GBV and other gendered impacts of transition to a low carbon economy

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Query: What evidence exists on the gendered, but specifically GBV, impacts (positive and negative) of transition to a low carbon economy? What risks and mitigations around adverse impacts have been encountered, and what evidence is there on opportunities on improving gender equality and addressing GBV arising from an energy transition?

1. Overview

The transition to a low carbon economy is essential to addressing climate change. As with climate change, the impacts of the transition to a low carbon economy will not be gender neutral. There will be positive impacts and opportunities to improve gender equality and address gender-based violence (GBV), and there is also the potential for negative impacts. This query explores these gendered impacts of this transition (Section 2) and highlights some of the GBV impacts, risks and mitigations around adverse impacts (Section 3), as well as the opportunities to improve gender equality and address GBV (Section 4).

Overall, the evidence base on the impacts and risks of the transition to a low-carbon economy remains at a relatively early stage, although there is much more evidence on gender, GBV and climate change more broadly. With regard to the gendered impacts, this review found more evidence related to the risks of the transition to a low-carbon economy than the potential positive impacts. Further there was significantly more information related to the impacts on jobs and the workplace than to other areas such as infrastructure. However, there are lessons that can be drawn from the wider literature, for example on the linkages between unemployment, financial stress and GBV, or on the risks associated with the construction of large infrastructure projects. There are several examples of promising practice and opportunities to improve gender equality and address GBV, but most examples are new initiatives and have not been evaluated.

Key takeaways:

Applying a gender lens to the transition to a low carbon economy is essential to strengthen the positive impacts and mitigate the negative impacts around jobs and workplaces, entrepreneurship, agriculture and food production, health, infrastructure and housing.

It is important to regularly screen, assess and mitigate the risk of increased GBV associated with the transition, for example around the loss of traditional male jobs, unemployment and financial uncertainty, women's employment in male-dominated 'green' jobs, and the construction of large renewable energy projects. A useful tool for identifying context-specific risks, preventing and responding to GBV is IUCN and USAID's Strengthening Safeguards: Addressing GBV in Environmental Action.

Impacts are likely to be worse for women, girls and gender-diverse people at highest risk of GBV. This includes women and girls with disabilities, migrant women, Indigenous women, LGBTQI+ people, adolescent girls and older women, and those living in rural, remote, conflict and disaster-prone areas.

As well as risks, there are also many opportunities for improving gender equality and addressing GBV include through training and mentorship, inclusive workplaces, climate-smart financing, climate-smart agriculture, green infrastructure and climate-smart cities, and gender-responsive social protection.

Gendered Risks	Examples of mitigations
Over-representation of women in informal, precarious and potentially dangerous jobs.	Supporting the establishment of unions to protect women in informal and precarious employment.
Exclusion of women from higher-paying jobs in STEM sectors.	Working with women to dismantle the barriers to STEM jobs. This could include funding education and training for women in STEM, mentoring programmes for women in STEM, and programmes supporting organisations working in STEM to retain women through inclusive policies and culture.
Exclusion of women entrepreneurs from green financing opportunities.	Working with women entrepreneurs to dismantle their barriers to accessing finance.
Women farmers might not benefit from climate-smart agricultural practices due to barriers to land ownership and access to capital and technical knowledge.	Working at the policy level to change discriminatory laws that prevent women from owning land. Funding programmes that increase women farmers' access to capital and technical training.
Exclusion of women from progress related to renewable energy and technology	Work with women from low-income and rural communities when designing sustainable energy programmes, to understand their needs and ensure they have access to affordable renewable energy and technology.
Sustainable energy projects entrench social norms which confine women to domestic roles.	Sustainable energy projects should take a gender-transformative approach, ensuring that a diverse range of women are included in the design and implementation of programmes.
Women lack the capital to invest in sustainable housing.	Subsidise sustainable housing options for women from low-income communities.
Sustainable housing and infrastructure fails to meet the needs of women if they are excluded from its design	Involve women from diverse backgrounds (including women with disabilities) in the design of sustainable housing and infrastructure programmes. For example, facilitate focus groups with local women to ensure programmes are tailored to their needs.
GBV Risks	**Examples of mitigations**
Increased IPV and non-partner sexual violence associated with loss of traditional male jobs and unemployment.	Interventions aimed at supporting a just-transition in areas with high male unemployment could include gender-transformative components to address financial stress, norms around violence and household decision-making. Engaging with women's rights organisations early on can help identify and understand the potential impacts associated with job losses within carbon-producing sectors.

