Advancing Gender-Inclusive Clean Energy Solutions in Developing Asia and the Pacific

BY JAMES CORREIA, SHEENA KANON LEONG, AND DINA AZHGALIYEVA

Abstract

This brief article explores the drivers and dynamics of the nexus between energy poverty and gender inequality in developing Asia and the Pacific. First, this begins with an overview of the social, economic, health and environmental aspects of gender and energy poverty in the region. Second, the policy approaches adopted to address these challenges through the provision of green employment opportunities, infrastructural initiatives, access to financing, and targeted interventions to tackle household air pollution (HAP) are examined. Third, this paves the way toward a set of practical recommendations for improving energy access and affordability, promoting women's economic empowerment, and accelerating the green energy transition.

Introduction and Context: Gender and Energy Poverty in Asia and the Pacific, and the Role of Women's Economic Empowerment in the Green Transition

Women are disproportionately exposed to the economic, health, social, and environmental aspects of energy poverty, particularly in developing Asia and the Pacific. Women often bear the primary responsibility for household tasks and spend more time on the collection and use of polluting solid fuels, which continue to form the key energy source for 1.2-1.6 billion people from across developing Asia and the Pacific.[1,2,3] This amounts to more than 20 hours per week on average, which entrenches existing gender inequalities, limits educational and job prospects, and carries health and physical security risks.[4] Due to persistent gender inequalities in labor markets and educational systems, women also often have lower incomes and more informal, poorly remunerated, and intermittent forms of employment.[5,6] This exacerbates affordability constraints and results in many female-headed households' spending more than 10% of their income on energy—a widely-used indicator of energy poverty. to 28% in Kazakhstan and 32% in Mongolia, for instance.[7,8] These factors often translate into gender-unequal intra-household dynamics, with women possessing lower bargaining power and decision-making authority for energy use decisions.[9] Women and children in developing Asia and the Pacific also tend to suffer most from household air pollution (HAP). Of the global total of 2.8-4.0 million deaths per year from HAP, more than 60% are women and children and almost three quarters are in developing Asia and the Pacific.[10,11]

Women's economic empowerment is crucial in accelerating the green energy transition. Despite widespread awareness of the harmful effects of traditional solid fuels on environmental sustainability and public health, significant barriers in infrastructure and access to finance continue to impede progress. A comprehensive governance framework and tailored financial support dedicated to women's empowerment is essential to addressing these constraints and expanding the uptake of climate-friendly energy sources, advancing gender equality, and reducing energy poverty.[12,13] This must be accompanied by infrastructural investments and expansions in grid connectivity to improve energy access, provide consistency of supply, and ensure the availability of access to greener alternatives.[14,15] Women's economic empowerment through employment significantly increases the likelihood that they will opt for cleaner energy, and accelerate the green transition. As women's employment prospects improve and incomes increase, the opportunity costs associated with fuel collection rise and the financial constraints on switching to cleaner energy options diminish.[16,17] This grants women the requisite economic capacity and bargaining power to choose cleaner energy, ultimately broadening the adoption of more climate-friendly alternatives.[18,19,20]

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Addressing the Nexus: Policy Approaches to Advancing Women's Economic Empowerment, Energy Access, and the Green Transition in Asia and the Pacific

There are several avenues and initiatives through which to advance women's economic empowerment, expand energy coverage and access, and accelerate the green transition in Asia and the Pacific.

Employment in fossil fuel extraction and combustion is traditionally highly masculinized. For instance, almost 90% of those working with coal in Indonesia are male.[21,22] The energy transition presents opportunities for women's employment. For example, female participation in Indonesian renewable energy initiatives through the MENTARI and Solar Mamas programs have achieved 41% female workforce participation, and this is 28% in the country as a whole.[23,24] In the Maldives, an ADB-sponsored project has accelerated the transition away from diesel generators by driving the implementation of rooftop solar panels, contributed to green job

creation for women, and enabled more than 160 islands to transition to climate-friendly energy sources.[25] Both initiatives are supported by an enabling ecosystem of public outreach, education and training, access to financing, and capacity building programs. These are marked by a near-equal participation of women, equipping them with essential skills and paving the way for a more socially equitable labor market in the energy sector going forward.

Comprehensive national infrastructure planning, development, and expansion is crucial. The electrification of rural households empowers women by granting them time to pursue employment opportunities, improving access to education and healthcare, and reducing the physical risks that come with fuel collection in unsafe lighting conditions.[26] The Fiji Rural Electrification Fund (FREF) provides an example of this approach, which is currently advancing the deployment of minigrids, smart meters, and other modern technologies.

