BEYOND GREEN: GENDER AND TECH IN THE ENERGY TRANSITION

Why this Intersection Matters?

CONTENT WARNING: This fact sheet contains descriptions of physical, sexual and psychological violence.

Every day, a woman walks further to gather wood because the forest edge has been fenced off as part of a carbon project boundary. A young territorial defender deletes messages from her phone after strangers start posting sexualised content about her online. A mine promises to provide clean-energy minerals for a decarbonised world, yet women living nearby face harassment, assault, polluted water, and the loss of land that once sustained their communities.

As the world races to decarbonise, the push for clean energy is redefining global infrastructure, technology, and extraction. However, without a fundamental shift in how renewable energy is governed, this "green" transformation threatens to entrench old injustices. Far from being a purely technical shift, the global energy transition sits at a critical intersection with gender equality, digital and human rights – where the pursuit of "climate solutions" can inadvertently exacerbate harm to marginalised communities on the frontlines.

The global energy transition – essential to countering climate collapse – presents an unprecedented opportunity to reshape how humanity produces, distributes and consumes power. Yet current trajectories risk replicating and intensifying colonial, patriarchal and extractivist violence against land, waters, Indigenous, Black and peasant communities, migrants, queers, women, and non-human life, effectively transforming the fossil-fuel economy into a greenwashed version of itself. While dominant "just transition" frameworks focus on environmental, macroeconomic and labour impacts, the specific forms of gendered and territorial violence emerging in new extraction territories remain largely overlooked.

This fact sheet examines how current energy transition interventions reproduce and exacerbate gender-based violence, how technology is deployed to amplify it, and how women-led and community-led alternatives can chart a course towards a genuinely just transition.

Wait, wait, wait... What is an energy transition?

An energy transition is a fundamental shift in a society's energy mix – such as moving from a predominant use of wood to coal in the 18th century, or from coal to oil in the 20th. Today's transition moves away from fossil fuels like oil, gas and coal towards low-carbon alternatives such as solar, wind, battery storage, and electric mobility. It also encompasses critical conservation efforts, such as protecting mangroves and peatlands to reduce carbon dioxide and mitigate extreme weather.

This transition requires new technologies to store and deploy energy, renewable energy infrastructure, carbon markets, programmes to reduce deforestation and forest degradation (REDD+), and the intensified extraction of so-called "critical minerals" –used for weapons, technology, and energy. This entails major cultural, economic and political shifts.



MORE THAN AN ENVORONMENTAL SHIFT

The energy transition has become "a massive and growing economic force". Meeting net-zero greenhouse gas goals under the Paris Agreement – alongside rising electricity demand from industrialisation and expanding data centres – requires rapid growth in renewable generation, power grids, energy storage, and critical mineral supplies. The International Energy Agency estimates **a sixfold increase in demand for critical transition minerals like lithium, cobalt and copper by 2040. Global investment in the energy transition reached a record $2.3 trillion in 2025, outpacing fossil fuel spending**. Overall, the energy market is projected to expand from $2.5 trillion to over $6.2 trillion by 2035, growing at a compound annual rate of nearly 9%.

Yet these financial flows remain profoundly unequal. Emerging and developing economies – home to two-thirds of the world's population – receive only one-fifth of global renewable energy investment. This disparity reproduces historical geographies of extraction, in which the Global South provides the land, labour, and raw materials, while the Global North captures most of the economic and technological benefits.

How this transition is framed dictates far more than how energy is consumed in homes and cities; it determines **who controls land, whose labour is valued, and which materials and data are extracted, where and under what conditions**. Current policies often accelerate "green" infrastructure without transforming who holds decision-making authority, who reaps the economic rewards, and whose land and labour are sacrificed in the process.

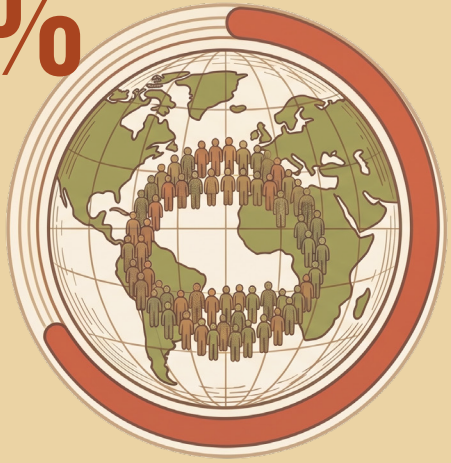
WHY SHOULD WE THINK ABOUT GENDER, INTERSECTIONALITY AND TECH WHEN WE TALK ABOUT ENERGY TRANSITIONS?

Energy projects do not unfold across socially neutral landscapes. They operate within environments where deep-seated, gendered power imbalances already shape land access, livelihoods, mobility, wages, and vulnerability to violence. Indigenous, Black, impoverished, disabled, rural, and migrant women – as well as queer communities – already contend with unequal land tenure, wage gaps, occupational segregation, heavy burdens of unpaid care work, time poverty, underrepresentation in decision-making, digital exclusion, and sexual violence. Within these contexts, the disruptions caused by energy projects are rarely neutral, and the violence inflicted on women and queer people is often far from an accidental side effect.

A lower-caste woman in Gujarat losing access to firewood and grazing land, an Indigenous Q'eqchi' woman facing forced eviction, and a trans defender targeted with deepfakes all experience energy transition interventions as direct violence, albeit through distinct mechanisms. Policymakers bear a clear responsibility to assess these impacts, including evaluating the "no project" scenario. The following sections outline the primary pathways through which energy transition interventions perpetuate gendered violence. Understanding these mechanisms is essential to developing targeted prevention strategies and effective counter-measures.

