GENDER EQUALITY AND CLIMATE CHANGE SECTORS GUIDE

NOVEMBER 2024

ASIAN DEVELOPMENT BANK

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Cover design by Nathan Sarcia. On the cover: Fiji Road Upgrading (Sector) Project. Fijian ladies walking along the ADB funded Kings Road project in the outskirts of Suva. (Photo by Luis Ascui/ADB).

All photos are from ADB unless otherwise stated.

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Preface

The *Gender Equality and Climate Change Sectors Guide* aims to explain why integrating gender equality across sectors is critical for a low-carbon and climate-resilient transition. The Sectors Guide was developed by the Asian Development Bank's (ADB) Gender Equality Division in the Climate Change and Sustainable Development Department in collaboration with the Climate Change, Resilience and Environment Cluster, CCSD. It is intended for use by staff from the ADB's operations departments of the Asian Development Bank (ADB) and consists of the following chapters:

- ***Chapter 1:*** Gender Equality and Climate Change in the Agriculture Sector
- ***Chapter 2:*** Gender Equality and Climate Change in the Energy Sector
- ***Chapter 3:*** Gender Equality and Climate Change in the Transport Sector

Each chapter starts with why integrating gender equality into that sector is critical for a low-carbon and climate-resilient transition. The key gender issues in the sector are then presented, i.e., women's employment opportunities, participation, and leadership in decision-making in the sector. Entry points are provided to address these issues in ADB operations, and recommendations are made on how to integrate gender equality into the sector for a low-carbon and climate-resilient transition.

In the agriculture sector, which is a major contributor to climate change, livestock production alone contributes 14.5% of global greenhouse gas emissions. Chapter 1 emphasizes that the feminization of agriculture and the role women now play in both agricultural emissions and adaptation as well as food security are particularly important in Asia and the Pacific, where nearly 60% of women work in agriculture. Despite this fact that they comprise most of the region's labor force, women are strikingly underrepresented in decision-making on agriculture. Decision-making that incorporates women's unique contributions especially for local, land-based climate change mitigation and adaptation yields better climate outcomes. In terms of policy and governance, promoting women's leadership at regional and national levels can lead to the development of sustainable agriculture policies that integrate gender and climate change considerations.

Chapter 2 notes how in the energy sector, women are underutilized in the transition to clean energy, and that women make up only 32% of the world's renewable energy labor force. Evidence suggests that as energy company employees and leaders, women can accelerate the transition toward a net-zero energy sector by communicating women's consumer needs and promoting innovation. Women are underrepresented in science, technology, engineering, and mathematics education, and in technical and vocational education and training as well. This limits women's future employment opportunities as part of the just transition. Women can be and are key agents of change in the low-carbon energy transition even while facing structural barriers and historic inequities to participation in the energy sector.

In the transport sector, Chapter 3 states that it is critical to decarbonize transport systems to reach net-zero and build resilient systems to adapt to and reduce the impacts of climate change. Between 2020 and 2050, Asia and the Pacific's urban population is expected to grow by almost 50%. As part of the just transition to cleaner and more sustainable transport, there is a unique opportunity to design gender-responsive transport systems to deliver on both climate change and gender outcomes while generating long-term savings.[1]

The Sector Guide was developed to provide a broad overview of the nexus of gender equality and climate change within the agriculture, energy and transport sectors. We hope the insights that this publication offers will foster learning, dialogue, and innovative approaches to address the needs and empowerment of women and girls within the context of climate change adaptation and mitigation in our developing member countries.

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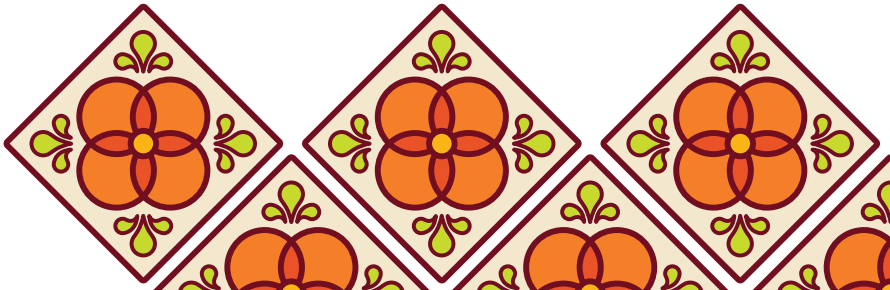
Climate Change and Sustainable Development Department
Asian Development Bank

[1] Per ADB's Operations Manual Section C2 on Gender Equality and Women's Empowerment in ADB Operations, gender responsiveness is paying attention to the unique needs of women, valuing their perspectives, respecting their experiences, understanding the developmental differences between girls and boys and between women and men, and ultimately empowering girls and women.



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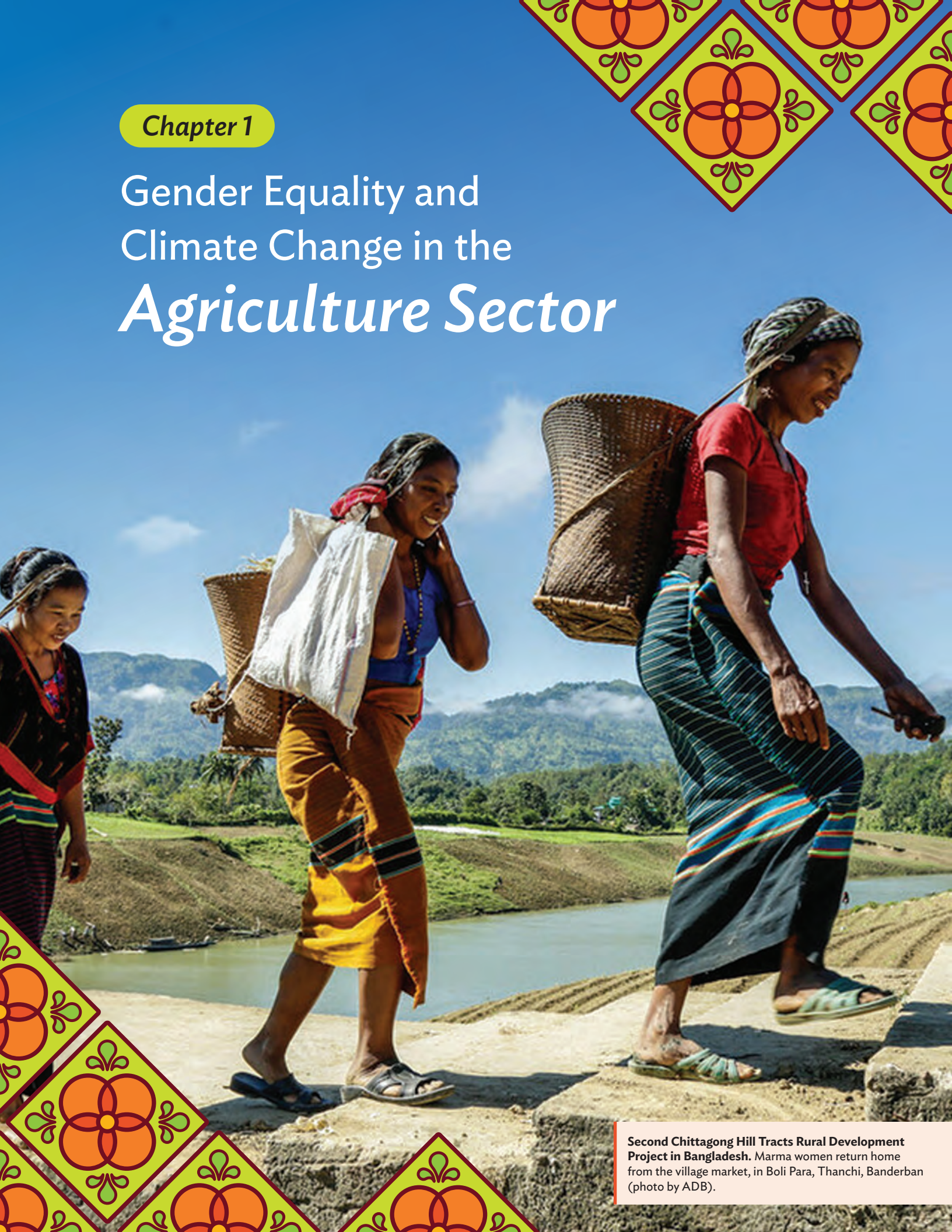
Abbreviations

ADB	Asian Development Bank
CAREC	Central Asia Regional Economic Cooperation
FAO	The Food and Agriculture Organization of the United Nations
IPCC	Intergovernmental Panel on Climate Change
ITF	International Transport Forum
OECD	Organisation for Economic Co-operation and Development
STEM	science, technology, engineering, and math

Chapter 1

Gender Equality and Climate Change in the *Agriculture Sector*



Second Chittagong Hill Tracts Rural Development Project in Bangladesh. Marma women return home from the village market, in Boli Para, Thanchi, Banderban (photo by ADB).

The feminization of agriculture and the role women now play in both agricultural emissions and adaptation as well as food security are particularly important in Asia and the Pacific, where nearly 60% of women work in agriculture. Decision-making that incorporates women's unique contributions yields better climate outcomes, especially for local land-based climate change mitigation and adaptation.