Sexual harassment of women taking on non-traditional jobs	Addressing organisational / job cultures can help address harmful attitudes, harassment and abuse against women taking on new roles that challenge gender stereotypes. Developing safeguarding measures, such as policies, codes of conduct, reporting and investigation mechanisms, training and awareness-raising can also be useful mitigation measures
Security risks associated with working in remote field locations, for example bringing off-grid solutions to remote, inaccessible villages	Conduct regular risk assessments to identify and mitigate any security risks. As part of mitigation processes, it will be important to provide access to multiple channels for reporting risks / incidents Security training and awareness raising for all staff
GBV associated with the construction of large renewable energy or infrastructure projects particularly during the construction phase when the risks are highest	Developing policies and codes of conduct, grievance mechanisms and investigation procedures to report GBV in a safe and confidential way are important mitigation measures. Working with contractors and suppliers, e.g. through procurement processes, contract selection, training and awareness-raising and regular engagement along the supply chain
Harassment of and violence towards Indigenous women leaders/activists who oppose renewable energy projects	Ensure that women in all their diversity can participate in the design of any renewable energy projects, including in any Environmental Impact Assessments, and that participation is not conditional on asset ownership (e.g. land tenure rights). Create an enabling environment for women leaders/activists to oppose energy transition projects safely.
Clean energy solutions unlikely to address the deeply rooted risk factors that underlie GBV	It is important to consider fuel stoves as part of a multicomponent programme that address the multiple risk factors underlying GBV, including harmful social norms
Women and girls use solar lamps to go outside more at night, with unintended consequences and GBV risks.	Include solar lamps as part of a broader programme aimed at improving community safety, including access to response services.

2. Gendered impacts of transition to a low carbon economy

2.1 Jobs and the workplace

The transition to a low carbon economy will have varying impacts across sectors. It is anticipated that the transition to a low carbon economy will increase the net number of jobs, however, unemployment may rise in some roles, sectors, or geographic regions.[1] Spending in the renewable energy sector could produce 70% more jobs per dollar of expenditure than in the fossil fuel industry, presenting massive opportunities for job creation in the context of wider job losses.[2] Within the manufacturing sector, efforts to reduce emissions are likely to involve machine upgrades that facilitate automation, the relocation of factories closer to consumer bases, a

reduction in demand for new products as companies move towards circular business models, and an increase in the use of recycled materials. In the agricultural sector, efforts to reduce carbon emissions could lead to increases in organic agriculture, reductions in demand for meat and dairy, and improvements in climate-smart farming techniques and technologies.

Potential positive impacts on women

- With targeted approaches, the creation of "green jobs"[3] could lead to an increase in the formal employment of women in decent jobs. In 2020 the Asian Development Bank funded a project in Fiji to train women in carpentry and in building climate-friendly and disaster-resilient houses. This led to the development of 20 new homes for women, increased climate resilience, and has opened up job opportunities for the women participants.[4] Similarly, the Grameen Shaki microloans initiative in Bangladesh trained over 5,000 women as Solar Photovoltaic Cell Technicians and maintenance workers, as well as installing over 100,000 solar home systems in rural communities.[5]
- With appropriate training, the move towards a low-carbon economy could lead to an increase of women working in science, technology, engineering and maths (STEM) jobs, which tend to be higher paid but are traditionally dominated by men. As of 2020, only 35% of students enrolled in the fields of study related to STEM were women.[6] Across the European Union, only 20% of women who hold an Information Communication Technology degree remain in the technology industry. This gap in education and retention is linked to various forms of discrimination and social norms that are ingrained at an early age.[7]

Potential negative impacts on women

- Across the energy sector and manufacturing sector, without targeted initiatives to promote substitution of jobs in high carbon industries, women are at risk of losing jobs, particularly those working in informal, labour-intensive jobs located far from their consumer base. Within the fossil fuel industry, women are often employed both directly and in associated service sectors and so will be affected by job losses during the transition to renewable energy.[8] Within the manufacturing sector, women are at risk of job losses due to efforts to reduce emissions by upgrading machines that will automate labour-intensive processes predominantly conducted by women and by relocating factories closer to consumer bases to reduce airmiles in a process known as "nearshoring" .[9] Finally, shifts in consumer behaviour, particularly increased environmental awareness, may lead to the development of circular business models, reducing demand for new products.[10] This is likely to cause difficult-to-replace job losses in low-income communities, hitting women especially hard in industries where they account for the majority of workers.
- Across the energy sector and manufacturing sector women are at risk of exclusion from the jobs created during the transition to a low carbon economy. An online global survey with 1500 respondents from 144 countries found that in 2018 women made up only 32% of the renewable energy workforce.[11] Only 40% of male respondents recognised the gender-related barriers to STEM jobs, as compared to 75% of women, posing a serious barrier to increasing

pathways for women in this sector. Within manufacturing, moves towards circular and rental business models may increase traditionally male jobs in logistics and distribution.[12]

- "Green jobs" are not inherently decent jobs; women are at risk of being hired into informal dangerous jobs during this transition. There are substantial risks around the manufacturing of renewable energy products such as solar panels, which involve the handling of highly toxic chemicals.[13] There are also risks associated with products made from recycled materials, with waste collection often conducted by informal women workers in hazardous conditions with a lack of access to social benefits and a risk of social stigma. [14]

Risks	Examples of mitigations
Over-representation of women in informal, precarious and potentially dangerous jobs.	Supporting the establishment of unions to protect women in informal and precarious employment. For example, the Waste Collectors' Union in India promoted a socially and ecologically innovative model of waste recovery that secured concrete benefits for waste collectors, 90% of whom are women.[15]
Exclusion of women from higher-paying jobs in STEM sectors.	Working with women to dismantle the barriers to STEM jobs. This could include funding education and training for women in STEM, mentoring programmes for women in STEM, and programmes supporting organisations working in STEM to retain women through inclusive policies and culture.