67%

of the global population



gets only about

20%

renewable energy investment



Source: World Economic Forum, 2021

SEVEN DRIVERS
OF GENDERED VIOLENCE IN ENERGY TRANSITION ECONOMIES

1 RESOURCE ENCLOSURE AND LIVELIHOOD DISRUPTION

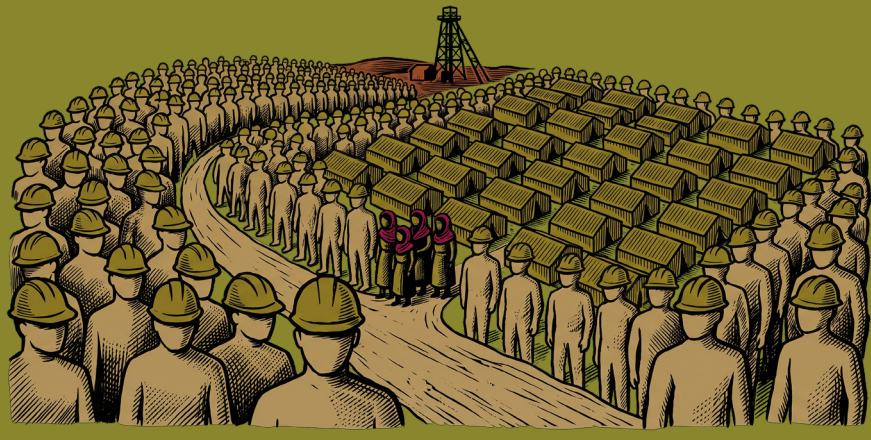
In SEVEN OUT OF TEN HOUSEHOLDS GLOBALLY where water must be collected outside the home, women and teenage girls bear primary responsibility. When land is enclosed for solar parks, mining concessions, carbon projects or biodiversity offsets, women are forced to walk significantly longer distances, escalating their exposure to harassment and assault.



When REDD+ initiatives, utility-scale solar projects, or conservation zones restrict access to communal lands, women often lose access to the commons — fuelwood, water, fodder, grazing land and medicinal plants — that sustain autonomous livelihoods. Furthermore, compensation is typically paid to male household heads (who usually hold legal land tenure). This practice deepens women's exclusion from decision-making, increases financial dependence, and raises the risk of intimate partner violence triggered by household financial strain.

2 LABOUR MIGRATION AND "MAN CAMPS"

Across large-scale critical minerals sites in the Democratic Republic of Congo (DRC), South Africa, and Chile's Atacama region, as well as across infrastructure projects in Senegal and REDD+ interventions in Kenya, the rapid influx of male workers correlates with sustained spikes in sexual exploitation and harassment against local women. In the DRC alone, women living close to mines controlled by armed groups are nearly three times more likely to experience sexual violence by a stranger than those living further away.



Large-scale infrastructure and mining projects bring in massive, transient, male-dominated workforces. In settings with weak safeguards, this creates "man camp economies", characterised by extreme gender imbalances, hyper-masculinised workplace cultures, escalated demand for transactional sex, sexual harassment, assault, trafficking, and the displacement of local women into survival sex work.

3 ECONOMIC DISPLACEMENT AND PATRIARCHAL BACKLASH

Wind farm development in the Borborema territory in northeastern Brazil – home to a grassroots agroecological network of family farmers, rural worker unions, and community associations – has enclosed agricultural land and displaced rural men from farming. Qualitative research documented a severe escalation in domestic violence linked to male job losses, alcoholism, and a crisis of working-class masculinity.

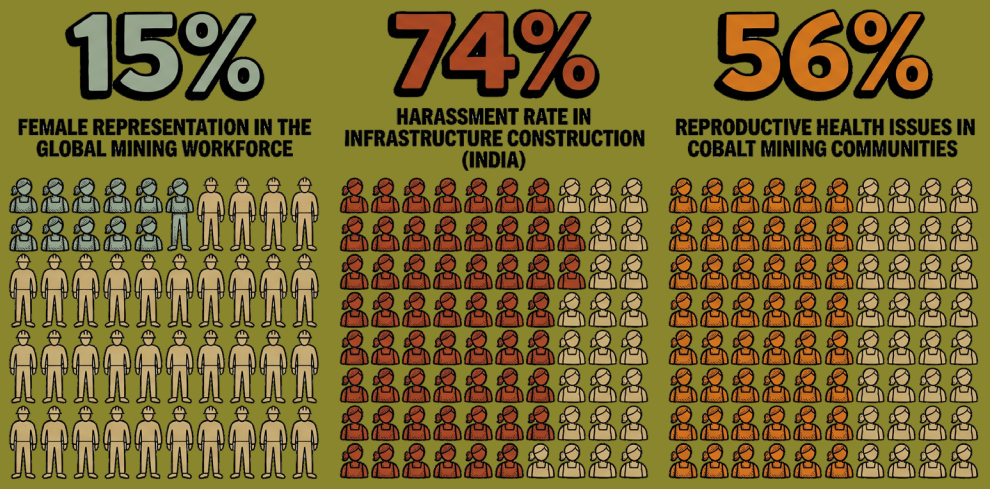
As "green" projects appropriate land, men facing job loss, economic enclosure, or shifting livelihood arrangements often experience a crisis of masculine identity. Conversely, women may gain autonomy through direct project participation. In both scenarios, patriarchal backlash can escalate as economic stress is frequently redirected into the household, triggering sharp increases in intimate partner violence.

4 UNSAFE WORKPLACES AND EXCLUSIONARY VALUE CHAINS

Mining and refining also disproportionately harm the reproductive health of women and people with gestational capacity. In the DRC, 56% of pregnant people living near industrial cobalt mines suffered from severe reproductive health issues – including miscarriages, persistent infections, and birth defects — caused by heavy metal contamination of their water supplies.

In infrastructure and civil construction – sectors expanding rapidly to build transition grids, wind farms and solar installations – women face extreme abuse. For example, 74% of female construction workers in central India report experiencing regular sexual harassment and exploitation from supervisors, contractors and site owners.

Energy transition supply chains remain deeply gendered and unsafe. Women – predominantly migrant and racialised workers – are concentrated in low-paid, informal roles in mining, component manufacturing, plantations, and waste recycling, where they frequently face abuse, harassment, exploitation, and occupational hazards. A lack of gender-appropriate personal protective equipment, weak corporate grievance mechanisms, and opaque supply chains leave women and queer people with little access to justice.