Private Sector Development Initiative in Papua New Guinea. Women in Fisheries Project helps women working in subsistence fishing by providing them with loans, training, and mentoring;, and access to markets to help them develop sustainable, formal businesses (photo by ADB).

Why Integrating Gender Equality into the Agriculture Sector is Critical for a Low-Carbon and Climate-Resilient Transition

The agriculture sector is a major contributor to climate change, with livestock production alone contributing to 14.5% of global greenhouse gas emissions.[1] Between 1996 and 2016, East Asia, the Pacific, and South Asia were responsible for 43% of global agricultural emissions.[2] Climate change will affect agricultural production in diverse ways through climate variability and seasonal changes. Research has already identified climate change-induced reductions in agricultural yields and increased food insecurity in India, Pakistan, and the Pacific.[3]

Fostering low-carbon, gender-inclusive, and climate-resilient development in the agriculture sector is critical. By 2030, it is estimated that heat stress could contribute to a loss of 2.2% of global working hours, thus leading to loss in income. Extreme heat poses a significant threat to agricultural productivity, with households headed by women in rural areas losing about 8% more of their income to heat stress than male-headed households.[4] A 1°C increase in long-term average temperatures is associated with a 23.6% reduction in farm income and a 34% reduction in the total incomes of households headed by women, relative to male-headed households.[5]

Empowering women can bring benefits to household food security and sustainable land management.[6] Gender-responsive interventions in the agriculture sector have the potential to deliver on both gender and climate outcomes.[7] For this reason, the Asian Development Bank (ADB) has placed gender at the center of its Climate Change Action Plan, 2023–2030 (Box 1).

1 The Food and Agriculture Organization of the United Nations (FAO). 2013. *Tackling Climate Change Through Livestock.*
2 A. Arcipowska et al. 2019. 5 Questions About Agricultural Emissions, Answered.
3 Pacific Community and Australian Aid. 2016. *Vulnerability of Pacific Island Agriculture and Forestry to Climate Change.*
4 FAO. 2024. Heatwaves and Floods Affect Rural Women and Men Differently, Widen Income Gap.
5 FAO. 2024. *The Unjust Climate: Measuring the Impacts of Climate Change on Rural Poor, Women and Youth.*
6 Intergovernmental Panel on Climate Change (IPCC). 2018. *Summary for Policymakers.*
7 International Finance Corporation. 2021. *The Business Case for Gender Responsive Climate-Smart Mining.*

Box 1: ADB's Commitments to Agriculture, Gender Equality, and Climate Change

The goal of the Asian Development Bank (ADB) for its agriculture and food security work is to help developing member countries (DMCs) strengthen inclusive food and agriculture value chains that improve farm and nonfarm employment opportunities; increase incomes; and create better living standards for poor people, women, and other vulnerable groups.[a] Significant opportunities exist to ensure that agriculture sector investments leverage synergies between gender equality and climate outcomes.

To foster low-carbon and climate-resilient agricultural development through its Climate Change Action Plan, 2023–2030,[b] ADB is committed to strengthen collaboration with partners in agriculture, food, and natural resources; support net-zero and a just transition in agrifood systems; adopt product-agnostic approaches to identifying high-impact climate intervention; and make 90% of incremental investments in agriculture, food, and natural resources climate-smart. The plan puts gender at the center of its climate agenda, with a commitment to work with developing member countries to integrate gender equality and women's empowerment into national policies and programs.

[a] ADB. ADB's Work in Agriculture and Food Security.
[b] ADB. 2023. *Climate Change Action Plan, 2023–2030.*
Source: ADB (Climate Change and Sustainable Development Department).

Smallholder Development Project in the Lao People's Democratic Republic. Phengsy Sipasert, 63, provides freshly cut grass to cattle on a farm in Vientiane province (photo by ADB).

Women's Productivity in Agriculture

Key Gender Issues

Gender gaps exist in access to productive agricultural resources, including in women's access to secure land tenure. Eliminating these gaps would increase women's capacity to improve food security and increase their agricultural yields enough to feed an estimated additional 100 million people.[8] Overcoming these structural barriers would enable women to contribute their unique knowledge and skills to sustainable land management, which is key to reducing agricultural greenhouse gas emissions while maintaining a sustainable, climate-resilient food supply.[9]

Women's access to productive agricultural resources is context-dependent. For example, in Nepal, women and children have major roles in and knowledge of natural resource management, from pasture management and livestock care to postharvest and caring duties. In lowland Southeast Asia, women have significant and underacknowledged roles in postharvest cleaning and storage but are rarely included in postharvest improvement trainings.

Climate change impacts increase the workload of women. This refers not only to women's unpaid reproductive labor, such as collecting fuel, firewood, and water, but also to productive activities that are typically managed by women, such as nontimber forest products and animal husbandry for household food consumption.[10] Heat stress further exacerbates these challenges, increasing women's responsibilities and health risks. Farm plots managed by women lose significantly more crop value than those managed by men during heat waves. In Ahmedabad, women working in informal sectors such as farming reported financial losses due to heat-induced spoilage of materials and lost income from reduced working hours.[11]

Entry Points

i. Improve the productivity of women farmers

This can be done through context-specific training and skills development in climate-smart agriculture technologies, practices, and crop varieties to build their capacity to play a key role in the just transition through sustainable agricultural or agro-processing production and distribution.

ii. Implement heat-resilient agricultural practices

These include gender-responsive early warning systems for heat waves, heat-tolerant crop varieties, innovative cooling solutions, and improved irrigation techniques. Female laborers who work outdoors have limited access to early warning systems due to social vulnerabilities like low literacy levels and lack of phone ownership.[12] Addressing these hurdles can help women farmers adapt to extreme heat and maintain productivity.

8 ADB. 2013. *Gender Equality and Food Security—Women's Empowerment as a Tool against Hunger.*
9 IPCC. 2019. *Climate Change and Land: Summary for Policymakers.*
10 United States Agency for International Development. An Online Sourcebook: Integrating Gender in Climate Adaptation Proposals: 7.1 Module A: Agriculture.
11 The All India Disaster Mitigation Institute. 2024. Urgency of Heatwave Risk Management.
12 A. Trahan, R. Walshe, and V. Mehta. 2023. Extreme Heat, Gender, and Access to Preparedness Measures: An Analysis of the Heatwave Early Warning System in Ahmedabad, India.

iii. Provide women farmers with access to machinery and equipment services, irrigation, and other productive assets

This will enable them to successfully manage farm businesses and close gender yield gaps.

iv. Invest in public infrastructure

Childcare centers as well as convenient, reliable, and affordable water, energy, and health care services reduce women's reproductive labor. They also support gender equality within households, as well as local climate change adaptation.[13]

Smallholder Development Project in the Lao People's Democratic Republic. A vegetable farmer waters plants at the organic farm in Boung Phao Village, Lao People's Democratic Republic (photo by ADB).

[13] Organisation for Economic Co-operation and Development (OECD) and Association of Southeast Asian Nations Secretariat. 2021. *Strengthening Women's Entrepreneurship in Agriculture in ASEAN Countries.*

Women's Employment in the Agriculture Sector

Key Gender Issues

The feminization of agriculture and the role women now play in both agricultural emissions and adaptation as well as food security are particularly important in Asia and the Pacific, where nearly 60% of women work in agriculture.[14] South Asia has the largest gender disparity in agriculture, where the sector employs 20% more female workers than male workers.[15]

Labor migration due to climate change is another significant gender issue in the region. As men migrate in search of jobs, often leaving behind their families in rural areas, women take on the roles traditionally held by men in agricultural work or other economic activities to sustain their household.

Although women play an increasingly critical role in agriculture, they commonly occupy lower-value segments of agricultural value chains (footnote 9). Women's roles in input provision and use, production, and harvesting are often informal and unacknowledged, and they are underrepresented in transportation, marketing, and sales of agricultural produce.[16]

Women in the region remain underrepresented in technical roles in the agriculture sector, such as agricultural extension workers, as they have more limited access to relevant technical and vocational education and training.[17] Due to the limited participation of women in designing and delivering curricula, agricultural extension programs often fail to target women and the specific barriers they face. This contributes to the limited adoption of climate-smart agricultural practices and climate-resilient technologies among female farmers.

In certain agricultural communities, women's livelihoods are more adversely impacted by climate change than that of men, as women are more reliant on natural resources and are overrepresented in the informal economy, specifically in microenterprises. Women-owned businesses are often categorized as microenterprises, being typically smaller scale and often home-based, due to the structural barriers women face in accessing financial services, information, and networks.[18] Consequently, women entrepreneurs often need additional support to launch sustainable, high-value agricultural enterprises and fully participate in the agriculture sector's just transition.

Heat stress significantly impacts women's agricultural productivity and economic opportunities. For instance, extreme heat can reduce crop yields and livestock productivity, affecting women's incomes and food security. Heat stress reduces the total incomes of rural households headed by women in low- and middle-income countries by $37 billion per year. [19]

[14] EmPower, United Nations Environment Programme, and UN Women. 2020. *Thinkpiece: Gender and Climate Change in the Context of COVID-19.*

[15] OECD. 2021. *Gender and the Environment: Building Evidence and Policies to Achieve the SDGs*.

