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Gendering energy justice: Women, renewable energy, and just transitions in South Africa and Zimbabwe

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Abstract: This article examines how energy poverty, climate vulnerability and renewable energy transitions affect differently situated women in South Africa and Zimbabwe. It focuses particularly on women in low-income rural and peri-urban households whose energy experiences are shaped by intersecting factors such as poverty, geographical location, household structure, age, disability, access to land and productive assets, informal or subsistence livelihoods, and

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responsibility for unpaid domestic and care. Rather than treating women as a homogeneous category, the article recognises that their exposure to energy insecurity and their capacity to benefit from renewable energy vary with these social and economic conditions. The article applies a gendered energy justice framework to assess whether the energy transitions in the two countries distribute benefits and burdens equitably, recognise women's differentiated energy needs and contributions, and enable their meaningful participation as users, workers, entrepreneurs, owners and decision makers. It argues that increasing renewable energy capacity will not, by itself, produce a just transition. A gender-just energy transition requires enforceable participation mechanisms, gender-responsive financing, equitable access to productive opportunities, recognition of unpaid care and household energy labour, and gender-disaggregated monitoring and accountability.

Key words: gendered energy justice; just transition; renewable energy; women; South Africa; Zimbabwe

1 Introduction

The transition from carbon-intensive energy systems to renewable and low-carbon alternatives is widely presented as necessary for climate mitigation, energy security and sustainable development.[1] Yet, an energy transition is not inherently just. Existing inequalities in income, employment, asset ownership, political influence and access to infrastructure shape its costs, benefits and opportunities.[2] Renewable energy expansion may therefore reduce emissions without reducing energy poverty or transforming the social inequalities through which energy is produced, distributed and used.[3] These concerns are especially significant in Southern Africa, where energy transitions occur alongside poverty, unreliable electricity, unequal access to modern energy services and increasing climate vulnerability.[4] South Africa and Zimbabwe illustrate different but related dimensions of this challenge. South Africa has a comparatively extensive and industrialised electricity system, historically dominated by coal, but continues to experience affordability pressures and electricity insecurity.[5] Zimbabwe has more limited generation capacity and lower levels of reliable electricity access, with many households continuing to depend on biomass and decentralised energy

1 J Cannon 'What does the just energy transition mean for Africa?' https://news.mongabay.com/2025/11/what-does-the-just-energy-transition-mean-for-africa/ (accessed 18 July 2026).
2 As above.
3 J Taylor 'Just an energy transition? A gendered analysis of energy transition in Northern Cape, South Africa' (2023) 37 *Agenda* 76.
4 K Fakier 'Women and renewable energy in a South African community: Exploring energy poverty and environmental racism' (2018) 19 *Journal of International Women's Studies* 166.
5 M Swilling, M Davies & H Wlokas *South Africa's contested transition to energy democracy? A collection of insights emerging from the national large-scale renewable energy programme* (2022), https://inspire-excellence.net/wp-content/uploads/2022/03/ED_Draft-4_2March_2022_reduce_4-1.pdf (accessed 18 July 2026).

sources.[6] In both countries, drought, infrastructure constraints and unaffordable energy intensify household vulnerability.

The consequences are gendered because women in many low-income households undertake a substantial share of cooking, fuel management, child care, water collection and other unpaid domestic and care work.[7] Electricity interruptions, high tariffs and dependence on biomass may therefore increase women's time poverty, health risks and responsibility for sustaining household welfare.[8] Women may also face barriers to employment, finance, ownership, technical skills and leadership within emerging renewable energy sectors. Women should, however, not be treated as a homogeneous category.[9] This article focuses principally on women in low-income rural and peri-urban households in South Africa and Zimbabwe, including female-headed households, women engaged in informal or subsistence livelihoods, women with limited access to land and finance, and women carrying significant unpaid care responsibilities. Their experiences differ according to income, age, disability, race, class, household status, education, location and access to infrastructure.[10] The article, therefore, does not suggest that all rural women, African women or women in the two countries, experience energy transitions in the same manner.

The analysis applies a gendered energy justice framework. Energy justice generally examines distributional justice, concerning how benefits and burdens are allocated; procedural justice, concerning participation and influence; and recognition justice, concerning whether affected groups' needs, identities and knowledge are acknowledged.[11] A gendered application highlights unequal household labour, unpaid care work, gendered access to assets and finance, occupational segregation and women's limited representation in energy governance.[12] It therefore assesses transition not only through electricity capacity, investment and formal employment, but also through affordability, time use, health, livelihoods, ownership and decision-making power.

The article asks: To what extent do renewable energy transitions and their governing policy frameworks in South Africa and Zimbabwe respond to the distributional, procedural and recognition dimensions of gendered energy justice? It further considers how energy poverty and climate vulnerability

6 EXP Tebeng, ADM Tchinda & CP Mbouga 'Climate vulnerability and the energy poverty trap in Africa' (2026) *Sustainable Development* 1, https://doi.org/10.1002/sd.71374.
7 M Feenstra 'Women engendering the just energy transition' in K Iwińska & X Bukowska (eds) *Gender and energy transition: Case studies from the Upper Silesia coal-mining region* (2022) 57-72.
8 As above.
9 M MacEwen & D Evensen 'Mind the gap: Accounting for equitable participation and energy democracy in Kenya' (2021) 71 *Energy Research & Social Science* 101843.
10 O Abe & V Azubike '(Re)examining the intersection between energy justice and energy transition in Africa' (2024) 42 *Journal of Energy & Natural Resources Law* 279.
11 UN Women 'Transforming care systems', https://www.unwomen.org/en/what-we-do/economic-empowerment/care-work (accessed 18 July 2026).
12 As above.

affect differently situated women, whether existing policies recognise women as users, workers, entrepreneurs, owners and decision makers, and which reforms are required to make the transition more gender-just. The comparison is useful because the countries share climate pressures and energy access challenges, but differ in the scale, structure and governance of their energy systems.[13] The aim is not to equate their political economies or women's experiences, but to identify common justice deficits alongside country-specific conditions.

Methodologically, the article uses a qualitative comparative design that combines a structured review of interdisciplinary literature, policy analysis and documented case illustrations. This follows as a method of literature review.[14] It relies on scholarly research, official policies, institutional reports, and published accounts of household and community renewable energy practices. It does not present original interviews or fieldwork.

The article contributes by applying energy justice through an explicitly gendered and intersectional lens, comparing South Africa and Zimbabwe. It also identifies the gap between inclusive policy commitments and the mechanisms required for implementation, including measurable targets, dedicated finance, equitable procurement, meaningful participation and gender-disaggregated accountability.[15] Part 2 outlines the method and comparative energy context. Part 3 develops the gendered energy justice framework and examines household energy use, adaptation and documented initiatives. Part 4 analyses the main policy frameworks. Part 5 identifies the principal justice gaps, part 6 proposes reforms, and part 7 is the conclusion.

