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Women's Earth & Climate Action Network, International

How Local Community Power is Central to the Renewable Energy Shift

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Authors' Note

This report is situated in our current moment as the world imperfectly transitions from one energy system (fossil fuels) to a new, regenerative energy system. This process is riddled with contradictions. We believe it is essential to engage in and visibilize these contractions and unchartered territories in order to ensure that the transition is the least socio-environmentally harmful as possible and upholds a rights-based framework. Through this writing process, we wrestled with a multitude of moral incongruities—navigating the differences between ideals and current realities. It would require volumes to deeply address the vast inequities and problems that arise in the effort to implement a Just Transition. Thus, the scope of this report is limited to naming some of the key issues that require and deserve ongoing research, assessment, and advocacy to ensure equitable and healthy results for people and the planet.

The analysis of this report is rooted in climate justice and well-being economic frameworks; we recognize the need to live with the land harmoniously and reciprocally, which includes prioritizing a circular economy and recycling materials already above ground. It also requires robust community engagement and respect for human and Indigenous rights.

Technologies used in the transition to renewable, regenerative energy have many complex issues that require ongoing research, conversation, and a willingness to confront ethical quandaries. We recognize that any pathway forward needs to prioritize reducing consumption (specifcally from wealthy countries), living within planetary boundaries, and confronting and transforming deeply entrenched societal inequalities and structures of injustice.

This report contributes to the ongoing conversation around how the global community can build an equitable and sustainable decentralized and democratized energy future.

Published by the Women's Earth and Climate Action Network (WECAN) International

WECAN is a solutions-based 501c3 non-profit organization established to engage women worldwide in policy advocacy, on-the-ground projects, trainings, and movement building for global climate justice. WECAN is based in the San Francisco Bay Area, California.

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Introduction

As global temperatures continue to rapidly rise due to anthropocentric climate change, communities worldwide are facing more frequent and severe extreme weather events.[1] Scientists and human rights experts agree that mitigating the worst social and environmental impacts of climate change requires an immediate and significant reduction of greenhouse gas (GHG) emissions.[2] Because the burning of fossil fuels remains the largest source of GHG emissions, it is imperative to immediately transition away from coal, oil, and gas across all sectors globally.[3] Efforts to shift away from fossil fuel economies must champion clean and renewable energy sources that not only reduce risk of harm but also actively benefit people and the planet.

The transition away from fossil fuels is neither a clear straightforward path nor are there solutions that can be universally applied. Effective and equitable solutions need to be guided by sound social and environmental principles, centering the experiences of marginalized communities and tailoring solutions to the unique needs of different regional and socio-ecological contexts. This report explores some of the barriers to implementing a Just Transition, as well as principles and on-the-ground lessons that can be used to guide a rights-based, community-led energy transition that simultaneously benefits people and the environment. The report also details the complexities of shifting away from our current social and economic structures—which are based in destructive extractive models—toward more just and equitable alternatives to living, thinking, co-existing, and thriving that prioritize, and even require, socio-ecological well-being.

As the global community navigates an energy transition, it is essential that solutions do not reproduce the same injustices of the fossil fuel economy, which prioritizes economic growth over human and environmental health. As renewable energy gains momentum in many parts of the world, environmental and human rights groups and vulnerable communities are concerned that the same extractive practices used in the fossil fuel industry (e.g., displacement of communities, human and Indigenous rights violations, and environmental destruction) are being replicated to produce energy that is touted by governments and corporations as clean and renewable. In order to end these systems of injustice and more effectively address the complexities of the climate crisis, energy transition solutions must be grounded in climate justice principles. Additionally, the global community needs to ensure that renewable energy benefits those who have historically been—and continue to be—most disproportionately harmed and impacted by current extractive systems and the adverse effects of climate change.

Community-led and/or community-owned renewable energy projects that are rooted in democratic governance and equitable local decision-making power play a vital role in safeguarding rights and strengthening democracy. These projects move the global community away from corporate, top-down fossil fuel power and pave the way for democratic energy models through the redistribution of wealth and ownership within the energy sector.[4] Expanding dem-

1 McSweeney, R., Tandon, A., Cleaver, K., et al. (2024, November 18). Mapped: How climate change affects extreme weather around the world. *CarbonBrief.* [LINK]
2 United Nations Environment Programme. (2024, October 24). *Emissions Gap Report 2024: No more hot air - please!* [LINK]
3 EPA. (n.d.). *Sources of Greenhouse Gas Emissions.* [LINK]
4 Democracy Collaborative. *Public Ownership for Energy Democracy.* [LINK]

ocratically controlled community ownership of energy production and distribution lowers the cost of and improves access to energy, which, in turn, supports access to basic human rights, including food and water.[5]

To stop fossil fuel expansion and avert the worst impacts of the climate crisis, countries' and communities' transitions to renewable energy must be scaled globally. This process should center community involvement and leadership to tailor approaches appropriately—and equitably—to local needs and conditions. This report offers guidance to this end. The report begins to outline climate justice-based principles, criteria, and policies—many of which have been laid out by other groups and communities who are concerned about climate justice—for a just energy transition.

Transitioning to low-emission economies that can support all communities necessitates access to clean, affordable, and sustainable energy. Through decentralization and democratization of the production and consumption of energy, some local communities and regional efforts are leading this transition. By presenting communities and initiatives that are navigating this transition and implementing energy-efficient technologies[6] in line with the Just Transition and climate justice principles, the report highlights lessons for how the global community can move away from fossil fuels.

The report also explores some of the barriers to implementing just energy solutions—barriers often perpetuated by corporations, financial institutions, and governments who are benefiting from the fossil fuel and extractivist economy. By highlighting the gaps between where global society is now and the goal of achieving a Just Transition, the report brings to light what changes are needed to redirect current detrimental systems that depend on fossil fuel extraction.

Importantly, the work and impact of community efforts and initiatives driving an urgent Just Transition away from fossil fuels cannot be understated. That said, this report is in no way a comprehensive list of all such efforts, nor does it claim to capture all approaches to achieving climate justice and a just energy future.

The report examines the nuances of the Just Transition through the following sections:

Definitions: This section lays out key terms and frameworks used to analyze the energy transition, equity, and community efforts to advance the Just Transition. Many terms — such as renewable energy or Just Transition — carry different meanings depending on the context and varied political and cultural perspectives. By providing clear definitions, this section begins to create a common understanding for the report's analysis.

Case Studies: This section highlights real-world examples of communities and initiatives that are successfully navigating the shift from fossil fuels to renewable energy within a climate justice framework. These case studies serve as evolving models that offer valuable lessons for how countries, regions, and communities can implement renewable energy. The eight case studies presented in the report were identified based on their alignment with Just Transition and climate justice principles (see the section below, Rethinking Energy Systems for principles used). Because these communities and initiatives are operating within current flawed cultural, economic, and political systems, these ef-

5 Institute for Human Rights and Business. (2022, December 13). *What is community ownership for renewable energy?* [LINK]
6 World Energy Council. (2013). *World Energy Perspective: Energy Efficiency Technologies.* [LINK]

forts are, by nature, imperfect. Yet, each example presents unique challenges, lessons learned, and innovative and effective strategies, providing guidance for shaping future efforts.

Barriers and Gaps: While a Just Transition rooted in climate justice is both necessary and urgent, it is important to recognize the numerous barriers standing in the way of achieving such efforts. These challenges are not accidental; they are ingrained in capitalist systems and power structures that prioritize profit over people and the planet. This section outlines the key hurdles imposed by corporations, governments, and financial institutions that have historically—and continue to—benefit from fossil fuel dependency and extractive economies. Ongoing colonialism, racism, and patriarchy also impact opportunities for meaningful change toward a Just Transition. Understanding these barriers is essential to overcoming them. By identifying the structures that hinder progress, governments and communities can develop more effective strategies to build sustainable pathways toward an equitable and just future.

