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The Importance of Women Participation in Ensuring Justice in Energy Transition in ASEAN and G7

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Abstract: Many countries have increased their climate ambitions, including net-zero by 2060. Gender equality is essential for just energy transition (JET). United Nations Sustainable Development Goals (SDG) 5 and 7 promote gender equality and access to sustainable energy for all. Women's participation in JET is crucial, yet they are underrepresented in the energy industry. This study promotes women's participation in the JET and strives to reconcile justice and inclusivity in the energy transition from upstream and downstream ASEAN beneficiaries with G7 precedents. This paper aims to analyse the aspect of justice in the energy transition from women's perspectives in ASEAN and G7 countries. Most of the literature on women's issues in the energy sector is related to energy poverty and energy access. Hence, this paper will contribute to the literature on women's perspectives in the energy transition both in the workforce and in society as consumers. This paper analyses to answer a question on "how far women in ASEAN have participated in the energy transition (leadership roles to end-users) compared to women in G7 economies?". We use case studies with cross-analysis of ASEAN and G7 countries throughout this paper to demonstrate the contrast and similarity of gender equality in energy sector by exploring women's experience as workers in the energy sector and as energy consumers (dirty to clean cooking – clean electricity). We applied strategy basic research by conducting content analysis with intensive literature reviews, and additional aspects of women's perspectives on this area, those who work and live in these regions to develop regional context. We also adopted the three tenets of justice by Jenkins et al (2016) and analysed the data collected using this framework. This paper finds that ASEAN and G7 regions are almost at the same level in terms of women participation in ensuring a just energy transition. Despite having more women in the leadership roles in renewable energy sector, G7 is almost at the same level as ASEAN in their effort of improving women's participation to accelerate and ensure a just transition in the regions.

Keywords: Women, Just energy transition, Tenets of justice, Distributional justice, Recognition justice, Procedural justice, Gender

1. Introduction

Women's participation in the energy transition is important (Maji et al. 2021; Wiese 2020; Yasmin and Grundmann 2020). The United Nations supports the importance of women's roles under its Sustainable Development Goals (SDG) 5 and 7 – gender equality and access to clean energy for all society. To promote a just energy transition (JET), all policies and decision-making processes should consider gender, age, handicap, and culture. However, this paper only focuses on women. Energy transition (ET) can influence women as energy users. Women can contribute to a JET by inventing renewable energy technology or adopting leadership roles. Despite this fact, women is still underrepresented in ET in general.

According to World Bank Indicators (n.d.), most ASEAN countries are classified as lower middle-income (Indonesia, Cambodia, Lao PDR, Myanmar, the Philippines and Vietnam). More than 43% of 2020's total energy demand in ASEAN was fossil fuels, and more than 60% of the electricity mix was fossil fuels, mainly coal (ASEAN Centre for Energy [ACE] 2022). G7 members have a track record of fostering innovation, creating new technologies, and commercialising through supportive policies in a stable economic climate. G7 decarbonization leadership would benefit its members by creating new knowledge, technologies, and jobs. Lessons learned could help other nations make transitions faster and less uncertain so they can apply G7 innovation, policies, and regulations (International Energy Agency [IEA] 2020).

This paper aims to analyse the aspect of justice in the energy transition in the context of women's participation in energy transition in ASEAN and G7. Currently, there is limited literature on women's perspectives in the energy transition around ASEAN and G7 countries. Hence, this paper will contribute to the literature on women's participation in the energy transition both in the workforce and in society as consumers.

This paper applies strategic basic research, which involves theoretical works to gain new knowledge, and the results could be helpful for policymaking (Thomas 2021). This paper addresses a research question on: how far

women in ASEAN have participated in the energy transition (leadership roles to end-users) compared to women in G7 economies? To answer this question, this paper applies the three tenets of justice in the energy transition by Jenkins et al (2016): recognition justice, procedural justice, and distributional justice. These tenets are used to analyse how far the two groups of countries have established an energy transition system that is inclusive to all society, in this context, women. We conduct interviews with women who work and live in these regions to acquire regional contexts.

Our paper has five sections. Section 2 discusses all literature on women's perspectives in the energy transition to provide an understanding of the current narrative in this field; section 3 discusses the methodology that we undertook in this research; section 4 is the discussion and analysis using the three tenets of justice and section 5 presents the conclusions.