2.2 Entrepreneurship

The transition to a low-carbon economy also has potential for transformative economic impacts for women. Lending to women entrepreneurs and fund managers active in climate-responsive solutions can support women's leadership, entrepreneurship and skills, as well as making commercial sense. For example, by working with women entrepreneurs to open 'last mile markets'[16] Shell Foundation increased sales of off-grid solutions by 85%.[17]

Potential positive impacts on women

- Changes in consumer behaviour create space for women entrepreneurs and women-led start-ups to drive climate responsive innovation.[18] Frontier Markets, a woman led start-up based in Jaipur, provides climate-responsive products and services to rural communities in India through a network of women entrepreneurs.[19] As of 2021, Frontier Markets has over 10,000 women entrepreneurs delivering over 2.2 million solar and digital connectivity appliances to 350,000 rural households. These women earn a 15% margin on sales, which reached $12 million in 2021. Following purchase of these products, customers (65% of whom are women) saved a combined 406,000 hours and $120 million.

Potential negative impacts on women

- Women entrepreneurs often face significant barriers to market-entry. In many contexts, laws and social norms create barriers to ownership, access to finance, training and mentorship and supply chains for women, limiting their ability to engage in the green economy.[20]

Risks	Examples of mitigations
Exclusion of women entrepreneurs from green financing opportunities.	Working with women entrepreneurs to dismantle their barriers to accessing finance.

2.3 Agriculture and food production

Agriculture is the primary driver of habitat loss, with deforestation accounting for 20% of emissions in the food value chain. Moves towards a low-carbon economy will require a move towards climate-smart agricultural practices (CSA) and nature-based solutions.[21] These approaches aim to increase resilience within food production, while mitigating the adverse effects through nature restoration. Digital developments are also expected to drive down emissions by increasing the efficiency of food production. In Africa, there are already at least 437 digital solutions actively operating in the agricultural sector.[22]

Potential positive impacts on women

- CSA approaches that lead to lower labour requirements are likely to reduce the burden of unpaid subsistence farmers.[23] In Sub-Saharan Africa, it is often women who are engaged in unpaid labour-intensive farming so access to CSA could be key to freeing up time and enabling them to diversify their incomes and engage in education.[24]
- CSA approaches are also likely to increase food security, which would help improve nutrition and reduce malnourishment at the household level.[25] In many countries, women are often the first to forego food within a household and so periods of food insecurity tend to disproportionately impact them.[26] Increased food security and more productive agricultural practices may also reduce the risk of male-out migration, which can exacerbate food insecurity and other challenges.[27]

Potential negative impacts on women

- Given the multiple barriers women face to land ownership and decision-making, improvements in yields due to CSA may act to widen the inequality between men and women in agricultural communities. Women account for 48% of the agricultural workforce in low-income countries but own as little as 10% of land.[28]
- Women who face barriers to capital and technical knowledge, are less likely to be able to transition to CSA.[29] In 2019, women in low- and middle-income countries were 10% less likely to own a mobile phone than men and 26% less likely to use mobile internet.[30] In rural areas, the number of women with access to digital technology is likely to be further reduced.

Risks	Examples of mitigations
Women farmers might not benefit from climate-smart agricultural practices due to barriers to land	Working at the policy level to change discriminatory laws that prevent women from owning land. Funding programmes that increase women farmers' access to capital and technical training.

ownership and access to capital and technical knowledge.	

2.4 Household responsibilities and care

The transition to a low-carbon economy has the potential to improve women's access to clean fuel and water and to reduce the time spent on household chores. In contexts where women and girls are expected to take responsibility for domestic chores, a reduction in the time needed to conduct these roles could free up time for income generation and education. As ever, without targeted approaches, women, and especially women from low-income backgrounds may be left out of this progress.

Potential positive impacts on women

- The move to low-carbon fuels and technologies will increase the time available for women and girls to engage in education and income-generating activities. Women and girls in rural areas of low-income countries spend significant time collecting fuel and water, limiting time to engage in education and renumerated labour.[31] Research from Brazil finds that girls in rural areas are 59% more likely to complete primary education by the time they are 18 years old if they have access to electricity than those without.[32] It also finds electrical appliances reduce time spent on chores, creating time for income generation. For example, having a washer in the household, increases the likelihood that women will be employed by 6.4 times.

Potential negative impacts on women

- Without targeted approaches, women in low-income countries may be left behind in the transition to renewable energy and technology. While the number of people with access to renewable electricity is increasing substantially, it is estimated that 660 million people, mainly living in Sub Saharan Africa, will continue to lack access to electricity in 2030.[33] Given social norms that place responsibility for household chores primarily with women and girls, a lack of access to electricity and time-saving technology will disproportionately affect women.
- There is also a risk that women with low-incomes, such as female-headed households, may be left behind due to a lack of financial capital to invest in clean energy and technologies. Research in Indonesia where the government has subsidised liquid petroleum gas (LPG) in a bid to reduce the consumption of kerosene found that, while consumption reduced by 92% in 10 years, it predominantly benefited richer households.[34] In rural areas it was difficult to acquire LPG at the official price, causing poor women to pay inflated prices.
- Sustainable energy projects which fail to take a gender-transformative approach also risk entrenching social norms which conflate women with domestic roles. For example, a micro-hydro project in Indonesia entrenched harmful social norms by excluding women from decision-making throughout the project and only allowing them to participate in meetings as a substitute for their husbands. [35] This not only entrenched social norms but also meant that the decisions made about the design and implementation of the programme did not reflect the particular needs of women.