2 Connecting climate, energy and gender

2.1 Method and comparative rationale

This article adopts a qualitative comparative design that combines a structured review of interdisciplinary literature, comparative policy analysis and documented case illustrations.[16] The review draws on scholarship on energy justice, gender and energy, just transitions, climate vulnerability, energy poverty and social reproduction. It is thematic rather than systematic and is used to identify recurring concepts, empirical findings and policy gaps.[17] The policy

13 N Götzmann & M Dicalou *Towards a feminist energy justice framework: Women's participation in the energy transition in sub-Saharan Africa* (2023), https://www.humanrights.dk/files/media/document/TOWARDS%20A%20FEMINIST%20ENERGY%20JUSTICE%20FRAMEWORK_accessible.pdf (accessed 18 July 2026).

14 G Paré & S Kitsiou 'Methods for literature reviews' in F Lau & C Kuziemsky (eds) *Handbook of eHealth evaluation: An evidence-based approach* (2017), https://www.ncbi.nlm.nih.gov/books/NBK481583/ (accessed 18 July 2026).

15 Götzmann & Dicalou (n 13).

16 Paré & Kitsiou (n 14).

17 As above.

analysis examines selected instruments on energy, renewable energy, climate and just transition from South Africa and Zimbabwe. It considers whether these frameworks contain gender-responsive targets, dedicated finance, inclusive participation procedures, ownership or procurement measures and gender-disaggregated monitoring. The analysis, therefore, distinguishes between general references to women or vulnerability and enforceable mechanisms capable of changing outcomes.[18]

Documented case illustrations are used to connect national policy with household and community experience.[19] These examples include published accounts of energy use, decentralised renewable energy technologies, livelihood strategies, and women-led or women-centred initiatives.[20] They are not presented as original case studies or as representative of all women in either country. The article relies exclusively on secondary and publicly available materials and does not report interviews, surveys or fieldwork.[21] Its conclusions, therefore, are limited to patterns and experiences documented in the sources examined.

South Africa and Zimbabwe are compared because they share regional climate pressures and significant energy access challenges, but differ in their energy structures and governance.[22] South Africa has a larger, industrialised and historically coal-dependent electricity system, while Zimbabwe has more limited generation capacity, less reliable access and greater dependence on biomass and decentralised energy.[23] These contrasts allow the article to assess whether different energy systems produce common or distinct forms of gender exclusion. The comparison does not assume that women in the two countries experience energy poverty in the same way. Instead, it applies common questions concerning affordability, unpaid labour, finance, ownership, participation and recognition, while remaining attentive to country-specific political, economic and infrastructural conditions.

2.2 Energy, climate and gender

South Africa and Zimbabwe face different but related energy transition challenges.[24] South Africa has a large, historically coal-dependent electricity

18 R Raman and others 'Energy justice and gender: Bridging equity, access, and policy for sustainable development' (2025) 6 *Discover Sustainability* 558.
19 Paré & Kitsiou (n 14).
20 Götzmann & Dicalou (n 13).
21 Paré & Kitsiou (n 14).
22 Sustainable Energy Africa *Energy poverty and gender in urban South Africa* (2017), https://www.cityenergy.org.za/uploads/resource_432.pdf (accessed 18 July 2026).
23 World Bank 'Zimbabwe gender assessment, (2024) http://hdl.handle.net/10986/41146 (accessed 18 July 2026).
24 NW Hlongwane & OD Daw 'Renewable electricity consumption and economic growth: A comparative study of South Africa and Zimbabwe' (2023) 13 *International Journal of Energy Economics and Policy* 197.

system and is expanding wind, solar and other renewable sources.[25] However, ageing infrastructure, grid constraints, rising tariffs and unreliable supply continue to affect households unevenly. Higher-income households may invest in rooftop solar panels, batteries and alternative fuels, while low-income households often have fewer options and may reduce consumption or revert to biomass, paraffin and other unsafe sources.[26] Zimbabwe operates under more severe generation and infrastructure constraints. Electricity supply depends substantially on hydropower and thermal generation, while drought, ageing infrastructure and limited investment contribute to recurring shortages.[27] Many rural and low-income households, therefore, rely on biomass, solar home systems and other decentralised sources, often combining several fuels in a pattern of energy stacking.[28] Climate change intensifies these pressures in both countries.[29] Drought, heat, rainfall variability and water scarcity affect electricity generation, agricultural production, household water access and the availability of biomass. Energy insecurity and climate vulnerability, therefore, are mutually reinforcing.[30]

These conditions are gendered because women in many low-income households perform a substantial share of cooking, fuel collection, water management, child care and other unpaid domestic work.[31] Where electricity is unavailable, unreliable or unaffordable, these tasks may become more time-consuming, physically demanding and hazardous.[32] Energy poverty can also limit women's education, paid work, enterprise development and participation in community decision making. The effects are not uniform. Women with low incomes, insecure livelihoods, disabilities, limited access to land or credit, or responsibility for female-headed households may have fewer resources with which to adapt.[33] By contrast, women with secure incomes, property, education

25 International Energy Agency 'South Africa', https://www.iea.org/countries/south-africa (accessed 18 July 2026).
26 Sustainable Energy Africa (n 22).
27 World Bank 'Zimbabwe economic update: Electrifying Zimbabwe's growth through reliable and universal energy Access (2025), https://www.worldbank.org/en/country/zimbabwe/publication/country-economic-update-electrifying-zimbabwe-s-growth-through-reliable-and-universal-energy-access (accessed 18 July 2026).
28 International Energy Agency 'Zimbabwe', https://www.iea.org/countries/zimbabwe (accessed 18 July 2026).
29 Intergovernmental Panel on Climate Change 'Africa' in *Climate Change 2022: Impacts, Adaptation and Vulnerability* (2022), https://www.ipcc.ch/report/ar6/wg2/chapter/chapter-9/ (accessed 18 July 2026).
30 As above.
31 As above.
32 As above.
33 United Nations Entity for Gender Equality and the Empowerment of Women (UN Women) 'Transformative approaches to recognise, reduce and redistribute unpaid care work in women's economic empowerment: Good practices, lessons learned and recommendations from Rwanda, Senegal and South Africa' (Economic Empowerment Section, UN Women 2024), https://knowledge.unwomen.org/en/digital-library/publications/2024/12/transformative-approaches-to-recognize-reduce-and-redistribute-unpaid-care-work-in-womens-economic-empowerment (accessed 18 July 2026).

and financial resources may be better positioned to adopt renewable technologies or participate in emerging energy markets.[34]

Women should also not be represented only as vulnerable users.[35] They make decisions about fuel use, combine energy sources, adjust household practices during shortages and participate in livelihood and community responses.[36] These forms of knowledge and agency are important, but are not always recognised in formal energy planning. The central justice challenge in South Africa is to ensure that large-scale decarbonisation and investment do not reproduce inequalities in affordability, employment and ownership.[37] In Zimbabwe, the challenge is to expand reliable, affordable access without shifting the costs of adaptation onto already burdened households.[38] In both countries, transition, therefore, should be assessed through its effects on access, unpaid labour, livelihoods, health, participation and economic opportunity.