Source: International Institute for Environment and Development, 2025

Source: Jonathan Parry, 2014

Source: RAID and AFREWATCH, 2024

5 MILITARISATION, FORTRESS PROTECTION, AND STATE-CORPORATE CRIMINALISATION

Militarised enclaves create checkpoints controlled by private security firms and local chiefs. In the DRC, armed militias and state security forces use mass rape and sexual slavery as deliberate tactics of war to control mineral-rich regions and displace communities from cobalt and copper mining areas – minerals required for electric vehicles, solar panels, wind turbines and power grids.

Extraction and conservation zones are increasingly militarised to secure corporate and state interests. Armed forces, private security, and militias use systematic sexual violence to terrorise communities, while women and queer environmental and territorial defenders resisting mining or conservation projects face targeted attacks and arbitrary arrest. Violence in these contexts serves to enforce extraction policies – designed to break resistance and facilitate the uncontested appropriation of commons and territories.

6 GOVERNANCE NEGLIGENCE, WEAK SAFEGUARDS AND IMPUNITY

In transition states such as Zambia, where only 19% of women hold land titles, the company operating the Mopani copper mine bypassed women entirely during land negotiations because the law required consultation only with the male community chief. This left women without land rights or compensation.



Most energy transition projects fail to incorporate gender-responsive safeguards. Where safeguards do exist, complaint systems are often inaccessible and audits are controlled by developers, which frequently silences survivors. Perpetrators usually face no consequences, while women and queer people are denied justice and equitable benefit-sharing. Critical failures include:

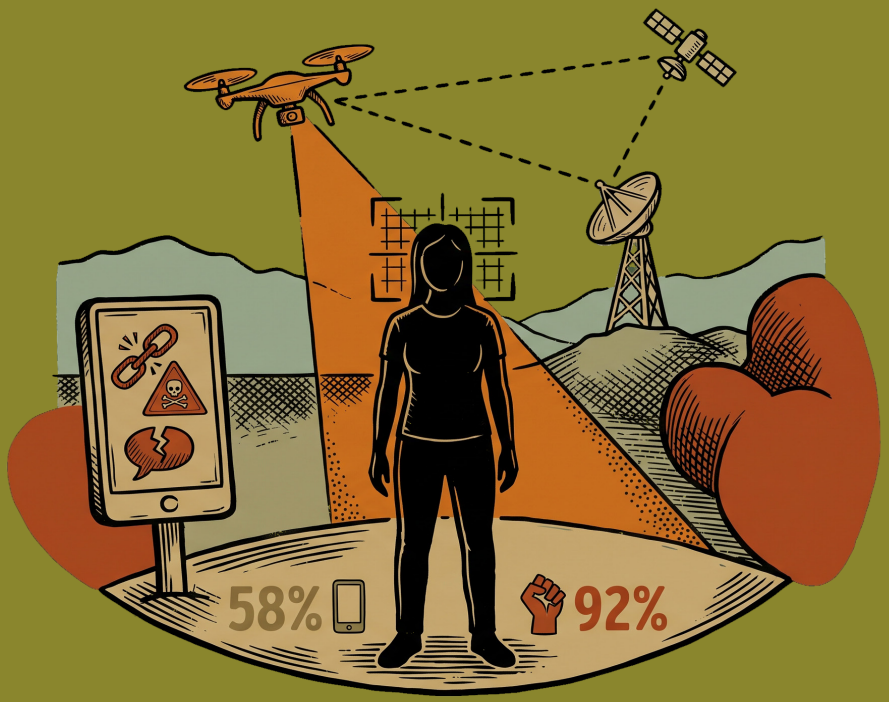
- male-biased decision-making, where consultation and benefit-sharing processes focus predominantly on male household heads and local elites;
- a widespread absence of safe, confidential grievance mechanisms for reporting sexual exploitation, abuse or harassment;
- weak accountability that allows perpetrators to act with impunity while survivors frequently face retaliation;
- narrow definitions of violence that fail to recognise economic, psychological, technology-facilitated, and territorial harm; and
- a lack of trauma-informed practices as well as reporting systems that re-traumatise survivors and lack referral pathways to essential support services.

7 HOW IS TECHNOLOGY USED TO FACILITATE GENDER-BASED AND TERRITORIAL VIOLENCE?

- **Nearly six in ten girls and young women (58%) worldwide have experienced online harassment.**
- **92% of territorial defenders surveyed by Global Witness experienced online abuse as direct retaliation for their work, with three-quarters (75%) reporting that these attacks directly contributed to subsequent offline physical harm.**

As climate and energy transition governance becomes increasingly digitalised, harm can escalate through surveillance, exclusion from digital benefits, misuse of location data, and cyber-violence. Far from being neutral tools for ecological preservation, digital technologies are frequently weaponised by state and corporate actors to surveil, intimidate and criminalise defenders.

Tech-facilitated gender-based violence is not entirely new – rather, it amplifies existing patterns of abuse through digital means. Addressing it is urgent given its rapid expansion and low public awareness of digital rights. Perpetrators can scale violence through coordinated or algorithmic amplification, maintain anonymity to evade accountability, extend abuse into homes and intimate spaces, and operate across jurisdictions, complicating legal remedies.



KEY TECHNOLOGIES AND MECHAN

BIOMETRICS AND DIGITAL ID SYSTEMS

FACIAL RECOGNITION SYSTEMS HAVE BEEN USED TO IDENTIFY AND TARGET INDIGENOUS WOMEN DEFENDING TERRITORIES IN THE ARCTIC, LATIN AMERICA AND SOUTHEAST ASIA.

In critical mineral mining concessions and monitored conservation zones, state and corporate actors deploy biometric systems and video surveillance ostensibly to prevent poaching or unauthorised entry. However, these systems also restrict access to benefits and mobility: the gender digital divide leaves women less likely to own mobile devices, hold bank accounts, or possess the digital literacy that biometric registries demand.

Facial recognition systems at protest sites and territorial boundaries allow corporate security and state police to profile women and queer defenders. Video analytics enable discriminatory targeting, while poor data governance over centralised databases accessible to state and corporate entities means personal information can be sold, leaked or misused.