2. Literature Review

2.1 Women in the Energy Transition

Men have played more significant roles in the centralised power sector and national energy decision-making and even held more powerful positions (Allen et al. 2019; Pearl-Martinez and Stephens 2016; Resurrección et al. 2017). In the past ten years, numerous international organisations have researched women's equality in the energy sector, especially since the UN emphasised SDGs 5 and 7. Their reports state that women in leadership strengthen a country's energy sector, and women as end-users and in rural regions play a key role in framing energy transition policy.

Energy and climate issues are often linked since energy is one of the primary sectors that contribute to GHG emissions, especially fossil fuel energy (Huang et al. 2017; Lamb et al. 2021; Neagu and Teodoru 2019). Climate change has directly impacted women working in many areas, such as housewives, farmers, industry and other professions which makes ET as a feminist issue (Wilson 2018; Bell et al. 2020). Transitioning from fossil fuel to cleaner energy could benefit women in many ways. Decarbonising our energy supply could give valuable chances to foster the more socially only approaches to living that put the worries of those generally taken advantage of women at the centre of energy progress legislative issues (Ding et al. 2014; Maji et al. 2021; Wilson 2018). Bell et al (2020) state that different perspectives on energy sectors, such as women, offer an essential and recognised framework for understanding why we remain in unsustainable energy culture. They also argue that women's perspectives are crucial to designing a just energy system. Without women's participation, especially in strategic roles, renewable energy projects will be at risk and fail (Cecelski 2000). Moreover, studies demonstrate that more gender-diverse energy corporations have higher financial performance in combination with supporting women's economic empowerment, yet, energy companies have only recently begun to embrace this approach (Johnson et al. 2019; Pearl-Martinez and Stephens 2016).

The latest figure of the women employees in the renewable energy sector globally (2019) is 3.7 million, around 32% of total jobs created in this sector (IRENA 2020). This percentage is slightly higher than the shares of women in the oil and gas sector, only 22%. A survey by IRENA shows that in the renewable energy sector, women in science, technology, engineering and mathematics (STEM) are lower than women in non-STEM. There are several barriers for women to getting into the renewable energy sector. They are perceptions of women's roles, cultural and social norms, and prevailing hiring practices (Baruah 2017; IRENA 2020; Standal et al. 2020).

Innovation is significant for a just energy transition, and this requires diversity in general (Konadu et al. 2022; Žuk and Žuk 2022). The concerns about women's inclusion in the energy sector, such as renewable energy, were raised more than two decades ago (Cecelski 2000). According to Cecelski (2000), renewable energy producers who disregard the needs of women will miss out on a substantial market opportunity.

Another women's perspective in the energy transition is the perspective of consumers. Civil society and consumers are critical players in the energy transition because they can push the system toward renewable energy, where countries in South East Asia Region (ASEAN) still hold on to culture and traditions (Johnson et al. 2019; Seah et al. 2021). According to Akash et al (2018), cultural factors such as literacy, poverty, economic diversity, and trust in leaderships play a significant role in determining a country's energy transition. Energy and women are linked in various ways; energy technology innovation can drive cultural change; hence, appropriate policies are required to encourage technology adoption in society (Ding et al. 2014).

2.2 Three Tenets of Justice

The concept of energy justice has been used in many energy research, especially in the area of energy transition (Moniruzzaman and Day 2020; Mundaca et al. 2018). This paper applies the three elements of justice, which are distributional justice, recognition, and procedurals justice (see Table 1).

Table 1: Three Tenets of Justice in the Context of Women's Participation in ASEAN and G7 Energy Transition

Tenets	Evaluative	Normative	Context
Recognition	Who is ignored?	How should we recognise?	The fundamental concept of recognition is that an individual or a group should be acknowledged appropriately (Whyte 2011).
Distributional	Where are the injustices?	How should we solve them?	The emphasis in this entry is primarily on principles designed to cover the distribution of economic benefits and burdens among individuals in a society (Lamont and Favor 2017).
Procedural	Is there a fair process?	Which new processes?	Procedural justice is about the fairness of the decision-making process. In other words, procedural justice focuses on the quality of making a fair distributive decision (Abdelzadeh et al. 2015).

