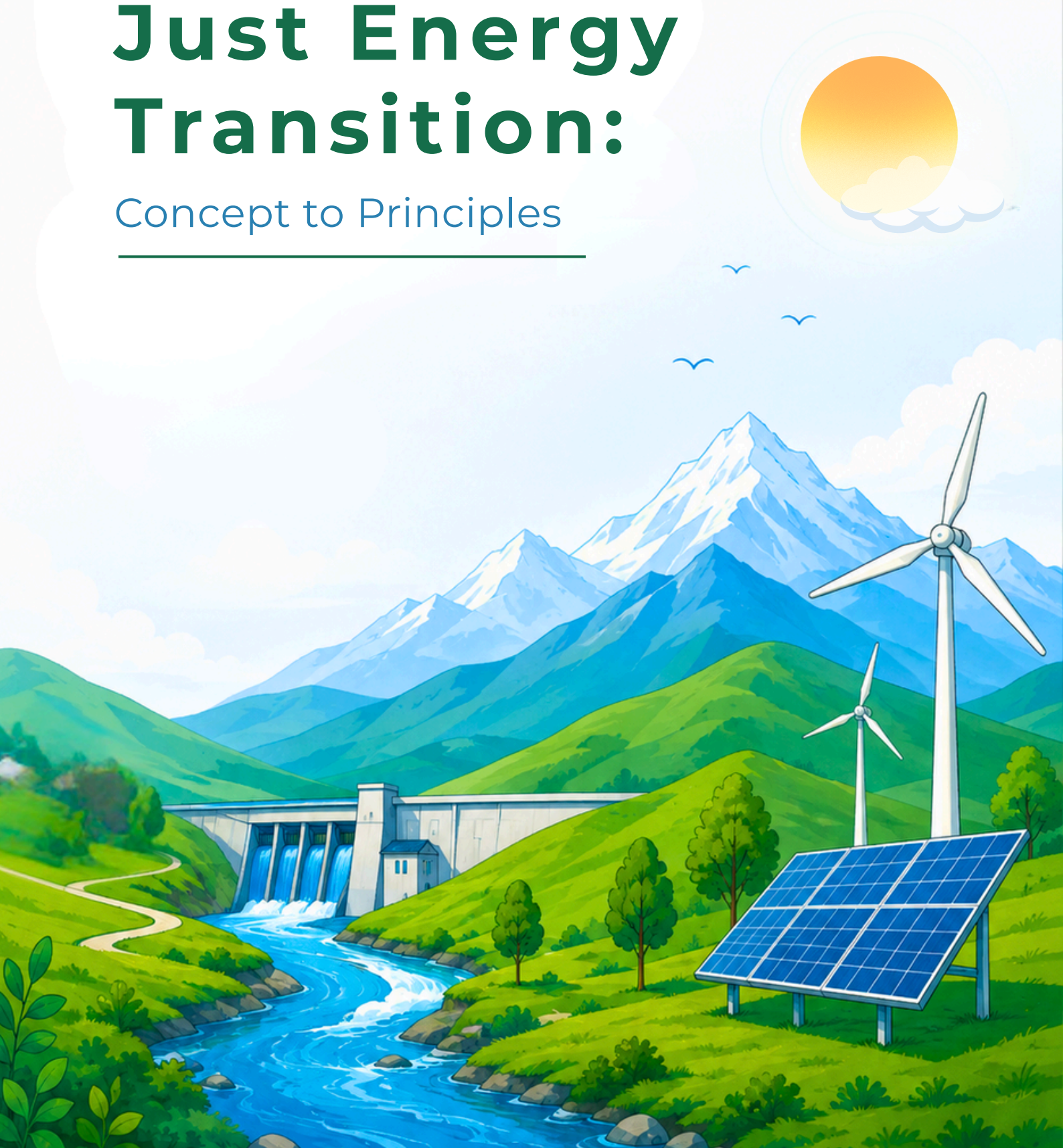


Just Energy Transition:

Concept to Principles



JUST ENERGY TRANSITION: CONCEPT TO PRINCIPLES**PUBLISHED BY PRAKRITI RESOURCES CENTRE****AUGUST 2026****© Prakriti Resources Centre (PRC) 2026**

Citation: Prakriti Resources Centre (2026). *Just Energy Transition: Concept to Principles*.