ARTIFICIAL INTELLIGENCE AND ALGORITHMIC GOVERNANCE

AI-driven systems and automated online surveillance are increasingly used by states and corporations to suppress grassroots environmental and land-based resistance, restricting civic space and making it dangerous for women and marginalised groups to organise.

Large-scale AI algorithms monitor social media to scrape activists' private data; state police in authoritarian contexts use AI tools to detect and remove activist content; and algorithmic discrimination reproduces and amplifies existing biases against racialised, Indigenous and LGBTIQ+ communities. Content removal disproportionately affects material created by women due to gendered bias in AI training data.

THE ALGORITHMS USED TO GOVERN GREEN TRANSITIONS ARE DESIGNED BY HIGHLY HOMOGENEOUS TEAMS: GLOBALLY, ONLY 22% OF ARTIFICIAL INTELLIGENCE PROFESSIONALS ARE WOMEN. THIS SEVERE UNDERREPRESENTATION EMBEDS PATRIARCHAL, EUROCENTRIC AND COLONIAL BIASES DIRECTLY INTO AI CODE AND TRAINING DATASETS.



ISMS INVOLVED

REMOTE SENSING, GEOGRAPHIC INFORMATION SYSTEMS, SATELLITES, AND DRONES

IN THE QUILOMBOLA TERRITORY OF ANGELIM II IN NORTHEASTERN BRAZIL, INDIGENOUS AND AFRO-DESCENDANT WOMEN TESTIFIED THAT SURVEILLANCE DRONES OPERATED BY AGRO-INDUSTRIAL ACTORS ROUTINELY HOVER OVER THEIR HOMES, VIOLATING THEIR PRIVACY, WHILE AERIAL CHEMICAL SPRAYING HAS POISONED LOCAL SUBSISTENCE CROPS AND LIVESTOCK.

Drones for anti-poaching and forest monitoring have introduced military-grade surveillance into civilian conservation landscapes, extending what women describe as a "patriarchal gaze" over territories. Initiatives like the WildDrone network, which automates wildlife monitoring, simultaneously enable continuous surveillance of protected-area inhabitants. Thermal imaging and radar map their movements in real time, creating a hostile environment for rural and Indigenous women that restricts their mobility and cuts off access to gathering and sacred sites. This digitised policing of local bodies and environments without consent violates self-determination, underscoring the urgent need to uphold rights-based earth governance networks.

MOBILE DATA COLLECTION AND ENVIRONMENTAL MONITORING PLATFORMS

The rapid spread of mobile devices has accelerated the development of custom apps for environmental monitoring, which can extract community data and personal identifiers without meaningful consent. Apps frequently lack adequate privacy standards, allowing state agencies to track defenders, while corporate-sponsored apps build centralised databases accessible to private security forces targeting local leaders.

CONNECTED SMART-GRID HOME TECHNOLOGIES FOR CLIMATE MITIGATION CAPTURE NON-ANONYMISED BEHAVIOURAL DATA. WEAK PRIVACY STANDARDS IN UTILITY REGISTRIES LET THIS DATA LEAK, AND ABUSERS EXPLOIT SHARED ACCOUNTS TO REMOTELY MONITOR AND CYBERSTALK DOMESTIC VIOLENCE SURVIVORS.

CARBON ACCOUNTING AND MONITORING, REPORTING, AND VERIFICATION SYSTEMS

The growth of carbon markets has driven the development of complex digital monitoring, reporting, and verification systems that can certify projects as successful while overlooking social harm – especially when audits are remote or conflict-blind. This creates plausible deniability: systems built to measure satellite-derived forest cover and carbon sequestration are not designed to capture on-the-ground violence, allowing developers to report success while ignoring displacement or sexual abuse within project boundaries.

Labelling voluntary carbon credits with Sustainable Development Goals to attract buyers is heavily criticised for its superficiality. Leading carbon standards have weak requirements for robust gender-disaggregated baselines, allowing developers to pass paper-based audits even as projects exacerbate gendered harm.

DIGITAL REPRESSION THROUGH SOCIAL MEDIA HARASSMENT, DOXXING, TROLLING, AND DEEPFAKES

IN GUATEMALA, 9 OUT OF 10 SURVIVORS OF ATTACKS AGAINST TERRITORIAL DEFENDERS DURING 2023 WERE INDIGENOUS MAYAN WOMEN FACING DIGITAL AND PHYSICAL THREATS – HARASSMENT THAT FREQUENTLY PRECEDES OFFLINE VIOLENCE.

Women defenders who speak out against large-scale renewable installations, carbon markets, or mining face coordinated, technology-facilitated attacks designed to push them out of public life. The methods used include:

- Doxxing: the publishing of personal data, home addresses and family details often precedes offline stalking, home invasions and physical attacks.
- Trolling: coordinated campaigns weaponise gender norms to attack a defender's sexual reputation, sexual orientation, family role, or mental stability, undermining their credibility within their communities and silencing their activism.
- Deepfakes: non-consensual explicit content is generated to humiliate, intimidate and discredit defenders.
- Cyber stalking and sextortion: digital tracking is combined with extortionate threats to compel silence.

THIS DIGITAL VIOLENCE HAS DEVASTATING IMPACTS ON WOMEN'S PARTICIPATION IN PUBLIC LIFE:

- **80% OF TARGETED WOMEN REDUCED THEIR OVERALL PARTICIPATION ON DIGITAL AND SOCIAL PLATFORMS.**
- **40% ACTIVELY SELF-CENSORED THEIR PUBLIC REPORTING, ENVIRONMENTAL CAMPAIGNS, AND ADVOCACY.**
- **33% WERE FORCED TO CHANGE JOBS OR ORGANISATIONS.**
- **25% LOST THEIR POSITIONS OR HAD THEIR CONTRACTS NOT RENEWED.**
- **80% LIVED IN GENERALISED FEAR FOR THEIR LIVES OR PHYSICAL SAFETY.**

FIVE CASES OF TECH-FACILITATED GEN

LARGE-SCALE RENEWABLE ENERGY AND MINING ON SÁMI, DOLGAN AND EVENKI LANDS (ARCTIC CIRCLE)

The 350 km Ambler Road copper project (Alaska), large-scale wind power on Sámi territories (Norway and Sweden), and palladium and platinum mega-projects on Dolgan, Evenki and Sámi lands (Russia's far north) are framed as "climate solutions". However, they dispossess communities of their traditional lands and livelihoods such as reindeer herding – knowledge largely held by women.