[16] International Finance Corporation. 2016. *Investing in Women along Agribusiness Value Chains.*

[17] M. Mamun-Ur-Rashid, M. Kamruzzaman, and M. Emad. 2017. Women Participation in Agricultural Extension Services in Bangladesh: Current Status, Prospects and Challenges.

[18] OECD. 2021. *Strengthening Women's Entrepreneurship in Agriculture in ASEAN Countries*; UKAid. 2019. *Promoting Economic Empowerment for Women in the Informal Economy: WOW Helpdesk Guidance No. 1.*

[19] FAO. 2024. Measuring the Impacts of Climate Change on Rural Poor, Women and Youth.

Entry Points

(i) Improve women's access to technical and vocational skills training

Training on agribusiness, information, and climate-resilient agricultural production and distribution technology will open new opportunities for women in the agriculture sector (footnote 17). This can also support women to transition to management of higher-value, climate-resilient crops and livestock.

(ii) Increase women's representation in technical roles

This can support women farmers' adoption of climate-smart agriculture practices and technologies.[20] Female extension workers can increase women's participation in agricultural training, especially where cultural norms limit women's interactions with men outside of the household (footnote 16).

(iii) Expand women's quality job opportunities in agribusiness value chains

This includes distribution, food processing and agro-processing, and access to finance, including through the private sector and microfinance institutions. Another form of support is equitable access to business development, financial services, and digital technologies that improve women's access to market information and opportunities, as well as entrepreneurship capacity (footnote 16).

(iv) Provide women farmers with access to heat-resilient technologies and practices, such as heat-tolerant crop varieties, improved water management systems, and cooling facilities

Women farmers are unable to adopt climate-resilient agriculture due to land tenure issues, lack of knowledge, awareness, and skills regarding technology, climate change, and production methods.[21] Addressing these structural barriers can enhance their productivity and economic resilience to extreme heat.

(v) Support women within the agriculture sector to transition to less climate-vulnerable employment opportunities

This will also mitigate the impacts of labor migration in their communities by equipping them with the skills to take on alternative livelihoods such as "green" jobs. This includes investing in their access to science, technology, engineering, and mathematics education as well as vocational training.

[20] Global Gender and Climate Alliance. 2016. *Gender and Climate Change: A Closer Look at Existing Evidence.*
[21] R. Rao and P. Moharaj. 2023. Empowering Women in Climate-Resilient Farming through Sustainable Agriculture Technologies

A woman farmer in Siem Reap, Cambodia. tends to her crops. As part of ADB's program to strengthen women's resilience to extreme heat, consultations with women farmers were held to inform gender-responsive cooling innovations and agricultural practices (photo by Micaela Agoncillo/ADB).

Women's Participation and Leadership in Climate and Agriculture Decision-Making

Key Gender Issues

Despite comprising most of the region's labor force, women are strikingly underrepresented in decision-making on agriculture in Asia and the Pacific. At the community level, women's limited land rights can inhibit their participation in decision-making on agriculture and land management. Other challenges include discriminatory cultural and social norms, entry fees for membership in producers' organizations, and rural women's limited access to information about markets and social networks within producers' organizations (footnote 18).

Women's historic underrepresentation in agricultural cooperatives is slowly improving, but women remain a minority in membership and have little influence over decision-making in community-level organizations.[22]

Women's participation in decision-making better addresses the barriers facing women in the agriculture sector and improves the provision of public goods, benefiting women and families.[23] As women are commonly responsible for most manual labor on smallholder farms in Asia and the Pacific, they have specialized knowledge about crops and land management. Consequently,

[22] S. Akter et al. 2017. Women's Empowerment and Gender Equity in Agriculture: A Different Perspective from Southeast Asia.
[23] Z. Hessami and M. L. da Fonseca. 2020. Female Political Representation and Substantive Effects on Policies: A Literature Review.

decision-making that incorporates women's unique contributions yields better climate outcomes, especially for local land-based climate change mitigation and adaptation.[24]

Incorporating women's perspectives on heat stress into agricultural policies and decision-making processes can inform the development of resilient agricultural practices and policies that address the specific needs of women farmers, such as their increased workload during heat waves, limited access to early warning systems, and financial losses due to heat-induced crop spoilage, especially as they often remain to manage care responsibilities and agricultural duties when men migrate for work due to drought and heat stress.[25]

Entry Points

(i) Promote women's engagement and leadership in producer groups

This includes establishing policies to include more women, providing leadership training for women members, and gender awareness trainings for all members.[26] Establishing women-only producer groups can also be considered depending on the country context. Women's engagement and leadership in producer groups can contribute to equalized gender relations and serve as a bridge to participation in formal decision-making.[27]

(ii) Promote women's leadership in policy and governance at regional and national levels

Women's involvement can lead to the development of inclusive as well as sustainable agriculture policies. Women's inclusion in agricultural leadership roles must be encouraged to ensure that their experiences with heat stress are reflected in policies and practices. This can lead to more effective and inclusive strategies for managing heat stress in agriculture.

(iii) Support the integration of gender and climate change considerations into regional and national agriculture policies and plans

Climate-friendly and gender-responsive agriculture policies should be formulated from key recommendations from gender analyses.

[24] IPCC. 2019. *Climate Change and Land: Summary for Policymakers.*
[25] E. Southard and H. Randell. 2022. Climate Change, Agrarian Distress, and the Feminization of Agriculture in South Asia.
[26] International Food Policy Research Institute. 2024. ANEW Way Forward: Strategies to Promote Women's Empowerment in Farmer Producer Organizations.
[27] FAO and CGIAR Research Program on Climate Change, Agriculture and Food Security. 2013. Training Guide: Gender and Climate Change Research in Agriculture and Food Security for Rural Development.

How to Integrate Gender Equality into the Agriculture Sector for a Low-Carbon and Climate-Resilient Transition

Table 1 presents sets of questions and gender performance indicators that could be used at the design stage. Examples of ADB projects are included as references for illustration.[28]

Table 1: Gender Performance Indicators and Questions for Data Gathering and Assessment in the Agriculture Sector

Sample Gender Indicators	Questions for Baseline Data Gathering and Project Assessment	ADB Project Examples
Women farmers' improved productivity		

• Climate-smart on-farm irrigation technologies established on lands managed by women
• Percentage of female farmers, herders, and relevant technical government staff who report improved knowledge and skills on
  ◦ environmentally friendly and climate-resilient smart farming, agriculture and/or aquaculture, green agriculture, environmental management, climate change mitigation and adaptation
  ◦ climate-resilient horticulture, postharvest management, and climate-resilient agroforestry
  ◦ circular economy
  ◦ private partnership and green governance
  ◦ gender equity in sustainable agricultural practices
• Percentage of female farmers who are consulted on identifying climate-resilient, high-value crop options
• Percentage of female farmers who are in extension services and farm demonstrations on climate-resilient agriculture
• Percentage of female herders, farmers, primary processors, and relevant technical staff of local governments who report improved skills on climate-resilient and low-emission production and quality control management
• Seed recipient female farmers who demonstrate improved production following participation in training on climate-adaptive crop production
	• What is the participation rate of households headed by women in agricultural extension services or climate-smart agriculture training compared to households headed by men?
	• If disparities exist in participation rates based on gender, what are their implications and what solutions can reduce these disparities?
	• How can women's access to climate-smart agriculture practices and technologies be improved?
	• How can heat stress considerations be integrated into gender performance indicators and project assessments? This includes evaluating the effectiveness of heat-resilient agricultural practices, such as heat-tolerant crop varieties and access to cooling technologies, to ensure they meet the needs of women farmers and increase their adaptive capacity to extreme heat.
		PRC: Jiangxi Ganzhou Rural Vitalization and Comprehensive Environment Improvement
		
		Uzbekistan Climate Adaptive Water Resources Management in the Aral Sea Basin Sector Project

continued on next page

[28] This is modeled off Table 3 in ADB. 2018. Gender-Inclusive Approaches in the Energy Sector Tip Sheet.

