ahlborg 2017; ENERGIA 2019).

For instance, access to modern energy typically delivers tangible benefits on gender equality and can improve livelihoods, well-being and productive work. However, women and men have different energy needs and they experience different burdens according to energy source, as demonstrated when women spend considerable portions of their day collecting fuelwood and cooking meals on smoky stoves or open fires. Without deliberation and effort, connectivity to modern energy services could easily reinforce these unequal but traditional gender roles (ENERGIA 2019).

The path towards renewables in Indonesia will continue to be uneasy, and potentially unjust for women and other marginalized groups, if concerted efforts are not taken to address entrenched inequities. Though Indonesia has committed to reducing carbon emissions within national and international policy arenas, political pressures and economic dependencies stand in the way of realizing these goals. At the same time, rapidly depleting fossil reserves and the need for equitable energy access across the nation demand transition to sustainable, low-carbon, and equitable energy systems. As the energy sector transitions from fossil-fuel to renewable energy, new opportunities for a more inclusive energy workforce, known as just transitions, are emerging.

## B. Energy innovations and deliberative processes

The concept of just transitions seeks to ensure that energy transitions fully recognize the rights of individuals and equal participation in decision-making (Healy and Barry 2017; Newell and Mulvaney 2013). As an important technological component of a just transition, renewable-energy projects benefit from deliberative processes such as public participation and awareness-raising among members of project communities. Closed processes, on the other hand, will likely lead to negative outcomes as evinced by civilian protests against HDE's geothermal exploration, which resulted in the State's use of militia to quell the protests in West Sumatra (YLBHI 2017).

Without efforts to include women in the decision-making process, community-led renewable-energy efforts may replicate or further entrench existing inequalities and keep women in their traditional domestic roles. For instance, the community-led micro hydro project, in Pekonina Village in the South Solok District, was generally supported by the community. The micro hydro plant was installed in 2011 with the support of the World Bank as part of its National Program for Community Empowerment (PNPM Mandiri) rural programme to reduce poverty (World Bank 2009). When installed, the micro hydro plant had a capacity of 8.4 KW that supplied 65 households, according to villagers. In 2018, it supplied 85 households with electricity and the generator was upgraded to meet the increased demand (Yonariza 2019a). During focus group discussions, users of the micro hydro plant cited affordability of the energy, opportunities for the transfer of technical skills, and collective action within the community as the project's main benefits.

Despite the range of new opportunities offered by the project, women remained in their traditional roles and were not actively engaged in decision-making (Box 1). They only participated in meetings as substitutes in their husband's absence.

These cases show that the introduction of technologies such as the geothermal plant and micro hydropower plant invite different reactions and responses from community members, based on conditions of transparency or opacity concerning information and benefits and on inclusion and exclusion in decision-making.

#### BOX 1. QUOTES FROM WOMEN'S FOCUS GROUPS IN PEKONINA VILLAGE

- We felt more comfortable [after the micro-hydro plant], we can now cook using electric rice cookers.
- We can use electric blenders for chilis.
- We have never seen the power- house, we only know our house is connected to electric.
- Men handle decision-making [of the project] so that we can stay at home to take care of domestic duties.

### C. Patriarchal land management disempowers women

In West Sumatra, the customary laws of the Minangkabau people define how, and by whom, different communal lands can be used. Although communal land and its management by customary leaders has been recognized by the provincial Government of West Sumatra since 2000, land conflicts still prevail due to negligence of customary law, unkept promises, and contradictory regulations (Tegnan 2015). These conflicts trace back to historical control over communal land from the 16th century, when Islamic rulers applied Islamic property and inheritance rules, and from the early 19th century, when the Dutch colonial administration applied Dutch ownership rights (von Benda-Beckmann and von Benda-Beckmann 2004).

Since the Dutch colonial period, communal land was considered inferior to private land for economic development and production (von Benda-Beckmann and von Benda-Beckmann 2004). Today, development for more lucrative industrial land use, such as oil palm plantations, have fed into more frequent conflict and subsequent negotiations to privatize the Minangkabau ancestral land (Tegnan 2015). In these negotiations, Minangkabau women play a small role. Despite the matrilineal system of land transfer, the Minangkabau structure of natural resource management is patriarchal, and men dominate land use decisions (Mutolib et al. 2016).



Women's focus group discussion  
© EKI AMNURHADI

Several other layers of male-dominated customary land management exist, such as the village council of elders, *Kerapatan Adat Nagari* (KAN) and other Minangkabau institutions (Tegnan 2015; Mutiani 2019). For instance, when BSS purchased the land for an oil palm processing facility that uses its oil palm biomass waste for electricity in Manggopoh village in the Agam District, the head of KAN had the ultimate authority over land-use decisions (Mutiani 2019).

As well, in a forest concession that took place in women's rightful customary land, male Melayu clan leaders sold the communal land to private buyers outside of their clan. When these logging concessions were converted into an oil palm plantation a few years later, the clan was allotted small land holdings of oil palm plots. The male customary law managers distributed the land holdings among themselves, their families, and other prominent men in the clan (Mutolib et al. 2016).

In short, land rights are a bundle of gendered rights: the right to bequeath and inherit land is exercised traditionally by women. However, transactions over the sales or leases of land are governed and transacted by wealthy elite men and male clan leaders. Though Minangkabau customary law allows women to inherit communal land, they are excluded from critical and formal decisions during negotiations around land use (Mutolib et al. 2016).

In the case of SEML, another geothermal developer in the Alam Pauh Duo subdistrict near Pekonina Village, the company set up an extensive process for public participation. In the process of determining compensation, the company invited heads of subvillages, landowners, and owners of adjacent plots as witnesses to ensure transparency and accountability in the process of land valuation (Yonariza 2019b). Landowners were then compensated double the assessed value of their land. Additionally, the company also established non-cash compensation including scholarships to support children's schooling (Yonariza 2019).



