Intersections: Gender and Sexuality in Asia and the Pacific
Issue 54, September 2026
https://dx.doi.org/10.25911/ZC2F-0D35

Future of Women Workers Facing Energy Transition in Coal-Producing Regions: Case Study of East Kalimantan, Indonesia

Martha J. S. Mendrofa, Institute for Essential Services Reform, martha@iesr.or.id

Julius C. Adiatma, Institute for Essential Services Reform, juliuschristian90@gmail.com

Ilham R. F. Surya, Institute for Essential Services Reform, ilham@iesr.or.id

Anindita Hapsari, Institute for Essential Services Reform, anindita@iesr.or.id

Shahnaz N. Firdausi, Institute for Essential Services Reform, shahnaz@iesr.or.id

Wira A. Swadana, World Resources Institute, Indonesia, wira.swadana@wri.org

Firmansyah, Faculty of Economics and Business Diponegoro University, firmansyah@live.undip.ac.id

Keywords. Women workers, coal-producing region, gendered-impact, just transition

Abstract

Indonesia's energy policies lack gender-disaggregated strategies and do not acknowledge the different impacts of energy transition on women, potentially perpetuating systemic inequalities, especially in coal-producing regions where local economies depend on coal and women's roles are largely unrecognised. While previous relevant studies in Indonesia have examined the employment impacts of coal phase-down and promoted gender mainstreaming in energy access and leadership, few have identified the gender-differentiated labour impacts. Addressing this gap, this study employs a mixed-methods approach to identify the future impacts of energy transition on women workers in coal-producing regions. We use Input-Output analysis to examine the gendered labour impacts of moving away from coal, showing that around 17 per cent of women workers will be unemployed if coal mining were removed from East Kalimantan's economy, despite women constituting only 2 per cent of the coal workforce. Moreover, drawing on literature and policy documents, we understand that women's low labour participation and economic marginality stem from expectations of domestic responsibility, limited access to skills and decision-making forums, and environmental degradation. These findings highlight the challenges in achieving a 'just energy transition' in Indonesia and the need for coherent policies that incorporate the gendered impact of energy transition.

Introduction

For a coal-dependent and coal-producing region, achieving renewable energy targets demands interdisciplinary consideration to ensure fair benefits for all people. A Just Energy Transition (JET) is defined as a fair and equitable shift to a post-carbon society, encompassing distributional justice (fair distribution of benefits and costs), procedural justice (equal and meaningful participation in decision-making processes), recognition justice (fair representation of each social group), and restorative justice (address and repair the existing

harms).[1] Gaining traction globally in the 2010, Just Energy Transition emphasises the need for socially equitable transition away from fossil fuel. In Indonesia, the government has acknowledged Just Energy Transition principles, predominantly focusing on economic and employment issues. Examples include the Long-Term Strategy for Low Carbon and Climate Resilience (LTS-LCCR); Nationally Determined Contribution, JETP-Comprehensive Investment Policy Plan (JETP-CIPP); and National Energy Policy or *Kebijakan Energi Nasional* (KEN). However, energy transition impacts social groups differently and can deepen existing inequalities; therefore, just energy transition discourse must go beyond jobs and economics.

Indonesia has a goal of net-zero emission by 2060 or earlier, which targets emissions reduction of around 1.26–1.49 billion tons of carbon dioxide equivalent (CO_2e) in 2035 under its Second Nationally Determined Contribution (NDC). The Just Energy Transition Partnership (JETP) aims for 44 per cent renewables by 2030, and the Electricity Supply Business Plan or *Rencana Usaha Penyediaan Tenaga Listrik* (RUPTL) 2025–34 sets a goal of 35 per cent renewable energy by 2034. Yet, in early 2025, the share of renewables in the energy mix was only around 14 per cent, far from the 2030 targets.[2] Causes for this slow progress, include delays in financial mobilisation; timely permits and deployment processes; limited grid readiness; and unclear regulatory support.[3]

These commitments and constraints point to a government-led phase-down of coal, accelerated renewable additions and gradual replacement or retirement of thermal capacity. The RUPTL 2025–34 plans to add 69.5 GW additional capacity by 2034, consisting of 42.6 GW of renewables (61% increase) plus 10.3 GW of storage and 6.3 GW of coal.[4] Further, Indonesia's latest production work plans, called *Rencana Kerja dan Anggaran Biaya* (RKAB) 2026, show national aggregate production of coal being cut to below 600 million tonnes (Mt). Some producers report 50–90 per cent reductions in 2026 output. Two demand projections indicate coal demand peaks of around 600 Mt in 2030 declining to around 450–480 Mt by 2050, while the 'accelerated-decline' pathway falls sharply from the 2020s and reaches about 30–70 Mt by 2050.[5] Major coal contraction occurs mainly between 2030 and 2040.

Amid the targets and current shifts, one critical yet often overlooked factor is how energy transition impacts on women across dimensions, such as changes in community

[1] Abidah B. Setyowati, 'Mitigating inequality with emissions? Exploring energy justice and financing transitions to low carbon energy in Indonesia,' *Energy Research & Social Science* 71 (January 2021), https://doi.org/10.1016/j.erss.2020.101817; Raphael J. Heffron and Darren McCauley, 'What is the "just transition?"' *Geoforum* 88 (2018): 74–77, https://doi.org/10.1016/j.geoforum.2017.11.016.

[2] MEMR (Ministry of Energy and Mineral Resources), *Handbook of Energy and Economic Statistics of Indonesia 2024* (Kementerian ESDM, 2025), https://www.esdm.go.id/assets/media/content/content-handbook-of-energy-and-economic-statistics-of-indonesia-2024.pdf.

[3] IESR (Institute for Essential Services Reform), *Indonesia Energy Transition Outlook (IETO) 2025* (IESR, 2024), https://iesr.or.id/pustaka/indonesia-energy-transition-outlook-ieto-2025/; IEEFA (Institute for Energy Economics and Financial Analysis), *Unlocking Indonesia's Renewable Energy Investment Potential* (IEEFA, 2024), https://ieefa.org/sites/default/files/2024-07/IEEFA%20Report%20-%20Unlocking%20Indonesia%27s%20renewable%20energy%20investment%20potential%20July2024.pdf.

[4] MEMR (Ministry of Energy and Mineral Resources), 'Materi Konferensi Pers RUPTL PT PLN Tahun 2025–2034 Meningkatkan Ketahanan dan Keberlanjutan Energi Nasional' (2025), https://gatrik.esdm.go.id/assets/uploads/download_index/files/4ec39-materi-paparan-ruptl-2025-2034.pdf.

[5] IESR (Institute for Essential Services Reform), *Redefining Future Jobs: Implication of coal phase-out to the employment sector and economic transformation in Indonesia's coal region* (IESR, 2022), https://iesr.or.id/en/pustaka/redefining-future-jobs.

engagement; the sex-segmented labour force in which men hold prime positions; domestic conflict, and self-perception as women.[6] Just Energy Transitions must incorporate recognition justice—the inclusion of marginalised groups and redressing gender disparities. For women, this means not only ensuring access to jobs and training but also recognition of their roles in households, the public sector, and energy organisations.[7]

Consideration of women's involvement in energy transition in Indonesia is typically addressed through efforts to increase women's participation in decision-making forums. But this strategy lacks comprehensive understanding of the complex nature of gender issues and fails to ensure fair involvement at all stages of energy transition.[8] This approach is inadequate because it focuses solely on procedural justice without addressing recognition and distributional justice. Women generally demonstrate greater awareness of energy and environmental issues than men,[9] but this awareness does not translate into equitable outcomes due to structural barriers.[10] In Indonesia in 2019–21 women were generally paid 35–38 per cent less than men.[11] Moreover, women in Indonesia had lower rates of tertiary education attainment (11.7% of women graduating compared to 13.9% for men).[12] An even greater disparity in educational fields critical to the energy transition (Science, Technology, Engineering, and Mathematics [STEM]) is where women constitute 12.4 per cent of total graduates compared to men 29.4 per cent, although secondary and tertiary education show near gender parity for enrolment.[13]

The challenge of addressing potential issues affecting women working in relevant economic sectors during and after the energy transition is even more pronounced in coal-producing regions, where Indonesia's energy transition will have its most direct socio-economic impacts. Indonesia's economy is deeply dependent on coal, as it is the world's

[6] Paul Walk et al., 'Strengthening Gender Justice in a Just Transition: A Research Agenda Based on a Systematic Map of Gender in Coal Transitions,' *Energies* 14, no. 18 (2021), https://doi.org/10.3390/en14185985.

[7] Daniela Lazoroska et al., 'Gender-based opportunity structure in the energy sector: a literature review on women's networking and mentoring,' *Energy, Sustainability and Society* 14, no. 67 (2024), https://doi.org/10.1186/s13705-024-00494-9; Becca Wilgosh et al., 'When two movements collide: Learning from labour and environmental struggles for future Just Transitions,' *Futures* 137 (March 2022), https://doi.org/10.1016/j.futures.2022.102903.