Definitions

Just Transition: The Just Transition was originally developed by the trade union movement in the 2010s to identify and implement the social interventions needed to secure workers' rights and livelihoods when economies shift toward renewable energy and sustainable production.[7] This framework includes principles, strategies, and practices to guide society as it moves from polluting and extractive economies to local, healthy, and sharing economies.[8] The International Labour Organization (ILO) defines the Just Transition as "greening the economy in a way that is as fair and inclusive as possible to everyone concerned, creating decent work opportunities and leaving no one behind."[9] A Just Transition focuses on integrating principles, strategies, and practices that prioritize frontline communities and workers in building new economies that align with local communities' needs and the surrounding ecosystems.[10] Some of the Just Transition principles include implementing a regenerative economy that promotes ecological resilience and restoration, reducing resource consumption and waste, building a circular economy, upholding human and Indigenous rights, and promoting transformative economic frameworks not based on Gross Domestic Product (GDP)—such as the philosophy and socio-environmental movement, Buen Vivir.[11] Another example, Bhutan, which prioritizes Gross National Happiness (GNH), is based on four unique pillars—good governance, sustainable socio-economic development, cultural preservation, and environmental conservation—to measure the well-being of its citizens rather than relying on GDP.[12] It is important to note that the Just Transition is a living framework that plays a vital role in moving the global community away from extractive economies and toward renewable energy systems rooted in justice. The Just Transition framework continues to evolve as governments, financial institutions, and civil society are perpetually defining and contesting what a fair and inclusive energy transition should look like. These conversations reflect differing needs, values, and perspectives. There continues to be significant concern about the co-option of the Just Transition by corporate and government entities, one that does not reflect the original intentions of the Just Transition. This report's conception of the Just Transition draws upon long standing rights-based groups, including climate justice, feminist, Indigenous, and labor movements.[13]

Climate Justice: Climate justice is a framework that seeks to address the disproportionate impacts of climate change on marginalized communities while advocating for equitable solutions to mitigate and adapt to its effects.[14] The framework emphasizes that the environmental, social, and economic consequences of climate change are not shared equally; vulnerable populations—such as low-income communities, Indigenous Peoples, people of color, women, and Global South populations—often bear the brunt of environmental degradation despite contributing the least

7 International Trade Union Conference. (2015, March 18). *ITUC Frontlines Briefing - Climate Justice: There are no jobs on a dead planet.* [LINK]

8 Ibid.

9 International Labour Organization. (2024, July 9). *Climate change and financing a just transition.* [LINK]

10 Climate Justice Alliance. (n.d.). *What Do We Mean By Just Transition?* [LINK]

11 Climate Justice Alliance. (n.d.). *What Do We Mean By Just Transition?* [LINK]; Villalba, U. (2013). Buen Vivir Vs Development: A Paradigm Shift in the Andes? *Routledge Taylor and Francis Group.* [LINK]; Balch, O. (2013, February 4). Buen vivir: the social philosophy inspiring movements in South America. *The Guardian.* [LINK]

12 Ura, K., Alkire, S., Zangmo, T., et al. (2012, May). An extensive analysis of GNH Index. *Centre for Bhutan Studies.* [LINK]; Sharma, L. (2021, October 25). What Bhutan Got Right about Happiness - and What Other Countries Can Learn. World Economic Forum. [LINK]

13 Climate Justice Alliance. (n.d.). *Communities taking Bold Action on the Frontlines of Climate Change.* [LINK]; Global Working Group on Principles for a Rapid, Equitable, and Just Transition to Renewable Energy Systems. (2025, February 17). *Ten Principles for the Rapid, Equitable, and Just Transition to Renewable Energy Systems.* [LINK]; JASS. (2020, August 4). *JUST (global feminist) Transitions.* [LINK]; WEDO. (2023, November). *Gender Just Transition: A Path to System Change.* [LINK]

14 Climate Justice Alliance. (n.d.). *Communities Taking Bold Action on the Frontlines of Climate Change.* [LINK]

to GHG emissions.[15] Climate justice calls for systemic changes that promote both environmental health and social equity, ensuring that those most affected by climate change and who often develop vital solutions have a voice in decision-making and access to resources for resilience and adaptation.

Renewable Energy: Renewable energy solutions are fundamental to addressing the climate crisis. When rooted in rights-based frameworks, renewable energy can provide sustainable, clean, and equitable energy access for all communities. Renewable energy sources need to include localized and small-scale solar power and wind energy, as well as geothermal energy when appropriate and possible. These efforts play a crucial role in reducing GHGs and mitigating climate change.[16] Renewable energy projects, however, need to be carefully designed and managed to ensure that they are truly eco-conscious and do not contribute to further harming ecosystems or communities. Renewable energy solutions must be tailored to local contexts, recognizing that each community has different needs, financial resources, and environmental considerations. There is no one-size-fits-all approach, and each solution needs to be implemented with respect to each communities' unique social, economic, and environmental factors. On the other hand, false solutions, which are approaches that cause socio-environmental damage and/or fail to address emissions at their source—such as carbon and forest marketing schemes, large-scale hydropower, biofuels from agriculture, incineration, carbon capture and storage (CCS), and geoengineering[17]—should not be considered viable pathways to a Just Transition.[18] False solutions can cause community displacement, food insecurity, ecological harm, delayed action, and various other long-term risks.[19] Achieving climate justice means prioritizing authentic renewable energy strategies that protect ecological health and upholding the rights and well-being of all communities. For further background on false solutions, please see the following reports: *The Need for Real Zero Not Net Zero* and *Hoodwinked in the Hothouse*.

Decentralized Energy: Decentralized energy refers to local or regional energy generation and distribution systems that operate independently of a centralized power grid. By producing energy closer to the point of use, these systems reduce transmission losses (energy lost as electricity travels through power lines), improve reliability, and enhance energy access in underserved areas.[20] Decentralized energy can include small-scale solar, wind, and other equitable energy solutions.[21] Unlike large-scale energy infrastructure that requires extensive transmission networks, decentralized energy often prioritizes local access and control. This approach is especially beneficial for last-mile and off-grid communities, providing them with reliable, affordable, and sustainable energy solutions tailored to their needs.[22] Decentralized energy systems also strengthen energy sovereignty by reducing dependence on costly and polluting alternatives, giving communities greater control over their energy future.[23]

Extractive Economy: Extractive economies are central to capitalist systems. A fundamental pillar of capitalism is profitability which inherently requires infinite material and load growth to feed the system's endless thirst for new forms

15 Roberts, T. and Parks, B. (2006, November 22). *A Climate of Injustice.* [LINK]; Center for Climate Justice. (n.d.) *What is Climate Justice?* [LINK]
16 United Nations. (n.d.). *Renewable energy – powering a safer future.* [LINK]
17 Climate False Solutions. (2021, April). *Hoodwinked in the Hothouse.* [LINK]
18 Just Transition Alliance. (n.d.). *False Solutions to Address Climate Solutions.* [LINK]; Women & Gender Constituency. (n.d.). *Issue Brief False Solutions.* [LINK]
19 Global Forest Coalition. (n.d.). *The End of False Solutions: Moving Towards Rights-Based and Gender-Transformative Solutions to Climate Change.* [LINK]
20 Jacobs, H. (2025, February 12). Innovating for Clean Energy Access: Bridging the Gap to Achieve SDG 7. *International Institute for Sustainable Development.* [LINK]
21 IRENA and SELCO Foundation (2022). *Fostering Livelihoods with Decentralised Renewable Energy: An Ecosystems Approach, International Renewable Energy Agency.* [LINK]
22 EmPower and UN Environment Programme. (2020, November). *Gender integration in renewable energy policy.* [LINK]
23 Ibid.