Woman at the micropower plant in South Solok © EKI AMNURHADI

Despite the company's efforts, the inclusion of those predominantly male village and clan leaders, other local key figures, and employees of the company led to discontent among other members of the community, according to both female and male focus group discussions. Previous issues with lack of clarity around land ownership in the SEML plant area may have added to this discontent. An interview with a male clan leader in Nagari Alam Pauh Duo hinted at the lack of clarity around land ownership in the area. Though the land was now classified as State land, access rights were being given to members of his family and other clan leaders' families for farming. Other clan leaders had also claimed the land as their own, by simply clearing it (Yonariza 2019d).

A focus group discussion with male members of the community around the SEML plant in Pekonina Village raised the issue of division within their community and of economic inequality between those who received compensation and those who did not. This created strong feelings of jealousy within the community. One discussant stated that the benefits from the project were unjust: "Those in high rank – the contractors – those who have capital that can make business during construction phase benefited more."

Consulted through focus group discussions conducted in the community, women also raised concerns about the unevenness of the benefits of land compensation from the energy companies. Even though some women had received compensation, they felt their income had declined significantly since giving up their land.

## D. Energy policies should address socially differentiated needs and conditions

The social effects of Indonesia's energy subsidies on liquefied petroleum gas (LPG) provides evidence for better gender considerations in energy policymaking. Indonesia has subsidized LPG since 2007 under the 'Zero Kero' programme to convert households from kerosene to

LPG for cooking (Kusumawardhani et al. 2017). The effect of this programme is wide-spread adoption of LPG and reduction of domestic kerosene consumption by 92% in less than 10 years (Thoday et al. 2018). Based on focus group discussions with women in Manggopoh village, LPG is the primary cooking fuel. All six women from the focus group used LPG in cooking and paid the equivalent of between US\$ 1.50 to 1.70 for a 3Kg container of LPG. Their main complaint concerns the limited supply and availability of LPG, which forces many communities to still rely on firewood as cooking fuel.

An unintended consequence of the Zero Kero programme was that it had minimal effect on reducing inequality (Government of Indonesia 2019). The programme benefited the non-poor the most, as around 70% of beneficiaries were richer residents of urban areas with access to LPG and not the poorest households in rural areas (Kusumawardhani et al. 2017; Ruggles 2017).

However, LPG does serve as an important energy source for cooking among 50% of poor and near-poor households (Ruggles 2017). LPG is often unavailable to consumers and small retailers at the official price due to the involvement of several subagents in the supply chain that add to the price. For this reason, some consumers and small retailers could end up paying up to 200 times more than the official subsidized price of approximately 0.80 USD per 3kg. Therefore, most poor women who access subsidized LPG pay inflated prices. The prices paid by the women in Manggopoh village were about twice the official subsidized price (Kusumawardhani et al. 2017; Ruggles 2017).

For the poor, the basic need for energy is a trade-off with other essential basic needs such as education. This was the case for one participant of a focus group discussion in Manggopoh village, who had no access to electricity as he chose to send his children to school rather than spend his meagre income on electricity.

Indeed, despite the national Government's ambitions to increase electrification, rural communities still experience barriers when connecting to the grid. Based on focus group discussion responses, while communities can access electricity from *Perusahaan Listrik Negara* (PLN), the state-owned electricity provider, the high connection cost due to their remote locations prevents them from getting electricity at affordable rates. Focus group discussions with male community members in Manggopoh village estimated installation costs to connect to PLN electricity grid to be between US\$ 70.00 to 220.00 – quite expensive for these rural communities. Both men and women in focus groups also expressed that, once connected, the price of electricity was high, costing around US\$ 15.0 per month for each household. By comparison, when not connected to a grid, renewable costs can be significantly less: In focus group discussions with community members from the micro hydro project in Pekonina Village, both men and women stated their satisfaction with the electricity price from the micro hydro plant that costs around US\$ 3.5 USD monthly per household.

## Discussion

This brief has captured snapshots of community perspectives on renewable energy that reveal different sociocultural contexts and customized approaches needed for explicitly considering local gender and social equity conditions.

On one hand, without specific efforts to understand and address the energy needs of different users, renewable-energy interventions can entrench the customs that trap women in the domestic realm, as shown in the case of the micro hydro project in Pekonina Village, or stand in the way of the poorest women from receiving these benefits, as in the case of the LPG subsidies policy. They may also disrupt livelihoods, achieve little, or displace residents. On the other hand, even careful consideration of communities' needs and efforts at inclusion cannot realistically meet the expectations of everyone, as shown in the case of SEML.

Another important consideration is the potential destabilization of interpersonal power relations introduced by socio-technical changes and by the potential that systemic inequalities will be reproduced or even reinforced by the changes. The case of SEML's geothermal energy development shows that renewable-energy development can add to existing tensions over customary land rights. Without gender considerations throughout the process, renewable-energy development projects can exacerbate rifts among social groups by creating winners and losers: men, women, insiders and outsiders, as well as haves and have nots, as shown in the cases from West Sumatra.

As Indonesia begins its process towards an uneasy renewable-energy transition, it is important to prioritize gender and social equity considerations in more holistic energy planning. In decision-making on renewable-energy policy, a gender-sensitive approach could seek to understand how policies will affect members of different social groups and to find solutions to achieve equitable outcomes. As exemplified by the LPG subsidy case, renewable energy policies may have different effects on members of different social groups such as women, elderly, the poor and members of indigenous and ethnic groups. Exploring the potential repercussions of policies by adopting a gender-sensitive approach to renewable energy decision-making will produce results that benefit more people and satisfy the needs of more communities and interest groups.

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