[8] PWYP (Publish What You Pay Indonesia), *Mainstreaming Gender Equality, Disability, and Social Inclusion (GEDSI) in Indonesia's Just Energy Transition* (PWYP, 2023), https://drive.google.com/file/d/1VN21HN_J7FHDFEXNwaSkPOK5H-JcJcJx/view; PYC (Purnomo Yusgiantoro Center), *Brief Report Vol. (III): GESI Mainstreaming Strategy for A Just Energy Transition Indonesia* (PYC, 2024), https://purnomoyusgiantorocenter.org/wp-content/uploads/2025/07/Eng_Brief-Report-Vol.-III.pdf.

[9] Alya Antasya and Rekha Kersana, 'Gender Inequality and Renewable Energy: How Women's Interests and Lack of Participation Leading to Women Marginalization in Renewable Energy in Indonesia,' *Journal of Indonesian Social Sciences and Humanities* 13, no. 2 (2023): 125, https://ejournal.brin.go.id/jissh/article/view/8877/6838.

[10] CELIOS (Center of Economic and Law Studies), *National Public Opinion Survey on Just Energy Transition Partnership* (CELIOS, 2023), https://doi.org/10.13140/RG.2.2.10178.18884.

[11] Antasya and Kersana, 'Gender Inequality and Renewable Energy,' 125; Meylan Ratnawati Panjaitan, 'Impact of Covid-19 Pandemic on Gender Wage Gap in Indonesia,' *Buletin Statistika dan Aplikasi Terkini* 3, no.1 (30 June 2023), https://garuda.kemdiktisaintek.go.id/documents/detail/3591118.

[12] WEF (World Economic Forum), *Global Gender Gap Report 2025* (WEF, 2025), 216, https://reports.weforum.org/docs/WEF_GGGR_2025.pdf.

[13] WEF, *Global Gender Gap Report 2025*, 216.

largest coal exporter, with average annual production of more than 500 million ton.[14] The coal sector has contributed to 4.1 per cent of Indonesia's GDP since 2020.[15] The coal sector generates employment in producing regions, contributing around 7 per cent of the total workforce in East Kalimantan.[16] The coal sector operates in a social and economic setting that is shaped by gender differences: workers in coal-related industries are predominantly male, while women are overrepresented in the informal coal workforce.[17] For example, the workforce of PT Kideco Jaya Agung, a major coal company in East Kalimantan, has 15 per cent women, concentrated in administrative or support roles.[18] Addressing systemic inequalities is essential to prevent climate and low-carbon policies from generating adverse social impacts.[19] If the transition is not managed carefully, existing inequalities in coal-producing regions may worsen during energy transition because of a limited number of new jobs being suitable for women. This paper explores evidence of such outcomes in coal-producing regions.

Policy and scholarly discussions on Indonesia's energy transition policies increasingly incorporate Just Energy Transition principles but have overlooked the gendered impact in coal-producing regions.[20] Existing research emphasises economic diversification and job creation but pays limited attention to how women workers will be affected. This study identifies the future impacts of energy transition on women workers in coal-producing regions, not only on their job opportunities but also on activities that may shape women's participation in the energy transition.

To address the study's aims, the paper is structured into six main sections. The introduction outlines the background and research objectives, while the methodology outlines the analytical approach and economic modelling assumptions. This is followed by the insights gathered as we explored women's roles around coal mines in East Kalimantan. The model results and interpretation of current women's workforce participation and the future impact are explained along with policy reviews on gender mainstreaming in energy transition.

---

[14] Badan Pusat Statistik, 'Produksi Barang Tambang Mineral,' (BPS, 2025), https://www.bps.go.id/id/statistics-table/2/NTA4IzI=/produksi-barang-tambang-mineral.html.

[15] Badan Pusat Statistik, 'PDB Menurut Lapangan Usaha Seri 2010 (Milyar Rupiah),' (BPS, 2025) https://www.bps.go.id/id/statistics-table/2/NjUjMg==/-seri-2010-pdb-seri-2010.html.

[16] Badan Pusat Statistik, *Keadaan Angkatan Kerja Provinsi Kalimantan Timur 2022* (BPS, 2023), 30, https://kaltim.bps.go.id/id/publication/2023/05/31/8e67fd5f7dec0481daf978c9/keadaan-angkatan-kerja-provinsi-kalimantan-timur-2022.html.

[17] World Bank, *Just Transition for All: A Feminist Approach for the Coal Sector* (World Bank, 2022), https://www.worldbank.org/en/topic/extractiveindustries/publication/just-transition-for-all-a-feminist-approach-for-the-coal-sector.

[18] IESR (Institute for Essential Services Reform), *Just Transition in Indonesia's Coal Producing Regions (Case Studies: Paser and Muara Enim)* (IESR, 2023), 27, https://iesr.or.id/en/pustaka/just-transition-in-indonesias-coal-producing-regions-full-report/.

[19] Chandni Dwarkasing, 'Inequality determined social outcomes of low-carbon transition policies: A conceptual meta-review of justice impacts,' *Energy Research and Social Science* 97, (2023), https://doi.org/10.1016/j.erss.2023.102974.

[20] Setyowati, 'Mitigating inequality with emissions?'; Laely Nurhidayah et al., 'Indonesia's Just Energy Transition: The Societal Implications of Policy and Legislation on Renewable Energy,' *Climate Law* 14, no. 1 (2024), https://doi.org/10.1163/18786561-bja10047.

Finally, the conclusion synthesises the key insights, states the study limitations, and suggests topics for future research.

Methodology

We collected, analysed, and interpreted both quantitative and qualitative data to draw conclusions of the research.[21] We employed a mixed-methods research design to address the research problems of this study. This design aims to illustrate the gendered aspects of the energy transition in various areas, such as policy and society, using the case study of coal-producing in East Kalimantan Province. Using this method, we can draw more comprehensive conclusions about the future of women workers in coal-producing regions in East Kalimantan.

Drawing on academic and policy reports and documents, we developed several research themes on women's roles in coal-producing regions of East Kalimantan, and a policy analysis of existing and future impacts of gendered measures to recognise women workers in these regions. For instance, we analyse data and information on women's roles and policy findings from an ecofeminist perspective, to further examine the importance of a just transition for underrepresented women workers.

In terms of the quantitative approach, we used the single region Input-Output (IO) model which analyses the interdependencies between industries within a specific, localised economy in order to estimate the potential impact of coal transition to women's employment in East Kalimantan.[22] This analysis was based on the 2016 East Kalimantan Input-Output table from the provincial statistics office, the *Badan Pusat Statistik* (BPS) 2021, and 2022 GRDP and employment data. Using the Input-Output table, we calculated the direct and indirect impact of coal transition to regional economic output and employment.

The steps to calculate the employment impact were as follows:

1. We calculated the appropriate 'injection value'; that is the value of outside assistance required to prevent the local economy from collapsing following the forced shutdown of coal plants, which creates an economic crisis (shock). In the simulation scenarios we used the Gross Regional Domestic Product (GRDP) for 2022.
2. Next, using the IO table, we calculated the impact of the injection on the output for each economic sector. The impact included the direct impact on the injected sector and indirect impact on other sectors.
3. We calculated the employment coefficient (employment per economic output) for each sex and each sector using 2022 data.

We calculated the employment impact for each sex by multiplying output impact and employment coefficient.

We assessed three hypothetical economic transformation scenarios:

[21] Ronald E. Miller and Peter D. Blair, *Input-Output Analysis: Foundations and Extensions*, vol. 2 (Cambridge University Press, 2009), https://doi.org/10.1017/CBO9780511626982.

[22] John W. Creswell and J. David Creswell, *Research Design: Qualitative, Quantitative, and Mixed Methods Approaches* (SAGE Publications, 2018).

- Scenario 1: Coal mine is closed without growth in other sectors: A negative injection equal to the GRDP of the coal and lignite mining sector is introduced in this scenario. No growth in other sectors was simulated.
- Scenario 2: Coal mine closure is compensated for with proportional growth in all other sectors. The contribution of coal and lignite mining to GRDP is eliminated while the overall GRDP growth target is set at 3.1 per cent (the average GRDP growth in previous years). Final demand injection is introduced to all other sectors to reach the economic growth target. The 'injection value' was distributed proportionally based on each sector contribution (more specifically each sectoral economic demand).
- Scenario 3: Coal mine closure is compensated for with growth in the five sectors least related to coal.

The contribution of coal and lignite mining to GRDP is eliminated, while the overall GRDP growth target is set at 3.1 per cent, with a similar objective to Scenario 2 of maintaining economic growth in East Kalimantan. Instead of distributing 'injection value' across all sectors, additional demand is directed only to five sectors that are least connected to coal mining. These five sectors are chosen because they have the least input linkages to coal and lignite mining. The final demand injection is distributed proportionally to the distribution of final demand of those five sectors.