of capital.[24] This system depends on the exploitation of people and the planet, turning land, water, and human lives into commodities that are separate and divisible.[25] Extractive economies extricate wealth—raw minerals, water, labor, etc.—from local, regional, and national communities through many means, including land dispossession, predatory financing, and labor exploitation. This economic model encloses wealth and power into the hands of a few, valuing profit over socio-ecological well-being. Capitalist and extractive practices have fueled historic and ongoing colonialism, slavery, and environmental destruction.[26]

Energy Justice: Energy justice, also known as energy equity, is a framework and movement aimed at correcting systemic inequalities that have historically harmed marginalized communities. Such harms include environmental pollution, health disparities, and the burden of unaffordable energy costs.[27] Part of energy justice is ensuring that decision-making within the energy system is both transparent and inclusive, allowing communities to meaningfully participate and shape energy policies and projects. In order to realize this vision, energy justice efforts need to confront multiple interconnected challenges: 1) energy burden (the share of household income spent on energy), 2) energy insecurity (the struggle to meet basic energy needs), 3) energy poverty (the lack of access to reliable energy services), and 4) energy democracy (shifting both decision-making power and ownership of energy resources away from centralized utilities and private interests to communities).[28] Achieving energy justice will require building energy systems that are not only clean, affordable, and accessible, but also democratically owned and governed, giving communities power and control over the energy that impacts their daily lives.

Well-Being Economy: A Well-Being Economy is described as a system that benefits people and the planet over material growth.[29] Rather than defining success solely based on GDP, a Well-Being Economy is based on long-term solutions for people and the planet: in this system, individuals have the means to live comfortably, securely, and with happiness.[30] This economic framework has gained traction with countries such as New Zealand, Australia, Wales, Costa Rica, Iceland, and Canada, where policies work to prioritize well-being over traditional economic benchmarks.[31] For example, the Well-Being of Future Generations Act of Wales legally requires national and local governments, local health boards, and other public entities to work toward achieving Wales' seven well-being goals.[32] The country's goals are designed to provide long-term social, environmental, and economic progress. While each country will implement and interpret a Well-Being Economy differently, there are some core values that remain consistent. According to the Stanford Social Innovation Review, three basic principles of a Well-Being Economy include: "restoring a harmonious relationship between society and nature…ensuring a fair distribution of resources to address economic inequality… [and] supporting healthy and resilient individuals and communities."[33]

24 Harvey, D. (2010, August 30). *The Enigma of Capital and the Crisis this Time.* Reading Marx's Capital with David Harvey. [LINK]
25 Harvey, D. (2003). *The New Imperialism.* Oxford University Press.
26 Ibid.
27 Initiative for Energy Justice. *What is Energy Justice.* [LINK]
28 Initiative for Energy Justice. *The Energy Justice Workbook.* [LINK]
29 Wellbeing Economy Alliance. (n.d.). *What is a Wellbeing Economy?* [LINK]
30 Ibid; OECD. (n.d.). *Well-being and Beyond GDP.* [LINK]
31 Thornton, T. (n.d.). Developing the Well-being Economy: The Current State of Play. *Global Development Policy Center.* [LINK]
32 Llywodreath Cymru Welsh Government. (2025, January 7). *Well-being of Future Generations (Wales) Act 2015: the essentials.* [LINK]
33 Chrysopoulou, A. (2020, December 16). The Vision of a Well-Being Economy. *SSIR.* [LINK]

Rethinking Energy Systems: The Need for Justice-Centered Principles and Policies

The global shift toward renewable energy needs to be guided by climate justice principles that address systemic inequities. A just energy transition rooted in climate justice ensures that communities most impacted by the climate crisis are central in decision-making processes; benefitting from employment opportunities; and securing access to affordable, reliable, and clean energy sources.

Achieving this future requires a framework that prioritizes justice-oriented, rights-based approaches; equity, ecological health, and well-being economic principles; and community leadership at every stage of the energy transition. It is important to note that a Just Transition will involve many types of strategies that are geared toward multiple different contexts; there is no techno-one-size fits all solution. The following principles lay the foundation for equitable policy design and implementation.

Principles for Climate Justice and a Just Transition

- ***Recognize the Right to Energy as a Human Right:*** Recognize that everyone deserves access to affordable, reliable, renewable, and energy-efficient solutions. Actions should prioritize access to energy as a basic human right while addressing the unique energy needs of vulnerable populations.

- ***Decentralize and Democratize Energy Systems:*** Promote community-owned, decentralized energy systems that prioritize local autonomy and energy sovereignty/independence. Shifting energy ownership from corporations to communities fosters more equitable, transparent, and resilient energy systems that better serve local needs.

- ***Ensure Community Voices are Prioritized in Decision-Making Processes:*** Ensure that women, Indigenous Peoples, people of color, and marginalized communities have a significant seat at the table in all stages of planning, policy development, and project implementation. Their participation and leadership strengthens the effectiveness of renewable energy projects and policies, as well as the accountability and transparency of companies', governments' and communities' efforts. All of these elements lead to more equitable outcomes.

- ***Recognize Indigenous Rights and Sovereignty:*** Recognize, respect, and uphold the sovereignty and rights of Indigenous communities, including land tenure, self-determination, and the rights outlined in the United Nations Declaration on the Rights of Indigenous Peoples. This includes upholding Free, Prior, and Informed Consent (FPIC)—guaranteeing that all proposed energy transition-related projects are carried out with robust due diligence processes to ensure implementation of FPIC.

- ***Promote Women's Leadership and Ownership in Energy Projects:*** Advance women's leadership by supporting initiatives that create pathways for women in all their diversity to own, lead, and operate clean energy projects.

- ***Support Workforce Development Opportunities:*** Build an inclusive workforce equipped for the energy transition by providing robust trainings, apprenticeships, and upskilling programs. A Just Transition ensures equitable access to local jobs in the clean energy sector, especially for women, low-income communities, and marginalized populations.

- ***Ensure Ethical Resource Extraction:*** Reject the exploitative economic models that have historically driven ecological and social harms. As demand for critical minerals (including lithium, cobalt, copper, and nickel) increases, it is essential to prioritize practices that uphold human and Indigenous rights, respect Indigenous sovereignty, and protect ecosystems.

- ***Prioritize the Use of Above-Ground Minerals:*** Minimize the need for new mining activities. There needs to be requirements that focus on utilizing minerals already in circulation. This approach ensures sustainable resource use and reduces waste.

- ***End Fossil Fuel Subsidies and Redirect Funding to Justice-Centered Energy Projects:*** Eliminate fossil fuel subsidies and redirect financial support to community-led renewable energy projects.

- ***Commit to Reparative Justice in the Energy Transition:*** Address the historical and ongoing harms caused by fossil fuel extraction, colonialism, and unfettered capitalism. A Just Transition prioritizes reparative measures—including financial compensation for communities disproportionately harmed by historic extractive industries—recognizing the need to repair past injustices while building a more equitable and just energy future. For example, recent discussions under the United Nations Framework Convention on Climate Change (UNFCCC) have emphasized the need for accessible climate finance and, more specifically, the enhancement of financial support for least developed countries and small island developing states.[34] At COP29, countries discussed the implementation of the Green Climate Fund—a global initiative financed primarily by high-income countries to strengthen low-income nations' capacity to address climate challenges.[35] These funds support location-specific projects and solutions, such as climate-resilient agriculture in Kenya, initiatives to enhance water security in the Amazon Basin, and coastal protection efforts in Pacific island nations. The Green Climate Fund remains significantly underresourced; financial contributions from high-income countries fall short of providing the necessary funds to address the scale of the climate crisis, thereby limiting the efficacy and success of the fund.[36] Additionally, initiatives such as these need to directly support effective community-led solutions rather than false solutions (see more about false solutions under renewable energy definition) that fail to deliver real emissions reductions or support a Just Transition.[37]

34 United Nations Framework Convention on Climate Change. (2025, March 27). *Report of the Conference of the Parties on its twenty-ninth session, held in Baku from 11 to 24 November 2024.* [LINK]

35 Ibid.

36 Climate Action Network International. (2023, October 5). *Rich nations fail to show the money at Green Climate Fund Pledging Summit*. [LINK]

37 Schalatek, L. (2025, February). *The Green Climate Fund.* Heinrich Böll Stiftung Washington, DC and ODI Global. [LINK]; Wyburd, I. and Dufrasne, G. (2023, September 15). *Exposing the methodological failures of REDD+ forestry projects.* Carbon Market Watch. [LINK]; Lyon, J. and Orielle Lake, O. (2024). *Climate Justice Perspectives on Climate Finance for COP29 UNFCCC.* Women's Earth and Climate Action Network. [LINK]

- ***Live Within Planetary Boundaries:*** Address overconsumption patterns of wealthy countries and promote sustainable lifestyles. By reducing excessive energy demand and prioritizing the equitable distribution of resources, societies need to reorient to respecting and upholding the planet's limits.