Risks	Examples of mitigations
Exclusion of women from progress related to renewable energy and technology	Work with women from low-income and rural communities when designing sustainable energy programmes, to understand their needs and ensure they have access to affordable renewable energy and technology.
Sustainable energy projects entrench social norms which confine women to domestic roles.	Sustainable energy projects should take a gender-transformative approach, ensuring that a diverse range of women are included in the design and implementation of programmes.

2.4 Health

The transition to a low-carbon economy has the potential to improve women's health by reducing exposure to household air pollution. However, the increased risk of unemployment can constrain access to healthcare. Targeted approaches are needed to ensure women are not excluded from technological advances and are supported during times of unemployment.

Potential positive impacts on women

- The move to low-carbon fuels and technologies for heating and cooking will reduce the health risks to women and children who are disproportionately impacted by air pollution in the home. Solid biomass is often the primary cooking fuel used by households in low- and middle-income countries (LMIC).[36] Burning biomass creates household air pollution (HAP), with severe, and even fatal, health consequences. .[37] Due to societal expectations that women and girls will do most of the household cooking, they are particularly exposed to HAP and at risk of HAP-related health conditions. Exposure to biomass smoke during pregnancy can increase the risk of stillbirth, preterm delivery and low birth weight of children.

Potential negative impacts on women

- Without targeted approaches, women from low-income countries may be left behind in the transition to low-carbon household fuels. The move to low-carbon fuels for household consumption is more difficult in low-income countries due to a lack of infrastructure and financial constraints at the household level. In 2019, one third of the global population remained without access to clean cooking fuels.[38] Of these, 910 million live in Sub Saharan Africa, with less than 5% of the populations of Democratic Republic of the Congo, Ethiopia, Niger, Uganda and others having access to clean energy. An estimated 1.8 billion people in low-income communities will remain reliant on solid biomass for cooking by 2040. [39]
- Industrial transitions are often characterised by periods of unemployment and retraining, during which access to health services may be constrained due to changes in affordability, availability and quality.[40] It is essential women have access to the health services they need during these periods, especially those linked to sexual and reproductive health, which are often underfunded and overlooked.

Risks	Examples of mitigations
Women from low-income communities lack the capital to invest in clean cooking fuels, which would improve health outcomes.	Work with women from low-income communities to understand their fuel needs and subsidise appropriate, accessible and affordable clean fuels and technologies
Women may lose access to health services during periods of unemployment and retraining.	Work with women who are unemployed and retraining to understand their needs and design interventions tailored to these.

2.5 Infrastructure and Housing

Innovation towards affordable low-carbon housing and infrastructure solutions is being driven by multiple global crises related to urbanisation, unaffordable housing, housing unfit for extreme weather patterns, climate breakdown, deprivation and exclusion**.** Recent innovations include the design of pre-fabricated energy efficient homes, communal living approaches with shared access to allotments and electrical appliances, the design of insulation using natural materials, and sustainable urban drainage systems.[41]

Potential positive impacts on women

- Sustainable housing design will reduce the costs of energy and thus energy poverty, which affect women particularly hard. A study from Uzbekistan found that female headed households find it harder to pay for energy and basic needs than male-headed households and were more likely to reduce their food consumption to cover these costs.[42]
- Redesigning urban spaces for increased climate resilience also offers opportunities to create safer and more accessible environments for women. This could include designing public transport routes that do not focus entirely on traditional male commute patterns but also consider the needs of diverse people including women. It could also involve planning cities so that childcare, market spaces, green spaces and healthcare services are located near to housing developments. This has the potential to promote community-building and to support women, who are often expected to take on the largest burden of care, balance these responsibilities with income generation activities.

Potential negative impacts on women

- Women from low-income backgrounds are at risk of being excluded from accessing sustainable housing and infrastructure development. They are also at risk of being excluded from the design of innovative housing and infrastructure projects since these sectors tend to be male dominated. Excluding women from the design of these projects means these projects may not meet the needs of women.
- Failure to provide affordable access to sustainable housing and infrastructure risks leaving women behind as women are disproportionately likely to live in poverty. Despite being a basic human right, the availability of decent housing in low-income communities is low. In Sub-Saharan Africa 59% of urban populations live in slums.[43] Within these slums, female-

headed households account for over 30% of inhabitants, suffering more from poverty, malnutrition and disease and food shortages than male-headed households.[44]

Risks	Examples of mitigations
Women lack the capital to invest in sustainable housing.	Subsidise sustainable housing options for women from low-income communities.
Sustainable housing and infrastructure fail to meet the needs of women if they are excluded from its design	Involve women from diverse backgrounds (including women with disabilities) in the design of sustainable housing and infrastructure programmes. For example, facilitate focus groups with local women to ensure programmes are tailored to their needs.