Source: Adapted from Jenkins et al (2016)

2.2.1 Recognition justice

Recognition justice is about those who are left behind and ignored in transitioning. Recognition of justice is one of the main issues we want to examine since women in energy transition are often overlooked (Mang-Benza 2021). The condition can apply to both public and private settings. Respecting and taking notice of people for who they are and the context in which they find themselves is an essential component of providing adequate appreciation. Recognition and its absence-misrecognition are prerequisites for distributive justice and critical components in and of themselves (Schlosberg 2007).

In general, recognition justice in the energy sector has focused on the effect of energy developments and activities on indigenous communities. Still, this paper focuses more on women's recognition in the energy transition process in ASEAN and G7. This includes how women in the industry or research communities are recognised and appreciated for their ideas and views on energy development.

2.2.2 Distributional Justice

The examination of where the significant impacts are located is referred to as distributional justice. Distributional justice in the energy transition is justice in economic distributions to all society, both its positive and negative impact of the transition, regardless of income, race, gender etc. The dimensions of distributive principles vary greatly. According to Lamont and Favor (2017), they differ in terms of what is considered relevant to distributive justice (income, wealth, opportunities, jobs, welfare etc.); the nature of the recipients of the distribution (individual persons or groups of people); and the basis on which the distribution should be made (equality, maximisation etc.).

The just energy transition raises the question of distributional justice, i.e., are the benefits of renewable energy development shared equally? Is anyone negatively affected by the energy transition? We look at the distribution of benefits and impact to women in transitioning from fossil fuel to cleaner energy sources. This could be benefits or impacts to those who works in the renewable energy sector or energy policy makers in a country or those who receive the benefits as consumers.

2.2.3 Procedural Justice

Procedural justice in the energy transition is attached to a policy-making process where communities have an equal say, no matter their backgrounds. Despite growing awareness of women's role in climate change and the energy transition, their engagement as decision-makers is limited (Feenstra 2020). In the early 2000, women were generally under-represented at the decision-making level in the energy sector and were rarely consulted regarding energy projects (Feenstra 2002). Hence, to formulate an energy policy that meets their energy needs, the government should consult these women and invite them to participate (Feenstra 2002). Research on this area has been evolving and more research are being done to highlight the role of women in leadership in the

energy transition (Allen et al. 2019; Weijnen et al. 2021). Instrumentalists argue that women should be involved in local and national energy sector governance and decision-making to share their knowledge and experience as energy users and to make decision-making more open and accountable (Rojas and Prebble 2020).

In this paper, we examine some policies in place in ASEAN and G7 for its energy sector and whether they have taken women's interest in these policies. In addition, we also explore how women in a leadership role can contribute to a more just energy transition policy in ASEAN and G7.

3. Methods

This paper applies strategic basic research and will look at the existing literatures on the subject (Thomas 2021). Hence, we conducted content analysis, an intensive literature review in this area to collect more evidence in the context of ASEAN and G7. We conducted an exploratory intensive literature reviews on this topic. This paper is also a semi-empirical study since we focus on evidence that is a result of experiences. We qualitatively analyse them using the three tenets of justice by Jenkins et al (2016).

This study explores existing studies in the region of the G7 and ASEAN countries, which include both academic research studies and international reports (secondary data). In addition, we also conducted semi-structured interviews with several stakeholders that we identified for this research (primary data). The interviews is to validate the findings from the content analysis and literature reviews within the three tenets of justice framework. The sample is a purposive non-probability sample, and we initially identified our prospective interviewees (Davies and Hughes 2014). The selection comprises international institutions, consulting, academics, and industry to gain a holistic perspective on gender equality in energy transitions. The qualification criteria required to be included in the above interview are participants with professional qualifications (i.e. degree level or higher). The flexibility of this approach enables the discovery or development of information that is significant to participants but may have been overlooked by previous researchers (Gill et al. 2008).

This examination of women's participation in the energy transition focuses on the following questions (1) the role of women in energy transition, (2) the gender gap and gender gap mitigation policy in place in the organisation, (3) women as consumers and leaders in the energy sector.

We have obtained consent forms from participants for this research purposes. We employed purposive sampling of women in the energy sector across the G7 and ASEAN Countries (Table 2).

Table 2: Key Informants in ASEAN and G7

ASEAN	G7
Intergovernmental Organisation (2)	Industry (3)
Industry (2)	International Institutions/Academia (3)
International Institutions/Academia (3)	

Source: Developed by Authors (2022)

The informant has an average of 10 years of experience in the energy sector in Norway, the UK, Germany, the Netherlands, Malaysia, Thailand, and Indonesia. To obtain descriptive and evaluation data, interviews comprised both open-ended and closed-ended questions. The authors transcribed and coded the interview data verbatim for data analysis purposes. The approach of this study is a deductive analysis where we apply the framework three tenets of justice to the data we collected (mainly secondary data and validated by primary data) (Table 1).