- ***Inspire Action Through Knowledge:*** Incorporate education about the climate crisis into schools and public initiatives to build a strong foundation of environmental awareness. By equipping individuals and communities with accurate knowledge and combating misinformation, communities can work towards collective, meaningful action and justice.

Lessons from Communities: Case Studies

People across the world are becoming increasingly concerned with the health of the environment and the safety of future generations: according to the Pew Research Center, in 2022, 71% of people globally considered climate change a major threat.[38] In addition to peoples' anxieties about climate change, the rising costs of fossil fuels and the adverse health and safety impacts of extractive activities are prompting many communities to consider alternative energy sources. Additionally, for populations who lack access to reliable power, installing localized clean energy can provide a safe, consistent power source (unlike kerosene or diesel). As the fossil fuel industry continues business-as-usual and governments stall the regulation of polluting practices and implementation of renewable energy, some communities and initiatives are taking the lead in grassroots renewable energy solutions.

Despite numerous policy and technical barriers, communities and initiatives globally are producing, distributing, and facilitating locally owned and operated solar and wind power. Below is an exploration of some of these efforts. While the localized solutions and strategies in the following examples are rooted in their own specific socio-environmental contexts, some of the energy efficiency strategies and renewable energy technologies adopted in these cases may be applicable to other regions and brought to scale. International, national, and subnational governments can learn from the granularity of these examples as they work to scale up the Just Transition within their own regional contexts. Scaling such efforts in ways that fulfill Just Transition criteria will require serious work, and challenges will undoubtedly arise as new energy systems are onboarded. It is critical for groups and legislators to review and understand cases that align with basic climate justice principles; these will provide an essential guide and reference when governments and groups look to scale.

The case studies in this report were selected based on their incorporation of the following baseline climate justice principles and practices:

1. Increasing Equity and Accessibility to Renewable Energy
2. Fostering Community-Based Leadership and Self-Determination
3. Creating Sustainable Lifestyles and Respecting Local Ecological Webs
4. Advancing Energy Sovereignty and Security
5. Retaining Culture and Community Way-of-Life and Integrating Place-Based Knowledge
6. Expanding Work, Training, and/or Educational Opportunities

When examining these criteria, it is important to acknowledge that the application of these principles can look significantly different in each case study because any long-term solution must be contextualized within each communities' cultural, economic, political, and ecological conditions. The way that Just Transition principles function in practice, therefore, shifts according to the unique situation, priorities, and needs of particular communities. These differences are especially apparent between high and low-income countries, due to significant financial disparities

38 Poushter, J., Fagan, M., Gubbala, S. (2022, August 31). Climate Change Remains Top Global Threat Across 19-Country Survey. *Pew Research Center.* [LINK]; Narawad, A. (2024, June 20). Global surveys show people's growing concern about climate change. *Clean Energy Wire.* [LINK]

and differences in access to technologies and materials. For example, while some countries lack energy access and other basic needs that require regenerative growth, many wealthier countries need to reduce growth and address over-consumerism. While respecting planetary boundaries is key to any just energy transition, the manifestations of climate justice principles and practices are always place-based and locally defined.

The communities and initiatives described in the following case studies are at different stages of realizing a Just Transition (and, therefore, in different stages of incorporating related principles into their various approaches). Each case, however, has lessons that further the agenda of true and just energy independence. In order to actualize and progress local, bottom-up decarbonization efforts, the global community needs to imagine and witness concrete examples of community-owned and led power initiatives. There is much to learn from the communities that have implemented these principles in their own local contexts and contended with the imperfect nature of transitioning to renewable energy amidst a capitalist economic system in which profits are prioritized over social and ecological well-being.

Below are cases that range in scale, from small communities owning their power to large regions that are being empowered through renewable energy training and operation. The examples are divided into three categories:

1. initiatives that are facilitating renewable energy in regions,
2. energy cooperatives,
3. and communities or regions that are largely running on renewables.

The research presented in the case studies below was limited to readily available public information; the activities of the community or organization could be more expansive than what is expressed in this report.

All of these case studies exemplify how the world can begin to move from where societies are now—reliant on harmful extractive economies—to where they need to be—the Just Transition—all while upholding and centering climate justice principles like democracy, gender justice, and place-based knowledge.

Initiatives Promoting Renewable

Initiatives supporting the expansion of renewable energy have existed for over 50 years and are multiplying as the effects of climate change increase and rural, unelectrified communities seek access to clean and healthy energy.[39] Initiatives can range from nonprofit organizations that train and fund individuals who live in remote off-the-grid regions to install and manage renewable energy systems to programs and networks of organizations and communities that provide education for and facilitation of renewable energy opportunities.

39 Barefoot College. (n.d.). *Welcome to the Real Barefoot College.* [LINK]

CASE STUDY

Barefoot College

Solar engineering trainer at Barefoot College, India. [UNWomen, Flickr]

"Everyone just learns from each other…trainers as much as the students…Whatever I've learned has been through seeing, learning and practicing in the 20 years I've spent [at BFC]…Today I can install, operate and repair complicated solar systems easily!"

Magan Kanwar
a Trainer with the Solar Mama's Program[40]

About:

Barefoot College, Tilonia (BFC) in India is an institution that has provided training and opportunities in sustainable solutions—including water, energy, and health—to marginalized communities in the Global South for more than 50 years.[41] The Barefoot Solar Engineers training program (otherwise known as the Solar Panel Mamas' project) educates women living in remote non-electrified regions to become solar engineers, i.e., to design, make, install, and maintain solar systems.[42] This informal learning environment occurs in the Barefoot Solar Engineering Training Center in Tilonia where women from countries across the Global South stay for half a year to learn about solar systems and other sustainable practices.[43] The women are chosen by their communities and their travel is funded by BFC.[44] The organization often provides communities that would otherwise rely on kerosene—a costly and unhealthy energy source—with access to clean, renewable energy.[45]

Local Context:

The initiative was started by Bunker Roy—an activist inspired by Mahatma Gandhi—who moved to Tilonia in 1972 to seek solutions to entrenched poverty.[46] BFC began with the goal of uplifting people at the bottom of India's caste system and transforming rural life for the world's most vulnerable communities.[47] After starting solar training in six regions in India, the program expanded to Afghanistan in 2005, Myanmar in 2007, and has now trained women from 96 countries.[48]

Funding:

BFC initially received funding from the European Union and has since received national and international funding from foundations, world banks, United Nations programs, and governments.[49]