Acknowledgement

This publication was developed by Prakriti Resources Centre (PRC) as part of the 'Strengthening Civil Society Engagement for Climate Change Policy Discourse in Nepal' project. PRC thanks Ms. Ashma Vaidya for preparing the original draft and Ms. Suvekchhya Tuladhar for revising and finalizing this version for publication.

We also appreciate Mr. Prabin Man Singh and Mr. Santa Kumar Maharjan for reviewing the paper and providing valuable feedback. The financial support from the Climate Works Foundation (CWF) was essential to completing this research. We thank Mr. Binod Bhattarai for copy editing and Mr. Amien Shakya for graphic design and layout.

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INTRODUCTION

Nepal contributes 0.1% of global greenhouse gas emissions, yet it remains among the most vulnerable countries to climate change impacts (World Bank, 2022). Nepal's third Nationally Determined Contributions (NDC 3.0)—a voluntary greenhouse gas (GHG) reduction target—aim to reduce net GHG emissions by 17.12% by 2030 and 26.79% by 2035. One NDC pathway to attain this is to accelerate the transition towards renewable and low-carbon energy systems. This will require increasing renewable electricity generation capacity from the current 3,500 megawatts (MW) to 14,031 MW by 2030 and 28,500 MW by 2035, with increased contributions from mini- and micro-hydropower, solar, wind, and bioenergy. Another NDC focus is reducing transmission and distribution losses while expanding the use of clean energy in cooking, heating, and for transport.

NDC 3.0 states that its preparation process integrated the principles of Just Energy Transition (JET), Leave No One Behind (LNOB), and Gender Equality, Disability, and Social Inclusion (GEDSI) through stakeholder consultations. The commitment also includes upholding JET principles during implementation, and requires preparation of JET plans, undertaking sectoral impact assessments, and instituting policies and regulatory frameworks. JET principles are imperative for ensuring that the shift towards a low-carbon economy is equitable, inclusive, and responsive to the needs of vulnerable and marginalised communities while Nepal pursues its ambitious energy and climate targets.

While there is some agreement across literature on the ways to operationalise a just transition (Wang & Lo, 2021), a consensus is also building around the notion that the move to clean energy should not come at the expense of the well-being of vulnerable groups, communities or countries, and that it should not cause or exacerbate inequalities, or propagate social and environmental detriments (Carley & Konisky, 2020). The elements of JET draw from the three core tenets of justice (Hazrati & Heffron, 2021): distributive, procedural and restorative justice.

JET has two major components. First, it involves a shift from fossil fuel-based energy to renewable and low-carbon alternatives. Second, it emphasizes fairness in how the transition is planned and justly implemented. The JET framework also aims to ensure that the benefits, risks, and opportunities are equitably shared, vulnerable and marginalised groups are protected, and that communities have a voice in decisions relating to the change. Together, these contribute to achieving both climate goals and social justice (Natural Justice, 2024).

01



Distributive justice

Distributive justice is concerned with the equitable distribution of costs and benefits resulting from a transition to low-emission and climate-resilient development pathways.

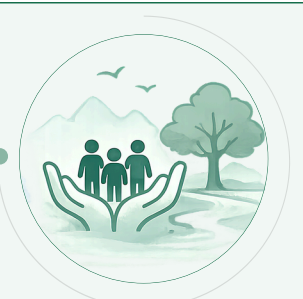
02



Procedural Justice

Procedural Justice is about ensuring equity and transparency in due process, practice and institutions, and recognizing and respecting the rights, interests and concerns of vulnerable marginalised groups, and local communities. Some scholars (Astola et al., 2022; Sovacool & Dworkin, 2015) include “recognition justice” to the framework—it investigates groups that are excluded or misrepresented in energy development processes. We treat elements of recognition justice as integral parts of procedural justice, acknowledging the potential of due process to address both kinds of injustices.