4. Results and Analysis: The Three Tenets of Justice Analysis

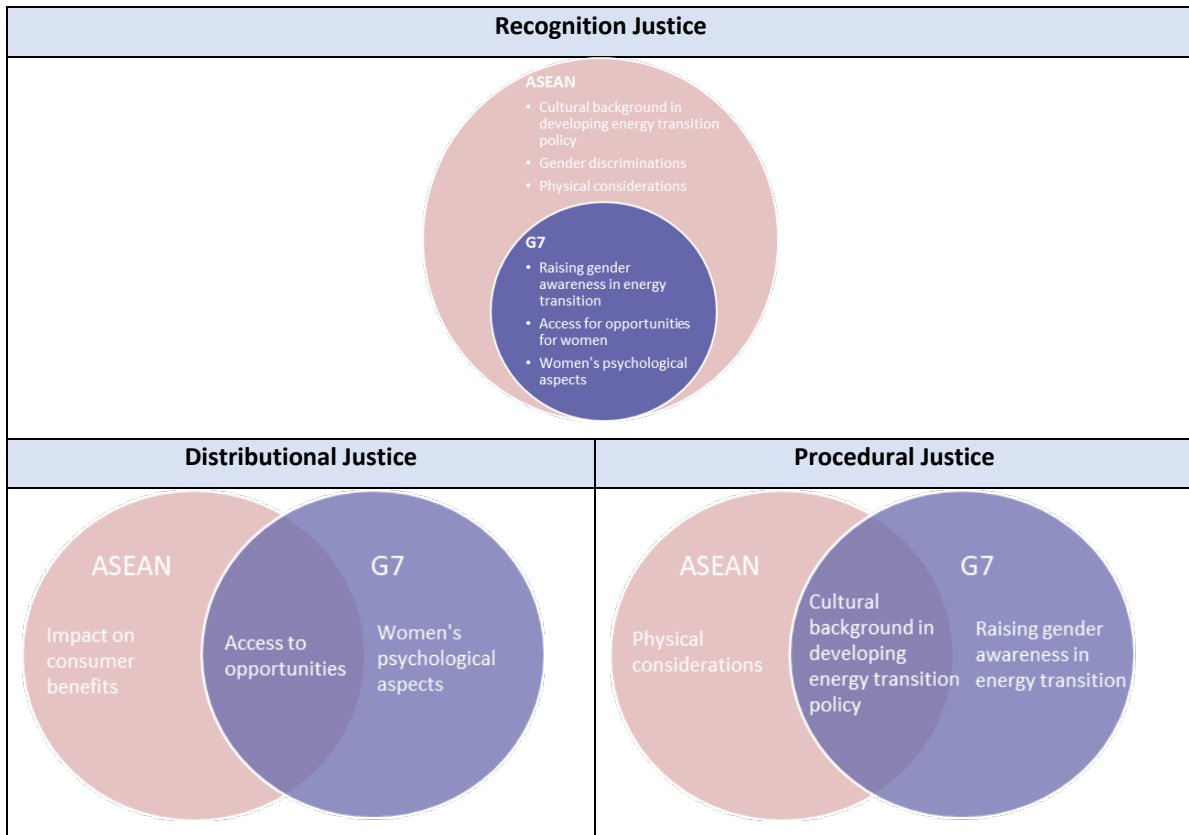
Gender diversity in the energy sector is critical for driving more innovative and inclusive solutions for global clean energy transitions. The energy sector, widely regarded as one of the least gender-diverse sectors of the economy, must shift the dial by enlisting all talents to provide a secure, affordable, and sustainable energy future for all. Hence, we identify key women's energy transition challenges as a starting point for strategic gender policy framework development.

4.1 Recognition Justice

According to Figure 1, the current position of women in the energy transition system in G7 is affected by the level of public awareness in this sector, access opportunities for women to participate in the energy transition, women's psychological aspects, cultural background and the physical nature of women. Therefore, ASEAN women

often sacrifice their career since they have to nurture their family (Chandra 2012). These factors influence the progress of energy transition in ASEAN regarding women's participation.