3 Gendered energy justice and women's lived experiences

3.1 Gendered energy justice

Energy justice assesses whether energy systems distribute benefits and burdens fairly, enable meaningful participation and recognise the needs and knowledge of affected groups.[39] Its three principal dimensions, distributional, procedural and recognition justice, provide the framework for this article.[40] Distributional justice concerns who receives reliable and affordable energy, employment, finance, ownership and community benefits, and who bears pollution, unaffordable tariffs, unreliable supply, livelihood losses and unpaid household labour.[41] A gendered analysis further asks how income, disability, household status, land ownership, employment and access to credit shape women's ability to absorb transition costs or benefit from renewable-energy opportunities.

Procedural justice concerns access to information, representation and influence in energy decisions.[42] Consultation is inadequate when women cannot participate due to transport costs, care responsibilities, inaccessible venues, technical language, or unequal authority within households and communities.[43] Participation is meaningful only where women can shape project design, procurement, tariffs and benefit allocation. Recognition justice concerns whether

34 As above.
35 Feenstra (n 7).
36 Swilling and others (n 5).
37 World Bank (n 23).
38 K Heffron & D McCauley 'The concept of energy justice across the disciplines' (2017) 105 *Energy Policy* 658-667.
39 As above.
40 As above.
41 As above.
42 Götzmann & Dicalou (n 13).
43 BK Sovacool & MH Dworkin *Global energy justice: Problems, principles and practices* (2015).

women are treated only as vulnerable users or also as workers, entrepreneurs, technicians, owners and decision makers.[44] It also requires recognition of unpaid domestic and care work and of differences among women by income, age, disability, location, livelihood and household status.

The three dimensions are interdependent. Women may receive few economic benefits because they are excluded from decision making, lack access to finance, and are not recognised as potential commercial or technical actors.[45] This article, therefore, asks five questions: who bears transition costs; who receives energy and economic benefits; whose needs and knowledge are recognised; who participates in decisions; and what accountability mechanisms exist where commitments are not implemented.

3.2 Household energy poverty, unpaid labour and resilience

Energy transitions are experienced through everyday decisions about cooking, lighting, heating, water, communication and livelihood activities.[46] In many low-income households in South Africa and Zimbabwe, women undertake a substantial share of these responsibilities. Their role in household energy management means that unreliable electricity supply, rising tariffs and dependence on biomass can increase unpaid labour, time poverty, health risks and livelihood insecurity.[47] Households rarely shift completely from one energy source to another. Many practise energy stacking by combining electricity, firewood, charcoal, paraffin, gas and solar power according to availability, cost and purpose.[48] This provides flexibility but may also reproduce gendered burdens. A household may use solar power for lighting while still relying on biomass for cooking, leaving fuel collection and exposure to household air pollution unchanged.[49] These choices are shaped by income, housing conditions, tenure, supply reliability and access to credit.[50] Female-headed households, women in informal or subsistence livelihoods and women without secure property rights may be unable to afford solar systems, batteries or clean-cooking equipment.[51] Even where technologies are available, women may use these without controlling the asset or household energy decisions. Energy insecurity also affects livelihoods.[52] Reliable electricity can support refrigeration, food processing, sewing, communication, retail and other home-based enterprises. Solar-powered irrigation, transport and refrigeration

44 As above.
45 Götzmann & Dicalou (n 13).
46 World Health Organisation 'Burning opportunity: Clean household energy for health, sustainable development, and wellbeing of women and children' (2016).
47 As above.
48 B Wernecke and others 'Fuel switching and energy stacking in low-income households in South Africa: A review with recommendations for household air pollution exposure research' (2024) 109 *Energy Research & Social Science* 103415, https://www.sciencedirect.com/science/article/pii/S2214629624000069 (accessed 18 July 2026).
49 As above.
50 As above.
51 Wernecke and others (n 48).
52 As above.

may strengthen climate adaptation and productive activity.[53] However, these benefits depend on affordable finance, technical support, maintenance, market access and women's control over equipment and income. Time use is central to gendered energy justice. Cleaner cooking, reliable electricity and labour-saving technologies may reduce time spent collecting fuel, heating water and reorganising household activities around outages. Yet, time savings should not automatically be equated with empowerment, because they may simply allow women to perform more unpaid and paid work unless domestic responsibilities are redistributed.

Health and safety are similarly important. Dependence on firewood, charcoal, paraffin and candles may increase exposure to smoke, burns and accidental fires.[54] Cleaner and more reliable services can reduce these risks, but only where households can afford sustained use. Energy stacking means that access to one clean technology may not eliminate continued reliance on polluting fuels.[55] Women also exercise agency by allocating limited energy resources, combining fuels and adjusting household and livelihood practices during shortages. These strategies demonstrate practical knowledge, but they can also conceal institutional failure.[56] Resilience should not be measured by women's ability to absorb repeated energy shocks.[57] A gender-just transition should reduce the need for harmful coping strategies by improving affordability, safety, productive access and women's control over energy assets and decisions.

3.3 Renewable energy and documented women-led initiatives

Renewable energy technologies can address energy poverty by providing services that are reliable, affordable and suited to household and livelihood needs.[58] Decentralised systems, including solar home systems, mini-grids, cleaner cooking technologies and productive-use equipment, are especially relevant where grid electricity is unavailable or unreliable.[59] Their gender-justice significance, however, depends not only on whether technology is installed, but also on whether women can afford, control, maintain and derive lasting economic benefits from it.[60] At the household level, solar systems may provide lighting, communication and power for small appliances, while cleaner cooking and water heating technologies may

53 M Rumbayan and others 'Solar energy implementation in rural communities and its contributions to SDGs: A systematic literature review' (2025) 6 *Unconventional Resources* 100180, https://www.sciencedirect.com/science/article/pii/S2666519025000469 (accessed 18 July 2026).
54 As above.
55 As above.
56 As above.
57 Wernecke and others (n 48).
58 OM Akinbami, SR Oke & MO Bodunrin 'The state of renewable energy development in South Africa: An overview' (2021) 60 *Alexandria Engineering Journal,* 5077, 5093, https://doi.org/10.1016/j.aej.2021.03.065 (accessed 18 July 2026).
59 As above.
60 As above.