40 Krishna, G. (2023, April 28). The 'Barefoot College' Reinventing Rural Education. *Reasons to be Cheerful.* [LINK]
41 Patterson, J. and Kinchington, F. (2024, May 14). Learning sustainability at the Barefoot College: local and global community values in action. *Sustain Earth Reviews* 7, 16. [LINK]
42 Barefoot College. (n.d.). *Solar.* [LINK]
43 Krishna, G. (2023, April 28). The 'Barefoot College' Reinventing Rural Education. *Reasons to be Cheerful.* [LINK]
44 Patterson, J. and Kinchington, F. (2024, May 14). Learning sustainability at the Barefoot College: local and global community values in action. *Sustain Earth Reviews* 7, 16. [LINK]
45 Barefoot College. (n.d.). *Solar.* [LINK]
46 Patterson, J. and Kinchington, F. (2024, May 14). Learning sustainability at the Barefoot College: local and global community values in action. *Sustain Earth Reviews* 7, 16. [LINK]
47 Ibid.
48 Barefoot College. (n.d.). *Solar.* [LINK]
49 Barefoot College. (n.d.). *Solar.* [LINK]

CASE STUDY

Barefoot College

Principles in Practice:

1. ***Equity and Access:*** According to the International Renewable Energy Agency, since the late 1990s, BFC has trained more than 1,700 women from rural and impoverished communities in solar engineering across 96 countries.[50] These trainings have resulted in 75,000 homes receiving solar electricity, 1,300 communities becoming fully electrified, and 45 million liters of kerosene pollution being avoided.[51]

   Additionally, BFC's emphasis on social learning supports equity and the reorienting of existing power dynamics within communities.[52] Studies demonstrate that solar training for women contributes to women's empowerment and self actualization.[53]

2. ***Energy Sovereignty:*** The BFC solar program's mission is to equip women with the skills, as well as the necessary equipment and parts, to start rural workshops and lead further solar development in their own communities.[54] Obtaining renewable lighting enables communities to support more schooling and other activities, which, in turn, facilitates future income and economic benefits.[55]

3. ***Participation:*** Early on, BFC transitioned from a hierarchical structure to a collaborative learning organization whose management is organically constructed and led from the bottom-up.[56] Power is distributed throughout BFC's staffing structure. The organization employs local leadership and values community knowledge and expertise.[57]

4. ***Respect for Planetary Boundaries:*** In addition to solar training, BFC also educates communities about rainwater harvesting and tree protection.[58] These other sustainability efforts support more efficient use of ecological webs and conservation practices.

5. ***Self Determination:*** By training women who are often widows, mothers, and struggling to make ends meet in solar engineering, BFC is empowering women to become leaders in their communities and supporting individual self-actualization.[59]

6. ***Meaningful Work:*** BFC employs local community members in the villages that it supports. The organization's educational model is based on participants' and community members' graduation from novice students to teachers to program experts and leaders.[60] This fosters generational knowledge within a community and allows the teachers to adapt the training to their own specific socio-ecological contexts.

   When they return to their villages from the six-month training period in Tilonia, each woman manages up to 200 solar units that generate energy for lighting and cooking across her community.[61] While the women are in Tilonia, their communities construct workshops for their return and redirect funds previously spent on fossil fuels to provide a living wage for the women.[62]

7. ***Culture and Indigenous Knowledge:*** The BFC solar projects that are implemented in different villages align with the communities' specific ecological contexts and environmental limitations. BFC emphasizes place-based knowledge over external and universalizing strategies and ideologies.[63]

50 IRENA. (2022, June 15). *Barefoot College Partnership Leaves Rural Footprint with Skilled Energy Champions*. [LINK]
51 Ibid.
52 Patterson, J. and Kinchington, F. (2024, May 14). Learning sustainability at the Barefoot College: local and global community values in action. *Sustain Earth Reviews* 7, 16. [LINK]
53 Ibid.
54 Barefoot College. (n.d.). *Solar*. [LINK]
55 Patterson, J. and Kinchington, F. (2024, May 14). Learning sustainability at the Barefoot College: local and global community values in action. *Sustain Earth Reviews* 7, 16. [LINK]
56 Ibid.
57 Ibid.
58 Ibid.
59 Ibid.
60 Ibid.
61 Ibid.
62 Ibid.
63 Ibid.

CASE STUDY

Native Renewables

Native Renewables solar technicians in front of a solar panel. [Native Renewables, LinkedIn]

"One thing that is underlying the work we're doing is recognizing that we need electrification solutions in our own communities…It was unfortunate that the energy development that was happening was impacting our communities but not fully benefiting [them] in the way our community members wanted."[64]

Suzanne Singer (Diné)
Cofounder of Native Renewables[65]

About:

Co-founded by Suzanne Singer (Diné) and Wahleah Jones (Diné), Native Renewables is a Native and women-led organization that works to bring solar power to Hopi and Diné (Navajo) community members and grow Indigenous-led solar power knowledge and solutions through educational programming.[66] The organization aims to provide off-grid energy access to 15,000 Dine and Hopi homes, many of which are rural and cannot affordably connect to the electrical grid. As of September 2024, the organization had donated nearly 100 off-grid solar systems to Hopi and Diné households.[67]

Local Context:

According to a Department of Energy Office of Indian Energy study, 21% of Navajo and 35% of Hopi households lack access to electricity; those that are on the grid pay more for electricity due to their rurality and limited utility options.[68] This is due to historic and ongoing violence: extractive industries have exploited Dine and Hopi communities' land and water—leading to generational health issues for the residents—to provide power for other parts of the country while excluding local communities from energy investment. Native Renewables was born out of the desire to rectify this injustice and the harm that has been inflicted by extractive industries and governmental neglect.[69]

Funding:

In order to carry out its mission, Native Renewables has received financial support through donations, private funding, and grants.[70]

64 Funes, Y. (2024, September 30). After Generations in the Dark, this Group is Bringing Solar Power to Tribal Lands. *Atmos.* [LINK]
65 Ibid.
66 Native Renewables. (n.d.). *Who We Are.* [LINK]
67 Funes, Y. (2024, September 30). After Generations in the Dark, this Group is Bringing Solar Power to Tribal Lands. *Atmos.* [LINK]
68 Ibid; Newland, B. (2023, March 29).Tribal Energy Development. *U.S. Department of the Interior.* [LINK]
69 Ibid.
70 Native Renewables. (n.d.). *Empowering Native Communities.* [LINK]

CASE STUDY

Native Renewables

Principles in Practice:

1. ***Equity and Access:*** Solar systems are donated and installed by Native Renewables to avoid high initial costs and monthly payments for the families receiving systems.[71] Because many Navajo and Hopi households are multi-generational, receiving a solar system provides many people with reliable electricity and supports family members to remain on their land.[72]

2. ***Energy Sovereignty:*** By localizing energy ownership, Native Renewables educates communities on solar management so that they can own their energy and the devices can be operated and maintained after installation without outside support.[73] Solar infrastructure has also been built to minimize complications for families.[74]

3. ***Self Determination:*** To facilitate education and increase the longevity of the infrastructure, Native Renewables employees visit households receiving solar systems annually for five years to ensure that the system is operating correctly and advise families about proper maintenance, including battery replacement, which the families become responsible for after five years.[75] This strategy of building relationships with the families supports residents to gain confidence in managing and maintaining their system, increasing its operation lifetime.

4. ***Meaningful Work:*** Native Renewables hires local Indigenous Peoples, training them in solar installation and maintenance.[76] Additionally, the organization has a workforce development program for Indigenous people to learn more about solar and start a career in renewable energy.[77] In this way, Native Renewables is both advancing energy independence and ensuring that the economic benefits from this transition are distributed to local Native residents, thereby redistributing resources and power.