Table 1 *continued*

Sample Gender Indicators	Questions for Baseline Data Gathering and Project Assessment	ADB Project Examples
Women's improved food security and nutritional outcomes		
• Percentage of women farmers who report improved household nutrition, measured via change in vegetable production and the quantity consumed in the household • Percentage of women of reproductive age who meet minimum dietary diversity	**Food security** • How do the food consumption patterns of women, men, girls, and boys differ? • What are the drivers of men and women's differing food consumption patterns and how are they affected by disasters and climate change impacts? **Nutrition** • How do people's nutritional outcomes vary by gender? • What are the implications on nutritional outcomes if disparities based on gender, age, and disability exist? • What more sustainable crops exist that could meet the nutritional requirements of all household members?	Lao PDR Sustainable Rural Infrastructure and Watershed Management Sector Project - Additional Financing
Women's enhanced decision-making on natural resource management and food security and safety		
• Percentage of farmer cooperatives and/or organizations led by women, or with at least 30% women in management positions who have been provided training on leadership and management and will be remunerated for their roles • Percentage of women on boards of value-chain linked farmer enterprises • Percentage of women in leadership positions in self-help groups (including livelihoods-based groups for agriculture and fisheries development, women's income generation) • Percentage of women who participate in district nutrition committees	• What barriers and opportunities exist for women's full and equal participation in decision-making on agriculture, for example, in producers' organizations? • What interventions and temporary measures, such as leadership training programs and targets, can be put into place to support the participation of women and other marginalized groups in decision-making around climate change mitigation and adaptation in the agriculture sector?	India Climate Resilient Brahmaputra Integrated Flood and Riverbank Erosion Risk Management Project in Assam

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Table 1 *continued*

Sample Gender Indicators	Questions for Baseline Data Gathering and Project Assessment	ADB Project Examples
Women's expanded opportunities in agribusiness value chains and access to finance		
• Percentage of low-carbon circular economy jobs created for women during project construction and operation • Percentage of women who hold technical and managerial positions in entities managing modern flow control and remote monitoring systems for irrigation • Percentage of women who report increased knowledge and/or skills on green business planning and management, or gender lens investing • Percentage of micro, small, and medium-sized enterprises owned or led by women that are involved in ecosystem protection who receive financial, marketing, or capacity-building support • Percentage of women-led green agriculture and aquaculture producers who receive financial assistance and assistance on use of value chain and market facilities • Percentage of female farmers and female-owned agribusinesses who report improved knowledge and skills on climate-smart agriculture and climate-adaptive agronomic techniques • Percentage of cooperatives or agro-enterprises owned or led by women who are supported with technical capacity and access to finance to introduce circular agriculture practices and waste management • Equity investments provided to enterprises owned by women in sectors of green agribusiness, environmental protection, and climate resilience • Market-driven business plans led by women to increase climate-resilient agricultural and fisheries practices completed and submitted for implementation • Percentage of farmers under the pilot insurance scheme who are women and percentage of these who are women heading households	• What opportunities exist for women's employment in agricultural extension services, particularly around climate-resilient and regenerative agriculture? • What barriers and opportunities exist for women's access to more profitable and climate-resilient crops and livestock? • What opportunities exist to ensure women's access to financial services, investment in climate-smart agriculture practices, and technologies to start enterprises? • What percentage of women in the agriculture sector in the project context have access to crop insurance for climate change and disaster impacts?	Tajikistan Climate- and Disaster-Resilient Irrigation and Drainage Modernization in the Vakhsh River Basin Project

continued on next page

Table 1 *continued*

Sample Gender Indicators	Questions for Baseline Data Gathering and Project Assessment	ADB Project Examples
Women's access to time-saving infrastructure		
• Number of women who have reduced time poverty as a result of childcare facilities operated with trained staff • Number of caregivers skilled in the delivery of childcare services • Number of women and children benefiting from childcare facilities • Number of skilled elderly care service jobs provided to local female residents	• What public and/or community infrastructure exists or can be built such as childcare and elder care centers, convenient water, energy and health care services?	Cambodia Sustainable Coastal and Marine Fisheries Project
Enabling environment		

• Climate-friendly and gender-responsive agribusiness policies formulated that integrate key recommendations from the gender analysis
• Gender-sensitive research studies produced on policies and governance related to green and climate-resilient farming, smart agricultural development, and agricultural greenhouse gas emission reduction
• Gender-sensitive green and sustainable agricultural practices guidebook developed featuring a participatory approach and disseminated to project stakeholders, farmers, agricultural managers, agricultural entrepreneurs, and extension workers
• Government ministry adopts a gender-sensitive landslide risk management road map accompanied by procedures on risk assessment, risk mitigation measures, and resettlement, which will include targets and actions to
  ◦ strengthen women's representation in senior and technical positions and in landslide risk management decision-making positions and structures; and
  ◦ enhance capacity on gender assessment of landslide risks and vulnerabilities
	• How often are gender-inclusive processes and stakeholder consultations conducted as part of sustainable agriculture and food security planning?
	• What agriculture policies and plans include both gender and climate indicators in their monitoring and evaluation frameworks?
	• What is the extent of commitment to collect, analyze, and use sex- and age-disaggregated data in the agriculture and food security-enabling environment to ensure that the just transition toward climate-resilient agriculture equally benefits women and men?
		Myanmar Climate-Friendly Agribusiness Value Chains Sector Project[a]
		
		PRC Hubei Yichang Rural Green Development Project
		
		Kyrgyz Republic Landslide Risk Management Sector Project

ADB = Asian Development Bank, PRC = People's Republic of China, Lao PDR = Lao People's Democratic Republic.
[a] Effective 1 February 2021, ADB placed a temporary hold on sovereign project disbursements and new contracts in Myanmar.
Source: Asian Development Bank (Climate Change and Sustainable Development Department).

Chapter 2

Gender Equality and Climate Change in the *Energy Sector*

Renewable Energy Development Project in Indonesia. Sri Wahyuni is a chemical analyst in Lahendong Geothermal Plant (photo by ADB).

Women are underutilized in the transition to clean energy. While women face structural barriers and historic inequities to participation in the energy sector, women can be and are key agents of change in the low-carbon energy transition. Evidence suggests that as energy company employees and leaders, women can accelerate the transition toward a net-zero energy sector by communicating women's consumer needs and promoting innovation.

Tajikistan: Strengthening Technical and Vocational Education and Training. Zamira Ubaydulloeva works as an electrician and a cook in a quarry in the Shahrinav district (photo by ADB).

Why Integrating Gender Equality into the Energy Sector is Critical for a Low-Carbon and Climate-Resilient Transition

Evidence suggests that women who lead businesses in energy system supply chains tend to perform as well as—or outperform—their male counterparts. However, women are less involved and are underutilized in the transition to clean energy, including, for example, in energy governance and businesses.[29] Women and men's equal access to clean energy is a critical enabler for sustainable economic growth, as energy poverty can contribute to environmental injustice and worsen unequal access to natural resources.

Lack of access to modern energy impacts women's health and safety due to their work burden, which can include, for example, risks associated with collecting energy resources (e.g., biomass) and exposure to indoor air pollution from cooking with dirty fuel.[30] Sixty percent more women than men are at high risk of lacking access to cooling services.[31]

Extreme heat exacerbates these challenges, particularly for women who spend long hours collecting fuel and performing other energy-related tasks that increase health risks and reduce productivity.

As the energy sector represents a significant share of ADB's portfolio at $1.173 billion as of 2022, significant opportunities exist to ensure that energy-related investments generate social, environmental, and economic benefits—particularly in tackling climate change and promoting gender equality (see Box 2). In this light, the just transition is critical as "using a gender-lens and integrated territorial development approaches ... may support the economic regeneration of communities that are dependent on fossil fuels and greenhouse gases emissions-intensive activities, and provide alternative pathways to sustainable, inclusive, resilient development.[32]

[29] ENERGIA. 2019. *Gender in the Transition to Sustainable Energy for all: From Evidence to Inclusive Policies.*
[30] C. P. Nguyen and T. D. Su 2021. Does Energy Poverty Matter for Gender Inequality? Global Evidence. *Energy for Sustainable Development*.
[31] Sustainable Energy for All. 2022. New Data: Cooling Access Gaps among Women and Men in 2022.
[32] MDB Group. 2021. MDB Just Transition High-Level Principles.

Box 2: ADB's Commitments to Energy, Gender Equality, and Climate Change

The Asian Development Bank (ADB) has made the following commitments on gender equality and climate change in energy projects:

(i) The 2021 ADB Energy Policy focuses on assisting developing member countries to develop sustainable and resilient energy systems, as well as supporting a low carbon just transition, for which gender equality is a key consideration.[a]
(ii) The Energy Policy explicitly promotes gender equality in ADB energy operations including through increasing employment opportunities for women as part of the energy transition, meaningful consultation with women, and inclusion of women in decision-making and enhancing women's leadership at all stages of energy sector operations. The policy also notes the need to address prevailing gender inequalities in energy access and commits to gender designs informed by women's different energy needs and gender roles.
(iii) Within its Climate Change Action Plan, 2023–2030, ADB is focused on identifying deep decarbonizing opportunities in key industries, scaling up investments to replace and retrofit large single-source emitters and climate-vulnerable infrastructure, supporting the development of climate-smart infrastructure design standards, and adopting product-agnostic approaches to identifying high-impact climate interventions in energy and related industrial sectors.[b]

[a] ADB. 2021. *Energy Policy: Supporting Low-Carbon Transition in Asia and the Pacific*.
[b] ADB. 2023. Climate Change Action Plan, 2023–2030.
Source: ADB. 2021. *Energy Policy: Supporting Low-Carbon Transition in Asia and the Pacific* and ADB. 2023. Climate Change Action Plan, 2023–2030.

Women's Employment Opportunities in the Low-Carbon Energy Transition

Key Gender Issues

Women make up only 32% of the world's renewable energy labor force and are clustered in administrative roles, taking up only 25% of management positions (footnote 5). Women are underrepresented in science, technology, engineering, and mathematics (STEM) education in school, and in turn, university and technical and vocational education and training. This limits women's future employment opportunities as part of the just transition and a green, resilient, and inclusive economic recovery from the coronavirus disease pandemic (footnote 14).