3. GBV impacts, risks and mitigation

3.1 Loss of traditional male jobs and unemployment

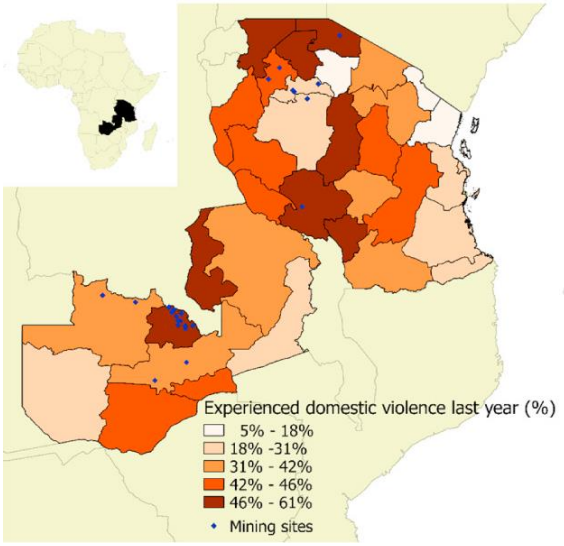
The transition to a low-carbon economy has the potential to lead to negative GBV impacts. This includes increased risks associated with job losses in those sectors with the largest adverse environmental impact, such as in coal mining, transport, automotive engineering and power plants - many of which are male-dominated sectors. The broader global evidence suggests that unemployment and financial stress are risk factors for intimate partner violence, with violence increasing when men face difficulties in finding or keeping a job and decreasing when they no longer face such challenges. For example, research in Bangalore, India found that women whose partners went from being in stable employment to experiencing difficulties finding employment had 1.7 times the odds of violence, as women whose husbands maintained their stable employment.[45]

The impact of unemployment and financial stress is likely to be highest in small, remote mining communities where the local economy depends heavily on coal and there are few alternative sources of income. There is some evidence from former coal-mining communities in the United States, Poland and United Kingdom that mine closures can exacerbate GBV risk factors, such as intra-household tension, poverty, unmet healthcare needs for people with mental health conditions and harmful use of alcohol and drugs. In the UK, research in former coalfield areas in Nottinghamshire found that cases of domestic violence increased as women became caregivers to husbands and fathers who had increased mental health needs due to unemployment and debt.[46] In the United States, analysis in former coal-producing Appalachian communities found that mine closure can lead to substance abuse and domestic violence.[47] In Poland, the closure of mines in the coal-producing Silesia region caused spikes in domestic violence and alcohol and substance abuse issues. Women's rights organisations (WROs) played a key role in supporting

women with social services being 'precariously underfunded' due to diminished revenues with the loss of jobs (see box below).[48]

In Zambia and Tanzania, research has found that domestic violence was more likely during economic downturns in the copper mining industry. The map (to right) shows higher rates of domestic violence in communities in the 'Old Copperbelt' in Zambia, where most of the mines are situated and where the greatest job losses happened. In contrast, the 'New Copperbelt' to the east is less closely associated with domestic violence. The report notes that many workers were laid off in the 'Old Copperbelt', leading to financial stress and increased violence towards women.[49]

Domestic violence and mining locations in Zambia and Tanzania (Kotsadam et al, 2017)



Promising practice of mitigating action: Women's rights organisations providing support to domestic violence survivors in former coal-mining communities in Poland

Women's rights organisations played a key role in supporting women affected by domestic violence in former coal-mining areas in Silesia, Poland. Examples of support includes providing counselling, shelter, and legal help for families affected by domestic violence, alcohol and substance abuse issues, which increased during the job layoffs associated with the restructuring of the Polish coal sector. [50]

Risks	Examples of mitigations
Increased IPV and non-partner sexual violence associated with loss of traditional male jobs and unemployment.	Interventions aimed at supporting a just-transition in areas with high male unemployment could include gender-transformative components to address financial stress, norms around violence and household decision-making. Engaging with women's rights organisations early on can help identify and understand the potential impacts associated with job losses within carbon-producing sectors.

3.2 Women's employment in green jobs

There is potential for negative GBV impacts when women take on new roles in the transition to a low-carbon economy that challenge traditional gender stereotypes, for example in science, technology, engineering and maths (STEM) and more technology-focused green jobs. The data remains limited and is likely to be highly context-specific, depending on norms and stereotypes around women's roles. Recent data shows that in many countries women experience high rates

of sexual harassment across STEM, with 43% of female STEM graduates, 50% of women in science, and 58% of women in academia reporting having experienced sexual harassment.[51] These high rates of sexual harassment are likely to be even higher for women of colour, with disabilities, or nonbinary people, although limited data exists. In addition to the risks associated with challenging cultural and social norms by working in a male-dominated sector, there are also security risks associated with the remoteness of working locations, for example when bringing off-grid energy solutions to remote, inaccessible villages.