Geospatial mapping and remote sensing were used to classify Indigenous lands as "vacant", while digital surveillance monitored extraction sites. The influx of male-dominated construction workforces brought escalating harassment and violence against Indigenous women and land defenders, who also faced targeted attacks and arbitrary arrest.

KASIGAU CORRIDOR REDD+ PROJECT (KENYA)

A joint investigation by the Amsterdam-based Centre for Research on Multinational Corporations (SOMO) and the Kenya Human Rights Commission (2022–2023) exposed a decade-long pattern of systematic sexual abuse at Wildlife Works' Kasigau Corridor REDD+ project in southeastern Kenya. Some male staff – mostly in senior positions – demanded sex from female employees in exchange for promotions, retaliating against refusals with bullying and wage withholding.

Internal corporate digital databases and communication channels were used to intimidate and silence survivors, who had no access to safe grievance mechanisms. Meanwhile, the project was verified under major voluntary carbon standards, including the Gold Standard and Verra. Despite these certifications, internal safeguards completely failed to detect or address a decade of abuse, exposing a critical gap in the voluntary carbon market's human rights due diligence and verification mechanisms.

COBALT EXTRACTION AND CRITICAL MINERALS (DEMOCRATIC REPUBLIC OF CONGO)

The Democratic Republic of Congo (DRC) holds some of the world's largest cobalt deposits – essential for battery manufacturing and electric vehicles – where competition for control has triggered prolonged violence resulting in millions of deaths. Mass rape and sexual assault are used as deliberate tactics of war by armed groups, such as M23 rebels and state militias, to terrorise communities and secure territorial control over mineral sites.

Transnational corporations satisfy elements of the legal concept of "joint criminal enterprise" by purchasing conflict minerals through Rwandan and Ugandan markets, helping finance armed groups. While corporate "ethical sourcing" software purports to trace supply chains and ensure "conflict-free" minerals, it often obscures supply-chain violence, enabling companies to maintain plausible deniability while profits flow to corporate entities and armed groups.

NDER-BASED VIOLENCE



ARTICLE 6.4 CLEAN COOKSTOVE PROJECT (MYANMAR)

Myanmar's Article 6.4 Clean Cookstove Project – the first globally to receive carbon credits under the UN's Paris Agreement Crediting Mechanism, in February 2026 – operated through military-junta-controlled institutions in Sagaing Region. This active conflict zone is marked by military violence, physical terror, food insecurity, deliberate targeting of civilians, mass displacement, and alarming levels of conflict-related sexual violence.

The project relied extensively on unpaid female labour without providing any protection. Due to security risks, verification was conducted remotely via 22 video interviews – only two of which were with women – leaving safeguards blind to localised violence. Ultimately, the project was implemented without conflict-sensitive monitoring, digital engagement safeguards, or mandatory gender protection frameworks.

REDD+ PROJECT IN CUSTOMARY LAND AREAS (FIJI)

Over 90% of forestland in Fiji is communally owned under customary tenure, yet patrilineal systems render women largely invisible in land ownership and resource management.

With the introduction of the REDD+ project in the Drawa and Emalu communities – which included community benefit-sharing with local Indigenous mataqali peoples – women were significantly underrepresented in preparatory consultations. Consequently, they were left exposed to unknowingly breaching lease terms through routine livelihood activities in restricted zones, facing violence and recrimination for a perceived failure to provide for their families. Furthermore, because benefits were paid into bank accounts – which most rural women cannot access – the project generated financial and digital exclusion. Women who accessed benefits without a husband's permission often faced domestic violence as new carbon-market income disrupted patriarchal household structures.

OTHER ENERGY TRANSITIONS ARE POSSIBLE

The present trajectory is not inevitable. The same transition that now too often reproduces extractive, patriarchal and colonial harm could be reorganised around care, consent, and territorial and digital rights. The question is not whether we should transition to renewable-energy-based economies or whether digital technologies should exist, but who governs them – and for whom.

A truly just energy transition holds profound emancipatory potential. When designed through decolonial, feminist and community-led frameworks, decentralised renewable energy and digital technologies can help dismantle gendered hierarchies, centre territorial knowledge, alleviate time and financial poverty, and strengthen territorial sovereignty.



FIVE CASES OF WOMEN-RENEWABLE ECONOMIE

SOLAR SISTER (SUB-SAHARAN AFRICA)

Operating across Kenya, Uganda, Tanzania, Nigeria, Mali, Senegal and the DRC, Solar Sister is a women-led clean energy micro-franchise network. It has reached over 250,000 households and supported more than 1,000 women entrepreneurs distributing solar lights, cookstoves and water purification systems. By recruiting women who often lack prior business experience and offering financial, business and technical literacy, the initiative subverts male gatekeeping in technology distribution. Research links participation to improved energy access, collective support networks, higher earnings, increased household bargaining power, and a reduced risk of assault and harassment – as solar lighting eliminates the need to gather firewood in unsafe areas.

PROAMAZONÍA'S BOTAS VIOLETA AND GENDER-RESPONSIVE REDD+ (ECUADOR)

PROAmazonía's Botas Violeta initiative in the Ecuadorian Amazon treats gender justice as central to conservation integrity rather than a safeguarding add-on. It applies an intersectional analysis of gender, race and class to conservation and violence prevention, guaranteeing women's equal participation in project design and implementation alongside gender-responsive, trauma-informed grievance mechanisms. Communities report increased female leadership and reduced gender-based violence, reinforcing research that shows gender-equal communities practise more effective resource stewardship and achieve stronger conservation outcomes.