The centers of production of energy (raw materials, plant installation, etc.) are often in remote geographical areas, limiting the participation of women in the sector. Women's traditional roles also mean they are less likely to work in energy sector jobs, and instead work in the informal sector, where they often experience poor working conditions in extremely hot, poorly ventilated spaces with little to no access to electricity. Low-carbon energy transition could reinforce structural inequities, providing short-term (gig economy) opportunities in the informal sector without long-term benefits. Growth in sectors that are critical to support the energy transition, such as in critical minerals, need to consider women.

While women face structural barriers and historic inequities to participation in the energy sector, women are key agents of change in the low-carbon energy transition. Evidence suggests that as energy company employees, women can accelerate the transition toward a net-zero energy sector by communicating women's consumer needs and promoting innovation.[33] Several studies have shown how gender diversity in the workplace unlocks innovation, reduces costs, and increases the competitiveness of clean energy technologies.[34]

Entry Points

(i) Invest in women's vocational and technical STEM education and skills to expand access to green jobs.[35]

Include targets for women's representation in the renewable energy sector labor force, especially in technical and managerial roles. Invest in programs that encourage girls and young women to choose sustainable energy-related careers[36] through scholarships, internships and job placements, and intergenerational mentorship.

(ii) Promote women's entrepreneurship through business development services, including access to finance.

This includes procuring from women-led businesses as part of energy project operations. Address specific barriers to women's enterprise growth through interventions in areas of energy efficiency and usage, as well as in product improvement and quality assurance.

(iii) Ensure that women working in the energy sector have access to heat stress mitigation measures, such as shaded work areas, hydration stations, and flexible working hours during peak heat periods.

Support women entrepreneurs in developing energy solutions that are resilient to heat stress, such as improved cooking fuels and stoves, and better-ventilated kitchens that reduce air pollution and heat-related illnesses.

33 EY. 2019. Could Gender Equality be the Innovation Boost Utilities Need?
34 2X Climate Finance Taskforce. 2021. Ways to Gender-Smart Climate Finance: Sustainable Energy.
35 The International Labour Organization defines green jobs as decent jobs that contribute to preserve or restore the environment, be they in traditional sectors such as manufacturing and construction, or in new, emerging green sectors such as renewable energy and energy efficiency.
36 ADB. 2018. Gender-Inclusive Approaches in the Energy Sector Tip Sheet.

Women's Participation and Leadership in Climate and Energy Decision-Making

Key Gender Issues

Women increasingly bear the brunt of climate change impacts but are not at the center of climate responses. They face social and economic barriers to participating in and leading climate and energy decision-making and are underrepresented at all levels. For example, women represent only 4% of board members in the power and utility sector in the Asia and Pacific region.[37] At international climate negotiations during the Conference of the Parties in 2021, women comprised 13% of the heads of delegation.[38]

Low levels of women's participation in decision-making means that women's priorities, such as reducing time poverty and ensuring the availability of clean cooking fuel; or promoting opportunities for women in STEM education, may not be reflected in renewable energy policies (footnote 12). At a community level, women's limited land rights can limit their input into decision-making on energy; for example, in the management of forestry resources and community water resources. Other structural challenges include discriminatory cultural and social norms.

Increasing women's participation in energy-related decision-making not only improves their status within communities at the local level but can also generate more effective and equitable outcomes. There is extensive international evidence that women's participation improves the effectiveness of promoting household renewable energy uptake and community-level climate change adaptation measures and land-based mitigation and adaptation measures.[39] Women's experiences with heat stress should be integrated into energy policymaking and decision-making processes to inform the development of resilient energy systems that address the specific needs of women and ensure equitable access to cooling services during extreme heat events

Entry Points

i. Promote women into leadership roles in energy sector government agencies and private sector companies.

This could be through establishing targets (depending on the country and project context), investing in flexible and family-friendly workplace policies such as paid parental leave, equipping women to take on new managerial positions through leadership training programs, as well as increasing women's opportunities for training in more technical fields of clean energy.

An ADB project under the Central Asia Regional Economic Cooperation (CAREC) Energy Strategy 2030 project is a good example of these initiatives. The project supports women to join existing international networks; and promotes their visibility in the regional energy sector by ensuring that 50% of speakers and panelists at the CAREC Energy Investment Forum are women, and by organizing a CAREC Women in Energy Summit.[40]

ii. Promote women's leadership in policy and governance at regional and national levels.

Women's involvement can lead to the development of inclusive and sustainable energy policies. Integration of gender and climate change considerations into national and regional energy policies and plans needs to be supported. The inclusion of women's perspectives on heat stress in energy policy discussions must be encouraged, for more comprehensive and inclusive energy strategies that account for the unique challenges women face during heat waves.

[37] World Bank. 2020. Stepping up Women's STEM careers in Infrastructure.
[38] United Nations Framework Convention on Climate Change. 2021. Gender Composition: Report by the Secretariat.
[39] EmPower and United Nations Environment Programme. 2020. Powering Equality: Women's Entrepreneurship Transforming Asia's Energy Sector; UN Women. 2017. *Understanding Cost-Effectiveness of Gender-Aware Climate Change Adaptation Intervention in Bangladesh*; IPCC. 2018. *Summary for Policymakers*.
[40] ADB. 2020. *Technical Assistance Report on Fostering Expanded Regional Electricity and Gas Interconnection and Trade under the CAREC Energy Strategy 2030*.

Women's Role in Community-Level Energy Interventions for Climate Change Mitigation and Adaptation

Key Gender Issues

Deeply embedded structural conditions determined by gender, caste or ethnicity, religion, language, and geography have made access to and benefits from energy resources highly uneven.[41] Women and men often have different priorities for clean energy investment; for example, women are more affected by inadequate heating and cooling because women often spend more time at home due to the gendered division of labor.

Heat waves exacerbate the energy burden on women, particularly in households without access to cooling solutions. Women may face mobility constraints due to social and gender norms and are disproportionately affected by exposure to air pollutants and heat stress from traditional cooking fires. Traditional stoves using biomass fuel emit harmful pollutants, contributing to 3.8 million premature deaths annually from household air pollution.[42] Data from India shows that women exposed to heavy indoor smoke are three times more likely to suffer chronic obstructive pulmonary disease than those who use clean fuels.[43]

As men typically have more control over cash resources within a household, they tend to be responsible for decision-making around investments in energy technologies. Equitable and inclusive access to clean energy is pivotal for women, especially since modern energy infrastructure tends to reach women last. Therefore, it is important to ensure that development pathways in energy technology are informed by women's needs and priorities.

Due to women's responsibility for cooking in many households, women, girls, and young children are more exposed to indoor air pollution from burning solid fuels.

Women are more likely than men to take up renewable energy options at the household level to save money on solid fuels or poor-quality fuels, and reduce their time spent collecting fuel and firewood. The inclusion of women in community-based adaptation is essential because women are often natural resource managers who can help develop strategies to cope with climate-related risks.[44]

Green Power Development Project in Bhutan. A woman installs solar panels on a roof in Bhutan (photo by ADB).

41 ADB. 2018. *Gender Equality and Social Inclusion Assessment of the Energy Sector: Enhancing Social Sustainability of Energy Development in Nepal.*

42 Parmar et al. 2019. Exposure to Air Pollutants and Heat Stress among Resource-Poor Women Entrepreneurs in Small-Scale Cassava Processing.

43 United States Agency for International Development. An Online Sourcebook: Integrating Gender in Climate Adaptation Proposals: 7.7 Module G: Energy.

44 United Nations Development Programme. 2010. Gender, Climate Change and Community-Based Adaptation.

Solar entrepreneur of rural India. DURGA Energy is a module manufacturing plant completely owned and operated by local tribal women of Dungarpur District, Rajasthan (photo by Kunal Gupta/Climate Visuals Countdown).

Entry Points

i. Promote and protect women's equal access, benefit, and control over new modern clean energy sources

This includes access to finance and investing in technical assistance and capacity building for indigenous-led and indigenous-focused sustainable energy initiatives.[45] Indigenous-led approaches to renewable energy production, including with community-based micro hydropower, have had promising results.

ii. Implement community-level energy projects that include heat stress management components

This includes promoting sustainable, accessible cooling technologies and providing training on heat stress mitigation.

iii. Promote women's participation in natural resource management and conservation efforts

Women need to be trained in using equipment that runs on renewable energy.

iv. Improve women's and children's health outcomes

This can be done by prioritizing clean cooking projects and working to reduce the number of households in the Asia and Pacific region that still rely on "dirty" cooking fuels.

[45] Indigenous Peoples Major Group. 2018. *Doing It Right! Sustainable Energy and Indigenous Peoples.*

How to Integrate Gender Equality into the Energy Sector for a Low-Carbon and Climate-Resilient Transition

Table 2 presents sets of questions and gender performance indicators that could be used at the design stage. Examples of ADB projects are included as references for illustration.