However, it is also possible that there could be positive GBV impacts, particularly over the longer term. When women take on new roles in the renewable energy sector, they could break gender stereotypes that underpin harmful social norms such as domestic violence. One study noted that 'solar mamas' trained in India and 'wonder women' trained in Indonesia have become agents of social transformation in their communities, and 'participating in the renewable energy sector has provided some women with a meaningful platform for questioning and subverting oppressive social norms and practices such as dowry, child marriage and domestic violence'.[52]

More broadly, there is a complex link between women's employment and intimate partner violence. Some studies show that women are at increased risk of physical partner violence in the short-term in contexts of high gender inequality[53] and social norms that normalise wife-beating.[54] However, in the longer term, there is also research to show that partner violence is less prevalent in countries where a large proportion of women are in the formal economy, although it may increase women's risk in countries where few women work.[55]

Risks	Examples of mitigations
Sexual harassment of women taking on non-traditional jobs	Addressing organisational / job cultures can help address harmful attitudes, harassment and abuse against women taking on new roles that challenge gender stereotypes. Developing safeguarding measures, such as policies, codes of conduct, reporting and investigation mechanisms, training and awareness-raising can also be useful mitigation measures
Security risks associated with working in remote field locations, for example bringing off-grid solutions to remote, inaccessible villages	Conduct regular risk assessments to identify and mitigate any security risks. As part of mitigation processes, it will be important to provide access to multiple channels for reporting risks / incidents Security training and awareness raising for all staff

3.3 Large renewable energy projects

The transition to a low carbon-economy also has potential GBV impacts and risks around the construction of large renewable energy projects, such as wind farms, hydropower stations and solar plants. As with any large construction project, there are potential risks which vary by country context, investment or operations. For example, research in largescale infrastructure projects in Cambodia, China, Lao PDR and Viet Nam found that construction workers often developed sexual

relationships with local girls and young women, with risks of sexual exploitation, abuse and harassment. There was also an increased presence of sex workers, often leading adolescent boys and community men to engage in high-risk sexual behaviour.[56] Some of the GBV risks associated with the construction phase for large renewable energy projects could include:[57]

- Large-scale influx of transient workers into small, often rural host communities, which often have low capacity to absorb a sudden increase of male workers.
- Remote locations with limited access to resources to report GBV and receive support.
- Presence of security personnel, who can provide protection but can also abuse their positions of power and status to perpetrate GBV.
- Male workers transporting goods (e.g. truck drivers), who can perpetrate GBV on routes and at truck stops associated with the project, even if not on the project site.
- Poorly designed or maintained physical spaces on project sites and in worker accommodation for example bad lighting in and around grounds and access routes.
- Informal workers, whose may either be more vulnerable to GBV due to lack of contracts or potential perpetrators may go unidentified due to lack of background checks.

Promising practice of mitigating actions: Salimar Solar Plant in Malawi [58]

Salimar Solar Plant is a solar power station constructed on the southwestern banks of Lake Malawi between 2018-2021. During the construction phase, an allegation of GBV was brought to the attention of JCM Power, the Canadian renewable energy, independent power producer.

In response, the company undertook a rapid assessment with the support of an external GBV consultant. It also recruited a permanent Gender Inclusion Specialist of Malawian nationality to drive Salima's gender action plan focused on preventing violence in the community and workplace, providing services for survivors, and conducting research, data collection and M&E.

Key learning from Salimar solar power plant on how to mitigate GBV in large renewable energy projects, includes:

- Embed gender issues and specifically GBV in the project development process, including in-depth baseline studies during the feasibility phase.
- Develop bespoke gender action plans to address gender-related risks and opportunities, including investing in prevention as well as response.
- Recruit local gender personnel with expertise in GBVH to help raise awareness with employees, community members and other key stakeholders. In the Salima plant, the Gender Inclusion Specialist was key to building trust, increasing reporting, working with local authorities on referral pathways, and using an individual case processing and protection for survivors.
- Provide necessary support to survivors at, and around, project sites.

Another potential risk associated with large renewable energy projects is the harassment of and violence towards Indigenous women leaders/activists who oppose projects. For example, in Guatemala, Indigenous women have filed a complaint against the Inter-American Development bank relating to the construction of a large hydropower project. Indigenous women are at the frontline of speaking out against the project in their role as 'guardians of the land and water',[59] and because of their protests, say they are being harassed by the dams' construction workers and fear revenge.[60]

Risks	Examples of mitigations
GBV associated with the construction of large renewable energy or infrastructure projects particularly during the construction phase when the risks are highest	Developing policies and codes of conduct, grievance mechanisms and investigation procedures to report GBV in a safe and confidential way are important mitigation measures. Working with contractors and suppliers, e.g. through procurement processes, contract selection, training and awareness-raising and regular engagement along the supply chain
Harassment of and violence towards Indigenous women leaders/activists who oppose renewable energy projects	Ensure that women in all their diversity can participate in the design of any renewable energy projects, including in any Environmental Impact Assessments, and that participation is not conditional on asset ownership (e.g. land tenure rights). Create an enabling environment for women leaders/activists to oppose energy transition projects safely.