AND COMMUNITY-LED TECHNOLOGIES IN ES

BAREFOOT COLLEGE (RAJASTHAN, INDIA, AND 80-PLUS GLOBAL SOUTH COUNTRIES)

Barefoot College has trained more than 2,400 solar engineers across more than 80 countries in the Global South, providing solar systems to over 250,000 households. This community-led energy governance model trains rural women – prioritising older women, widows, and those marginalised by the formal economy – to design, install, and manage decentralised solar energy systems in their villages. Research indicates that communities with Barefoot-trained engineers enjoy improved energy access, lower costs, greater system sustainability, and increased economic autonomy for women. The model directly challenges the myth that engineering and technology are "men's work", enhancing community energy sovereignty by allowing villages – rather than external corporations – to govern their own energy systems.



BIOGAS DIGESTERS FOR RURAL WOMEN (NEPAL, INDIA, AND BANGLADESH)

Over 50,000 household biogas systems – which convert agricultural waste into clean cooking fuel – have been installed across Nepal and scaled into India and Bangladesh. Designed with communities rather than just for them, these systems are culturally appropriate, technically sustainable, and genuinely responsive to local needs, with women leading the design process. Research documents reduced time poverty, decreased economic dependency, higher agricultural productivity, and improvements in respiratory health due to better indoor air quality.

SAFEBODA (KAMPALA, UGANDA)

SafeBoda, a GPS-enabled motorcycle transit app in Kampala, Uganda, has provided over 2 million safe rides. The platform features real-time tracking for trusted contacts, driver vetting, safety training, and an emergency alert button integrated with police and women's support organisations. Built to prioritise women's safety over corporate profit, it demonstrates how "safety by design" can protect rather than harm women. Research highlights a reduced risk of harassment and expanded economic participation, with location data remaining safely in women's hands.



WHAT ARE THE MAIN FORMS OF GENDER-BASED VIOLENCE IN ENERGY TRANSITION CONTEXTS?

- **Sexual violence:** Rape, sexual assault, coercive sex, sexual harassment, trafficking and sexual exploitation in workplaces and project zones, and during forced evictions, conflict, or militarised conservation.
- **Physical violence:** Assault by workers, security forces, or state agents; forced evictions and physical intimidation; and intimate partner violence linked to enclosure, lost livelihoods, or patriarchal backlash.
- **Psychological violence:** Threats, intimidation, humiliation, surveillance, blackmail, and public shaming.
- **Economic violence:** Exclusion from employment, wages, land compensation, project benefits, or credit; time poverty; forced labour; and debt bondage.
- **Institutional violence:** Complaint systems that expose survivors to retaliation; non-response by authorities; male-biased decision-making; and criminalisation of livelihood practices.
- **Political violence:** Reprisals against women leaders, defenders, and unionists; silencing of opponents; and criminalisation of resistance.
- **Environmental violence:** Environmental degradation and bodily harm from land and water pollution, toxic exposure, and loss of community safety networks.
- **Tech-facilitated violence:** All forms of violence using information and communication technologies to police, silence, and harass women, queer people, and territorial defenders. Includes online harassment, doxxing, sextortion, and deepfake pornography; algorithmic amplification of smear campaigns; and the weaponisation of smart utilities, geolocation tracking, and surveillance tools to control, stalk, and silence defenders and survivors.

WHO FACES THE HIGHEST RISKS?

- **Indigenous and forest-dependent:** First in land loss and last in benefit-sharing, and usually targeted for their territorial knowledge and leadership.
- **Black and Afro-descendant:** Disproportionately affected by mining and pollution in their territories and subject to racialised violence.
- **Lower-caste and Dalit:** Structurally excluded from land ownership, are often the first to lose access to commons and are subject to caste violence.
- **Peasant and rural:** Primary resource-dependent, usually with weak land tenure and high unpaid care burdens.
- **Migrant and refugee:** Lacking legal protections, they are more subject to exploitation and trafficking and vulnerable to deportation and retaliation.
- **LGBTQIA+:** Targeted for both leadership roles and identity; subject to homophobic and transphobic smear campaigns, outing, and sexual violence threats, while facing severe digital silencing, exclusion from green labour markets, and secondary victimisation under discriminatory legal systems.
- **Disabled:** Systematically ignored in transition impact assessments and excluded from green labour due to ableist hiring norms, while facing heightened risks of physical and sexual violence, compounded by isolation from mainstream feminist protection networks and extreme vulnerability to transit-related harassment.
- **Informally employed:** Lacking contracts, benefits, or legal protections, they are more vulnerable to exploitation and wage theft.
- **Environmental and land defenders:** Targeted by state, corporate, and vigilante violence for resisting the commodification of their territories.

KEY LESSONS

Verification and safeguards must move beyond policy reviews to include: direct, confidential engagement with survivors; independent labour rights and workplace safety audits; power analysis mapping decision-making authority and risk hierarchies; community-level, on-site investigations; and mandatory physical site visits – since remote-only verification leaves safeguards blind in active conflict zones. Explicit contractual protections should be mandatory wherever unpaid female labour is part of a project, and overcrediting must be treated as evidence of systemic dysfunction rather than a technical error to be quietly corrected.

Grievance mechanisms must be built *with*, not *around*, the people who will use them: This requires multiple trusted access points rather than a single office controlled by the accused authority, strict confidentiality, and staff trained in trauma-informed response. There must be a clear, working distinction between environmental or land disputes and escalated gender-based violence so the latter is never diluted into the former (mechanisms developed by WI-HER and Marstel-Day were built around precisely this distinction). Where benefits are distributed digitally, projects need an explicit plan for women without documentation or banking access; otherwise, digital systems become a new axis of exclusion.

"Green" does not mean "just": A "green" label changes only how a project is described – it does nothing to lessen its impact on land tenure, water access, or grazing rights. In extraction zones, sexual violence functions as a direct tool of territorial control, not an unfortunate byproduct. Similarly, "ethical sourcing" software must be treated as a trigger for scrutiny rather than proof of a clean supply chain, as these digital systems frequently offer plausible deniability to corporations funding violence they claim not to see. The exclusion of Indigenous women from decision-making in green extractive projects is not a minor gap to observe, but a fundamental design failure that must be corrected.