Table 2: Gender Performance Indicators and Questions for Data Gathering and Assessment in the Energy Sector

Sample Gender Indicators	Questions for Baseline Data Gathering and Project Assessment	ADB Project Examples
Women's increased opportunity for energy-based livelihoods and income-generating activities in low-carbon energy transition		
• Increased number of women-led or women-owned clean energy or energy efficiency enterprises benefiting from available or productive use of energy • Increased number of women-owned clean energy or energy efficiency enterprises established • Increased number of loans or other financial products disbursed to clean energy or energy efficiency enterprises owned d by women or with majority women workers • Collection, analysis, and use of sex-disaggregated data on the suppliers of products or services	• How many women-led and/or women-owned clean energy or energy efficiency enterprises benefit from productive use of energy? • What percentage of loans are disbursed to women-led and/or women-owned clean energy or energy efficiency enterprises? • What incentives and support can help increase the number of women entrepreneurs in clean energy and energy efficiency? • What barriers do women-led and/or women-owned clean energy or energy efficiency enterprises face? • How can gender-responsive interventions address these barriers, particularly women entrepreneurs' access to finance and resources? • What support can be provided to women-led and/or women-owned micro, small, and medium-sized enterprises contributing to climate change mitigation to strengthen their resilience to economic and environmental shocks? • What efforts, if any, are being made to include women-owned and/or women-led enterprises in renewable energy procurement?	Tonga: Nuku'alofa Network Upgrade Project

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Table 2 *continued*

Sample Gender Indicators	Questions for Baseline Data Gathering and Project Assessment	ADB Project Examples
Employment in the clean and renewable energy sector		

• Proportion of women in technical positions in clean power system and/or plant installation, maintenance, and operation; and green energy production such as rooftop solar operation
• Proportion of women as paid interns in technical roles in clean power plants
• Proportion of relevant female technical staff who report increased knowledge and skills on
  ◦ energy efficiency and safety measures
  ◦ emissions reduction measures
  ◦ operation and maintenance of digital substations
  ◦ climate change impact mitigation and adaption
  ◦ hydropower development
  ◦ installation and maintenance requirements of renewable heating systems
  ◦ operation of solar-hybrid energy systems
• Proportion of staff who report increased knowledge on use and maintenance of sex-disaggregated data for provision of customer services
	• What temporary measures such as quotas or targets are in place to support an increase of women employed in the clean energy sector?
	• What mentorship networks and gender-responsive workplace policies, such as childcare services, exist to support women in the clean energy sector?
	• What opportunities exist for promoting women's access to training in clean energy?
	• What measures related to renewable energy and energy efficiency, such as targeted programs to promote the participation of women in STEM education or TVET, are in place?
		Uzbekistan Distribution Network Digital Transformation and Resiliency Project
		Mongolia Renewable Heating Demonstration in Remote Areas
		Azerbaijan Alat Solar Power Plant
		Thailand Green Yellow Rooftop Solar Project

Increased accessibility of clean (i.e., non-coal) and/or renewable energy (solar, wind, and hydropower)		
• Increased number of households headed by women with access to clean energy (through subsidized connections) • Percentage of loans made to households headed by women for purchase and installation of rooftop solar home systems • Percentage of households headed by women with smart meters installed • Women's time spent on accessing energy sources decreased	• How many households headed by women have access to clean energy, as compared to households headed by men? • If disparities based on gender exist, what are their implications? • Are heat stress considerations incorporated into gender performance indicators and project assessments? This includes evaluating the effectiveness of energy solutions in mitigating heat stress and ensuring that women have equitable access to energy services that enhance their resilience to extreme heat.	Regional: Maximizing Poverty Alleviation and Gender Co-benefits through Innovative Clean Energy Solutions in Asia and the Pacific

continued on next page

Table 2 *continued*

Sample Gender Indicators	Questions for Baseline Data Gathering and Project Assessment	ADB Project Examples

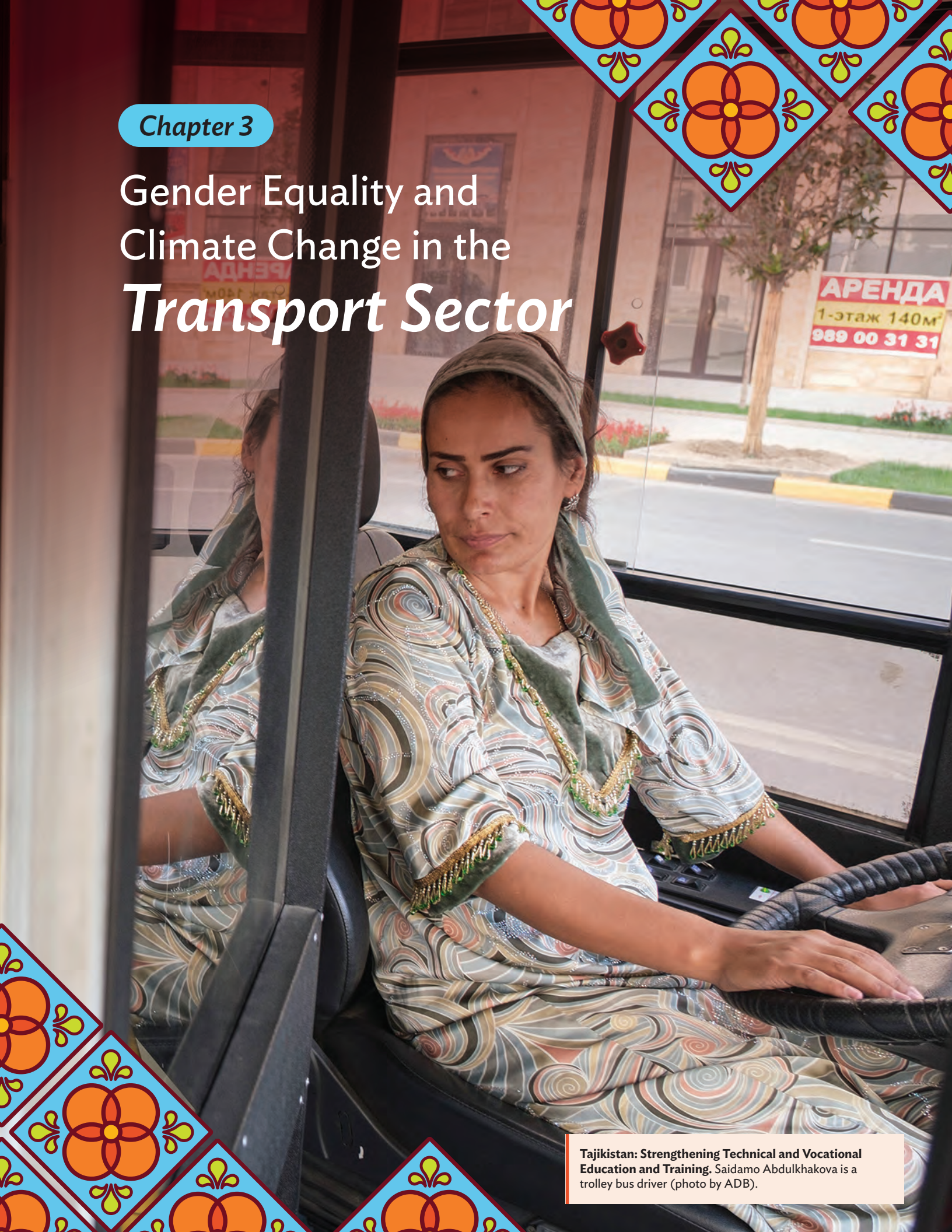
• Proportion of women residential consumers and/or female participants in user education programs who report increased knowledge or skills in
  • efficient and safe electricity use,
  • energy efficiency measures or clean energy technologies,
  • climate- and disaster-resilient infrastructure, and
  • safe use of electricity for household chores including cooking and energy conservation
	• How do energy use audits by energy end users adequately capture women's activities and energy use and how can they be improved?
	• What are the differences between men and women in their customer satisfaction ratings of clean energy or energy efficiency technologies, and the opportunities for these technologies to better meet the needs of women? How can clean energy technologies be made more affordable for a range of social groups, including women?
	• Do women have access to training to build their user knowledge on and access to clean energy technology?	

Optimized benefits and efficiency of energy for health, safety, and well-being		
• Reduced workload of women in the households • Proportion of women customers who use improved cooking stoves as their primary cooking source • Increased number of female distribution agents of improved cooking stoves	• How do changes to energy use or new clean energy technologies reduce women's unpaid household labor? • What energy sources do households use for cooking?	India Greenway Carbon Credits Gender Finance Project
Enabling environment		
• National strategies, plans, and/or implementation frameworks developed in line with the United Nations Framework Convention on Climate Change's enhanced Lima Work Programme and its gender action plan • Gender and social inclusion framework for the Energy Transition Mechanism developed	• Do monitoring and evaluation frameworks for energy policies and plans include both gender and climate indicators? • Do strategies, plans or implementation frameworks include a commitment to collect, analyze, and use sex-disaggregated data to ensure that low-carbon transition benefits women and men equally?	Integrating Gender and Social Inclusion Dimensions in Climate Change Interventions in Southeast Asia

STEM = science, technology, engineering, and mathematics; TVET = technical and vocational education and training.
Source: Asian Development Bank (Climate Change and Sustainable Development Department).

Chapter 3

Gender Equality and Climate Change in the *Transport Sector*



Tajikistan: Strengthening Technical and Vocational Education and Training. Saidamo Abdulkhakova is a trolley bus driver (photo by ADB).

Between 2020 and 2050, Asia and the Pacific's urban population is expected to grow by close to 50%. It is critical to decarbonize transport systems to reach net-zero and build resilient systems to adapt to and reduce the impacts of climate change. As part of the just transition to more sustainable transport, there is a unique opportunity to design gender-responsive transport systems to deliver on both climate change and gender outcomes while generating long-term savings.