3.4 Household fuel

Increasing access to clean cooking fuels is often suggested as having positive impacts on reducing GBV risks when collecting firewood, particularly in conflict-affected contexts. For example, one study in DRC found that 90% of women in displaced households had experienced some form of harassment, violence or rape while collecting fuelwood in the forests.[61] In Kenya, one qualitative study found that the provision of stoves helps to mitigate transactional sex for cooking fuel and reduce domestic violence.[62]

Although there is evidence that clean cook stoves reduce women's firewood collection trips, few studies have measured changes on preventing GBV and some studies have critiqued the 'rape-stove panacea' as an overly simplistic technological solution to a complex social issue.[63] Others have noted that clean cookers may be premised on gendered assumptions and thus 'reproduce gender inequality rather than contest it'.[64]

It is also worth noting that environmental degradation (e.g. collecting firewood for household fuel) is also a driver of GBV, exacerbating resource scarcity, conflicts and displacement. Research shows that GBV is often used as a means of reinforcing privileges and power imbalances benefiting from control over resources.[65]

Risks	Examples of mitigations
Clean energy solutions unlikely to address the deeply rooted risk factors that underlie GBV	It is important to consider fuel stoves as part of a multicomponent programme that address the multiple risk factors underlying GBV, including harmful social norms

3.5 Solar lighting

Women and girls who have received solar lamps to use in poorly lit communal spaces in humanitarian contexts including South Sudan,[66] Lebanon[67] and Haiti[68] report that they use the lamps on a regular basis both inside and outside the home. In Lebanon, Syrian refugee women who were given portable solar lamps reported that the lamps had made a positive difference to their lives, and they felt safer.[69] However, the most rigorous evaluations involving control groups find little impact on preventing violence. For example, an impact evaluation of the distribution of handheld solar lamps in two camps for people internally displaced by the Haiti earthquake found that women's perceptions of their own safety remain the same or worsened after the lamps were distributed, due to broader security concerns that cannot be solved by a stand-alone lamp distribution.[70] The Haiti evaluation also found that women and girls were more likely to report certain night-time activities outside the home (e.g. buying water, food and gas) when they had the lights than before light distribution, raising concerns about possible unintended consequences and GBV risks for women and girls.[71]

Risks	Examples of mitigations
Women and girls use solar lamps to go outside more at night, with unintended consequences and GBV risks.	Include solar lamps as part of a broader programme aimed at improving community safety, including access to response services.

4. Opportunities for improving gender equality and addressing GBV

4.1 Training and mentorship

The transition to a low-carbon economy and the shifts in the types of jobs that will be available as a result provides a key opportunity to improve women's access to higher paid, formal employment. Without targeted approaches from young ages to encourage girls to start along and stay on STEM pathways, women will be excluded from the economic benefits of new-job creation and will be excluded from decision-making in the design of innovative climate technologies, meaning they may not meet the needs of women in their diversity.

Example of promising practice

Ayana Renewable Power, India.[72] In order to increase the number of women working on a renewable power plant in India, the UK's Department for International Development (DFID) and the Self-Employed Women's Association (SEWA) implemented a pilot programme to train potential women employees from local communities. In advance of this training they mapped out the skills of prospective employees and designed training tailored to their needs. They also encouraged women's participation in the training by providing gender-sensitive facilities such as women-only transport and toilets. One third of those who completed the training were recruited by the power plant immediately

4.2 Inclusive workplaces

The transition to a low-carbon economy provides huge opportunities for entrepreneurship, business creation and growth. Evidence finds that organisations which are more inclusive of women are key to supporting the transition itself. Various studies find that the percentage of women on corporate boards is positively correlated with the disclosure of carbon emissions information, that female executives invest more in environmental sustainability processes to reduce emissions and pollutants than male executives, and that firms with more women on their boards are less likely to be sued over environmental violations.[73]

These organisations are in a strong position to create cultures from the outset that are inclusive of the needs of women in their diversity. For example, this could include safeguarding policies that commit to protecting against sexual exploitation, abuse and harassment among other harms; providing on-sight childcare, committing to hiring senior management teams with diverse backgrounds and experience, and offering employees the opportunity to be shareholders in the company.

Example of promising practice

Geothermal electricity generation company, LaGeo, El Salvador.[74] The geothermal company has put in place several measures to create a more gender-inclusive workplace, including access to labour benefits (e.g. maternity and breastfeeding conditions). LaGeo also sponsors a nursery and daycare facility for employees' children, including those with special needs. By integrating gender-responsive workplace activities, LaGeo has increased women's participation at its plants and offices by 5% in four years.

4.3 Climate-smart financing

Climate finance provides an opportunity to promote gender equality, women's empowerment and address GBV. The Gender-Smart Climate Finance toolkit provides useful guidance on how to apply a gender-smart lens, as well as identify risks and opportunities.

Example of promising practice

The Green Economy Financing Facility (GEFF) [75] provides climate finance across 26 countries affected by climate change and with large gender gap. It is supported by more than EUR 4 billion of EBRD finance and has collectively avoided almost 7 million tons of CO_2 emissions per year. The GEFF is conducting country gender baseline studies to better understand men's and women entrepreneurs' needs, priorities, and vulnerabilities to climate change. It is working with local banks to address the different gendered access to climate finance and low-carbon technologies.

ENVenture, Uganda[76] supports community-based organisations in Uganda to start and sustain green start-ups which aim to increase access to solar, clean fuels and water filters. They are committed to funding enterprises that provide services and products, which are inclusive of women, youth, refugees and people with disabilities. Their Women's Empowerment Fund is a capacity building scholarship that supports women entrepreneurs travel to training bootcamps, covering the cost of accommodation and facilitation.