Table 1. List of sectoral categories used in the study

Code	**Aggregated sectors (17)**	**Disaggregated sectors (52)**
A	Agriculture, Forestry, and Fishing	Food Crops
		Horticultural Crops
		Plantation Crops
		Livestock
		Agricultural Service and Hunting
		Forestry and Logging
		Fishery
B	Mining and Quarrying	Crude Petroleum, Natural Gas, and Geothermal
		Coal and Lignite Mining
		Iron Ore Mining
		Other Mining and Quarrying
C	Manufacturing	Manufacture of Coal and Refined Petroleum Products
		Manufacture of Food Products and Beverages
		Manufacture of Tobacco Products
		Manufacture of Textiles; and Wearing Apparel
		Manufacture of Leather and Related Products and Footwear
		Manufacture of Wood and of Products of Wood and Cork, and Articles of Straw and Plaiting Materials
		Manufacture of Paper and Paper Products, Printing and Reproduction of Record Media
		Manufacture of Chemicals and Pharmaceuticals and Botanical Products
		Manufacture of Rubber, Rubber Products and Plastics Products
		Manufacture of Other Non-Metallic Mineral Products

Code	Aggregated sectors (17)	Disaggregated sectors (52)
		Manufacture of Basic Metal
		Manufacture of Fabricated Metal Products, Computer, and Optical Products, and Electrical Equipment
		Manufacture of Machinery and Equipment
		Manufacture of Transport Equipment
		Manufacture of Furniture
		Other Manufacturing, Repair and Installation of Machinery and Equipment
D	Electricity and Gas	Electricity
		Gas Procurement and Ice Production
E	Water Supply, Sewerage, Waste Management and Remediation Activities	Water Supply, Sewerage, Waste Management and Remediation Activities
F	Construction	Construction
G	Wholesale and Retail Trade; Repair of Motor Vehicles and Motorcycles	Wholesale and Retail Trade and Repair of Motor Vehicles and Motorcycles
		Wholesale and Retail Trade excluding Motor Vehicles and Motorcycles
H	Transportation and Storage	Railways Transport
		Land Transport
		Sea Transport
		River, Lake, and Ferry Transport
		Air Transport
		Warehousing and Support Services for Transportation, Postal and Courier
I	Accommodation and Food Service Activities	Accommodation
		Food and Beverage Service Activities
J	Information and Communication	Information and Communication
K	Financial and Insurance Activities	Financial Intermediary Services
		Insurance and Pension Fund
		Other Financial Services
		Financial Supporting Service
L	Real Estate Activities	Real Estate Activities
M,N	Business Activities	Business Activities
O	Public Administration and Defence; Compulsory Social Security	Public Administration and Defence; Compulsory Social Security
P	Education	Education
Q	Human Health and Social Work Activities	Human Health and Social Work Activities
R,S,T,U	Other Services Activities	Other Services Activities

Source. Badan Pusat Statistik, 2026.[23]

[23] This is a general categorisation developed by BPS and it remains the same over time. We have included the most recent references. Badan Pusat Statistik, *Produk Domestik Regional Bruto Provinsi-Provinsi di Indonesia Menurut Lapangan Usaha 2021-2025* (BPS, 2026), 10–12,

The employment assessment used the aggregated 17 economic sectors, while the IO model uses the disaggregated 52 economic sectors, in BPS statistics (Table 1). Consequently, some details were lost during aggregation, especially in sectors with diverse sub-sections such as agriculture and manufacturing. Following the BPS definition, 'employment' includes formal (i.e. permanent paid workers; regular employees) and informal (i.e. own account workers; temporary/unpaid workers; casual workers in agriculture; casual workers not in agriculture; and family workers/unpaid workers).

Understanding the role of women who work in and in the vicinity of coal mining in East Kalimantan, from previous studies

Women's employment comprised 2 per cent of the total mining employment in East Kalimantan. Despite women being considered unsuitable for work in coal mines, women work in offices and also as mine machinery operators for companies such as PT Kaltim Prima Coal. However, women workers face challenges: their husbands and families expect them to also undertake domestic work. Women have the dual burden of professional and domestic work.[24]

It is not only those working for coal mining companies who experience discrimination. Women are also marginalised in decision-making processes in both the public and private spheres. In addition, they must cope with environmental degradation and the loss of traditional, land-based livelihoods in mining concession areas. This includes women from the Indigenous Dayak Basap community, located in East Kalimantan, who once relied on the forest, but have been forced to adapt to a different way of life to survive due to coal mining expansion. While many men work in mining, women support their families by teaching in schools, either as civil servant and non-civil servant teachers, running small businesses, and growing vegetables and horticultural produce in their backyards.[25]

According to research by Kuntala Lahiri-Dutt and Petre Mahy, most women in the coal region of East Kalimantan, such as Singa Geweh in Sangatta, a village located around a mining settlement, are housewives.[26] In fact, many would like to work in offices but cannot because they lack the necessary qualifications. They are busy taking care of their families with limited, or reduced resources and do not have time for paid work. Women participate in the community through collective women's groups, such as the Family Welfare and Empowerment Organisation (or *Pemberdayaan dan Kesejahteraan Keluarga* (PKK)), a government-supported organisation, and the rotating savings and credit association (*arisan*) which is formed based on kinship relations. Lahiri-Dutt and Mahey argue that most women do not see themselves aspiring to political positions such as village leader, as they feel less qualified than their male counterparts.[27] In terms of skill development, there are limited programs for women in rural areas to return to education, with most programs targeting

https://www.bps.go.id/id/publication/2026/04/30/f01b7d753185ea2e879d321f/produk-domestik-regional-bruto-provinsi-provinsi-di-indonesia-menurut-pengeluaran-2021-2025.html.

[24] Zulfatun Mahmudah, 'Gender Equality in Mine: Best Practice Toward a Better Future of Mining Industry,' *Zulfa at a Glance* (21 November 2023), https://zulfatunmahmudah.id/?p=831.

[25] Aidy Halimanjaya, 'From coal to crops: Dayak women lead a just transition through backyard farming,' *The Conversation Indonesia* (17 July 2025), https://theconversation.com/from-coal-to-crops-dayak-women-lead-a-just-transition-through-backyard-farming-260827.

[26] Kuntala Lahiri-Dutt and Petra Mahy, *Impacts of Mining on Women and Youth in Indonesia: Two Mining Locations* (ANU Enterprise, 2007).

[27] Lahiri-Dutt and Mahy, *Impacts of Mining on Women and Youth in Indonesia.*

those living in or near the district capital.[28] As stewards of their households, women living near coal mines also struggle to ensure their families' food security and family health. Environmental deterioration associated with coal mining means it is no longer possible to provide clean water and air, putting an increased burden on women when it comes to taking care of their families.[29]

People living close to mining and coal production areas are at higher risk of exposure to hazardous environments. Even if they do not work in coal production, living close to mines can increase their exposure to environmental hazards. Women who live near coal mining areas have a higher risk of health problems than the population in general, especially in reproductive health. Women working in the oil, mining and gas industries often experience complications in pregnancy, menstrual problems and hormonal issues. They are also more likely to have babies with a low birth weight.[30]

In summary, coal industry communities have not provided equitable conditions for women in coal mining areas to thrive and contribute to the community. This is a low base from which to seek a 'just energy transition.' Women need to juggle paid work and unpaid domestic work regardless of their work status (formal or informal). The degradation of their surrounding environment means there are additional burdens to providing security for their families. Women who do not work in coal mining face marginalisation, with the risk of fewer opportunities to lead or participate in discussions with the community. Women living and working near the coal industry face health risks. Some of them also struggle with low self-esteem in relation to their community, for example, because they are less educated and qualified than their male counterparts.

Women's participation in labour market and analysis on future impacts of the transition from coal

In East Kalimantan, as in Indonesia generally, women's participation in the labour market (working and job-seeking) is much lower than men. In East Kalimantan, women's labour-force participation rate in 2022 was only 45 per cent, compared to 83 per cent for men.[31] Almost 80 per cent of women outside the labour market had unpaid domestic responsibilities, while 15 per cent of women outside the labour market were studying.

Looking into the employment structure in East Kalimantan, only 33 per cent of the total numbers in employment in 2022 were women. Employment in many of the major economic sectors is male dominated, including agriculture, mining, transportation, and construction. The sectors with high female employment include trade, hospitality, education, health, and services. While there are variations, the gender composition in these economic sectors has been relatively consistent over the years (Figure 1).

[28] Lahiri-Dutt and Mahy, *Impacts of Mining on Women and Youth in Indonesia.*

[29] Ike Anggraeni et al., 'Environmental Quality on Surrounding Community of Coal Mining Area in Samarinda, East Kalimantan, Indonesia,' *Public Health of Indonesia* (2019).

[30] Rina H. Razafimahefa et al., 'Occupational Factors Affecting Women Workers' Sexual and Reproductive Health Outcomes in Oil, Gas, and Mining Industry: A Scoping Review,' *Public Health Rev.* 43 (April 2022). https://doi.org/10.3389/phrs.2022.1604653.

[31] Badan Pusat Statistik, *Keadaan Angkatan Kerja Provinsi Kalimantan Timur 2022,* (BPS, 2023).