Lahore Rapid Mass Transit System Project. Women and children ride the Lahore Metro Bus service in Pakistan (photo by ADB).

Why Integrating Gender Equality into the Transport Sector is Critical for a Low-Carbon and Climate-Resilient Transition

Almost a quarter of energy-related global greenhouse gas emissions come from transport, the world's largest energy end-use sector.[46] Transport emissions are predicted to grow substantially in developing countries—where transport is the fastest-growing energy end-use sector—particularly most rapidly in Asia and the Pacific, due to increased demand caused by rapid population growth, economic development, and urbanization.

Between 2020 and 2050, Asia and the Pacific's urban population is expected to grow by close to 50% (footnote 45). It is therefore critical to decarbonize transport systems to reach net-zero and build resilient systems to adapt to and reduce the impacts of climate change. As part of the just transition to more sustainable transport, there is a unique opportunity to design gender-responsive transport systems to deliver on both climate change and gender outcomes while generating long-term savings.[47] Gender is the primary determinant of an individual's access to suitable transport, although age, income, disability, location, and ethnicity are also important factors (footnote 46). If the just transition approach is not used while developing low-carbon and climate-resilient transport systems, the challenges that women face may be further compounded. For example, transport systems may become more difficult or expensive to access, thereby increasing gender inequality.

Extreme heat also affects women's access to and use of transport systems, particularly in underserved urban and rural areas. For instance, heat stress can make travel more physically demanding and dangerous, especially for those walking or using nonmotorized modes of transport. Cultural and gender norms, such as required layers of clothing and headscarves, can exacerbate the discomfort and risks associated with heat. Additionally, social restrictions and lower prioritization as passengers on public transport further limit women's mobility.

The International Transport Forum (ITF) states that developing countries in Asia and the Pacific have an opportunity to "leapfrog" to sustainable infrastructure and transport systems while meeting increasing transport demand (footnote 45). ADB for its part has committed to place gender at the center of its climate agenda (Box 3).

[46] International Transport Forum (ITF). 2021. Global Transport Outlook 2021.
[47] The Secretary-General's High-Level Advisory Group on Sustainable Transport. 2016. Mobilizing Sustainable Transport for Development.

Box 3: ADB's Commitments to Transport, Gender Equality, and Climate Change

Strategy 2030 of the Asian Development Bank (ADB) includes the twin targets of 75% of projects promoting gender equality and supporting climate change adaptation and mitigation.[a] ADB's Climate Change Action Plan, 2023–2030 puts gender at the center of its climate agenda, with a commitment to work with developing member countries to integrate gender equality and women's empowerment into national policies and programs.[b]

ADB's transport strategy aims to (i) support public transport systems with women-focused security and station facilities; (ii) encourage local community employment opportunities for women; (iii) support ADB gender targets in transport sector support; and (iv) promote changes in transport agencies to support gender equality through employment as regular employees, consultants, and contractors and to inform the design of transport systems.[c]

[a] ADB. 2018. *Strategy 2030: Achieving a Prosperous, Inclusive, Resilient, and Sustainable Asia and the Pacific*.
[b] ADB. 2023. *Climate Change Action Plan, 2023–2030*.
[c] ADB. 2023. *Strategy 2030 Transport Sector Directional Guide*.
Source: Asian Development Bank (Climate Change and Sustainable Development Department).

Sustainable Transport Solutions That Work for Women

Key Gender Issues

Mobility is heavily influenced by gender. Across Asia and the Pacific, women have different transport needs from men, with women spending an average of 90 minutes per day traveling for household or medical purposes.[48] Multipurpose travel or "trip chaining" is a characteristic of women's mobility and heavily influences their transport choices.[49] Evidence notes clearly that transport use patterns are shaped by social factors, gender, age, disability, and income. However, these diverse needs are yet to be mainstreamed in transport system design.

Women and men use public transportation differently. In some countries in Asia and the Pacific, women spend more time using public transport than men, as men often get precedence over owned-vehicle use.[50] Financial resources can be a barrier to public transport for women, and limited safe, affordable, public transport options impact women's employment choices.[51] In rural areas, women have a unique set of transport needs and options. Owing to cost and distance, women lack access to motorized transport, which means they predominantly walk or use nonmotorized modes of transportation.

Women face limited access to health care and cooling facilities due to personal safety concerns and lack of personal transportation.[52] During heat waves, these issues are exacerbated as women may avoid public transport to reduce exposure to extreme heat, further limiting their access to essential services and increasing their vulnerability. Additionally, cultural norms may restrict women's access to public transportation, preventing them from traveling to cooler places and exposing them to greater heat stress at home.

[48] McKinsey Global Institute. 2018. The Power of Parity: Advancing Women's Equality in Asia Pacific.
[49] ITF. 2021. *Transport Innovation for Sustainable Development: A Gender Perspective*.
[50] UN Women and UN Office for Project Services. 2019. *Guide to Integrating Gender into Infrastructure Development in Asia and the Pacific: Transport and roads*.
[51] McKinsey Global Institute. 2018. *The Power of Parity: Advancing Women's Equality in Asia Pacific*; ITF. 2021. *Global Transport Outlook 2021*.
[52] Sorensen et al. 2018. Climate Change and Women's Health: Impacts and Opportunities in India.

Climate impacts on transport infrastructure, including the accelerated deterioration of infrastructure assets and increased need and cost of maintenance, will affect women and men differently in rural and urban areas. Women's mobility is more likely to be impacted by deterioration of nonvehicular roads and access pathways. Measures to decarbonize the transport sector, such as the promotion of electric vehicles, energy efficiency improvements, and the reduction of the carbon intensity of the sector have significant socioeconomic implications for women. Projects need to consider how e-mobility is more suited to urban contexts due to resource availability, cost-effectiveness, and efficiency.

Entry Points

i. Link gender analysis with climate risk and vulnerability assessments of the transport sector.

Understanding the transport needs of women and men, and the climate change impacts of these transport options can ensure that inclusive and climate-smart investments are prioritized.

ii. Support tailoring transportation investments to users' needs, which can influence the uptake and use of mass transit.[53]

The collection and analysis of sex-, age- and disability-disaggregated data (including on trip duration, purpose, and mode) should be prioritized as these can help overcome the existing data biases in large transport datasets and support the design of equitable and inclusive transport operations and infrastructure.[54]

Gender considerations, such as increasing the number of female staff or having all-women staff, as well as training transportation staff on women's safety, are critical to ensuring women's increased access to and use of public transportation.

iii. Support intermodal transport systems that can meet women's flexible transport needs in cities

Informal and formal transport systems, such as fleets of lightweight electric vehicles, or bicycles, must be incorporated near public transport hubs. Also, increase the safety, useability, and attractiveness of cycling to encourage women's uptake of this low emission mode of transport.[55]

Lower Secondary Education Development Project in Viet Nam. Pupils of Ha Thuong Secondary School are on their way to school (photo by ADB).

[53] ITF. 2018. *Understanding Urban Travel Behavior by Gender for Efficient and Equitable Transport Policies.*
[54] ITF. 2021. *Global Transport Outlook 2021.*
[55] OECD and ITF. 2023. *Gender Equality and the Role of Women in Decarbonising Transport*.

Women's Employment in Sustainable Transport

Key Gender Issues

In Asia and the Pacific, women are typically found in fewer than 9% of transport jobs.[56] However, sustainable transport creates an opportunity to advance women's participation in the sector as part of the just transition and provide women with transport services to take up alternative employment if their current jobs are impacted by climate change. For example, in Nepal, in a traditionally male-dominated transport sector, women make up a large proportion of *safa-tempo* (minibus) drivers. They often face challenges in accessing financial services to attain or upgrade their electric vehicle technology, such as lithium-ion batteries that last longer, which could otherwise improve their livelihood opportunities.[57]

Women are underrepresented in scientific and technological research and development, comprising 23% of the workforce in South Asia and West Asia, 25% in East Asia and the Pacific, and 48.5% in Central Asia.[58] Research and development will be key to driving the further development of low-carbon, climate-resilient transport solutions, and women's contributions can help to ensure that sustainable transport technology meets the needs of women.

Entry Points

i. Improve women's access to TVET and invest in women's STEM skills

This can be done by setting targets for women and girls to enter STEM subjects, reforming STEM curricula, supporting teacher training in STEM subjects, and exposing girls to career opportunities in STEM fields through coding camps. The qualifications required for professional public transportation operators, such as bus drivers, and requirements to get business operation licenses should be considered when supporting women's entry into technical and vocational education and training.

ii. Expand access to green jobs[59]

This should include targets for women's representation in the sustainable transport labor force, especially in technical and managerial roles. Other activities to consider are behavior change and awareness campaigns promoting women and girls in the sustainable transport sector, as well as establishing partnerships with organizations that provide mentorship and networking for women in technical sectors.

iii. Consider innovative financing to women entrepreneurs

This will increase uptake and support the shift to electric mobility. Women entrepreneurs should be supported so they can become accredited carbon offset providers. This overcomes barriers to women's livelihoods and empowerment in a male-dominated sector and contributes to reductions in greenhouse gases and local air pollution.