What makes women-led and community-led alternatives work: Successful alternatives rely on recruitment strategies that deliberately target women with no prior formal experience, pairing job opportunities with business training, financial literacy and microfinance access. They also reject rigid formal credentialism in favour of territorial expertise, prioritising community-led design where external engineers serve as advisors rather than directors. Crucially, these initiatives embed physical safety features directly into the technology and conduct gender analyses at the very beginning of project design – ensuring women's leadership is built into governance structures from the outset.



Critical Failure	Current Corporate Practice	Trauma-Informed Safeguard
Stakeholder Consultation	Centres on male household heads and community elites.	Mandatory, gender-disaggregated Free, Prior, and Informed Consent (FPIC).
Grievance Reporting	Online-only or developer-controlled portals; high risk of retaliation.	Independent, secure, localised oral grievance platforms.
Definition of Violence	Limited strictly to severe physical assaults.	Incorporates economic violence, digital harassment, and environmental and bodily pollution.
Remediation & Justice	Cash payouts to male titleholders; impunity for subcontractors.	Joint land titling, contractor disqualification, and independent third-party monitoring.

TOWARDS TRULY JUST TRANSITIONS

JUST TRANSITION FOR WHOM?

Mainstream frameworks tend to measure justice through the narrow lenses of formal employment and macroeconomic growth. By contrast, feminist and Indigenous critiques insist that no transition can be truly just without securing land rights, recognising unpaid care work, ensuring personal and community safety, and respecting territorial sovereignty.

CARBON MARKETS: REFORM VS ABOLITION.

While some actors seek to reform voluntary carbon markets by embedding gender premiums and Sustainable Development Goal 5 criteria into verification standards, feminist and environmental justice alliances argue these mechanisms are fundamentally flawed. They counter that carbon markets merely greenwash pollution and perpetuate climate colonialism by allowing continued emissions in the Global North at the expense of communities and territories in the Global South.

TECHNOLOGY: THREAT OR PROTECTION?

Rapid digitalisation exposes women and queer people to algorithmic bias and escalating technology-facilitated violence. However, when digital tools are built around "safety by design" principles and aimed at the well-being of communities and territories, they become genuinely protective – enabling emergency GPS-based response, resilient community power grids, secure decentralised mapping, and community-controlled data systems. The ultimate outcome depends entirely on who holds design power, and to what end.

By treating climate change as an apolitical technical problem to be solved with speculative finance and quick techno-fixes, the currently dominant corporate decarbonisation consensus preserves high-emission lifestyles for a privileged few while shifting the real costs onto the bodies and territories of the Global South. Confronting this reality requires a reparative, decolonial, and intersectional feminist approach – one that rejects the hegemony of carbon metrics, challenges corporate profits, and prioritises relationality, community-owned energy, and collective structures of care.



REFERENCES AND FURTHER READING

- Association for Progressive Communications (APC). (2024). *"Overview of manifestations and impacts of technology-facilitated gender-based violence and the need for safety by design"*. https://www.apc.org/en/pubs/overview-manifestations-and-impacts-technology-facilitated-gender-based-violence-and-need
- Audu, Victoria. (2023). *"The Back End of Genocide: How the Rush for Congo's Cobalt is Killing Thousands"*. https://republic.com.ng/october-november-2023/congo-cobalt-genocide
- Bringel, Breno and Svampa, Maristella. (2023). *"The Decarbonisation Consensus"*. https://www.academia.edu/113554007/The_Decarbonisation_Consensus_English_Version_Breno_Bringel_and_Maristella_Svampa_2023_
- Business & Human Rights Resource Centre. (2024). *"Transition Minerals Tracker: 2024 Analysis"*. https://www.business-humanrights.org/en/from-us/briefings/transition-minerals-tracker-2024-global-analysis/
- Caretta, Martina Angela and Vela-Almeida, Diana. (2025). *"Just energy transition and gender. A systematic review for feminist research"*. https://doi.org/10.1016/j.erss.2025.104138
- Castañeda Camey, Itzá, Sabater, Laura, Owren, Cate and Boyer, A. Emmett. (2020). *"Gender-based violence and environment linkages"*. https://portals.iucn.org/library/sites/library/files/documents/2020-002-En.pdf
- Centre for Research on Multinational Corporations (SOMO) and Kenya Human Rights Commission. (2023). *"Offsetting human rights: Sexual abuse and harassment at the Kasigau Corridor REDD+ Project in Kenya"*. https://www.somo.nl/offsetting-human-rights/
- CNRS News. (2025). *"The myth of energy transition"*. https://news.cnrs.fr/articles/the-myth-of-energy-transition
- Cook, Nathan J., Grillos, Tara and Andersson, Krister P.. (2019). *"Gender quotas increase the equality and effectiveness of forest commons governance"*. https://doi.org/10.1038/s41558-019-0409-9
- Danish Institute for Human Rights. (2023). *"Towards a Feminist Energy Justice Framework: Women's Participation in the Energy Transition in Sub-Saharan Africa"*. https://www.humanrights.dk/publications/womens-human-rights-energy-transition-sub-saharan-africa-roundtable-event-outcome
- Energy Sector Management Assistance Program (ESMAP) / World Bank Group. (2025). *"Violence Against Women & Girls Resource Guide: Energy Brief"*. https://documents1.worldbank.org/curated/en/930771499888717016/pdf/117350-ACS.pdf
- European Center for Not-for-Profit Law. (2023). *"Where AI and climate action meet"*. https://ecnl.org/publications/where-ai-and-climate-action-meet
- European Parliament. (2026). *"Women's rights and democracy: combatting stereotypes, disinformation, violence in the digital age"*. https://www.europarl.europa.eu/thinktank/en/document/IUST_BRI(2026)785000
- Forest Peoples Programme. (2020). *"Understanding Gender-Based Violence in the Context of Conservation"*. https://www.forestpeoples.org/fileadmin/uploads/fpp/migration/documents/Understanding%20gender-based%20violence%20in%20the%20context%20of%20conservation.pdf
- Global Forest Coalition. (2025). *"Exploited Lands, Exploited Lives: Struggles for Forests, Life, and Gender Justice in the Global South"*. https://globalforestcoalition.org/exploited-lands-exploited-lives-struggles-for-forests-life-and-gender-justice-in-the-global-south/
- Global Forest Coalition. (2026). *"First UN Paris Agreement 'High-Integrity' Carbon Credits Linked to Myanmar Junta, New Report Finds"*. https://globalforestcoalition.org/first-un-paris-agreement-high-integrity-carbon-credits-linked-to-myanmar-junta-new-report-finds/
- Global Witness. (2018). *"At what cost? Irresponsible business and the murder of land and environmental defenders in 2017"*. https://globalwitness.org/en/campaigns/land-and-environmental-defenders/at-what-cost/#africa
- Global Witness. (2025). *"Toxic platforms, broken planet: How online abuse of land and environmental defenders harms climate action"*. https://globalwitness.org/en/campaigns/digital-threats/toxic-platforms-broken-planet/
- International Institute for Environment and Development (IIED). (2024). *"Understanding gender-based violence in critical mineral mining"*. https://www.iied.org/understanding-gender-based-violence-critical-mineral-mining
- International Union for Conservation of Nature (IUCN). (2025). *"Protecting people, protecting nature: The nexus between gender-based violence and the environment"*. https://iucn.org/blog/202511/protecting-people-protecting-nature-nexus-between-gender-based-violence-and-environment
- Leigh Day (Eleanor Brade and Sarah Gibbons). (2024). *"The Mining Industry's Inadequate Response to GBV"*. https://www.leighday.co.uk/about-us/our-people/senior-staff/eleanor-brade/