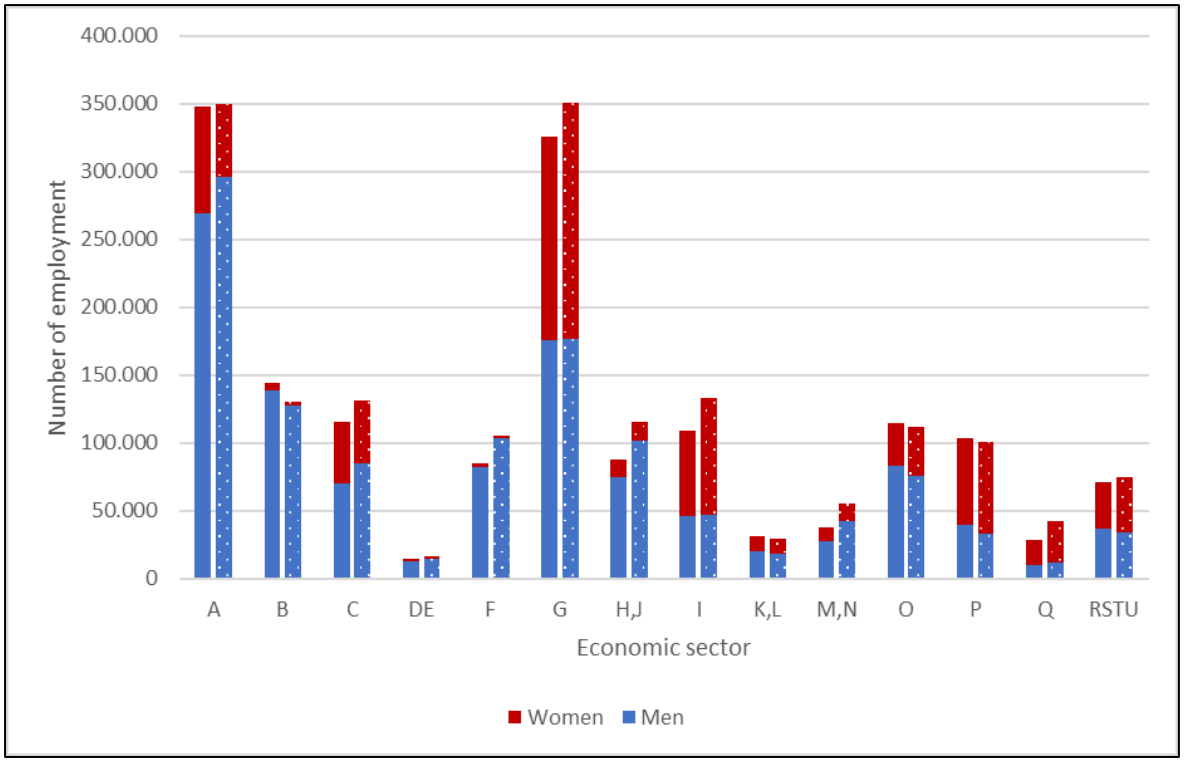

Figure 1. Number of people employed by economic sector and sex in East Kalimantan in 2018 (plain) and 2022 (dotted). A description of economic sectors is available in Table 1.
Note. The sector with the highest number of female employees is Wholesale and Retail Trade; Repair of Motor Vehicles and Motorcycles (Sector G), while the Mining and Quarrying sector (Sector B) has very few female workers.
Source. Authors' own analysis from BPS employment data.[32]

Coal mining (and mining in general) has been male dominated: globally, only around 15 per cent of workers in the sector are women.[33] In Indonesia, women make up only 8 per cent of those employed in the mining sector.[34] This gap is even larger in East Kalimantan, where only 2 per cent of mining workers are women. However, in many countries, mining provides indirect employment for women through its supply chain and supporting industries.

Our analysis based on the input-output model suggests that without new economic activities, quitting coal mining could cause a 29 per cent decline in male employment and 17 per cent decline in total female employment in East Kalimantan. Women's employment contributes 22 per cent of the total employment loss, considerably more than its 2 per cent share in total mining employment. This is due to the indirect impacts of coal exit, causing a decline in other economic sectors, including some with relatively high shares of women workers such as trading, manufacturing, and business services (Figure 2).

[32] Badan Pusat Statistik, *Keadaan Ketenagakerjaan Provinsi Kalimantan Timur 2018,* (BPS, 2019); Badan Pusat Statistik, *Keadaan Angkatan Kerja Provinsi Kalimantan Timur 2022* (BPS, 2023).

[33] Rachel Perks and Tehreem S. Ford, 'Breaking barriers for women in mining,' *World Bank Blogs,* 14 June 2024, https://blogs.worldbank.org/en/energy/breaking-barriers-for-women-in-mining-.

[34] Badan Pusat Statistik, *Keadaan Angkatan Kerja di Indonesia Agustus 2024* (BPS, 2024). https://www.bps.go.id/id/publication/2024/12/09/6f1fd1036968c8a28e4cfe26/keadaan-angkatan-kerja-di-indonesia-agustus-2024.htm.

Without targeted interventions, women who lose their jobs (comprising 22% of the total employment losses) in Scenario 1 are more likely to remain outside the workforce or experience difficulties when trying to return to work following the closure of coal mines. Women's ability to compete equally with men in the job market is hindered by their lower rates of graduation in higher education. This is likely due to the physical and normative barriers to education, especially for women in rural areas.[35] Even if women can return to the workforce, they have the double burden of paid employment and household responsibilities.[36] This could result in women choosing not to work again, which could affect their economic livelihood and social standing in the community.

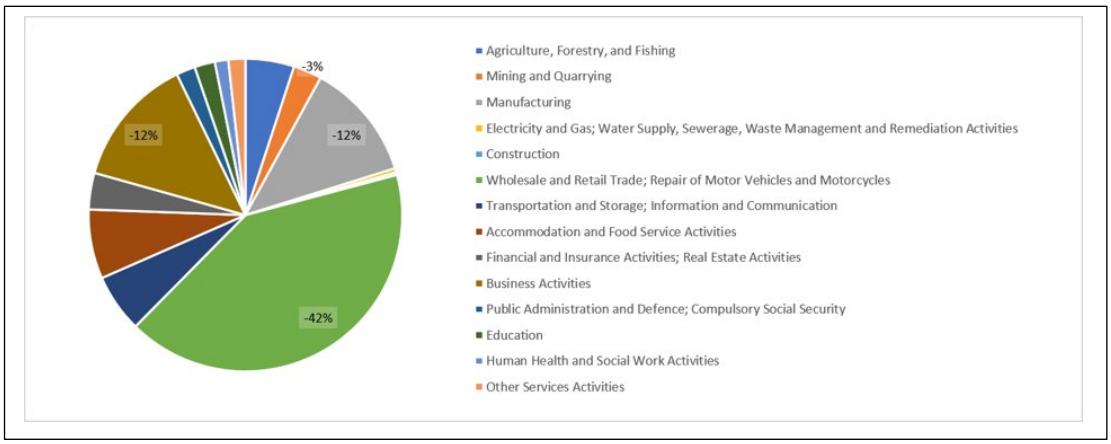

Figure 2. Sectoral distribution of female employment loss under Scenario 1.
Source. Authors' own analysis from BPS IO and employment data.[37]

Under Scenario 2, job losses resulting from the cessation of coal economic activity are compensated by injecting final demand proportionately into all other economic sectors. Manufacture, construction, and agriculture are the sectors with the highest increase in economic output. In this case, the number of people in employment overall is expected to increase by 73 per cent and 95 per cent, for men and women, respectively. Most of the new jobs would be in the agriculture sector, as shown in Table 2, due to its high employment-to-economic output ratio, meaning that by nature, those sectors can create many jobs even with a smaller amount of economic activity. However, historically, agriculture in East Kalimantan is male dominated. In 2022, 85 per cent of agricultural workers were male. This sector also typically involves a large proportion of informal workers, as shown in Figure 3. The newly created female employment in this scenario is evenly distributed among sectors, with the highest contribution coming from trade, followed by hospitality services and education (Figure 4).

[35] Ali Gilang Pratama et al., 'Realizing Social Justice: East Kalimantan's Gender Profile 2023 in the Perspective of Human Right and Citizenship,' *HUMANISA: Journal of Gender Study* 8, no. 1 (2024), http://dx.doi.org/10.30983/humanisme.v4i2.9717.

[36] Mahmudah, 'Gender Equality in Mine.'

[37] Badan Pusat Statistik, *Tabel Input Output Tahun 2016 Provinsi Kalimantan Timur Tahun Anggaran 2021* (BPS, 2021); Badan Pusat Statistik, *Keadaan Angkatan Kerja Provinsi Kalimantan Timur 202,* (BPS, 2023).