03



Restorative Justice

Restorative Justice is about restoring or ensuring the well-being of groups, communities, or countries affected or likely to be affected by energy transition initiatives. It takes a forward-looking approach, also considering inter generational justice concerns.

OBJECTIVES

This paper seeks to explore the JET framework in the context of Nepal, a developing country that is navigating the seemingly incompatible challenge posed by its need to develop while managing climate change. We discuss energy transition framed around the concepts of justice and equity and present a framework to operationalize JET in Nepal.

Specifically, the paper aims to:

- Outline key JET principles relevant to Nepal’s energy sector, with a focus on the justice and equity dimensions; and
- Examine the challenges and opportunities for operationalising these principles in Nepal’s energy transition.

JET PRINCIPLES

1. Energy use, access and security

Although Nepal has made major progress in hydroelectricity generation and grid connectivity— 99% of the country's population has access to electricity (Nepal Electricity Authority, 2024)—many households still use very little electricity, far below what they could use to access modern energy-enabled services such as lighting, education, health, and communication. This shows that energy access alone does not guarantee productive energy use or improved living standards. Disparity in energy consumption is a significant barrier to a just energy transition (Oswald et al., 2020). The per capita electricity consumption, according to the Nepal Electricity Authority (NEA), was 400kwh per year in 2024. The low consumption, especially in rural areas, is also indicative of deeper structural barriers, including poverty, limited use of energy-powered appliances, and a general lack of productive opportunities for electricity use. For Nepal's energy transition to be just, policies must move beyond power connections and focus on enabling households to actually use modern energy in ways that improve welfare and livelihoods.



Fig: Incremental levels of access to energy services
(Source: IEA, cited in AGECC 2010)

Nepal's progress toward accessing modern energy services has been slow and highly unequal across regions. Among the seven provinces, Karnali and Sudurpaschim have the lowest electrification rates of 74.38% and 86.59%, respectively, (Khabarhub, 2024) and households in these provinces still depend heavily (70% to 82%) on firewood for cooking (Malla et al., 2025). While there has been major improvement in electricity access in urban areas, the supply is unreliable, and people have no access to modern energy services in rural and remote communities in the mountain and hill districts of these provinces.

Further, Nepal's investment in electricity distribution infrastructure has not kept pace with the rapid growth in power generation and large transmission projects (Thapa, 2024). Although the NEA (Nepal Electricity Authority, 2024) claims almost 99% electrification coverage and has begun exporting "surplus" electricity to India, the domestic demand also remains unmet largely due to weak transmission and distribution networks, especially in rural areas.

Nepal's Energy Development Roadmap 2024 anticipates exporting 15,000 MW of the 28,500 MW electricity generation target. However, critics argue that the strong focus on export risks the diversion of attention and resources away from improving domestic access and use of electricity (Thapa, 2024). Without parallel investment in distribution networks and in increasing electricity demand, the export pathway risks reinforcing existing inequalities and delaying progress toward universal access to affordable, reliable, sustainable modern energy services by 2030.

2. Work force transition and employment creation

Job creation and workforce transition form the core of the JET framework. Existing jobs may be disrupted, and new opportunities will emerge as new energy systems evolve. Ensuring decent work, skills development, and fair access to employment is essential to achieve equitable and sustainable outcomes.

Decentralized energy systems in off-grid areas have generated local jobs and business opportunities, often through community-based organizations and cooperatives. However, many of the energy systems face sustainability challenges due to limited technical and institutional capacity, and high operation and maintenance costs. The expansion of the national grid will reduce their viability further, weaken the community institutions and threaten local investments. This shift to the grid can also displace skilled local workers such as technicians, operators, and managers. JET therefore requires participatory transition plans that support responsible decommissioning or integration of existing systems, while ensuring upskilling, reskilling, and absorption of affected workers in the new energy infrastructure.

Employment in hydropower and other clean energy sub-sectors is largely temporary and unskilled, even though some projects have demonstrated that targeted training can enable local workers to access skilled jobs and take on professional roles. Scaling such approaches, alongside support for clean energy enterprises and technical training, remains critical, as structured pathways linking training to employment are still limited in Nepal.