5. ***Culture and Indigenous Knowledge:*** Jones and Singer's efforts honor cultural knowledge by creating a future in which Native communities achieve energy sovereignty and reduce harm to the environment.[78]

71 Silversmith, S. (2024, March 13). Solar projects in the Navajo and Hopi nations to electrify homes win federal funding. *AZ Mirror.* [LINK]
72 Ibid.
73 Funes, Y. (2024, September 30). After Generations in the Dark, this Group is Bringing Solar Power to Tribal Lands. *Atmos.* [LINK]
74 Ibid.
75 Silversmith, S. (2024, March 13). Solar projects in the Navajo and Hopi nations to electrify homes win federal funding. *AZ Mirror.* [LINK]
76 Funes, Y. (2024, September 30). After Generations in the Dark, this Group is Bringing Solar Power to Tribal Lands. *Atmos.* [LINK]
77 Ibid.
78 Native Renewables. (n.d.). Who We Are. [LINK]

CASE STUDY

Solar Sister

"It's been eight years of starting innovation, trying to see how gender and energy are interlinked, and how we can reap the benefits of women being at the forefront of this clean energy transition."[79]

Olasimbo Sojinrin
Solar Sister Nigeria Director

Solar sister entrepreneur holding parts to a small solar system. [Solar Sister, Flickr]

About:

Founded in 2009, Solar Sister is a nonprofit organization based in Sub-Saharan Africa that strives to eradicate energy poverty and empower women to become entrepreneurs by providing them with solar energy technologies to sell in off-grid and/or rural communities.[80] Solar Sister not only expands access to sustainable energy, but also combats gender inequality; women in this region are most affected by lack of access to economic opportunities and clean energy resources.

Local Context:

According to the Center for Strategic and International Studies, Africa is the most energy-deficient continent, accounting for 75% of the world's population without access to electricity.[81] In sub-Saharan Africa alone, over 600 million people lack reliable power. This electricity shortage limits access to education and economic opportunities, perpetuating cycles of poverty.[82] Additionally, more than 940 million people across sub-Saharan Africa still rely on firewood and charcoal for cooking. Open-fire cooking poses serious health risks, as exposure to pollution from household smoke can lead to respiratory and heart diseases and can cause strokes and lung cancer.[83] Women and children spend the most time near these fires and are at highest risk of harm. Expanding access to clean energy is crucial for improving health, reducing poverty, and fostering economic and energy sovereignty.[84]

Funding:

Since its inception, Solar Sister has received funding from various sources, including partnerships, grants, foundations, and other investments, all of which have allowed them to expand their reach.[85]

79 Obiezu, T. (2022, July 21). Nigeria's Solar Sisters Bring Clean Energy to Communities. *VOA*. [LINK]
80 Ibid.
81 Baskaran, G. and Coste, S. (2024, January 31). Achieving Universal Energy Access in Africa amid Global Decarbonization. *CSIS*. [LINK]
82 Solar Sister. (n.d.). What we do: Why our Work Matters. [LINK]
83 WHO. (n.d.). *Household Air Pollution*. [LINK]
84 Baskaran, G. and Coste, S. (2024, January 31). Achieving Universal Energy Access in Africa amid Global Decarbonization. *CSIS*. [LINK]
85 Solar Sister. (n.d.). Light, Hope, Opportunity. [LINK]

CASE STUDY

Solar Sister

Principles in Practice:

1. ***Equity and Access:*** Solar Sister works to bring clean, affordable energy solutions to *last-mile* communities.[86] This term refers to communities that often lack access to grid power, are low-income, and/or are geographically remote and isolated. By gaining energy access, these last-mile communities are connected to needed resources and opportunities. Even though these last-mile communities are a main focus of Solar Sister's mission, the organization also recognizes that those connected to the grid can experience frequent outages, forcing them to rely on costly and harmful energy sources. Solar Sister recognizes that all populations, regardless of location or income, should be able to benefit from reliable and affordable power.[87]

2. ***Women Leadership/Self Determination:*** As of October 2023, Solar Sister has provided support, training, and services to over 10,000 women across sub-Saharan Africa to become entrepreneurs in the clean energy sector. Solar Sister's Business Development Associates work with these women, guiding them through a 12-month participatory training curriculum that builds both technical skills and business expertise.[88] This ongoing mentorship is crucial in helping women entrepreneurs thrive and create lasting change in their communities. In addition, one-third of these entrepreneurs have gone on to start other businesses, further contributing to their communities' economic development.[89]

3. ***Energy Sovereignty:*** Solar Sister's model supports local energy sovereignty by training and empowering women entrepreneurs to become energy solution providers in their own communities. These women act as the bridge between clean energy technologies and households that need them, helping to establish local markets for solar products, clean cookstoves, and other sustainable energy solutions.[90]

4. ***Community Well-being:*** When women gain access to reliable and affordable energy solutions, they can create businesses that generate steady income. This has a transformative effect on their families and communities because women often use their earnings to support others, especially those in their households.[91] They often prioritize spending on essentials that directly improve the quality of life for their families, such as school fees, clothing, nutritious food, and healthcare. By providing for their children's education and well-being, these women are not just improving their own lives—they are thinking about the next generation, ensuring that their children have better opportunities for their future.[92]

86 Solar Sister. (n.d.). *What we do: Why our Work Matters*. [LINK]
87 Ibid.
88 Solar Sister. (n.d.). *What we do: Women's Economic Empowerment*. [LINK]
89 Solar Sister. (n.d.). *2023 Annual Report*. [LINK]
90 Ibid.
91 Adesnik, C. (2022, April 14). Solar Sister is addressing gender equity, energy poverty, and climate change. *CISCO*. [LINK]
92 Solar Sister. (n.d.). *Women are the Solution to Energy Poverty*. [LINK]

Renewable Energy Cooperatives

Renewable energy cooperatives (REC) are organizations (often in the form of non-profits) that provide energy to a community. Members of a cooperative own and manage the production of the energy and hold equal stakes in the organization and any excess funds. Energy is often democratized and decentralized in RECs, allowing communities to be less reliant on top-down governance and corporate structures. REC's energy may or may not be connected to the grid. RECs exist throughout the world and are rapidly multiplying. Energy cooperatives in the U.S., for instance, power 56% of the country and 92% of persistent poverty counties.[93] 95% of the almost 900 electric cooperatives under the National Rural Electric Cooperative Association—an organization that supports electric cooperatives in the U.S.—focus on renewable energy generation and/or procurement.[94] This method of managing energy is especially important for rural and non-electrified communities across the world who might otherwise have no method of obtaining energy access, let alone renewable energy. Urban environmental justice communities, who may be paying excessive amounts for electricity, also benefit from RECs.

93 NRECA. (2024, April 19). *Electric Co-op Facts & Figures.* [LINK]
94 Jackson, L. (2019, August 8). Energizing Rural America: A Cooperative Effort to Advance Renewable Power. *Bipartisan Policy Center.* [LINK]

CASE STUDY

GoiEner

Member of GoiEner shaking hands with woman. [Albaola, Flickr]

"We don't have to wait for the governments to do it for us—we can do it ourselves if we want to."