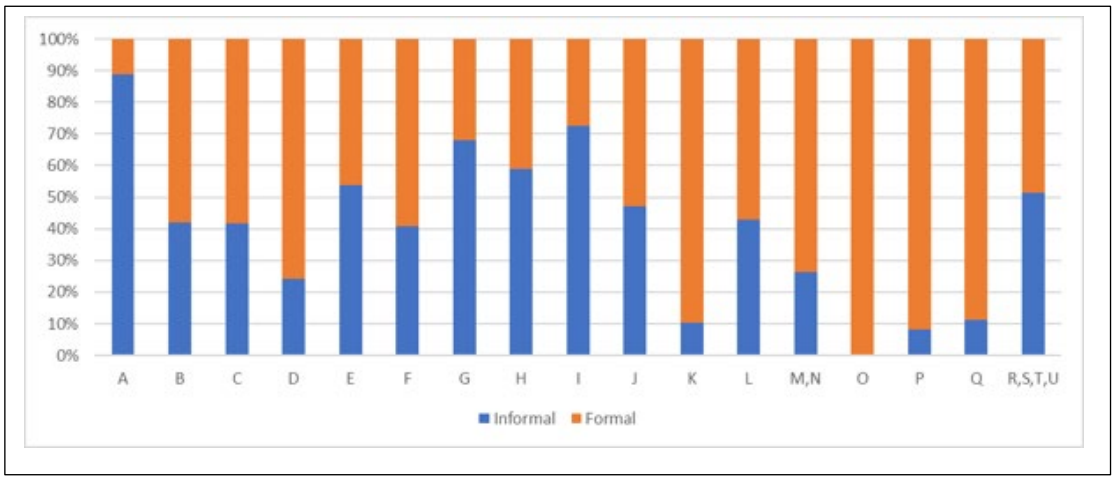

Figure 3. Share of formal and informal employment by economic sector in Indonesia in February 2025. A description of economic sectors is available in Table 1.
Note. The sectors with the highest formal employment are Financial and Insurance Activities (Sector K); Public Administration and Defence; Compulsory Social Security (Sector O); Education (Sector P); and Human Health and Social Work Activities (Sector Q). Meanwhile, employment in Agriculture, Forestry, and Fishing (Sector A) is predominantly informal.
Source. BPS Indonesia employment data.[38]

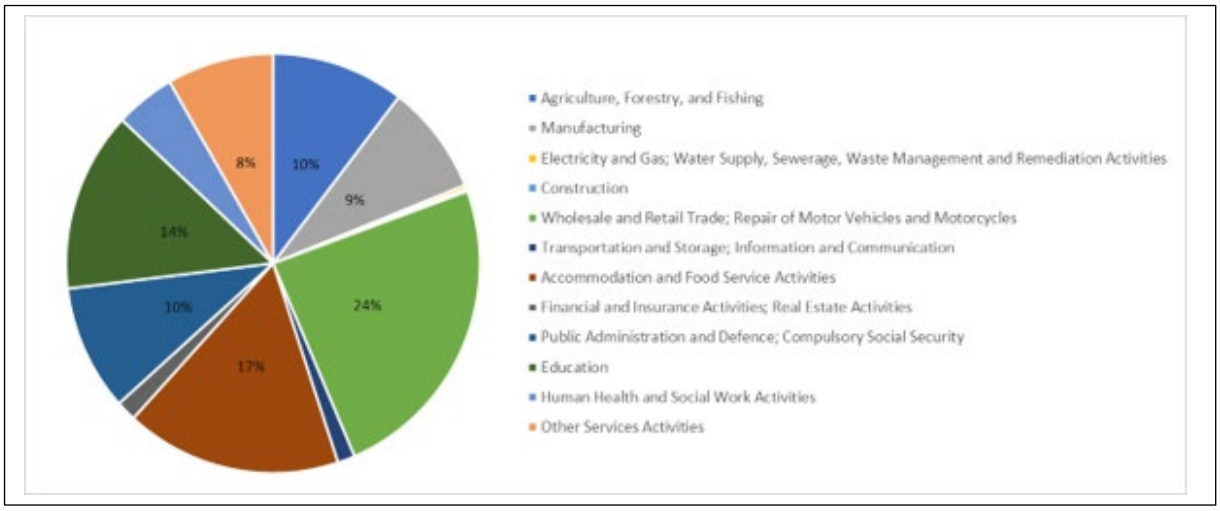

Figure 4. Sectoral distribution of newly created women's employment under Scenario 2.
Source: Authors' own analysis from BPS IO and employment data[39].

[38] Badan Pusat Statistik, *Keadaan Angkatan Kerja di Indonesia Februari 2025* (BPS, 20 June 2025), https://www.bps.go.id/id/publication/2025/06/20/fec826c9a88adaa045a6ac9f/keadaan-angkatan-kerja-di-indonesia-februari-2025.html.

[39] Badan Pusat Statistik, *Tabel Input Output Tahun 2016 Provinsi Kalimantan Timur Tahun Anggaran 2021* (BPS, 2021); Badan Pusat Statistik, *Keadaan Angkatan Kerja Provinsi Kalimantan Timur 202,* (BPS, 2023).

Table 2. Employment impact by gender and economic sector under Scenario 2. Green indicates positive changes in employment (job gain), while red indicates negative changes in employment (job loss).

Economic sector	Changes in number of employment		Total employment	
	Male	Female	Male	Female
Agriculture, Forestry, and Fishing	322.295	57.450	618.879	110.317
Mining and Quarrying	- 101.628	- 2.239	26.121	576
Manufacturing	85.917	46.966	170.875	93.408
Electricity and Gas; Water Supply, Sewerage, Waste Management and Remediation Activities	11.231	1.551	26.060	3.599
Construction	85.587	1.163	189.569	2.576
Wholesale and Retail Trade; Repair of Motor Vehicles and Motorcycles	136.140	133.218	313.255	306.532
Transportation and Storage; Information and Communication	55.495	7.441	157.181	21.075
Accommodation and Food Service Activities	51.925	93.186	99.444	178.465
Financial and Insurance Activities; Real Estate Activities	15.369	8.693	34.234	19.364
Business Activities	- 9.721	- 2.921	32.619	9.804
Public Administration and Defence; Compulsory Social Security	110.973	53.564	186.488	90.013
Education	37.708	76.738	70.854	144.191
Human Health and Social Work Activities	9.629	25.846	21.115	56.678
Other Services Activities	38.006	45.970	72.042	87.138
Total	848.926	546.626	2.018.736	1.123.736

Source: Authors' own analysis from BPS IO and employment data.[40]

Table 3. Employment impact by gender and economic sector under Scenario 3. Green indicates positive changes in employment (job gain), while red indicates negative changes in employment (job loss).

Economic sector	Changes in number of employment		Total employment	
	Male	Female	Male	Female
Agriculture, Forestry, and Fishing	1.567.170	279.353	1.863.754	332.220
Mining and Quarrying	- 122.199	- 2.693	5.550	122
Manufacturing	128.332	70.152	213.290	116.594
Electricity and Gas; Water Supply, Sewerage, Waste Management and Remediation Activities	1.722	238	16.551	2.286
Construction	- 17.770	- 241	86.212	1.172
Wholesale and Retail Trade; Repair of Motor Vehicles and Motorcycles	8.552	8.368	185.667	181.682
Transportation and Storage; Information and Communication	- 24.442	- 3.277	77.244	10.357
Accommodation and Food Service Activities	323.070	579.792	370.589	665.071
Financial and Insurance Activities; Real Estate Activities	- 4.745	- 2.684	14.120	7.987
Business Activities	- 34.309	- 10.311	8.031	2.414
Public Administration and Defence; Compulsory Social Security	3.502	1.690	79.017	38.139
Education	- 746	- 1.518	32.400	65.935
Human Health and Social Work Activities	6	17	11.492	30.849
Other Services Activities	15.623	18.897	49.659	60.065
Total	1.843.766	937.783	3.013.576	1.514.893

Source: Authors' own analysis from BPS IO and employment data.[41]

Under Scenario 3, the closure of the coal sector is compensated by increasing final demand (meaning overall money spent in East Kalimantan) allocated proportionately to the five sectors which have least linkage with coal sectors, that is: food crops (agriculture), fishery (agriculture), manufacture of food and beverages (manufacture), food and beverage activities (hospitality), and financial support (financial services and real estate). In this scenario, the highest increase in output occurs in manufacturing, agriculture, and hospitality. Consequently, employment increased by 158 per cent and 162 per cent for men and women,

[40] Badan Pusat Statistik, *Tabel Input Output Tahun 2016 Provinsi Kalimantan Timur Tahun Anggaran 2021* (BPS, 2021); Badan Pusat Statistik, *Keadaan Angkatan Kerja Provinsi Kalimantan Timur 2022,* (BPS, 2023).

[41] Badan Pusat Statistik, *Tabel Input Output Tahun 2016 Provinsi Kalimantan*; Badan Pusat Statistik, *Keadaan Angkatan Kerja Provinsi Kalimantan Timur 2022.*

respectively. Very high employment growth is driven by an increased output in agriculture and hospitality, which have particularly high employment coefficients.

In this third scenario, the sectoral distribution of newly created jobs differs from Scenario 2, with female employment mostly growing in hospitality services and agriculture, in response to the demand injection those sectors received (Table 3). The contribution from the manufacturing sector is less noticeable despite demand for injections in food and beverage manufacturing due to its low employment coefficient. Trade, while being the main source of female employment in scenario 2, has a significantly diminished contribution in Scenario 3 (Figure 5).