Government interventions to reduce household air pollution (HAP) are also pivotal in tackling gender inequalities, reducing environmental and health risks, and improving energy access. HAP represents the third most prominent cause of premature mortality among women across the globe and significantly reduces cognitive performance and economic productivity, locking women into cycles of energy poverty.[27,28] In Bangladesh, the Improved Cookstove Program and Rural Electrification and Renewable Energy Development II Project (RERED II) has enabled more than 3.4 million people to access greener and healthier energy sources, driven down direct emissions by 9.5 million tons per year, and created 3,000 green jobs.[29] In Mongolia, URECA's Coal to Solar project supports those living in Ger—traditional dwellings of nomads in which more than a quarter of the national population reside—to install solar panels. This has reduced the time spent collecting solid fuels by two hours per day, driven down energy costs by 70%, and contributed to indoor air quality improvements that reduce the incidence of respiratory illnesses, cardiovascular disease, and premature mortality.[30]

The delivery of financial support by governments, international organizations and multilateral development banks (MDBs) is also essential in accelerating a gender-inclusive green transition. Women often face high barriers to accessing finance, with longer times for processing loan requests, lower likelihood for them being granted, and a lack of collateral due to more limited property and capital ownership than men.[31,32] As a result, they generally tend to receive higher interest rates and less favorable terms. The gender finance gap can be reconciled and an enabling environment for women's participation the green transition can be crafted. As women are disproportionately affected by the negative environmental and health impacts of solid fuel use, they stand to gain outsize benefits from investments in clean energy.

Policy Recommendations

To address the identified challenges, the following measures are suggested to strengthen gender equity, enhance energy access and affordability and empower women economically, with a view to accelerate the transition toward a more environmentally sustainable and socioeconomically inclusive future.

1. Building the strategic and governance framework: the adoption of national gender action plans and their integration with climate mitigation and adaptation frameworks represent the central precondition of effectively addressing the gender-energy-climate nexus. As of July 2023, only 12 countries across Asia and the Pacific[33] had adopted National Gender Action Plans (UN Women, 2023).[34] The creation of government agencies and coordination between existing bodies is also a vital element of success. These steps should be supported by the establishment of national databases to monitor progress and performance, track women's access to energy and participation in the sector, and evaluate the outcomes of gender-focused interventions to enable more informed and evidence-based policymaking.[35] For example, the Solomon Islands has a dedicated Ministry for Women, five-yearly National Gender Equality and Development Policies, a National Climate Strategy that mainstreams gender-related considerations, and a monitoring, reporting, and verification (MRV) infrastructure.[36]

2. Developing gender-inclusive employment and educational systems: key transmission channels that can advance sustainable development include creating gender-inclusive educational and employment systems, particularly in the renewable energy sector. In Asia and the Pacific, for instance, women in India's renewable energy sector make up only 11% of the workforce, a disparity driven largely by significant barriers to STEM education and technical training. This is particularly pronounced in rural areas. Investment into capacity building and education projects that equip women from marginalized communities with technical expertise is critical to close this gap. Governments can draw valuable lessons from India's Skill Council for Green Jobs, which offers stipends and certification to participants upon completing courses in solar panel operation and wind turbine maintenance, equipping women with essential skills and opening up employment opportunities.

3. Boosting access to green and sustainable financing: ensuring access to capital is vital in enabling women and marginalized groups to participate in and benefit from the green transition. In Mongolia, the ADB, European Bank for Reconstruction and Development (EBRD), and Khan Bank have developed and rolled out a green gender bonds program designed to expand the number of loans held by women, provide targeted financial products and services for women borrowers, and upskill them in their appropriate use through a series of training academies.[31,32] For female entrepreneurs and employees, the UNEP-sponsored Pioneer Facility (PF) provides flexible debt financing to women-led, climate-friendly enterprises across Southeast Asia—including Cambodia, Bangladesh, Indonesia, and the Philippines—boosting low-carbon projects and empowering women simultaneously. For households,

the PF unlocked capital and facilitated access to clean energy for 14,713 households, producing 21.5 million kWh of clean energy and avoiding 69,206 tons of CO2 emissions.[37]

4. Improving clean energy access for households: to reduce the exposure of women to the environmental and health risks of household air pollution, grant them the time to pursue educational and employment opportunities, and provide material support for green behaviors and prioritization, dedicated initiatives to encourage fuel-switching are required. A largescale example of this is India's Pradhan Mantri Ujjwala Yojana (PMUY), which provided over 95 million free LPG connections for cleaner cooking solutions to low-income households as of 2023, and contributed to an almost 40% rise in female employment in rural areas since 2019.[38] Going forward and taken together, these recommendations carry the potential to improve socio-economic productivity and wellbeing, advance gender equality, broaden energy access and affordability, and accelerate the green transition.