4.4 Climate-smart agriculture

There are also opportunities to address gender inequalities and GBV in the transition towards an agricultural sector that its low-carbon, climate resilient and not harmful to the environment. In South Africa, for example, the Agricultural Food and Allied Democratic Workers Union (AFADWU) has designed a blueprint for the just transition in agriculture which focuses on the role of women workers, for example dedicated policies which aim to increase ownership and support to women landowners and agricultural producers.[77]

Examples of promising practice:

Bio-reclamation of Degraded Land, Niger.[78] In Niger, women face various barriers to owning land and are often restricted to using degraded land that is allotted to women's groups. The International Crops Research Institute for the Semi-Arid Tropics (ICRISAT) worked with women to support the reclamation of this degraded land for food production. This involved water harvesting technologies, the application of composted plant and animal waste, and the planting of hardy and high value fruit trees as well as drought-resilient indigenous vegetables. Within three years, 241 hectares of degraded land had been converted to productive land in 172 villages. Women participating in this project generated incomes 51% higher than women not participating.

African Women in Agricultural Research and Development (AWARD), Africa.[79] AWARD invests in African scientists, research institutions and agribusinesses to support them deliver gender-responsive agricultural innovation across Africa's agricultural value chains. Their work involves building a pool of African scientists to lead advances and innovations within this sector, funding gender-responsive research conducted by gender-diverse research teams, and building awareness of gender issues in policies, programmes and accountability mechanisms related to the agricultural sector.

4.5 Green infrastructure and climate-smart cities

There are also opportunities for improving gender equality and addressing GBV through the transition to low-carbon cities and green infrastructure. Two examples are shown below of how investments in environmentally-friendly public transport systems have built in opportunities to economically empower women and create a more safe, inclusive transport system that tackles GBV.

Examples of promising practice:

Pune and Bangalore metro, India. The new metro lines in the cities of Pune and Bangalore use innovative climate-aligned technologies to create a more inclusive, safe city for women. In Pune, solar-powered electric vehicles will help passengers with the 'last mile' of their journeys between stops and final destinations. Other features aimed at improving safety for women travellers include night-time patrols of platforms (including women security guards), CCTV cameras, and dedicated metro coaches for women. In Bangalore, a third of all positions as drivers and station controllers will be filled by women, with creche facilities and flexibility about rotas. Women drivers will also be scheduled to work at stations close to where they live.[80]

Tbilisi, Georgia was one of the first cities to join the European Bank for Reconstruction and Development's (EBRD) Green Cities. As part of the transition to a low-carbon city, EBRD signed a green transport project on the buses, cable cars, and metro trains. The project promotes gender equality in its environmentally-friendly public transport system, including by training women as metro drivers and tackling GBV on public transport.[81]

4.6 Gender-responsive social protection

The shift towards a low-carbon economy can also include social protection measures to address poverty and vulnerability for groups at the heart of the energy transition.[82] Without social protection, there is a risk that gendered risks and vulnerabilities are exacerbated during the transition.[83] For example, carbon pricing and/or removal of fossil fuel subsidies could lead to negative economic shocks for low-income households, and intimate partner violence associated with financial stress. In Peru, simulations show that a carbon tax amounting to USD 50 per tonne of CO_2 could increase poverty by 6.2%, but compensation through the country's conditional cash transfer programme 'Juntos' could decrease poverty by 13%.[84] Several studies are currently underway to understand how best to design gender-responsive social protection measures that tackle the structural barriers to transformative gender equality and GBV, for example including complementary activities that specifically include critical reflection on gender, power and household decision-making, and to better understand the importance of different design features (e.g. who receives the transfer, the amount of money and duration of transfers).[85]

Annex 1: Methodology

This rapid research query has been conducted as systematically as possible, under tight time constraints.

Step 1: Search – Literature was identified primarily through existing evidence reviews on the gendered impacts of the transition to low-carbon economies such as "Women and the Net Zero economy: A briefing on changes in garment, agriculture and energy supply chains". In addition, searches were conducted using Google and relevant electronic databases using key search terms including but not restricted to: GBV, violence against women, violence against children, gender based violence, gendered impacts, job losses women, job creation women, job substitution women, household chores, manufacturing, decision making, housing, health, agriculture, land management, affordable housing, female headed households, climate-smart agriculture, climate-smart financing, climate-smart infrastructure, energy efficiency, solar lighting, construction, clean fuels, renewable energy, women, girls, women with disabilities.

Step 2: Inclusion - To be eligible for inclusion in this rapid mapping, reports had to fulfil the following criteria:

- **Focus:** Research or case studies demonstrating or predicting the impact of the transition to a low-carbon economy on gender equality and gender-based violence.
- **Time period:** From January 2010 to present.
- **Language:** English.
- **Publication status:** Publicly available – in almost all cases published online
- **Geographic focus:** Global, with a focus on comparable (middle-income) geographies to South Africa
- **Format:** Research reports, evaluation reports, peer-reviewed journal articles, systematic reviews, rapid assessments, grey literature
- **Study design:** All study types, designs, and methodologies including primary and secondary studies with clear methodologies to enable an assessment of quality

In total, 70+ documents have been reviewed for this report.

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