3. Alignment with constitutional rights and SDGs

In developing countries, aligning low-emission energy pathways with the Sustainable Development Goals (SDGs) and constitutional rights is important for avoiding fragmented interventions, and to ensure efficient use of resources, technical capacity, and public investment (UNDP, 2017). Within a JET framework, climate and energy actions must reinforce (and not undermine) broader development, environmental protection, and social justice objectives.

There is evidence showing that poorly planned hydropower projects can contribute to river fragmentation and negatively affect ecosystems, food security, and local livelihoods, especially for women, Indigenous Peoples, and marginalised groups who depend heavily on natural resources (Crootof et al., 2021; Grill et al., 2020; Shrestha & Dixit, 2020). Nepal's Water Resources Act (1992) and the Water Resources Bill (2024) prioritise drinking water, domestic use, irrigation, and agriculture over hydropower, but these priorities are not always upheld in practice, raising concerns about environmental rights, livelihood security, and equitable access to the resource.

Case Study 1

Impacts of Hydropower on Communities and River Systems

A study on the impacts of 12 hydropower projects (four NEA-owned and eight owned by Independent Power Producers), with installed capacities ranging from 1.5 MW–70 MW in the Gandaki River Basin, found that only three had ensured year-round irrigation for local communities, and farmers with access to this water had been able to diversify crops, increase income, and improve livelihoods. However, river water availability was significantly reduced across all 12 sites (Crootof et al., 2021), undermining the ability of many indigenous and marginalised groups to derive ecological, livelihood, and cultural benefits from the river systems. The findings demonstrate how a narrow, sector-specific focus that fails to recognize the interlinkages between water, energy, food, and livelihoods, can restrict opportunities for integrated solutions that advance economic transformation and sustainable development across multiple SDGs (UNDP, 2022).

ONLY 3 out of 12 hydropower projects had ensured year-round irrigation for local communities

Clear regulatory frameworks and enforceable safeguards are required for aligning the energy transition with the SDGs and basic rights, including the right to a clean environment, food security, and social justice. The transition must include fair compensation for physically and economically displaced people, equitable benefit-sharing mechanisms, transparency and accountability in decision making, and robust environmental and social monitoring systems. Such measures are critical for ensuring that the energy transition initiatives contribute to inclusive development while upholding rights and respecting ecological limits.

4. Stakeholder dialogue and engagement

Stakeholder dialogues are essential for JET. Such dialogues not only help in identifying risks and local priorities, but are also important for trust building, ensuring procedural fairness, and strengthening the social legitimacy of energy projects. Involving affected communities from the outset in risk and impact assessments can enhance the effectiveness, fairness, and acceptance of the interventions (Crootof et al., 2021; International Hydropower Association 2017; Basnet, 2012). Early and continuous engagement can also help to align project design with community needs, and to reduce conflicts during implementation.

Various national instruments, including the National Water Plan (2005), National Water Resources Policy (2019), and Environment Protection Act/ Regulations (2019/2020), mandate consultations with project-affected communities for water resource and infrastructure development. However, despite the provisions, procedural and recognition-based injustices are commonplace owing largely to limited transparency, weak monitoring, unclear guidelines, and insufficient opportunities for marginalised groups to participate meaningfully (Wagle & Seldon, 2022; Ghimire et al., 2021; Nepal Hydropower Association, 2016). This gap between policies and implementation points to the need for stronger enforcement mechanisms.

For example, hydropower projects are often located in rural areas with limited infrastructure, where communities naturally expect roads, electricity, and employment (Crootof et al., 2021; Basnet, 2012). The local people may feel disenfranchised when their expectations are not met often leading to protests, project delays, and cost overruns.

Case Study 2

Ridi Khola Hydropower Project

The 2.4 MW Ridi Khola Hydropower Project in Ruru Rural Municipality, Gulmi, began operating in 2009. The local communities had demanded early engagement with the project, prompting the developer to visit affected households to discuss potential impacts and build trust. The inclusive and extended negotiations resulted in a mutually beneficial agreement: the company committed to year-round irrigation water supply, canal improvements, construction of a check dam, subsidised electricity, equity, and employment with on-the-job training. In return, the community cooperated fully during construction. In effect, the developer was able to avoid costly delays by identifying community needs early, and by integrating them into project design. The Ridi Khola experience underscores the importance of inclusive, community-centred planning in achieving just hydropower development in mountain regions (Crootof et al., 2021).