The following figure shows women in ASEAN and G7 in the tenet of justice perspectives.



Source: Developed by authors (2022)

Figure 1: Three Tenets of Justice Analysis

In terms of women's involvement in the just energy transition in ASEAN and G7 countries, we find that often women's participation is not seen as necessary. We find that there has been a lack of women's visibility in the renewable sector in both ASEAN and G7 countries. ASEAN and G7 should increase awareness of women in the renewable energy sector to support women facing the psychological issue. This psychological issue is due to an old paradigm where women should only be doing administrative work and working behind desks (Czako 2020; IRENA 2020). In contrast, men can work on technical (engineering, construction, technology, etc.). Despite having women prioritised in some technical job vacancies, some women may still think, "Am I hired because I have the expertise to do the job or because I am a woman?". In ASEAN, one of the main reasons is their cultural and value backgrounds, where women are often seen as second priority after men (Permana et al. 2015). This affects the women's right to give their opinions/ideas/inputs within organisational meetings or get involved in decision-making.

4.2 Distributional Justice

According to IEA (2022a), women's income in the energy sector is lower than men's. This is because women tend to underestimate their skills and expertise in the energy sector. STEM is seen as men's subject, and women in STEM with the same level of expertise often think that they deserve to be paid lower. Moreover, maternity benefits in Asia are typically limited, while provisions for protracted career breaks without pay and the concept of paternity leave are uncommon (Chandra 2012). According to Figure 1, both ASEAN and G7 countries consider that there is a lack of access for women in the energy sector. The old paradigm that women should not work in STEM fields but in administrative roles is still dominant. According to IRENA (2019), women in STEM jobs in renewable energy only accounts for 28%, while 45% works in administrative roles globally. Both ASEAN and G7 women lack access to renewable energy jobs. The underrepresentation of women in technical positions in the energy industry is closely related to the underrepresentation of female students in STEM education (Czako

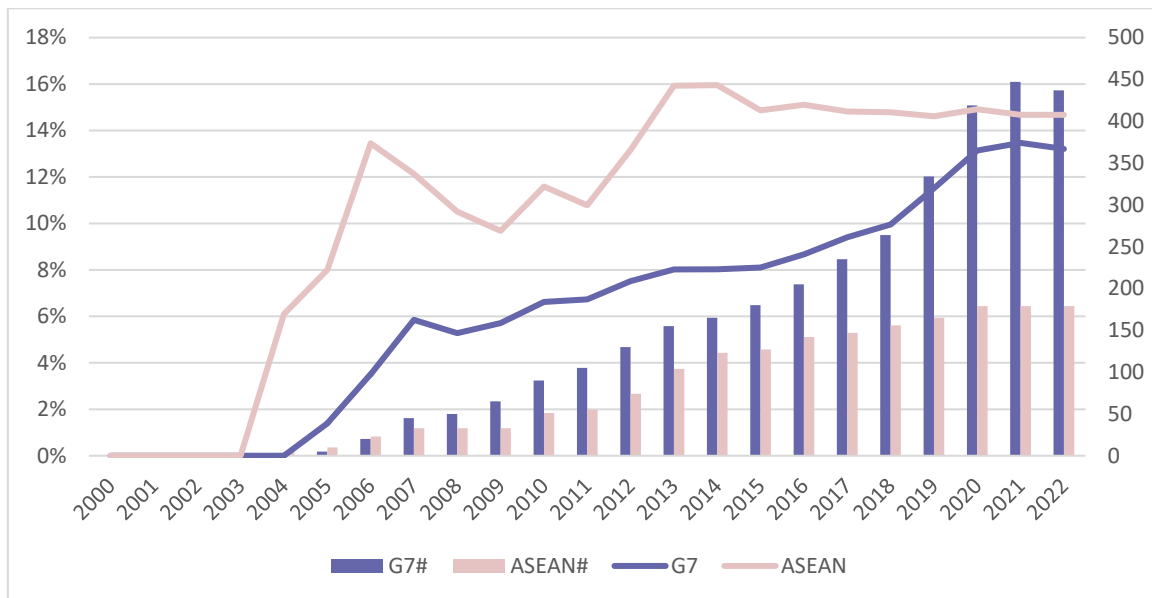
2020). Therefore, increasing women's work opportunities and STEM education is crucial. Distributional injustice can potentially be reduced by promoting STEM higher education for women (Hwang 2016).