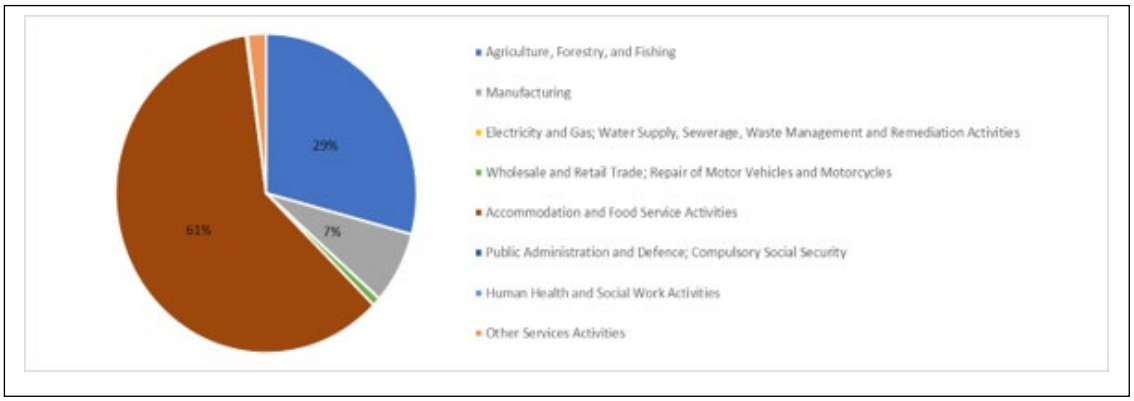

Figure 5. Sectoral distribution of newly created female employment under Scenario 3.
Source. Authors' own analysis from BPS IO and employment data.[42]

The figures under simulated economic interventions in scenarios 2 and 3 showcase the opportunity for greater women's participation in the labour market. Potentially, providing interventions to facilitate women's return to work could enable them to achieve a socio-economic status comparable to men, given the increased allocation of employment opportunities specifically designed for women. However, women could still face some challenging situations. Women in coal regions may still be unable to fill jobs in male-dominated fields such as manufacturing and agriculture. This is due to their limited access to higher education and participation in public decision-making compared to men.[43] Women may be viewed as a burden when working in male-dominated roles, due to entrenched negative stereotypes associated with biology, especially in the reproductive arena (menstruation, pregnancy).[44] Measures for economic change and renewal, post-coal closure, need to address the barriers linked to negative stereotypes and the unequal treatment of women.

Policy analysis for current gender mainstreaming in energy transition in Indonesia, especially in coal-producing regions

The challenges women experience in coal regions, mentioned above, highlight the urgent need for structural interventions. As East Kalimantan navigates its role in Indonesia's energy transition agenda, the gendered impacts of coal dependence cannot be overlooked. Now is

[42] Badan Pusat Statistik, *Tabel Input Output Tahun 2016 Provinsi Kalimantan Timur Tahun Anggaran 2021* (BPS, 2021); Badan Pusat Statistik, *Keadaan Angkatan Kerja Provinsi Kalimantan Timur 2022,* (BPS, 2023).

[43] Lahiri-Dutt and Mahy, *Impacts of Mining*, 42–43.

[44] Razafimahefa et al., 'Occupational Factors,' 10–11.

the time to examine Indonesia's existing policy framework for gender mainstreaming in energy transition with its focus on coal-producing regions.

The commitment to mainstream gender equality into Indonesia's energy transition policies at the national level has been outlined in *Indonesia's Long-Term Strategy for Low Carbon and Climate Resilience (LTS-LCCR) 2050.* The document underscores the importance of promoting gender equality and justice in addressing climate-related issues. It highlights several gender mainstreaming efforts implemented in Indonesia, such as the gender responsive budgeting and 'tagging' for national development planning (i.e. identifying, labelling, and tracking specific budget items, projects, or policies) and strategies to accelerate gender mainstreaming through the national development planning document.[45]

But a specific strategy for gender equity issues within the energy and climate sectors is limited. The LTS-LCCR provides general guidance without detailing sector-specific strategies or implementation. In other policy documents, such as Indonesia's Second Nationally Determined Contribution (NDC) and Just Energy Transition Partnership (JETP), gender mainstreaming is outlined, promoting women's participation in energy transition policy-making forums and encouraging social dialogue to facilitate community interest.[46] In contrast, other key policy documents such as the National Energy Policy (KEN) and the National Energy Plan (RUEN), make no reference to gender mainstreaming at all, highlighting the limited efforts made by Indonesia's energy sector.

The basis for gender mainstreaming in Indonesia is outlined in Presidential Instruction No. 9 of 2000, which requires the incorporation of gender in planning, preparing, implementing, and evaluation of national development policies and programs, such as the Long-term National Development Plan or *Rencana Pembangunan Jangka Panjang Nasional* (RPJPN) and Medium-term National Development Plan or *Rencana Pembangunan Jangka Menengah Nasional* (RPJMN). These policies are important in strengthening women's participation in development, including within the energy sector. However, the provisions are general and do not specifically address the energy sector.

At the provincial level, the Regional Regulation No. 8 of 2019 on the General Energy Plan or *Rencana Umum Energi Daerah* (RUED) of East Kalimantan Province does not contain provisions on gender mainstreaming. The regulation focuses primarily on technical, economic, and environmental aspects of energy development, such as energy supply, demand projections, targets, and institutional arrangements, without addressing social factors (including gender).

East Kalimantan has, however, taken a progressive step by enacting the East Kalimantan Provincial Regulation No. 2 of 2016 on Gender Mainstreaming in Regional Development, which explicitly mandates all local government institutions, including Regional Apparatus Work Units or *Satuan Kerja Perangkat Daerah* (SKPD), to integrate a gender perspective into every stage of development planning and implementation. This regulation establishes institutional mechanisms such as the Gender Mainstreaming Working Group or *Kelompok Kerja Pengarus Utamaan Gender* (Pokja PUG) and Focal Points, as well as analytical tools such as Gender Analysis and Gender-Responsive Planning and Budgeting (*Perencanaan dan Penganggaran Responsif Gender* (PPRG)).

[45] Government of Indonesia, 'Indonesia Long-Term Strategy for Low Carbon and Climate Resilience 2050.' UNFCCC, 2021. https://unfccc.int/sites/default/files/resource/Indonesia_LTS-LCCR_2021.pdf.

[46] Government of Indonesia, *Just Energy Transition Partnership Indonesia: Comprehensive Investment and Policy Plan 2023* (JETP, 2023), https://jetp-id.org/storage/official-jetp-cipp-2023-vshare_f_en-1700532655.pdf.

Table 4. Summary of policies for gender mainstreaming in development and energy sector

Policy instrument	Mandates on gender mainstreaming
A. National level	
Law No. 59 of 2024 on Long-term National Development Planning (RPJPN) 2025-2045	Gender mainstreaming is embedded in the national vision of Social and Ecology Resilience. Policy directions include strengthening the governance of gender mainstreaming; reinforcing affirmative policies through leadership, economic empowerment, and access to services; and strengthening the enabling environment through knowledge management, accountability, incentives, and community engagement.
Law No. 30 of 2007 on Energy	None
Law No. 13 of 2003 on Employment	While it does not specifically mention gender mainstreaming, it regulates the rights, protection, and working conditions of women workers, covering aspects such as working hours and safety, menstrual and maternity leave, breastfeeding and child welfare, special protection for night workers, prohibition of discriminatory dismissal, and the guarantee of equal opportunity and career development.
Law No. 6 of 2023 on Job Creation	None
Government Regulation No. 40 of 2025 on National Energy Policy (KEN)	None
Presidential Regulation No. 22 of 2017 on National Energy Plan (RUEN)	None
Presidential Regulation No. 12 of 2025 on Medium-term National Development Planning (RPJMN) 2025-2029	Promotes women's empowerment as part of national human development priorities, achieved through improving access to essential services, enhancing women's capacity, leadership, and economic participation, as well as strengthening governance of gender mainstreaming in the development process. Targets include improvement in Gender Inequality Index, Gender Development Index, and Women Labour Force Participation Rate.
Presidential Instruction No. 9 of 2000 on Gender Mainstreaming in National Development	Establishes the legal foundation for gender mainstreaming in all stages of national development, including planning, implementation, monitoring, and evaluation. Implementation is conducted through gender analysis and communication, information, and education within government institutions at national and regional levels
B. East Kalimantan level	
East Kalimantan Province Regulation No. 8 of 2019 on General Energy Plan of East Kalimantan Province	None
East Kalimantan Province Regulation No. 2 of 2016 on Gender Mainstreaming in Regional Development	It mandates all local government institutions, including Regional Apparatus Work Units (SKPD), to integrate a gender perspective into every stage of regional development. Implementation is carried out through institutional mechanisms such as the Gender Mainstreaming Working Group (Pokja PUG) and Focal Points. In addition, gender mainstreaming is applied through analytical instruments such as Gender Analysis and Gender-Responsive Planning and Budgeting (PPRG), accompanied by monitoring and evaluation based on gender indicators.

Source: Authors' analysis from Indonesia and East Kalimantan regulations: Law, Gov Regulation, Presidential Regulation, East Kalimantan Province Regulation.