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Footnotes

[1] Mishra, R., Rahut, D. B., Bera, S., Dendup, N., & Sonobe, T. (2024). In pursuit of sustainable development goal 7: Evidence of clean cooking fuel usage from 46 developing countries. *The Electricity Journal, 37*(4–5), 107408. https://doi.org/10.1016/j.tej.2024.107408

[2] Foell, W., Pachauri, S., Spreng, D., & Zerriffi, H. (2011). Household cooking fuels and technologies in developing economies. *Energy Policy, 39*(12), 7487–7496. https://doi.org/10.1016/j.enpol.2011.08.016

[3] Asian Development Bank. (2023a). *2021 energy policy of the Asian Development Bank: Supporting low-carbon transition in Asia and the Pacific*. https://doi.org/10.22617/SPR230214-2

[4] IEA. (2019). *Data and Statistics Tables*. https://Www.Iea.Org/Data-and-Statistics/Data- Tables.

[5] Gould, C. F., and Urpelainen, J. (2018a). LPG as a clean cooking fuel: Adoption, use, and impact in rural India. *Energy Policy*, *122*, 395–408. https://doi.org/10.1016/ J.ENPOL.2018.07.042.

[6] Moniruzzaman, M., & Day, R. (2020). Gendered energy poverty and energy justice in rural Bangladesh. *Energy Policy*, *144*, 111554. https://doi.org/10.1016/j.enpol.2020.111554

[7] Kerimray, A., De Miglio, R., Rojas-Solórzano, L., and Ó Gallachóir, B. P. (2018a). Causes of energy poverty in a cold and resource-rich country: evidence from Kazakhstan. *Local Environment*, *23*(2), 178–197. https://doi.org/10.1080/13549839.2017.1397613.

[8] Bayasgalan, O. (2024, June 3–7). Coal-to-solar: Improving ger district lives [Conference presentation]. *Deep Dive Workshop (DDW) on Gender-Inclusive Clean Energy Solutions to Tackle Energy Poverty*, Manila, Philippines. https://asiacleanenergyforum.adb.org/ddw-gender-inclusive-clean-energy-solutions/

[9] Choudhuri, P., and Desai, S. (2020). Gender inequalities and household fuel choice in India. *Journal of Cleaner Production*, *265*. https://doi.org/10.1016/ j.jclepro.2020.121487.

[10] Our World in Data (2024) https://ourworldindata.org/grapher/household-air-pollution-deaths-by-region

[11] Of these deaths, more than a million are in the People's Republic of China (PRC) alone (https://www.who.int/china/health-topics/air-pollution#:~:text=Air%20pollution%20is%20responsible%20for,the%20same%20period%20in%20China).

[12] Azhgaliyeva, D., Holzhacker, H., Rahut, D., & Correia, J. (2024). ADBI Working Paper Series EMPOWERED WOMEN PRIORITIZE THE ENVIRONMENTAL AND HEALTH IMPACTS OF FUEL CHOICE: EMPIRICAL EVIDENCE FROM CENTRAL ASIA Asian Development Bank Institute. *ADBI Working Paper*, *1482*. https://doi.org/10.56506/HDYJ7785

[13] Timilsina, R.R., Jena, P.R., Rahut, D. B., & Managi, S. (2024). Towards parity: Examining the closing gender gap on electricity access in India using data from 1998 to 2021. *Energy Sustainable Development/ Energy for Sustainable Development*, *80*, 101450–101450. https://doi.org/10.1016/j.esd.2024.101450

[14] Kim, E., and Standal, K. (2019). Empowered by electricity? The political economy of gender and energy in rural Naryn. *Gender, Technology and Development*, *23*(1), 1–18. https://doi.org/10.1080/09718524.2019.1596558.

[15] Koirala, D. P., and Acharya, B. (2022). Households' fuel choices in the context of a decade-long load-shedding problem in Nepal. *Energy Policy*, *162*, 112795. https://doi.org/10.1016/j.enpol.2022.112795.

[16] Alem, Y., Beyene, A. D., Köhlin, G., and Mekonnen, A. (2016). Modeling household cooking fuel choice: A panel multinomial logit approach. *Energy Economics*, *59*, 129–137. https://doi.org/10.1016/j.eneco.2016.06.025.

[17] Zheng, Y., Xu, Z., Liao, W., Lin, B., & Chen, J. (2023). Multi-Step Forecasting for Household Power Consumption. *IEEJ Transactions on Electrical and Electronic Engineering*, *18*(8), 1255–1263. https://doi.org/10.1002/tee.23845

[18] Ma, W., Zhou, X., & Renwick, A. (2019). Impact of off-farm income on household energy expenditures in China: Implications for rural energy transition. *Energy Policy*, *127*, 248–258. https://doi.org/10.1016/j.enpol.2018.12.016

[19] Sun, D., Yang, X., and Qiu, H. (2022). Off-farm work and rural residential energy transition: a farm-household model and empirical evidence from China. *China Agricultural Economic Review*, *14*(4), 816–831. https://doi.org/10.1108/CAER- 09-2021-0188.