Inclusive, community-centred planning transformed potential conflict into long-term cooperation and successful project delivery.

5. Due process, accountability and transparency

Due process, accountability, and transparency are central to a just energy transition. This is because fairness during the transition depends on who participates in decision-making, how risks and impacts are assessed, and whether affected people have access to remedy and justice. Without strong procedural safeguards, energy projects risk creating dispossession, exclusion, and the violation of rights despite “good intentions”.

Transparency gaps in land acquisition, licensing, compensation, and compliance to environmental and social safeguards remain the major concerns in Nepal. The laws require environmental and social impact assessments (ESIA) and mitigation measures for hydropower projects, which, however, are often poorly enforced, or are enforced as procedural formalities rather than as tools to ensure accountability and transparency. One example is undertaking ESIA late in the project cycle. As a result, avoidable environmental damage, livelihood losses, and social disruptions frequently go unaddressed, or compensation is delayed, inadequate, or contested (Ojha, 2025).

These challenges are particularly serious for Indigenous Peoples. Many hydropower and other renewable energy projects (such as transmission lines) are located within Indigenous Peoples’ traditional territories, and directly affect their land, natural resources, cultural practices, and livelihoods (Viaene, 2023). Many of these projects do not comply fully to Free, Prior, and Informed Consent (FPIC), required by the Constitution of Nepal 2015 (Lawyers’ Association for Human Rights of Nepalese Indigenous Peoples, 2020).

Case Study 3

FPIC and Due Process



Nepal ratified ILO Convention 169 and endorsed the UN Declaration on the Rights of Indigenous Peoples (UNDRIP) in 2007, committing to obtaining Free, Prior and Informed Consent (FPIC) of Indigenous Peoples before approving projects affecting their lands and resources.

The Likhu river basin, traditionally stewarded by Sunuwar indigenous communities along with Sherpa and other groups, has now been developed as a hydropower hub. However, according to Sunuwar (2021), affected indigenous communities were not consulted meaningfully, and no effort was made to obtain FPIC. Public hearings that were organised were largely procedural and did not allow informed participation. Further, the projects there failed to disclose information on anticipated impacts and benefits, while even the promised jobs and community services were not delivered. Hydropower development in the basin has also affected culturally and spiritually significant sites, and local livelihoods.

Community opposition was reportedly met with pressure from state authorities, allowing projects to proceed without addressing local grievances. Projects in the Likhu basin are examples of how weak due process, lack of transparency, and failure to uphold FPIC can lead to procedural injustices, undermine Indigenous rights, and contradict the principles of JET.

Affected indigenous communities were not consulted meaningfully, and no effort was made to obtain FPIC.

Despite Nepal's commitments to uphold indigenous rights, including FPIC, affected communities are often excluded from meaningful participation and decision-making. FPIC non-compliance leads to land dispossession, forced displacement, environmental harm, and violation of the right to self-determination.

Framing such projects solely as contributions to development or decarbonization can therefore obscure the procedural injustices done in the process. Further, analysts have suggested that environmental assessments for infrastructure projects, including hydropower projects often lack rigor, and sometimes also contain fallacious information (Hjolmo & Abulu, 2024; Joshi, 2022). Environmental Impact Assessment (EIA) and detailed design are typically carried out concurrently, much later in the pre-construction phase, greatly limiting the ability of project developers to avoid, minimise or mitigate impacts (Joshi, 2022). Environmental and technical risks (such as seismic risks, climate risks, etc.) are also frequently overlooked or downplayed in reports, driven by financial interests and a pervasive pro-hydropower sentiment entrenched in the country (Butler & Rest 2017; Huber 2019). Such practices are problematic particularly for vulnerable groups, including people with low-incomes, persons with disability, the elderly, children, marginalised and indigenous groups, and people living near the project sites who are likely to be worst affected when disaster strikes. Therefore, energy investments that neglect environmental and social risks are bound to be counterproductive and can potentially exacerbate distributive and restorative injustices.