reduce dependence on polluting fuels and some forms of unpaid labour.[61] These benefits should not be presumed. Upfront costs, maintenance expenses, insecure tenure and limited access to finance may exclude low-income households.[62] A solar system that provides lighting and phone charging may also fail to meet the greater energy requirements of cooking, refrigeration and productive activity, leaving women dependent on multiple fuels.[63]

Control over technology, therefore, is as important as access.[64] Where a renewable energy system is financed or registered in the name of the household member who owns the property or earns the principal income, women may use the service without acquiring ownership or decision-making authority.[65] Renewable energy adoption should consequently be assessed according to women's access to services, control over assets and income, and participation in the associated supply and service chains.[66] Documented South African initiatives demonstrate women's participation at enterprise, professional and sector-development levels.[67] Solar Turtle has been identified in government materials as a women-owned enterprise providing specialised solar energy services.[68] Its significance lies in positioning women as providers and managers of renewable energy technology rather than solely as household beneficiaries. However, one successful business cannot establish that the wider sector is inclusive. Such examples instead demonstrate the commercial and technical capacities that may be expanded through appropriate procurement, finance and enterprise support.[69]

BioTherm Energy offers another illustration of women's leadership in South Africa's renewable energy industry. Government documentation identified the company as a South African renewable energy developer led by a black woman chief executive and reported women's participation across different parts of its operations.[70] This example is relevant because it demonstrates women's entry into leadership and project development roles within the formal renewable energy sector, which has generally remained male-dominated.[71] Government-supported Women in Energy programmes and Women in Oil and Energy South Africa have also sought to increase women's participation in ownership, investment, procurement and business development.[72] These initiatives have provided

61 United Nations Entity for Gender Equality and the Empowerment of Women 'Transformative approaches to recognise, reduce and redistribute unpaid care work in women's economic empowerment: Good practices, lessons learned and recommendations from Rwanda, Senegal and South Africa' (UN Women 2024).
62 Mofokeng (n 46).
63 Wernecke and others (n 48).
64 Götzmann & Dicalou (n 13).
65 Feenstra (n 7).
66 United Nations Entity for Gender Equality and the Empowerment of Women (n 61).
67 Department of Mineral Resources and Energy 'South African Renewable Energy Masterplan (SAREM)' (Government of South Africa 2025).
68 As above.
69 Akinbami and others (n 58).
70 Department of Mineral Resources and Energy (n 67).
71 Akinbami and others (n 58).
72 Department of Mineral Resources and Energy (n 67).

information and engagement opportunities in renewable energy procurement, solar and wind development, finance and enterprise support.[73] Their existence reflects an institutional recognition that formal equality alone is insufficient to achieve women's meaningful participation in the renewable energy economy and that targeted measures are required to address structural barriers to ownership, finance, procurement and leadership.

More recent initiatives have focused on identifying opportunities for women entrepreneurs within decentralised solar photovoltaic and battery storage value chains.[74] These programmes examine the knowledge, financing and technical support that women need to participate in installation, distribution, maintenance and related services.[75] This is important because women's inclusion should not be confined to large utility-scale projects; decentralised systems create additional opportunities for smaller businesses and locally based service providers.[76] Nevertheless, women remain underrepresented in technical and leadership roles. South African guidance on gender and emerging green energy industries reports that women account for approximately one-third of the country's renewable energy workforce, with lower representation in some technical subsectors.[77] This suggests that general sector growth will not automatically correct occupational segregation.[78]

Zimbabwe provides examples linking decentralised renewable energy more directly with rural enterprise and service delivery. Powerlive is a women-led initiative that combines solar energy and internet connectivity with support for women-led businesses in rural communities. Its importance lies in connecting access to electricity with digital inclusion and livelihood development, while positioning women as leaders and service providers rather than passive recipients. Mobility for Africa provides another example with solar-powered electric tricycles used in rural areas.[79] Women have operated the vehicles to transport agricultural produce, reach markets and services and generate income.[80] Lease-to-purchase arrangements have enabled some participants to move from using vehicles to owning productive assets.[81] Reporting from Wedza indicates that women's earnings from the tricycles have strengthened their contribution to household expenditure and their involvement in family decision making.[82]

73 Götzmann & Dicalou (n 13).
74 International Renewable Energy Agency (IRENA) 'A gender perspectives acknowledgement' (2019), https://www.irena.org/-/media/Files/IRENA/Agency/Publication/2019/Jan/IRENA_Gender_perspective_2019.pdf (accessed 18 July 2026).
75 As above.
76 Götzmann & Dicalou (n 13).
77 International Renewable Energy Agency (IRENA) (n 74).
78 Akinbami and others (n 58).
79 Götzmann & Dicalou (n 13).
80 T Chikweche 'A green move to independence | Future-makers' (Western Sydney University 23 July 2024), https://www.westernsydney.edu.au/future-makers/issue-seven/a-green-move-to-independence (accessed 18 July 2026).
81 As above.
82 As above.

This initiative demonstrates how renewable energy can address several constraints simultaneously. Rural women's economic participation may be limited not only by inadequate electricity, but also by distance, transport costs and poor access to markets and healthcare services. Solar-powered mobility, therefore, can connect clean energy with mobility, agricultural trade and income generation.[83] However, affordability, maintenance, battery replacement systems and ownership terms remain relevant justice considerations. Zimbabwe's solar mini-grid programmes provide another potential pathway for productive inclusion.[84] The Mashaba solar mini-grid, for example, was designed to supply irrigation schemes, business centres, a clinic, a school and a study centre.[85] Such infrastructure can support agricultural processing, trading and public services on which women depend. Yet, a project should not be described as women-centred merely because women live or work in the beneficiary community.[86] Evidence is also required that women participate in project governance, obtain affordable connections, access productive equipment and control the resulting enterprises and income.

The examples reveal three levels of women's participation. First, women may be household or community users of renewable energy services.[87] Second, they may use energy productively for agriculture, trade, transport and digital enterprise. Third, they may participate as technicians, managers, business owners, investors and energy service providers. A gender-just transition should expand all three forms while recognising that household access alone does not amount to empowerment.[88] A distinction must also be made between women-centred and women-led initiatives. Women-centred programmes respond to women's identified needs but may remain designed and controlled by governments, donors or private developers.[89] Women-led initiatives place women in substantial ownership, management or decision-making roles.[90] Both may improve welfare, but women-led models have greater transformative potential where women exercise durable control over technology, finance and institutional governance. Renewable energy initiatives, therefore, should be assessed through the three dimensions of gendered energy justice. Distributional justice asks whether women can afford the technology and retain its material benefits.[91] Procedural justice asks whether they influence programme design and governance. Recognition justice asks whether they are treated as knowledgeable users, productive actors,

83 L Ndhlovu 'Solar grid keeps livelihoods high, hospitals lit in rural Zimbabwe' *Africa21*, https://www.africa21.org/wp-content/uploads/Proposed-writing-project_.pdf (accessed 18 July 2022).
84 As above.
85 Ndhlovu (n 83).
86 As above.
87 Götzmann & Dicalou (n 13).
88 Feenstra (n 7).
89 Götzmann & Dicalou (n 13).
90 As above.
91 M Feenstra & G Özerol 'Energy justice as a search light for gender-energy nexus: Towards a conceptual framework' (2021) 138 *Renewable and Sustainable Energy Reviews* 110668, https://doi.org/10.1016/j.rser.2020.110668 (accessed 18 July 2026).

technicians, entrepreneurs and owners.[92] Where only access is achieved, renewable energy may improve services without transforming the inequalities that structure women's participation in energy systems.