Conversely, women's health and productivity have been affected directly by the type of energy sources they consume. For example, in ASEAN, women still use biomass (wood) or charcoal as their primary cooking fuel. Both of these types of cooking fuels emit CO₂ that affects their health. Fossil fuels cookstove is one of the biggest threats to health in developing economies (World Health Organization 2021). Additionally, women also have to spend more time collecting wood for cooking needs.

4.3 Procedural Justice

According to Figure 1 above, both ASEAN and G7 consider that cultures and beliefs have influenced employers' decisions in the renewable energy sector and in general. Women who play the role of mother and wife are considered in professional decisions, such as employability. Having more women in managerial positions can positively influence the work environment. Research has found that having women leader in a company has enhanced firm value, financial performance, economic growth, innovation, and social responsiveness (Joecks et al. 2012; Chisholm-Burns et al. 2017; Galbreath 2011). In addition, in one of the ASEAN countries, there are many women with expertise in the renewable energy sector, but it rarely happens when it comes to senior leadership positions. A gender (women) equality policy in energy sector could increase the number of women in leadership role. According to the latest ASEAN Centre for Energy (2022) gender report, there is currently an absent of gender equality policy in place in this sector. A different view from G7, One of our participants is a leader of a renewable energy project based in Asia. She stated that being a woman leader affects how others react or behave towards her. Being a woman should not stop a woman from achieving a leadership position. However, there is still a lack of women in senior leadership positions in both regions. This fact is evidenced in some studies by Feenstra (2002; 2020) on women's decision-making process in the energy sector.

The latest IEA's (2022) report focuses on the share of women in senior managerial positions in renewable energy sectors globally. Figure 2 shows the trend of women's share in senior managerial positions in renewable energy sectors from 2000-2022 in ASEAN and G7. ASEAN has more percentage of women at the senior managerial level compared to G7 despite the more significant number of samples in G7 (G7# and ASEAN#). However, both groups exhibit an increasing portion of women senior managers up to 2022.



Source: IEA (2022)

Figure 2: Share of Women in Senior Managerial Levels in the Renewable Energy Sector in G7 and ASEAN (2000 -2022)

Women in leadership positions play a significant role in accelerating the change in the energy system, such as energy transition, and advancing the principles of energy justice (Allen et al. 2019). Greater gender diversity in corporate leadership increases a firm's success through various perspectives and inventive decision-making (Belghiti-Mahut et al. 2016). Women are generally energy managers in the household and are affected by indoor

air pollution (Sovacool 2012). Managing climate change and energy transition require significant innovation in the energy system. A study by Gamser (1988) finds that energy users are significant for technology development in the energy sector. There have been many studies on social acceptance towards renewable energy development and innovation (Ek 2005; Gross 2007; Wolsink 2012). Hence, women in senior management roles can drive innovation to happen as they can also positively influence social acceptance of renewable energy development in the regions.

5. Conclusions

This article demonstrated that women's participation in ensuring a just energy transition is almost the same in ASEAN and G7 regions. G7 confronts similar issues in getting more women into the energy transition process despite having more women in renewable energy leadership roles.

The principle of recognition justice is respecting and noticing those involved and affected by some activities/projects or decisions and acknowledging where they are. Renewable energy projects risk being inappropriate or failing without women in influential positions. There is lack of women recognition in ensuring a just energy transition in ASEAN and G7, both as consumers and decision-makers/producers (as leaders).

In terms of distributional justice, there are still many women in ASEAN that are affected directly as consumers of the use of cooking fuel, especially those who are still using biomass (wood). Significant efforts are needed in ASEAN, both technical and financial. ASEAN and G7 still have to frame their gender-responsive energy policy to ensure a just energy transition in both regions. Renewable energy development has become more and more significant for women and community welfare. In a different scenario, women can save time by collecting wood to cook food and do more productive activities, such as helping their children study or starting a home-industry business. This could improve their livelihood and increase economic activities.

Energy transition must consider the aspect of procedural justice to ensure the decision-making process is fair and include all stakeholders. There is still big gap in the percentage of women in leadership in renewable energy sector in both ASEAN and G7 countries. All stakeholders (governments, industries, institutions, and communities) in both regions should take part in ensuring the energy transition is just by encouraging and promoting women to be in leadership and policy-making roles. This opens opportunity to further research on this topic.

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