Renewable energy development can contribute to deepening social conflict, undermining public trust, and contradicting the JET principles in the absence of transparent decision-making, independent monitoring, enforceable safeguard standards, and accessible grievance and remedy mechanisms.

6. Maximising socio-ecological benefits

JET requires energy planning to go beyond capacity expansion and economic returns, and to actively maximise social, ecological, and long-term economic benefits. In Nepal, hydropower will remain the backbone of the energy system. The Energy Development Roadmap 2024 expects hydropower to help meet most of the generation target of 28,500 MW (Ministry of Energy, Water Resources and Irrigation, 2024). Hydropower development also has broader geopolitical and economic significance, including reducing reliance on imported fossil fuels, improving the balance of payments, enabling cross-border electricity trade, and strengthening regional energy integration.

However, capacity expansion alone will not guarantee just outcomes. To align hydropower development and other energy transition initiatives with JET principles, the projects must deliver tangible benefits to local communities, protect ecosystems, and safeguard intergenerational rights. This requires making strategic policy choices, and robust benefit-sharing mechanisms and governance systems that ensure energy development contributes to local livelihoods, environmental sustainability, and long-term resilience, rather than unfairly concentrating the benefits for developers while overlooking the social and ecological costs.

In remote areas where grid extension or sole management by the NEA is not feasible, community-driven rural electrification and decentralized renewable energy systems have played a critical role in expanding access to electricity and catalysing local socio-economic benefits. These models promote local participation in infrastructure development, encourage community ownership,

and support local employment. How the energy transition takes place after the national grid reaches areas previously served by community-managed systems—such as micro-hydropower plants, solar mini-grids, and community rural electrification schemes— will test Nepal’s commitment to JET.

For energy transitions to be just and sustainable, they must be guided by clear intent and comprehensive planning. This includes transparent decision-making, continuity and improvement of service quality, fair recognition and compensation for community investments, and provisions for integrating or reskilling local staff within new management structures. Without such safeguards, a system transfer can erode local livelihoods, weaken community trust, and contribute to reproducing distributive and procedural injustices, hindering the objective of maximising the socio-ecological benefits from the energy transition.

Case Study 4

Local Benefits from Community Rural Electrification Entities

Community Rural Electrification Entities (CREEs) operate as local electricity distributors in rural areas. They purchase power in bulk from the NEA and supply it to households for a fee. Under this model, local communities contribute 10% of the total cost of rural electrification and distribution system rehabilitation, while 90% is financed by the Government of Nepal through the NEA.

In 2023, CREEs provided electricity access to more than 475,539 rural households across 43 of Nepal’s 77 districts. Nepal had 516 CREEs, of which 59 have been transferred to NEA management following the expansion of the utility’s distribution centers. Eventually all community-led systems will be integrated into the national grid. Therefore, it is essential that such transitions explicitly assess and address social, economic, and institutional impacts. When managed well, the integration can go beyond service continuity and create new opportunities, such as improved service quality, expanded local employment, skills upgrading, and stronger local–national institutional linkages, while preserving community investments, livelihoods, and social capital.

475,539+ Rural households served by CREEs across 43 districts (2023)

7. Social Protection Systems

Nepal has signed several international and regional agreements that have strong clauses protecting workers, including ones dealing with minimum wages, social security, child labour, labour protection and social dialogue. However, in 2024, Nepal was rated 3 on the Global Rights Index (GRI), indicating regular violations of the rights of workers and trade unions (International Trade Union Confederation, 2025). The GRI rating ranges from 1 to 5+, with 5+ (lowest) indicating “no guarantee of rights due to breakdown of the law” and 1 (highest) indicating “sporadic violation of rights”. A large proportion of Nepal’s workforce is associated with informal employment, including workers in the energy sector,

which makes the application and monitoring of labour and business regulations extremely challenging (International Labour Organization, 2025). Many jobs in the energy sector—particularly those in hydropower and manufacturing sectors—with relatively higher occupational health and safety risks, need to be formalised for better regulation and monitoring of work conditions and workforce development.