3.4 Assessing transformative outcomes

Renewable energy can strengthen women's livelihoods and resilience, as it provides reliable and affordable services for productive activity. Electricity for refrigeration, food processing, irrigation, communication, transport and retail may reduce losses, improve market access and support home-based or small-scale enterprises.[93] These benefits, however, depend on women's access to finance, equipment, training, maintenance services and control over the income generated.[94] Time use is a central measure of gendered energy justice. Reliable electricity, cleaner cooking and labour-saving technologies may reduce the time spent collecting fuel, heating water and reorganising household activities around outages.[95] Yet, reduced labour should not automatically be treated as empowerment. Time savings may simply enable women to undertake more unpaid and paid work unless household responsibilities and decision-making power are also redistributed.[96] Health and safety outcomes are equally important. Dependence on biomass, paraffin and candles may expose households to smoke, burns and accidental fires.[97] Cleaner energy services can reduce these risks, particularly for women and children who spend substantial time near cooking areas.[98] However, benefits remain limited where households continue to combine clean and polluting fuels because cleaner alternatives are unaffordable or unreliable.[99]

Renewable energy may also improve resilience to climate and electricity shocks by maintaining lighting, communication, refrigeration, water pumping and livelihood activities.[100] Nevertheless, resilience should not be understood as women's ability to absorb repeated shortages by taking on additional labour

92 As above.
93 I Das and others 'Frameworks, methods and evidence connecting modern domestic energy services and gender empowerment' (2023) 8 *Nature Energy* 435.
94 D Gad & P Leone 'Productive use of energy of women-owned micro-, small-, and medium-sized enterprises: Insights from food and textile businesses in selected African countries' (2024) 10(11) *Heliyon* e32313.
95 Das (n 93) 438-441.
96 As above
97 World Health Organisation 'Household energy and health' (2023); International Energy Agency, International Renewable Energy Agency, United Nations Statistics Division, World Bank & World Health Organisation 'Tracking SDG 7: The Energy Progress Report 2024' (2024).
98 World Health Organisation (n 97).
99 International Energy Agency, International Renewable Energy Agency, United Nations Statistics Division, World Bank & World Health Organisation 'Tracking SDG 7: The Energy Progress Report 2024' (2024); Energy Sector Management Assistance Programme (ESMAP), World Bank 'The state of access to modern energy cooking services' (2020).
100 International Energy Agency and others (n 99).

and employing coping strategies.[101] A gender-just transition should reduce vulnerability by improving affordability, safety and access to productive uses, and women's control over energy assets and decisions.[102] The effect of renewable energy, therefore, should be assessed not only through the installation of technology, but through measurable changes in women's health, time use, income security, control over productive resources and capacity to influence household and community energy decisions.[103]

4 Policy frameworks in South Africa and Zimbabwe

Energy and climate policies shape more than the pace and technological direction of renewable energy development. They determine how public resources are allocated, which actors participate in energy markets, whose needs influence planning and whether transition benefits reach households and communities experiencing energy poverty.[104] A gendered energy justice analysis must therefore examine both formal policy commitments and the mechanisms through which those commitments are implemented. The analysis below assesses the two countries' frameworks through the lenses of distributional, procedural and recognition justice. Distributional justice concerns affordability, access, employment, enterprise participation, finance and ownership. Procedural justice concerns women's representation and influence in policy formulation, procurement, project governance and community benefit structures. Recognition justice examines whether policy acknowledges women's differentiated vulnerability, unpaid household labour, knowledge and capacity to participate as economic and technical actors.[105]

4.1 South Africa

South Africa's transition framework is anchored in the Integrated Resource Plan 2019, the Renewable Energy Independent Power Producer Procurement Programme, the Climate Change Act 22 of 2024, the Just Transition Framework and the Just Energy Transition Investment Plan 2023-2027.[106] Together, these instruments provide a substantial basis for renewable energy expansion, electricity sector restructuring, climate mitigation, and socio-economic transition.[107] The

101 Das and others (n 93) 441-444.
102 UN Women (n 33).
103 Das and others (n 93) 441-444.
104 United Nations Development Programme 'What does it mean to leave no one behind in the energy transition?' (2023).
105 Das and others (n 93).
106 Department of Mineral Resources and Energy 'Integrated Resource Plan 2019' (2019); Presidential Climate Commission 'A Framework for a Just Transition in South Africa' (2022); The Presidency 'South Africa's Just Energy Transition Investment Plan (JET IP) 2023-2027' (2023); Climate Change Act 22 of 2024.
107 Presidential Climate Commission 'A framework for a just transition in South Africa' (2022); The Presidency 'South Africa's just energy transition investment plan (JET IP) 2023-2027' (2023).

Integrated Resource Plan determines the projected electricity generation mix and guides the procurement of new capacity. Its significance lies in directing the shift from a historically coal-dependent system towards greater incorporation of wind, solar and other technologies. However, its principal emphasis remains generation adequacy, system cost and technical capacity. It does not, by itself, ensure that additional renewable electricity becomes affordable to low-income households or that women gain access to ownership, employment and enterprise opportunities.[108] The Renewable Energy Independent Power Producer Procurement Programme provides a more direct mechanism for distributing transition benefits. Its economic development requirements address employment, local content, enterprise development, socio-economic development and community benefits. These provisions create opportunities to connect renewable energy investment with broader development objectives.[109] Nevertheless, formally inclusive procurement does not necessarily produce gender-equitable outcomes. Women-owned enterprises may struggle to satisfy capital, certification, experience and guarantee requirements designed around established firms.[110] Women may also be included in overall employment figures while remaining concentrated in temporary, administrative or lower-paid roles rather than in skilled technical, managerial and ownership positions. The relevant question, therefore, is not merely whether women benefit, but which women benefit, in what capacities and to what degree of control.[111] The programme's community benefit mechanisms also raise procedural concerns. Communities may be consulted or included in trusts and development structures, but women's attendance does not establish meaningful influence. Meeting times, transport costs, technical information, unpaid care responsibilities and unequal authority within local institutions may limit their ability to shape project priorities and benefit allocation.[112]