[56] Sustainable Mobility for All. 2023. *Gender Imbalance in the Transport Sector: A Toolkit for Change*.
[57] UN Environment Programme. 2019. *Driving an Electric Future in Nepal*.
[58] UNESCO Institute of Statistics. 2020. *Women in Science*.
[59] Green jobs are defined by the International Labour Organization as decent jobs that contribute to preserve or restore the environment, be they in traditional sectors such as manufacturing and construction, or in new, emerging green sectors such as renewable energy and energy efficiency.

Women's Participation and Leadership in Decision-Making on Sustainable Transport

Key Gender Issues

The lack of sustainability of the transport sector could be attributed to the lack of female representation in its leadership.[60] Women are underrepresented across all levels of decision-making: out of the 64 member countries of the International Transport Forum, only 7 countries had female transport ministers in 2023.[61] Research demonstrates that women make more sustainable transport-related decisions, and that increasing the representation and visibility of women throughout transport decision-making improves the inclusivity of transport systems. There is also evidence that the presence of female executives on boards of directors increases enterprises' green innovation.[62]

Without gender-responsive consultation processes in transport projects, women's specific needs regarding sustainable transport may not be addressed. The participation of women in local consultation and decision-making on sustainable transport can support the design of more climate-friendly transport systems. Incorporating women's perspectives on heat stress into transport planning and decision-making processes can inform the development of transport systems that are resilient to extreme heat and address women's specific needs during heat waves.

Entry Points

i. Promote women into leadership roles

This can be achieved by establishing targets (depending on the country and project context), investing in flexible and family-friendly workplace policies such as paid parental leave, equipping women to take on new managerial positions through leadership training programs, as well as increasing women's opportunities for training in more technical fields of sustainable transport.

ii. Promote women's leadership in policy and governance at regional and national levels.

Women's involvement can lead to the development of inclusive and sustainable transport policies, and support the integration of just transition and gender equality considerations in transport policies and sector planning. In particular, the just transition approach should be integrated in nationally determined contributions planning and implementation for the transport sector.

60 OECD and ITF. 2022. *Gender Equality and the Role of Women in Decarbonising Transport.*
61 Sustainable Mobility for All. 2023. *Gender Imbalance in the Transport Sector: A Toolkit for Change.*
62 X. He and S. Jiang. 2019. *Does Gender Diversity Matter for Green Innovation?*

How to Integrate Gender Equality into the Transport Sector for a Low-Carbon and Climate-Resilient Transition

Table 3 presents sets of questions and gender performance indicators that could be used at the design stage. Examples of ADB projects are included as references for illustration.

Table 3: Gender Performance Indicators and Questions for Data Gathering and Assessment in the Transport Sector

Sample Gender Indicators	Questions for Baseline Data Gathering and Project Assessment	ADB Project Examples
Women's increased employment in sustainable transport		
• Percentage of female operators of public charging stations • Percentage of female e-bus drivers and/or e-ferry crew • Percentage of female employees in ITS big data center • Percentage of female employees in smart city operations center • Proportion of relevant female technical staff who report increased knowledge and skills on sustainable transport, including nonmotorized transport and e-mobility • Percentage of female employees who received professional development and training on new areas of clean technology • Proportion of transport staff with knowledge of the intersection between gender equality and climate change	• What measures are in place such as targets and/or mentorship networks to increase the number of women employed in sustainable transport, especially in technical and leadership positions?[a] • What gender-responsive workplace policies are in place such as childcare services, flexible work schedules, and parental leave policies? • What opportunities exist for promoting women's access to training in sustainable transport? • What are the measures in place such as targeted programs on sustainable transport and related research and development to promote the participation of women in STEM education or TVET? • How can transport help to facilitate access to alternative employment opportunities for sectors impacted by climate change? • What capacity-building initiatives are needed to ensure that transport providers have knowledge and skills to apply a gender and climate lens to their operations?	Philippines: Market Transformation through Introduction of Energy-Efficient Electric Vehicles Project Viet Nam: Administration of Equity Investment Selex Smart Electric Vehicles JSC India: GreenCell Electric Bus Financing Project Guizhou Gui'an New District: New Urbanization Smart Transport System Development Project Thailand: E Smart Bangkok Mass Rapid Transit Electric Ferries Project

continued on next page

Table 3 *continued*

Sample Gender Indicators	Questions for Baseline Data Gathering and Project Assessment	ADB Project Examples
Women's increased entrepreneurship in sustainable transport		
• Increased number of women-owned sustainable transport enterprises established • Increased number of loans or other financial products disbursed to sustainable transport enterprises owned by women or with majority women workers • Collection, analysis, and use of sex-disaggregated data on the suppliers of sustainable transport products or services	• What incentives and support can help to increase the number of women entrepreneurs in sustainable transport? • What barriers do women-owned sustainable transport enterprises face and what gender-responsive interventions can be put into place to address these barriers, particularly in access to finance and resources? • What support that contributes to climate change mitigation and adaptation can be extended to women-owned transport enterprises to strengthen their resilience to economic and environmental shocks?	
Women's increased access to and usage of sustainable transport		
• Increase in percentage of female riders in sustainable transport systems • Sex-disaggregated data collected on electrical vehicle use (by type of transport, private, taxi, 2-wheeler) • Percentage of each type of passenger (males, females, and elderly or people with disabilities) who have positive perceptions of the sustainable transport system in terms of its affordability, safety, reliability, connectivity, comfort, and responsiveness to the needs of all types of passengers. • Bike lanes and walkways constructed approaching all stations to ensure convenient and safe access of all kinds of passengers, especially women • Bike-sharing system established with a percentage of bikes built and allocated for women users	• How do the experiences of men and women differ with regard to access and usage of sustainable transport? • Where women's needs regarding sustainable transport services and networks are not being met, how can research and development solve these gaps? • What are the gender differences in the adoption of new and emerging sustainable transport technologies? • How do the customer satisfaction ratings of sustainable transport technologies between men and women differ and how can sustainable transport technologies be improved to better meet the needs of women? • How are men and women affected differently by the impacts of climate change and disasters due to vulnerabilities in the transport sector?	Pakistan: Peshawar Sustainable Bus Rapid Transit Corridor Project Philippines: Davao Public Transport Modernization Project

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Table 3 *continued*

Sample Gender Indicators	Questions for Baseline Data Gathering and Project Assessment	ADB Project Examples
	• Are heat stress considerations incorporated into gender performance indicators and project assessments? This includes evaluating the effectiveness of transport solutions in mitigating heat stress and ensuring that women have equitable access to safe, cool, and reliable transportation options during extreme heat events. Solutions such as misting systems at bus stops, shaded walkways, and improved ventilation in public transport can help mitigate the impacts of extreme heat on women.	
Enabling environment		
• Sustainable mobility plan developed that is gender-inclusive[b] and integrates mobility, safety, and convenience for women and the elderly • Gender-inclusive[c] country transport sector road maps presented to the selected developing member countries at a stakeholder workshop with a gender-balanced, high-level panel	• What decarbonization plans does the government have in place for the transport sector, and what are their impacts on access to and benefits from a more sustainable transport system for women and men? • What commitment is in place to increasing women's representation in sustainable transport planning? • What commitment is in place to collect, analyze, and use sex- and disability-disaggregated data in the transport-enabling environment to ensure that low-carbon transition benefits women and men equally?	Papua New Guinea: Port Moresby Sustainable Urban Transport Mobility Approaches Developing Low-Carbon Pathways for Post-Pandemic Recovery Enabled by Transport Connectivity

ITS = intelligent transport systems; STEM = science, technology, engineering, mathematics; TVET = technical and vocational education and training.

[a] "There is a significant positive correlation between the proportion of female managers in the transport sector and the total female participation in the transport workforce. This finding supports the importance of female role models in attracting and retaining a more diverse workforce. (Source: International Transport Forum. 2020. The Gender Dimension of the Transport Workforce).

[b] This will include collection of sex-disaggregated data on travel patterns, accessibility, and safety needs; targets for equitable access to transport services, skilled jobs for women, and representation of women in leadership positions; as well as capacity building and budgeting to assist stakeholders to include gender in transport. See Sustainable Mobility for All. 2019. *Global Roadmap of Action Toward Sustainable Mobility: Gender*.

[c] See footnote b.

Source: Asian Development Bank (Climate Change and Sustainable Development Department).

Gender Equality and Climate Change Sectors Guide

The *Gender Equality and Climate Change Sectors Guide* explains why integrating gender equality across the agriculture, energy, and transport sectors is critical for a low-carbon and climate-resilient transition. It is intended for use by staff of the Asian Development Bank (ADB) who are engaged in operations. Each chapter presents the key gender issues in the sector, e.g., inclusion of women's employment opportunities and productivity in the sector, and participation and leadership in decision-making. Entry points are provided to address these issues in ADB operations, and questions and sample gender performance indicators are provided that could be used at the design stage.

About the Asian Development Bank

ADB is committed to achieving a prosperous, inclusive, resilient, and sustainable Asia and the Pacific, while sustaining its efforts to eradicate extreme poverty. Established in 1966, it is owned by 69 members —49 from the region. Its main instruments for helping its developing member countries are policy dialogue, loans, equity investments, guarantees, grants, and technical assistance.

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