8. Gender equity and social inclusion

Deep-rooted gender norms shape distinct energy needs for women and men. Women, particularly in rural and low-income households, are disproportionately affected by the lack of access to modern and clean energy solutions. This is because they are burdened by the primary responsibility of cooking, farming, and collecting firewood and water. Further, they also often lack ownership and control over resources, limiting their ability to access energy services and technologies on equal terms with men.

Evidence shows that workforce gender diversity, especially in leadership roles, improves sector performance and generates broader social and economic benefits (ILO, 2019; Orlando et al., 2018). However, Nepal's energy sector remains heavily male-dominated. Women constitute only about 10% of the workforce in the hydropower sector, where 8% are in executive positions, and only 5% in technical roles (International Finance Corporation, 2020). Similarly, a survey (Water and Energy Commission Secretariat, 2024) of 12 federal energy-related agencies in 2024 found that women comprised less than 30% of officers or higher-level staff at nine organisations.

Gender equality is therefore central to procedural justice in JET, as it determines who participates in decision-making, who benefits from energy investments, and whose needs are reflected in energy planning.

Case Study 5

Gendered employment outcomes in micro-hydropower



A disaggregated analysis of data of micro-hydropower schemes indicates that while such projects have contributed to improved educational outcomes for women and marginalised groups, the employment benefits remain skewed toward socially dominant groups, particularly men and upper-caste individuals (Subedi et al., 2023). This suggests that access to energy alone does not automatically lead to equitable employment outcomes. Therefore, tailored interventions are required to improve gender equality and diversity in the sector (IFC, 2023). As the ILO notes, without deliberate efforts to increase women's participation in emerging green occupations, existing gender stereotypes are likely to persist, leaving women with access to only a small share of newly created jobs (ILO, 2022). This will impede a just energy transition.

Access to energy does not automatically translate into equitable employment—deliberate policies are needed to ensure women and marginalized groups benefit from the green energy transition.

Studies (Wagle and Seldon, 2022; Ghimire et al., 2021; NHA, 2016) show that procedural and recognition-based injustice remain common in hydropower development mainly due to lack of inclusive and transparent decision-making processes, limited accountability for negative impacts, lack of clear guidelines and weak monitoring, and limited opportunity for actual project-affected, and marginalised and indigenous groups to learn about and discuss impacts, or negotiate.

Often indigenous, marginalised and poor households cannot claim the benefits meant for them. For example, in off-grid and remote areas, the Government of Nepal provides subsidised energy technologies, such as solar water pumping systems, solar thermal systems, and biomass-based improved cooking stoves. However, various studies (Kaphle et. al., 2022; Bhattarai et. al., 2018) have shown that such programs have historically had limited success at reaching the actual poor, women and men from marginalised and vulnerable groups, and have largely benefited the well-off and elites who have better access to social and political networks.

CONCLUSION

The Paris Agreement emphasizes the need for all climate actions to be just and equitable and to promote gender equality and intergenerational equity. In response, more countries have begun acknowledging JET as a crucial component of their climate commitments. Nepal has also included JET as the pathway to achieving its NDC 3.0 targets.

Nepal's energy vision is centred around transitioning to a clean energy mix while reducing dependence on traditional and fossil fuels. The current efforts to expand power generation capacity, enhance distribution networks, and improve energy efficiency and access to modern energy services are encouraging. However, to achieve an energy transition that is just, it is important to assess the aforesaid initiatives through the lens of energy justice or the JET principles. This paper has discussed the JET principles that are most relevant to Nepal's energy sector development.

Energy transition planning must adopt a democratic process, and decision-making must be open, participatory and inclusive. The pursuit of national energy goals must not violate the rights of citizens to healthy, dignified, and discrimination-free lives, nor undermine livelihoods or the ability to fulfil their basic human needs. The goal of the JET framework is to reduce disparities, promote and uplift historically disadvantaged groups, and foster a more equitable society that guarantees equal access to clean and modern energy solutions for all. JET can help to ensure that the benefits of the energy transition are distributed fairly, without exacerbating existing socio-economic inequalities or creating new ones.

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