The Climate Change Act provides an important recognition-justice foundation. Its principles acknowledge differentiated vulnerability and identify poor and rural women as among those requiring particular consideration in climate governance.[113] This recognition is legally significant because it challenges an undifferentiated approach to climate impacts. However, framework recognition must be translated into sectoral plans, budgets, procurement rules and measurable implementation obligations.[114] The Just Transition Framework

108 Das and others (n 93).
109 Independent Power Producer Office *Renewable Energy Independent Power Producer Procurement Programme (REIPPPP): An overview* (2024); Department of Mineral Resources and Energy *Independent Power Producer Procurement Programme* (2024).
110 United Nations Entity for Gender Equality and the Empowerment of Women (UN Women) *Explainer: Why women must be at the centre of a just transition to a renewable energy future* (2023); International Renewable Energy Agency *Renewable Energy and Gender Equality: A Review of Evidence and Emerging Practices* (2023).
111 International Renewable Energy Agency (n 73).
112 UN Women (n 110).
113 Climate Change Act 22 of 2024 secs 4 & 5.
114 United Nations Development Programme 'What does it mean to leave no one behind in the energy transition?' (2023); United Nations Entity for Gender Equality and the Empowerment of Women (UN Women) *Explainer: Why women must be at the centre of a just transition to a renewable energy future* (2023).

and the Just Energy Transition Investment Plan broaden transition beyond emissions reduction by addressing affected workers, communities, skills, industrial restructuring and investment.[115] Yet, their predominant emphasis on formal employment, coal-dependent regions and large-scale infrastructure may understate household energy poverty, informal livelihoods, clean cooking and unpaid care work. Women in low-income households may experience transition less through formal coal sector restructuring than through tariffs, unreliable electricity and exclusion from emerging energy markets.[116]

South Africa's framework, therefore, performs unevenly across the three justice dimensions. It provides substantial institutional recognition of vulnerability and creates distributional opportunities through procurement, investment and community development mechanisms. However, enforceable gender-responsive targets, dedicated finance, ownership pathways and meaningful representation remain limited.[117] A substantively gender-responsive approach would require measurable targets for women's skilled employment, leadership, ownership and enterprise participation; accessible procurement and financing mechanisms for women-owned firms; representation in project and community-benefit governance; and gender-disaggregated reporting on access, affordability, contracts, employment and ownership.[118]

4.2 Zimbabwe

Zimbabwe's energy transition framework includes the National Energy Policy 2012; the National Renewable Energy Policy 2019; the National Energy Efficiency Policy; and the National Climate Policy and Climate Change Gender Action Plan. These instruments seek to expand energy access, diversify energy supply, improve efficiency and integrate gender into climate action.[119] The National Energy Policy establishes the general basis for energy supply, regulation and access to modern energy services. Its developmental orientation is relevant to distributional justice because reliable energy supports household welfare, health, education and livelihoods. However, a general commitment to access does not directly address women's differentiated exposure to unreliable electricity, dependence on biomass, unpaid household labour, and limited access to income and assets.[120]

115 Presidential Climate Commission (n 107).
116 Das and others (n 93).
117 Presidential Climate Commission (n 107).
118 International Renewable Energy Agency 'Renewable energy and gender equality: A review of evidence and emerging practices' (2023); International Renewable Energy Agency 'Renewable Energy and Jobs: Annual Review 2024' (2024).
119 Ministry of Energy and Power Development National Renewable Energy Policy (2019); Ministry of Environment, Climate, Tourism and Hospitality Industry *Climate Change Gender Action Plan* (2024-2030); Government of Zimbabwe *National Climate Policy* (2017).
120 Das and others (n 93).

The National Renewable Energy Policy provides a more specific framework for grid-connected and decentralised renewable technologies. Its emphasis on rural access, private investment, employment and community participation creates opportunities for household electrification, productive-use technologies and local enterprise. However, the policy's market-oriented approach may favour actors with capital, collateral, technical expertise and formal business structures. Women operating small, informal or subsistence enterprises may remain unable to access licensing, finance, procurement and project ownership.[121] References to gender equality, therefore, are important but insufficient unless they are translated into targets, budgets and institutional responsibilities.[122]

The National Energy Efficiency Policy may contribute to affordability by reducing the energy required by households and businesses. Yet, the benefits of efficiency depend on access to appliances, equipment, information and upfront finance. Women from low-income households, tenants and informal traders may be unable to adopt efficient technologies without subsidies, concessional finance or targeted support.[123] Zimbabwe's National Climate Policy and Climate Change Gender Action Plan provide the strongest basis for recognition and procedural justice. They acknowledge differentiated vulnerability, women's knowledge and the need for gender-responsive participation across climate-related sectors, including energy.[124] The Gender Action Plan is particularly valuable because it moves beyond presenting women solely as a vulnerable group and recognises their roles in adaptation, agriculture, energy management and community governance.[125] However, these commitments remain vulnerable to institutional separation. Gender mainstreaming within climate policy will have a limited effect if it is not incorporated into energy-sector procurement, rural electrification, budgeting, training and monitoring.[126] The core question is whether energy ministries, regulators, rural electrification institutions and project developers adopt corresponding gender-responsive duties.

Rural electrification and clean-cooking programmes illustrate this challenge. Connecting a community does not establish gender justice where women cannot afford household access, use electricity productively, participate in project governance or control energy-enabled assets. Similarly, distributing cleaner technologies does not establish a just outcome where ongoing fuel or maintenance costs are unaffordable.[127] Zimbabwe's policy framework, therefore, contains meaningful recognition of renewable energy, rural access and gender

121 Winther and others (n 94).
122 UN Women (n 110).
123 International Energy Agency *Energy efficiency 2023* (2023); International Renewable Energy Agency *Renewable energy and gender equality: A review of evidence and emerging practices* (2023).
124 Ministry of Environment, Climate and Wildlife *Zimbabwe Climate Change Gender Action Plan 2024-2030* (2024); Government of Zimbabwe *National Climate Policy* (2017).
125 Government of Zimbabwe (n 124).
126 United Nations Development Programme (n 114).
127 Winther and others (n 94).

inclusion, but remains weak in terms of enforceable implementation. A stronger approach would require measurable targets for women's employment, enterprise ownership and representation; dedicated financing and credit guarantees; simplified procedures for women-owned and smaller businesses; and gender-disaggregated monitoring of affordability, access, technology use, ownership and livelihood outcomes.[128]