[20] Chang, H., and Zhang, J. (2024). Income growth versus labor loss: The joint impacts of rural-urban migration and off-farm employment on household energy use in rural China. *Renewable and Sustainable Energy Reviews*, *203*. https://doi.org/10.1016/j.rser.2024.114746.

[21] East Asia Forum (2024) Where are the Women in Indonesia's Energy Transition? https://eastasiaforum.org/2024/09/06/where-are-the-women-in-indonesias-energy-transition/

[22] https://www.worldbank.org/en/results/2023/01/19/moving-the-needle-on-clean-cooking-for-all

[23] Irdiana, N., & Islami, M. N. (2024). In Indonesia, a just energy transition needs women. *Palladium*. https://thepalladiumgroup.com/news/In-Indonesia-a-Just-Energy-Transition-Needs-Women

[24] Wadah Foundation. (2022, October 11). Solar Mamas: Ready to become agents of change. *Wadah Foundation*. https://wadahfoundation.or.id/solar-mamas-ready-to-become-agents-of-change/

[25] Kolantharaj, J. (2024, June 3–7). Towards an inclusive energy transition in South Asia: The Maldives case [Conference presentation]. *Deep Dive Workshop (DDW) on Gender-Inclusive Clean Energy Solutions to Tackle Energy Poverty*, Manila, Philippines. https://asiacleanenergyforum.adb.org/ddw-gender-inclusive-clean-energy-solutions/

[26] Bhukta, R., Pakrashi, D., Saha, S., & Sedai, A. (2024). Community electrification and women's autonomy. *Energy Economics, 137*, 107792. https://doi.org/10.1016/j.eneco.2024.107792

[27] WHO (2023) Household Air Pollution https://www.who.int/News-Room/Fact-Sheets/Detail/Household-Air-Pollution-and-Health#:~:Text=Each%20year%2C%203.2%20million%20people,Air%20pollution%20data%20for%20details

[28] UNICEF (2024) State of Global Air, https://ceh.unicef.org/events-and-resources/knowledge-library/state-global-air-2024

[29] The World Bank. (2019). Bangladesh offers model of successful clean cooking program. https://documents1.worldbank.org/curated/en/571731573763114047/pdf/Bangladesh-Offers-Model-of-Successful-Clean-Cooking-Program.pdf

[30] Bayasgalan, O. (2024, June 3–7). Coal-to-solar: Improving ger district lives [Conference presentation]. *Deep Dive Workshop (DDW) on Gender-Inclusive Clean Energy Solutions to Tackle Energy Poverty*, Manila, Philippines. https://asiacleanenergyforum.adb.org/ddw-gender-inclusive-clean-energy-solutions/

[31] Green Climate Fund. (2020, November 18). *Gender action plan for FP153: Mongolia Green Finance Corporation*. Green Climate Fund. https://www.greenclimate.fund/document/gender-action-plan-fp153-mongolia-green-finance-corporation

[32] Asian Development Bank. (2023b). *Gender Assessment and Action Plan—Khan Bank Green Bond Investment Project (FAST MON 57215)*. https://www.adb.org/sites/default/files/project-documents/57215/57215-001-gap-en.pdf

[33] Afghanistan, Bangladesh, Indonesia, Japan, Nepal, New Zealand, The Philippines, Republic of Korea, Sri Lanka, Solomon Islands, Timor-Leste, Viet Nam.

[34] Afghanistan, Australia, Bangladesh, Indonesia, Japan, Nepal, New Zealand, the Philippines, Republic of Korea, Sri Lanka, Solomon Islands, Timor-Leste, Viet Nam (source: https://asiapacific.unwomen.org/en/focus-areas/peace-and-security/national-action-plans)

[35] Narayan, P. (2024, June 3–7). Keynote speech [Keynote]. *Deep Dive Workshop (DDW) on Gender-Inclusive Clean Energy Solutions to Tackle Energy Poverty*, Manila, Philippines. https://asiacleanenergyforum.adb.org/ddw-gender-inclusive-clean-energy-solutions/

[36] United Nations General Assembly (UNGA). (2021). National report submitted in accordance with paragraph 5 of the annex to Human Rights Council resolution 16/21*: Solomon Islands* (UN Doc A/HRC/WG.6/38/SLB/1). https://www.asiapacificgender.org/sites/default/files/2024-03/National%20report%20Solomon%20Islands_2021.pdf

[37] Lorinet Foundation. (2024, January 4). Pioneer Facility Fund, Southeast Asia. *Lorinet Foundation*. https://www.lorinetfoundation.org/pioneer-facility/

[38] Government of India. (2023). *ECONOMIC SURVEY HIGHLIGHTS THRUST ON RURAL DEVELOPMENT*. Pib.gov.in. https://pib.gov.in/PressReleasePage.aspx?PRID=1894901

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