- Marstel-Day & WI-HER. (2020). *"Gender-based Violence and REDD+ in Fiji: Tackling resource conflict and addressing gender-based risk in the environment"*. https://www.wi-her.org/wp-content/uploads/2021/08/USAID-RISE-Gender-and-Environment-Analysis-Fiji.pdf
- Mayapple Energy Transition Collective. (2024). *"Putting metrics last: A decolonial feminist approach to evaluating energy justice"*. https://seas.umich.edu/news/when-it-comes-energy-and-equity-metrics-arent-enough
- Mininni, G. M.. (2022). *"The Barefoot College 'eco-village' approach to women's entrepreneurship in energy"*. https://doi.org/10.1016/j.eist.2022.01.006
- Müller, Franziska. (2024). *"Energy colonialism"*. https://doi.org/10.2458/jpe.5659
- Natural Justice. (2025). *"The Situation of Women Environmental & Human Rights Defenders Across Africa"*. https://naturaljustice.org/cop30-environmental-defenders-from-all-over-the-world-still-demanding-protection/new-report-from-natural-justice-the-situation-of-women-environmental-and-human-rights-defenders-across-africa-1/
- Rubiano Rodríguez, Natalia – Global Unit for Feminism and Gender Democracy – Heinrich Böll Stiftung. (2025). *"Reclaiming Tech: Tools for Territorial Defenders Facing Digital Repression"*. https://www.boell.de/en/2025/12/10/reclaiming-tech-tools-territorial-defenders-facing-digital-repression
- Simlai, Trishant & Sandbrook, Chris. (2025). *"The Gendered Forest: Digital Surveillance Technologies for Conservation and Gender-Environment Relationships"*. https://doi.org/10.17863/CAM.111664
- Social Development Direct. (2022). *"Integrating a Gender Lens in Voluntary Carbon Markets"*. https://www.sddirect.org.uk/sites/default/files/2022-11/ASEAN%20Integrating%20gender%20into%20VCMs%20-%20Volume%20II%20-%20FINAL.pdf
- Sultana, Farhana. (2022). *"The unbearable heaviness of climate coloniality"*. https://doi.org/10.1016/j.polgeo.2022.102638
- Sursiendo & May First Movement Technology. (2025). *"Actions for environmental justice from autonomous and community-based technological infrastructures"*. https://archive.org/download/tech-infra-and-enviro-sust/202506_Tech-Infra-And-Enviro-Sust_web.pdf
- Tattersall, Erin, Cardinal-McTeague, Warren, Myers-Smith, Isla, Jenkins, Deborah A. and Burton, Andrew Cole. (2025). *"Affirming Indigenous data sovereignty in collaborative wildlife conservation in the era of open data"*. https://doi.org/10.1002/pan3.70161
- United Nations Development Programme (UNDP). (2025). *"Recalibrating the Future of Development in Latin America and the Caribbean"*. https://hdr.undp.org/content/under-pressure-recalibrating-future-development-latin-america-and-caribbean
- Work and Opportunities for Women (WOW). (2024). *"Integrating gender into the design, implementation and monitoring of carbon credit projects: Practical Guidance for Project Developers in the Voluntary Carbon Market"*. https://assets.publishing.service.gov.uk/media/66fec09c080bdf716392edcc/Integrating-gender-into-the-design-implementation-monitoring-of-carbon-credit-projects.pdf

DISCLAIMER

Every effort has been made to provide information that is current and accurate. Nevertheless, inadvertent errors in information may occur.

HEINRICH BÖLL STIFTUNG
FEMINISM AND
GENDER DEMOCRACY
Global Unit

IMPRINT

Publisher: Global Unit for Feminism and Gender Democracy of the Heinrich Böll Foundation, September 2026
Author: Natalia María Rubiano Rodríguez
Concept support: Aida Fatić, Global Unit for Feminism and Gender Democracy
Editor: Todd Brown
Design and layout: Maja Ilić, art4smart, Banja Luka, BiH
Print: Pentagram, Sarajevo, BiH

This work is made available under the terms of the Creative Commons Attribution-ShareAlike 4.0 International (CC BY-SA 4.0 DE) licence. Full details of this licence are available at: https://creativecommons.org/licenses/by-sa/4.0/legalcode. A summary of (and not a substitute for) the licence is available at: https://creativecommons.org/licenses/by-sa/4.0/deed.en.