4.3 Comparative assessment

The comparison reveals both significant differences and a common implementation gap. South Africa's transition is driven primarily by large-scale procurement, industrial restructuring and investment mobilisation. Zimbabwe's transition places greater emphasis on energy access, decentralised technologies, rural electrification and efficiency.[129] These different structures create different entry points for gender justice. In South Africa, the principal opportunity lies in using procurement, investment and industrial policy to redistribute employment, ownership and enterprise opportunities. The principal risk is that capital-intensive programmes reproduce male-dominated technical sectors and established commercial networks. In Zimbabwe, decentralised renewable energy may be more directly connected to household access, rural livelihoods and women-led enterprise. The risk is that limited finance, affordability constraints and weak institutional implementation prevent women from controlling technologies and productive assets.[130]

Despite these differences, the two systems share three weaknesses. First, women are more clearly recognised as vulnerable users and beneficiaries than as owners, technicians, entrepreneurs and institutional decision makers. Second, participation commitments are not consistently supported by procedures that give women meaningful influence. Third, policies frequently lack measurable targets, assigned responsibilities and gender-disaggregated accountability.[131]

The comparison, therefore, suggests that the principal challenge is not the complete absence of gender-sensitive language. It is the failure to translate general inclusion into programme design. The justice of transition will depend on whether policy instruments alter the distribution of finance, assets, employment and authority, rather than merely expanding renewable-energy infrastructure.

128 International Renewable Energy Agency (n 118).
129 The Presidency *South Africa's Just Energy Transition Investment Plan (JET IP) 2023-2027* (2023); Ministry of Energy and Power Development *National Renewable Energy Policy* (2019); Ministry of Environment, Climate and Wildlife *Zimbabwe Climate Change Gender Action Plan 2024-2030* (2024).
130 Das and others (n 93); Winther and others (n 94).
131 UN Women (n 110).

5 Barriers and justice gaps

The comparative policy analysis exposes a central paradox. South Africa and Zimbabwe recognise renewable energy, climate vulnerability and social inclusion, yet women's substantive position within their energy transitions remains weak. The problem is not simply that women have insufficient access to renewable technologies. Existing inequalities determine who can afford energy, own assets, enter energy markets, participate in decisions and convert access into lasting economic and social power.[132] These inequalities are mutually reinforcing. Poverty limits women's ability to purchase technologies or participate in enterprises; limited asset ownership restricts access to finance; exclusion from decision-making prevents these barriers from shaping policy design; and failure to recognise unpaid care work obscures the additional labour created by energy insecurity. Distributional, procedural and recognition injustice must therefore be understood as interconnected rather than as isolated policy failures.[133]

5.1 Distributional barriers: Access without control

Renewable energy expansion may increase generation or extend infrastructure while leaving energy poverty largely unchanged. In both countries, low-income women may remain unable to afford electricity, clean cooking fuels, solar systems or energy-efficient appliances. This creates a distinction between formal availability and substantive access. Technology may be present in a community but inaccessible due to tariffs, connection charges, maintenance expenses or repayment requirements.[134] The distributional issue also concerns ownership and control. Women may use household solar systems, irrigation equipment or productive technologies without owning the asset, controlling its operation or deciding how the resulting income is used. Access without control may improve services while leaving household and economic power relations intact.

Energy justice, therefore, requires attention to who owns equipment, manages debt, controls income and decides how technologies are used.[135] Women's participation in employment and enterprise is similarly unequal. Renewable energy development creates jobs in engineering, construction, maintenance, finance, administration and project management. However, women may remain concentrated in temporary, administrative or lower-paid positions, while skilled, managerial and ownership roles remain male-dominated.[136] The barriers differ in form across the two countries. South Africa's large-scale procurement system creates substantial opportunities but imposes capital, certification and experience requirements that may exclude smaller women-owned firms. Zimbabwe's

132 Das and others (n 93).
133 International Renewable Energy Agency (n 118).
134 International Energy Agency and others (n 99).
135 Winther and others (n 94).
136 International Renewable Energy Agency (n 118).

decentralised systems create opportunities for rural enterprise and productive use, but limited access to credit, unstable markets, and high technology costs constrain women's participation. In both cases, formally neutral market arrangements may reproduce unequal starting positions.

Distributional justice requires more than equal eligibility. It requires targeted financing, guarantees, subsidies, technical support, accessible procurement, and measurable targets for women's employment, ownership, and enterprise participation. Without these measures, renewable energy transitions may redistribute technology without redistributing economic power.[137]

5.2 Procedural barriers: Contested consultation

Both countries recognise participation in climate and energy governance, but formal consultation does not necessarily enable women to influence outcomes. Women may attend meetings without shaping decisions on tariffs, technology, project location, procurement or community benefits. Participation becomes symbolic where institutions have already determined priorities or are not required to respond to submissions. Practical barriers deepen this exclusion. Distance, transport costs, unsuitable meeting times, unpaid care responsibilities, inaccessible technical language and limited information may prevent women from participating effectively. Unequal authority within households and communities may also restrict women's capacity to speak, challenge local leadership or advance independent priorities.[138] Procedural injustice is also evident within formal institutions. Women remain underrepresented in ministries, regulators, utilities, project boards and procurement bodies. This influences which issues receive attention. Generation capacity, investment and formal employment may be prioritised over affordability, clean cooking, unpaid labour and informal livelihoods.[139]

Community-benefit mechanisms require particular scrutiny. Trusts, committees and development funds may redistribute project benefits, but they can also be dominated by local elites. Women's inclusion among beneficiaries is insufficient where they lack authority over governance, access to financial information or influence over expenditure.[140] Meaningful participation, therefore, requires early and accessible information, representation in decision-making bodies and evidence that women's contributions affected outcomes. Institutions should also provide mechanisms for complaints and reviews when consultation or benefit commitments are not implemented.[141]

137 As above.
138 UN Women (n 114).
139 International Renewable Energy Agency (n 114).
140 United Nations Development Programme (n 104); UN Women (n 114).
141 International Renewable Energy Agency (n 114).