While the regulation provides a formal mandate to integrate gender considerations into regional development planning and budgeting, its implementation remains largely

procedural. In many cases, gender mainstreaming is limited to administrative requirements, such as the preparation of gender analysis pathways and gender budget statements, without being fully integrated into sectoral policies. Moreover, limited technical capacity among local government agencies in gender analysis, coupled with insufficient availability of gender-disaggregated data at the sectoral level, constrains the ability to design targeted interventions. These challenges are captured in a study of Berau Regency, East Kalimantan.[47] As a result, the implementation of the regulations has yet to address effectively structural gender inequalities.

There is a gap in current policy frameworks: the foundation for gender equity mainstreaming is well established in the development sector, but its translation into policies for the energy sector remains weak, both nationally and at the provincial level. Instruments such as the LTS-LCCR, NDC, and JETP acknowledge gender considerations at a high level but with limited operational detail, and key energy documents like KEN, RUEN, and East Kalimantan's RUED exclude consideration of gendered power and gender relations entirely. Even with progressive regulations on gender mainstreaming at the provincial level, implementation within the energy governance framework remains weak.

Policy coherence between development planning, labour policy and energy governance is critical to achieving a just energy transition that recognises women as affected actors and potential agents of transformation. Policy coherence is one of the key enablers for inclusive development.[48] The current lack of policy coherence creates challenges for women workers. If not addressed, this incoherence may further perpetuate and perhaps worsen the barriers faced by future women workers in energy transition.

Efforts to improve policy coherence in Indonesia involve integrating gender-disaggregated labour data into transition impact assessments; designing accessible and suitable reskilling and entrepreneurship programs for women; and embedding gender-responsive budgeting (PPRG) within transition financing frameworks. Policymakers should also intervene at the enterprise level to create suitable working environments for women through flexible working arrangements and workplace safety measures. Achieving policy coherence also means empowering women to participate in and represent themselves within the community, regardless of their profession or socio-economic status.

Conclusion

We conclude that it is likely that women in coal-producing regions will experience negative impacts from the energy transition. Women in East Kalimantan have different roles and positions in coal-related and non-coal-related industries. Without interventions to empower women, they will struggle to adapt to the new socio-economic landscape, where their voices will be heard less. For example, unlike their male counterparts, women in the coal mining industry must balance work and family life.

---

[47] Winda Jubaidah, 'Keterlibatan Perempuan dan Kebijakan Daerah dalam Pembangunan Responsif Gender di Kabupaten Berau,' *Eco-Build: Economy Bring Ultimate Information All About Development Journal* 9, no. 1 (2025), https://doi.org/10.35915/ej.v9i1.953.

[48] Organisation for Economic Co-operation and Development (OECD), *Policy Coherence for Sustainable Development 2019: Empowering People and Ensuring Inclusiveness* (OECD, 28 May 2019), https://www.oecd.org/publications/policy-coherence-for-sustainable-development-2019-a90f851f-en.htm; Marlene Buchy and Sharmila Shakya, 'Exploring policy coherence to understand limited progress of gender and social inclusion in the energy sector: The case of Nepal,' *Energy Policy* 190 (2024), https://doi.org/10.1016/j.enpol.2024.114140.

Importantly, we found that among women, potential job losses resulting from transitioning away from coal would exceed the actual number of women currently employed in the coal industry. There is a ripple effect across other sectors where women workers have a larger share, such as trade, services, and manufacturing. Alternatively, targeted economic intervention scenarios indicate significant potential to increase women's employment, creating around twice as many jobs in the region. These employment gains would primarily occur in sectors where women are already well represented, including hospitality, agriculture, and trade. The projected increase in women's employment in these scenarios exceeds that of men, indicating that targeted economic diversification could present substantial opportunities for women.

Nevertheless, these opportunities cannot be fully realised without addressing the structural barriers that have led to low workforce participation rates for women. These barriers include deeply rooted gender norms that confine women to domestic responsibilities, limited access to skills training, and limited representation in decision-making spaces. Not only are the future impacts of the energy transition on women workers in coal-producing regions due to shifts in economic structures, but also to forms of vulnerability that extend beyond direct employment. Women in coal and non-coal industries may have less agency in personally deciding how they can contribute to the economy and their neighbourhood after the transition, as they face barriers to representation and participation. The future for women not working in the coal industry (including housewives) is even more uncertain than for those working in formal industries.

These results indicate the urgent need for more coherent policy design within Indonesia's energy transition framework, one that not only focuses on job creation but also integrates the energy transition agenda with labour force development and gender equality. While national and provincial policies provide a solid foundation for gender mainstreaming in development, these commitments remain insufficiently integrated into energy-specific policies, including in coal-producing regions. Integrating gender equality plans and energy-specific decarbonisation strategies into a coherent policy framework is crucial to ensure that women are not merely objects of structural shifts but become key actors in sustainable transformation.

While contributing insights into the future of women workers in coal-producing regions, this study has limitations. Given the nature of the economic modelling used, this study is unable to address the gradual process of coal phase-down as newly stated by the Indonesian government and, instead, uses coal phase-out scenarios in its modelling, which allows for an estimation of the total transition pathway. Beyond quantitative analysis, we also did not gather primary qualitative data, which limits the depth of overall insights.

In addition to this limitation, when preparing this paper, we identified the need for further research. First, a more detailed qualitative study in coal-producing regions of the impact of moving away from coal on different women's groups would improve our understanding of these women's lives. Second, we suggest researching the dynamics of future women's work and activities in other coal-producing provinces in Indonesia. Such research would help identify patterns and impacts emerging during transitions away from coal.

References

Anggraeni, Ike, Annisa Nurrachmawati, Riza Hayati Ifroh et al. 'Environmental Quality on Surrounding Community of Coal Mining Area in Samarinda, East Kalimantan, Indonesia.' *Public Health of Indonesia* (2019): 91–98.

Antasya, Alya, and Rekha Kersana. 'Gender Inequality and Renewable Energy: How Women's Interests and Lack of Participation Leading to Women Marginalization in Renewable Energy in Indonesia.' *Journal of Indonesian Social Sciences and Humanities* 13, no. 2 (2023): 123–35. https://ejournal.brin.go.id/jissh/article/view/8877/6838.

Badan Pusat Statistik. *Keadaan Angkatan Kerja di Indonesia Agustus 2024*. Badan Pusat Statistik, 2024. https://www.bps.go.id/id/publication/2024/12/09/6f1fd1036968c8a28e4cfe26/keadaan-angkatan-kerja-di-indonesia-agustus-2024.html.

Badan Pusat Statistik. *Keadaan Angkatan Kerja di Indonesia Februari 2025*. Badan Pusat Statistik, 20 June 2025. https://www.bps.go.id/id/publication/2025/06/20/fec826c9a88adaa045a6ac9f/keadaan-angkatan-kerja-di-indonesia-februari-2025.html.

Badan Pusat Statistik. *Keadaan Angkatan Kerja Provinsi Kalimantan Timur 2018*. Badan Pusat Statistik, 2019. https://kaltim.bps.go.id/id/publication/2019/04/25/1fa6a81b342f9fe2b4311db7/keadaan-angkatan-kerja-provinsi-kalimantan-timur-2018.html.

Badan Pusat Statistik. *Keadaan Angkatan Kerja Provinsi Kalimantan Timur 2022*. Badan Pusat Statistik, 2023. https://kaltim.bps.go.id/id/publication/2023/05/31/8e67fd5f7dec0481daf978c9/keadaan-angkatan-kerja-provinsi-kalimantan-timur-2022.html.

Badan Pusat Statistik. 'PDB Menurut Lapangan Usaha Seri 2010 (Milyar Rupiah).' Badan Pusat Statistik, 5 November 2025. https://www.bps.go.id/id/statistics-table/2/NjUjMg==/-seri-2010-pdb-seri-2010.html.

Badan Pusat Statistik. 'Produksi Barang Tambang Mineral.' Badan Pusat Statistik, 24 January 2025. https://www.bps.go.id/id/statistics-table/2/NTA4IzI=/produksi-barang-tambang-mineral.html.

Badan Pusat Statistik. *Tabel Input Output Tahun 2016 Provinsi Kalimantan Timur Tahun Anggaran 2021*. Badan Pusat Statistik, 2021. https://kaltim.bps.go.id/id/publication/2021/12/30/00da86f69fbaa14f7c4770cc/tabel-input-output-tahun-2016-provinsi-kalimantan-timur-tahun-anggaran-2021.html.

Buchy, Marlene, and Sharmila Shakya. 'Exploring policy coherence to understand limited progress of gender and social inclusion in the energy sector: The case of Nepal.' *Energy Policy* 190 (2024). https://doi.org/10.1016/j.enpol.2024.114140.

CELIOS (Center of Economic and Law Studies). *National Public Opinion Survey on Just Energy Transition Partnership*. 2023. http://doi.org/10.13140/RG.2.2.10178.18884.

Creswell, John W., and J. David Creswell. *Research Design: Qualitative, Quantitative, and Mixed Methods Approaches*. SAGE Publications, 2018.

Dwarkasing, Chandni. 'Inequality determined social outcomes of low-carbon transition policies: A conceptual meta-review of justice impacts.' *Energy Research and Social Science* 97 (2023). https://doi.org/10.1016/j.erss.2023.102974.