GoiEner[95]

About:

Founded in 2012, GoiEner is a nonprofit energy cooperative and social enterprise which produces and supplies renewable energy to over 20,000 people (at rates similar to market rates) in communities in the Southern Basque Country in Spain.[96] The organization was created in reaction to Spain's energy oligopoly—control over the energy market by very few producers and sellers—and the 2008 economic crisis and related rise in the anti-austerity movement.[97] Now, with over 17,500 members,[98] the cooperative centers energy self-consumption (i.e., the consumption of renewable energy produced by community members), participation, trust, and gender equality with the goal of reclaiming energy sovereignty.[99] The cooperative defines renewable energy as "solar, biogas, wind power, etc."[100]

Local Context:

Cooperatives gained ground in Spain when, in 1997, the government of José María Aznar liberalized the electricity sector, opening up retail and generation electricity markets.[101] Although electricity retail and generation continue to be controlled by very few companies, and transmission and distribution are still regulated, cooperatives like GoiEner are now able to operate in parts of the energy system. Despite this advancement, the Spanish energy law (24/2013) prevents entities from operating both the retail and generation of electricity. GoiEner navigated this obstacle by starting a separate cooperative for electricity generation—Nafarkoop.[102]

Funding:

GoiEner is funded through cooperative members' fees and pooled funds. Some of the cooperative's projects are also funded through the European Commission and other entities.[103]

95 GoiEner (n.d.). *FAQ.* [LINK]
96 REScoop.eu. (2023, August 3). *March success story: Towards a gender-just energy future.* [LINK]
97 Martxan, E. and GoiEner Cooperative. (2018, December 7). GoiEner Cooperative, Basque Country. *Energy Democracy.* [LINK]
98 Energy Community Platform. (n.d.).*GoiEnergy*. [LINK]
99 GoiEner (n.d.). *The Cooperative.* [LINK]
100 Ibid.
101 Martxan, E. and GoiEner Cooperative. (2018, December 7). GoiEner Cooperative, Basque Country. *Energy Democracy.* [LINK]
102 Ibid.
103 GoiEner (n.d.). *European Projects.* [LINK]

CASE STUDY

GoiEner

Principles in Practice:

1. ***Equity and Access:*** GoiEner's social branch is committed to addressing equity and energy poverty.[104] The cooperative supports energy access by reaching out to socially excluded people and care workers. The governance of the cooperative is based on sociocracy, which centers teamwork and co-responsibility.[105] This responsibility includes the provision of energy and improved general welfare to its members and community.[106] Additionally, by reducing energy prices for all members, GoiEner is economically supporting community members across the region.

2. ***Energy Sovereignty:*** The cooperative focuses on the Basque Country because members believe that cooperatives should remain regional entities that support the local economy.[107] By hiring local people, distributing tax payments regionally, and purchasing locally, GoiEner is supporting community autonomy. The cooperative also supports renewable energy cooperatives in other parts of Spain to amplify local and democratic energy sovereignty. In 2017, GoiEner cofounded Unión Renovables, the Spanish national federation of renewable cooperatives, which lobbies the national energy ministry and supports members to adjust to regulatory changes and obstacles.[108]

3. ***Energy Efficiency:*** GoiEner emphasizes rational and efficient use of energy. The cooperative provides workshops around the Basque region supporting people to understand and reduce their electricity usage and costs.[109] This includes promoting energy-saving practices and responsible consumption.

4. ***Democracy/participation:*** GoiEner holds regular meetings with members in which each person holds a vote. Members collectively decide how to use any profits from the organization's energy production and distribution, e.g., to invest in renewable energy projects for the cooperative.[110]

5. ***Gender-just:*** GoiEner developed and adopted a gender equality plan in 2019. The plan incorporates a political commitment to gender equality and prioritizes a gender-focused lens in the following areas: organizational culture, management of care and conflicts, participation and decision-making, and human resources management. Following the plan's release, members introduced a proposal for a mandatory gender balance in the steering committee, and the cooperative established gender requirements to enact this change. As of 2023, the four presidents of GoiEner are all women.[111] In a discussion regarding the establishment of gender equality plans, Erika Martinez, one of GoiEner's presidents advises:

   "The first step is to explain that a gender equality plan isn't against anybody, but a collective diagnosis that showcases a reality with the aim of giving everybody the same opportunities. I would start by organizing workshops and sessions to discuss the topic and feel the temperature of the room. There is no point in having a gender plan if it is not followed and embraced. It will not bring about real change. A gender equality plan needs to be a collective decision, and if there is any rejection, it should be openly discussed and addressed… putting in writing the objectives agreed upon and the actions to achieve them…"[112]

104 Martxan, E. and GoiEner Cooperative. (2018, December 7). GoiEner Cooperative, Basque Country. *Energy Democracy.* [LINK]
105 Ibid.
106 Huybrechts, B., Pérez-Suárez, M., Cobeña, M., et al. (2024, June). Energy co-operatives in Spain: The role of social enterprises in the energy transition. *Futures* 160. [LINK]
107 Martxan, E. and GoiEner Cooperative. (2018, December 7). GoiEner Cooperative, Basque Country. *Energy Democracy.* [LINK]
108 Ibid.
109 Ibid.
110 Ibid.
111 REScoop.eu. (2023, August 3). *March success story: Towards a gender-just energy future.* [LINK]
112 Ibid.

CASE STUDY

Sunset Park Solar

Brooklyn Army Terminal in New York. [Felix Lipov, Shutterstock]

"For me, this is more than just renewable energy; it's a model of how we take control over our climate future, our economic future..."

Elizabeth Yeampierre
Executive Director of UPROSE.

About:

Sunset Park Solar, which was first announced in 2020, is the first co-operatively-owned community solar project in New York City (NYC).[113] The construction of solar panels is expected to begin in early 2025, and they will be built on the roof of the Brooklyn Army Terminal in South Brooklyn.[114] Over a 25-year timeframe, the project is expected to deliver $1.24 million USD in energy bill savings to the approximately 150 participating households.[115] Sunset Park Solar provides a model for how urban low-income communities might establish a REC.

Local Context:

Sunset Park is a working-class, low-income neighborhood where one in three residents live in poverty and 69% of the population is non-white.[116] This community faces disproportionate exposure to environmental pollution and significant economic, educational, and social barriers.[117] Developing solar panels on the neighborhood building will provide community members with potential future profits, as well as substantial cost-saving benefits that will not contribute to local pollution. This effort also begins to build climate resiliency for the community.

Funding:

This community-led not-for-profit initiative was a collaboration between UPROSE, a locally-based climate justice organization; Working Power, a renewable energy developer that supports construction and finance in marginalized communities; and the New York City Economic Development Corporation (NYCEDC), NYC's economic development organization.[118]

113 UPROSE. (n.d.). *Sunset Park Solar*. [LINK]
114 Gallucci, M. (2025, January 6). A new solar project in Brooklyn could offer a model for climate justice. *Canary Media.* [LINK]
115 NYCEDC. (2024, December 6). *New Solar Panels at Historic Brooklyn Army Terminal to Power Sunset Park Community.* [LINK]
116 Nguyen, K.H. and Leichenko, R. (2022). Operationalizing Urban Climate Justice: A Case Study of Sunset Park, Brooklyn, New York City. *Journal of Extreme Events* 9, 2&3. [LINK]
117 Ibid.
118 Sunset Park Solar. (n.d.). *What is Sunset Park Solar?* [LINK]

CASE STUDY

Sunset Park Solar

Principles in Practice:

1. ***Equity and Access:*** The solar initiative aims to support working-class communities not only to transition to clean energy but also to economically serve them by reducing their electricity rates. Households that participate in the solar project will receive a discount of approximately 20% on their utility bills, which will alleviate the rising costs of energy expenses.[119] These benefits, as well as any revenue generated from selling energy to the grid, will go to the Sunset Park neighborhood, which is largely comprised of Asian, Latine, and immigrant residents and working-class families.[120]

2. ***Local Democracy and Participation:*** Every member of the energy cooperative has a vote in deciding how Sunset Park Solar's profits will be invested, e.g., reinvesting in additional solar projects.[121] Members' concerns and ideas can be raised at the cooperative's regular meetings. This active participation is critical to the mission of Sunset Park Solar, which emerged from community efforts to build locally-owned and democratically controlled solar that will thrive in the face of climate change.[122]

3. ***Energy Sovereignty:*** Community members who participate in Sunset Part Solar will share the ownership of the solar installation.[123]

4. ***Meaningful Work:*** In 2019, Solar One—a New York City-based nonprofit that specializes in solar education and training— and UPROSE led a training course on solar installation for Sunset Park residents, supporting trainees to work at solar projects across NYC.[124] For project construction, Sunset Park Solar partners are committed to training and hiring employees within the community and paying a fair living wage.[125]

119 Sunset Park Solar. (n.d.). *What is Sunset Park Solar?* [LINK]
120 Ibid.
121 C40 Cities. (2020, February). *Sunset Park: Community Solar Energy in NYC.* [LINK]
122 Ibid.
123 Gallucci, M. (2025, January 6). A new solar project in Brooklyn could offer a model for climate justice. *Canary Media.* [LINK]
124 Gallucci, M. (2025, January 6). A new solar project in Brooklyn could offer a model for climate justice. *Canary Media.* [LINK]
125 Sunset Park Solar. (n.d.). *Project Details*. [LINK]; Gallucci, M. (2025, January 6). A new solar project in Brooklyn could offer a model for climate justice. *Canary Media*. [LINK]

Other Community and Region-Wide Projects

In addition to RECs and local initiatives, communities worldwide are leading efforts to advance energy independence and climate change resilience. By adapting to regional conditions, relying on local ecological webs, and building strong partnerships, some communities and regions are navigating the Just Transition and advancing renewable energy that is rooted in place-based knowledge and climate justice principles.