5.3 Recognition gaps

Recognition justice requires policies to acknowledge women's differentiated needs, knowledge and agency. Yet, women are often framed primarily as vulnerable household users rather than as workers, entrepreneurs, technicians, owners and decision makers. This may generate household-level assistance without altering women's exclusion from the economic and institutional opportunities created by the transition.[142] Broad categories such as 'rural women' may further obscure differences. A female-headed subsistence household, an informal trader, a woman with a disability and a professional seeking entry into energy procurement face distinct barriers. Policies that aggregate these experiences may fail to identify which women are excluded and what forms of support are required.[143]

Unpaid domestic and care work remains especially under-recognised. Energy shortages increase the time women spend obtaining fuel, reorganising cooking, protecting food and sustaining household welfare. Yet, transition success is commonly measured through installed capacity, investment and formal employment. These indicators overlook time poverty, household safety and unpaid energy labour.[144] Recognition, therefore, must change policy priorities rather than simply add gender-sensitive language. Women's household and community knowledge should influence technology selection and programme design, while their commercial and technical capacities should be supported through training, procurement and ownership opportunities.[145]

5.4 Accountability deficit

The recurring weakness in both jurisdictions is the distance between commitment and enforceability. Policies refer to inclusion, participation and gender equality, but often lack measurable targets, assigned institutional responsibilities, dedicated budgets and reporting requirements. Where no institution is clearly responsible for delivery, gender commitments remain aspirational.[146]

Gender-disaggregated data are essential to closing this gap. Governments and project developers should report who receives connections, finance, training, employment, contracts, ownership opportunities and community benefits. Data should, where possible, be further disaggregated by income, location, disability, age and household status. Aggregate figures on women's participation may otherwise conceal concentration in low-paid roles or unequal access among different groups of women.[147] Accountability also requires accessible remedies.

142 Das and others (n 93).
143 UN Women (n 110).
144 Das and others (n 93).
145 International Renewable Energy Agency (n 110).
146 United Nations Development Programme (n 114).
147 International Renewable Energy Agency (n 110).

Women should be able to challenge exclusionary procurement, inadequate consultation, unaffordable financing or failure to deliver promised benefits. Institutions should acknowledge complaints, give reasons for decisions, establish corrective timelines and report publicly on implementation.[148]

The principal justice gap, therefore, is not an absence of policy commitment, but a failure to convert commitment into institutional obligation. A gender-just transition requires distributive rules that expand women's control over resources and assets, procedures that enable meaningful influence, and accountability mechanisms that can identify and correct exclusion.[149] Without these elements, women may become more visible in transition discourse while remaining marginal to ownership, governance, and economic power in the emerging energy system.

6 Towards a gender-just energy transition

The analysis shows that renewable energy expansion will not produce a just transition unless gender equality is embedded in policy design, financing, participation and accountability. South Africa and Zimbabwe have adopted important commitments to renewable energy, climate action and inclusion, but these commitments must be converted into practical measures that alter women's access to energy, economic opportunity and decision-making power.[150] Responding to the distributional, procedural, recognition and accountability gaps identified above requires six mutually reinforcing measures.

First, energy affordability must be treated as a justice issue. Renewable energy capacity is of limited value to low-income households where electricity, clean-cooking fuels or decentralised technologies remain unaffordable. Governments, therefore, should combine energy expansion with targeted subsidies, social tariffs, concessional finance and support for clean cooking and productive-use technologies. These measures should prioritise women in low-income and female-headed households, as well as those dependent on informal or subsistence livelihoods.[151]

Second, transition finance and procurement should expand women's economic participation. Public programmes should establish measurable targets for women's skilled employment, ownership, leadership, and participation in renewable energy supply chains. Women-owned enterprises require accessible procurement procedures, technical support, credit guarantees and dedicated financing. Participation should be assessed by the quality and sustainability

148 United Nations Development Programme (n 104).
149 As above.
150 UN Women (n 150).
151 International Energy Agency, International Renewable Energy Agency, United Nations Statistics Division, World Bank & World Health Organisation *Tracking SDG 7: The Energy Progress Report 2024* (2024); World Health Organisation *Household energy and health* (2023).

of opportunities created, not merely by the number of women recorded as beneficiaries.[152]

Third, women's participation in energy governance must be institutionalised. Women should be represented in policy bodies, regulatory bodies, utilities, project committees and community-benefit structures. Consultation procedures should provide accessible information, appropriate notice, local-language communication and practical support where transport, child care or unpaid care responsibilities limit participation. Institutions must also demonstrate how women's submissions influenced final decisions.[153]

Fourth, policy must recognise household energy labour as part of the transition. Progress should not be measured solely by installed capacity, investment and formal jobs. Indicators should also assess affordability, reliance on biomass, time spent obtaining fuel, household safety, access to clean cooking, control over productive assets and the effect of energy services on unpaid domestic and care work.[154]

Fifth, gender-responsive implementation requires reliable data and accountability. Energy institutions and project developers should collect and publish gender-disaggregated data on access, employment, training, contracts, ownership, finance and community benefits. These data should be further disaggregated, where possible, by location, income, disability, age and household status. Clear institutional responsibilities, reporting obligations and accessible complaints mechanisms are also necessary where gender commitments are not implemented.[155]

Finally, energy, climate, gender, labour, agriculture and rural development institutions should coordinate their programmes. Women's energy needs and opportunities cut across these sectors. Linking renewable energy deployment with skills development, agricultural production, transport, digital access and enterprise support can yield broader livelihood and resilience benefits.[156] A gender-just transition, therefore, requires more than adding women to existing programmes. It requires changing the rules through which energy finance, technology, employment, ownership and authority are distributed. Women must be recognised not only as users of energy services, but also as workers, entrepreneurs, owners, innovators and decision makers within the emerging energy system.

152 International Renewable Energy Agency (n 151).
153 UN Women (n 110).
154 Das and others (n 93).
155 International Renewable Energy Agency (n 151).
156 United Nations Development Programme (n 104).

7 Conclusion

This article has argued that renewable energy expansion is not inherently gender-just. In South Africa and Zimbabwe, women's experiences of energy transition are shaped by poverty, unreliable supply, dependence on biomass, unpaid domestic and care work, unequal access to finance and assets, and limited representation in energy governance. These conditions affect women differently depending on income, location, household status, disability, age, livelihood and access to infrastructure. Applying distributional, procedural and recognition justice shows that both countries have made important commitments to renewable energy, climate action and inclusion. However, these commitments are not consistently translated into affordable access, meaningful participation, women's ownership, skilled employment, dedicated finance or gender-disaggregated accountability. Women, therefore, remain more visible as household users and vulnerable beneficiaries than as workers, entrepreneurs, owners and decision makers.

Documented initiatives in both countries demonstrate that women can play substantive roles in renewable energy enterprises, productive-use technologies and community-level energy services. Yet, isolated successes cannot substitute for systemic reform. Their wider significance depends on whether policy and institutional arrangements remove the financial, technical, social and procedural barriers that prevent women from participating at scale. A gender-just transition requires measurable employment and ownership targets, gender-responsive procurement and finance, accessible participation procedures, recognition of unpaid household energy labour, and reliable monitoring and complaints mechanisms. It must also assess progress in terms of affordability, health, time use, livelihood security and decision-making power, rather than generation capacity and investment alone.

The central conclusion is that gender justice must be treated as a condition of an effective energy transition, not as an additional social objective. Where women gain affordable access, control over productive assets and meaningful authority, renewable energy can strengthen livelihoods, resilience and social legitimacy. Where these inequalities remain unaddressed, low-carbon development risks reproducing existing injustice in a new technological form.