Government of East Kalimantan. 'Peraturan Daerah (Perda) Provinsi Kalimantan Timur Nomor 2 Tahun 2016 tentang Pengarusutamaan Gender Dalam Pembangunan Daerah.' Peraturan BPK, 2016. https://peraturan.bpk.go.id/Details/20950.

Government of East Kalimantan. 'Peraturan Daerah (Perda) Provinsi Kalimantan Timur Nomor 8 Tahun 2019 tentang Rencana Umum Energi Daerah.' Peraturan BPK, 2019. https://peraturan.bpk.go.id/Details/185167/perda-prov-kalimantan-timur-no-8-tahun-2019.

Government of Indonesia. 'Instruksi Presiden (Inpres) Nomor 9 Tahun 2000 tentang Pengarusutamaan Gender dalam Pembangunan Nasional.' Peraturan BPK, 2000. https://peraturan.bpk.go.id/Details/285278/inpres-no-9-tahun-2000.

Government of Indonesia. 'Peraturan Presiden Republik Indonesia Nomor 22 Tahun 2017 tentang Rencana Umum Energi Nasional.' ESDM, 2017. https://www.esdm.go.id/assets/media/content/content-rencana-umum-energi-nasional-ruen.pdf.

Government of Indonesia. 'Indonesia Long-Term Strategy for Low Carbon and Climate Resilience 2050.' UNFCCC, 2021. https://unfccc.int/sites/default/files/resource/Indonesia_LTS-LCCR_2021.pdf.

Government of Indonesia. 'Just Energy Transition Partnership Indonesia: Comprehensive Investment and Policy Plan 2023.' JETP, 2023. https://jetp-id.org/storage/official-jetp-cipp-2023-vshare_f_en-1700532655.pdf.

Government of Indonesia. 'Peraturan Pemerintah (PP) Nomor 40 Tahun 2025 tentang Kebijakan Energi Nasional.' Peraturan BPK, 2025. https://peraturan.bpk.go.id/Details/328789/pp-no-40-tahun-2025.

Halimanjaya, Aidy. 'From coal to crops: Dayak women lead a just transition through backyard farming.' *The Conversation Indonesia*, 17 July 2025. https://theconversation.com/from-coal-to-crops-dayak-women-lead-a-just-transition-through-backyard-farming-260827.

Heffron, Raphael J., and Darren McCauley. 'What is the 'just transition'?' *Geoforum* 88 (2018): 74–77. https://doi.org/10.1016/j.geoforum.2017.11.016.

IEEFA (Institute for Energy Economics and Financial Analysis). *Unlocking Indonesia's Renewable Energy Investment Potential*. 2024. https://ieefa.org/sites/default/files/2024-07/IEEFA%20Report%20-%20Unlocking%20Indonesia%27s%20renewable%20energy%20investment%20potential%20July2024.pdf.

IESR (Institute for Essential Services Reform). *Indonesia Energy Transition Outlook (IETO) 2025*. Study Report. 2025. https://iesr.or.id/pustaka/indonesia-energy-transition-outlook-ieto-2025/.

IESR. *Just Transition in Indonesia's Coal Producing Regions (Case Studies: Paser and Muara Enim)*. Study Report. 2023. https://iesr.or.id/en/pustaka/just-transition-in-indonesias-coal-producing-regions-full-report/.

IESR. *Redefining Future Jobs: Implication of coal phase-out to the employment sector and economic transformation in Indonesia's coal region*. Study Report. 2022. https://iesr.or.id/en/pustaka/redefining-future-jobs.

Jubaidah, Winda. 'Keterlibatan Perempuan dan Kebijakan Daerah dalam Pembangunan Responsif Gender di Kabupaten Berau.' *Eco-Build: Economy Bring Ultimate Information All About Development Journal* 9, no. 1 (2025). https://doi.org/10.35915/ej.v9i1.953.

Lahiri-Dutt, Kuntala, and Petra Mahy. *Impacts of Mining on Women and Youth in Indonesia: Two Mining Locations*. Research Report. ANU Enterprise, 2007.

Lazoroska, Daniela, Jenny Palm, and Anna-Riikka Kojonsaari. 'Gender-based opportunity structure in the energy sector: a literature review on women's networking and mentoring.' *Energy, Sustainability and Society* 14, no. 67 (2024). https://doi.org/10.1186/s13705-024-00494-9.

Mahmudah, Zulfatun. 'Gender Equality in Mine: Best Practice Toward a Better Future of Mining Industry.' *Zulfa at a Glance* (blog), 2023. https://zulfatunmahmudah.id/?p=831.

MEMR (Ministry of Energy and Mineral Resources). *Handbook of Energy and Economic Statistics of Indonesia 2024*. Kementerian ESDM, 2025. https://www.esdm.go.id/assets/media/content/content-handbook-of-energy-and-economic-statistics-of-indonesia-2024.pdf.

MEMR. 'Materi Konferensi Pers RUPTL PT PLN Tahun 2025–2034 Meningkatkan Ketahanan dan Keberlanjutan Energi Nasional.' 26 May 2025. https://gatrik.esdm.go.id/assets/uploads/download_index/files/4ec39-materi-paparan-ruptl-2025-2034.pdf.

Miller, Ronald E., and Peter D. Blair. *Input-Output Analysis: Foundations and Extensions*. Vol. 2. Cambridge University Press, 2009. https://doi.org/10.1017/CBO9780511626982.

Nurhidayah, Laely, Shawkat Alam, Nurrahman Aji Utomo, and Agus Suntoro. 'Indonesia's Just Energy Transition: The Societal Implications of Policy and Legislation on Renewable Energy.' *Climate Law* 14, no. 1 (2024). https://doi.org/10.1163/18786561-bja10047.

Organisation for Economic Co-operation and Development (OECD). *Policy Coherence for Sustainable Development 2019: Empowering People and Ensuring Inclusiveness*. 28 May 2019. https://www.oecd.org/publications/policy-coherence-for-sustainable-development-2019-a90f851f-en.htm.

Panjaitan, Meylan Ratnawati. 'Impact of Covid-19 Pandemic on Gender Wage Gap in Indonesia.' *Buletin Statistika dan Aplikasi Terkini* 3, no.1 (30 June 2023), https://garuda.kemdiktisaintek.go.id/documents/detail/3591118.

Perks, Rachel, and Tehreem Saifey Ford. 'Breaking barriers for women in mining.' *World Bank Blogs*, 14 June 2024. https://blogs.worldbank.org/en/energy/breaking-barriers-for-women-in-mining-.

Pratama, Ali Gilang, Suryaningsi, and Wingkolatin. 'Realizing Social Justice: East Kalimantan's Gender Profile 2023 in the Perspective of Human Right and Citizenship.' *HUMANISA: Journal of Gender Study* 8, no. 1 (2024). http://dx.doi.org/10.30983/humanisme.v4i2.9717.

PWYP (Publish What You Pay Indonesia). *Mainstreaming Gender Equality, Disability, and Social Inclusion (GEDSI) in Indonesia's Just Energy Transition*. PWYP, 2023. https://drive.google.com/file/d/1VN21HN_J7FHDFEXNwaSkPOK5H-JcJcJx/view.

PYC (Purnomo Yusgiantoro Center). *Brief Report Vol. (III): GESI Mainstreaming Strategy for A Just Energy Transition Indonesia*. PYC, 2024. https://purnomoyusgiantorocenter.org/wp-content/uploads/2025/07/Eng_Brief-Report-Vol.-III.pdf.

Razafimahefa, Rina H., Jerico F. Pardosi, and Adem Sav. 'Occupational Factors Affecting Women Workers' Sexual and Reproductive Health Outcomes in Oil, Gas, and Mining Industry: A Scoping Review.' *Public Health Rev.* 43 (April 2022): 1604653. https://doi.org/10.3389/phrs.2022.1604653.

Setyowati, Abidah B. 'Mitigating inequality with emissions? Exploring energy justice and financing transitions to low carbon energy in Indonesia.' *Energy Research & Social Science* 71 (January 2021). https://doi.org/10.1016/j.erss.2020.101817.

UNFCCC. 'Second Nationally Determined Contribution Republic of Indonesia.' 2025. https://unfccc.int/sites/default/files/2025-10/Indonesia_Second%20NDC_2025.10.24.pdf.

Walk, Paul, Isabell Braunger, Josephine Semb et al. 'Strengthening Gender Justice in a Just Transition: A Research Agenda Based on a Systematic Map of Gender in Coal Transitions.' *Energies* 14, no. 18 (2021): 59–85. https://doi.org/10.3390/en14185985.

WEF (World Economic Forum). *Global Gender Gap Report 2025*. World Economic Forum, 2025. https://reports.weforum.org/docs/WEF_GGGR_2025.pdf.

Wilgosh, Becca, Alevgul H. Sorman, and Inaki Barcena. 'When two movements collide: Learning from labour and environmental struggles for future Just Transitions.' *Futures* 137 (March 2022). https://doi.org/10.1016/j.futures.2022.102903.

World Bank. 'Just Transition for All: A Feminist Approach for the Coal Sector.' 8 December 2022. https://www.worldbank.org/en/topic/extractiveindustries/publication/just-transition-for-all-a-feminist-approach-for-the-coal-sector.