CASE STUDY

Ladakh Region, India

Solar cells in Hunder village in Leh Ladakh, India. [Anirut Rassameesritrakool, Alamy Stock Photo]

"The solar lights in our village streets make it easier for us to gather as a community, even in the evenings. It has changed how we live."

Namgyal Dolkar
School Teacher, Ladakh

About:

The Ladakh region is located in Northern India extending from the Himalayan to the Kunlun Ranges.[126] At over 9,800ft or almost 3,000m high and with over 300 days of sunshine on average per year, this region is an ideal location for solar production.[127] Local solar development in Ladakh began in the early 2010s and has had financial and training support from government-backed programs, NGOs, and local communities.[128] Off-grid and decentralized solar solutions and microgrids are now a reliable energy source for many Ladakh villages, supplying energy to their households, schools, community centers, public facilities, and hospitals. These communities previously relied on candles, as well as diesel generators and kerosene, which are costly and toxic. Solar in Ladakh spans from microgrids powering entire villages to smaller solar panels owned by community members.[129]

Local Context:

By using less wood-burning stoves, diesel generators, and kerosene, Ladakh communities are reducing their GHGs and lessening their impact on local forests. In this way, villages in Ladakh are simultaneously tackling energy scarcity and reducing their environmental footprint.[130]

Funding:

Solar infrastructure in Ladakh has received financial support from local and national governments, NGOs, and local communities, as well as from the Ladakh Renewable Energy Development Agency—a renewable energy initiative that implements non-conventional energy projects of the Ministry of New and Renewable Energy of the Government of India.[131]

126 Life on the Planet Ladakh. (2024, October 30). *Solar-Powered Ladakh: A Journey into Sustainable Villages | Renewable Energy & Eco-Friendly Living.* [LINK]
127 Ibid.
128 Ladakh Renewable Energy Development Agency. (n.d.). *Welcome to LREDA.* [LINK]
129 Life on the Planet Ladakh. (2024, October 30). *Solar-Powered Ladakh: A Journey into Sustainable Villages | Renewable Energy & Eco-Friendly Living.* [LINK]
130 Life on the Planet Ladakh. (2024, October 30). *Solar-Powered Ladakh: A Journey into Sustainable Villages | Renewable Energy & Eco-Friendly Living.* [LINK]
131 Ladakh Renewable Energy Development Agency. (n.d.). *Welcome to LREDA.* [LINK]

CASE STUDY

Ladakh Region, India

Principles in Practice:

1. ***Equity and Access:*** Because of Ladkah's remote and rugged landscape, the transportation and installation of the solar systems was expensive. This challenge was overcome by using lightweight and durable solar infrastructure.[132] Additionally, employing modular solar panels designed for extreme climates not only facilitates solar installation in harsh environments, but also allows parts of the solar infrastructure, rather than the entire system, to be replaced if the equipment malfunctions.[133]

2. ***Self Determination:*** Solar training programs across Ladakh allow community members to maintain their solar systems with reduced outside support.[134] Additionally, because the solar technology employed in Ladakh is modular, if parts of the systems malfunction, the community does not need to replace all of the equipment. These techniques allow the solar infrastructure to last long and be maintained locally, making the communities less dependent on outside experts and technology.[135]

Examples

The Students' Educational and Cultural Movement of Ladakh (SECMOL) provides a glimpse into how low-carbon living can intertwine with solar technologies. SECMOL's school campus located in Phey produces all of its energy, including for pumping water, from solar panels.[140] The campus has passive earth building and students and teachers practice low-carbon living, adjusting their lifestyles to be more active during daylight hours. Students democratically manage the energy at SEMCOL, building stronger energy sovereignty. In another example, the Himalayan Institute of Alternatives developed an agri-photovoltaic system—using land for solar energy production and agriculture—to grow food and generate energy. In other cases, solar energy is used to pump water to areas facing water scarcity which is perpetuated by the effects of climate change.[141]

140 Joshi, N and Kothari, A. (2024, December 26). Autonomy and pluriversal energy futures in Ladakh, India. *Sage Journals*. [LINK]
141 Ibid.

3. ***Respect for Planetary Boundaries and Energy Efficiency:*** The transition to solar energy in Ladakh has been paired with low-carbon living. Communities have prioritized low-impact development (e.g. passive solar construction) and lifestyles practices to reduce reliance on energy.[136] For example, in Leh, a nine story passive solar-earth building—Leh Palace—which was built in the 17th century, has been adapted to incorporate passive solar technologies (e.g., southern facing windows and a Trombe wall system—walls that absorb heat from sunlight—to keep the building warm).[137] Other techniques used in Ladakh include parabolic reflectors for cooking and dry toilets (saving water), building greenhouses for growing food in the winter (reducing energy needs for transporting and growing food elsewhere), and solar water heaters.[138] Part of this eco-conscious living is a result of the communities' cultures and relations with the land and the sun.

4. ***Meaningful Work:*** Solar installation in Ladakh is also invigorating the local economy and creating employment opportunities for community members. The increase in solar systems has created jobs in the region and long-term sources of income for the community. Additionally, workforce development programs to train residents in solar system installation and maintenance have provided community members with new skills and career opportunities. In Leh, for instance, 15 community members work at a solar system repair workshop where they are trained by a program funded by an NGO. Sustainable growth has also expanded in Ladakh: in Sumda Chenmo, for example, community members opened a solar-powered community market.[139]

132 Life on the Planet Ladakh. (2024, October 30). *Solar-Powered Ladakh: A Journey into Sustainable Villages | Renewable Energy & Eco-Friendly Living*. [LINK]
133 Ibid.
134 Ibid.
135 Ibid.
136 Ibid.
137 Joshi, N and Kothari, A. (2024, December 26). Autonomy and pluriversal energy futures in Ladakh, India. *Sage Journals*. [LINK]
138 Joshi, N and Kothari, A. (2024, December 26). Autonomy and pluriversal energy futures in Ladakh, India. *Sage Journals*. [LINK]
139 Life on the Planet Ladakh. (2024, October 30). *Solar-Powered Ladakh: A Journey into Sustainable Villages | Renewable Energy & Eco-Friendly Living*. [LINK]

5. ***Culture and Indigenous knowledge:*** The Ladakhi population is 97% Indigenous and has an assortment of customs and backgrounds.[142] The local villages' place-based and Indigenous knowledge has informed the region's implementation of renewable energy and energy efficiency projects. Combining local Indigenous knowledge with solar technologies has created numerous innovations that embed cultural practices and respect ecological boundaries.[143]

Challenges

The Government of India is currently seeking to install a large high-impact solar and wind project in Ladakh, which would transmit energy (through a 900-km or 560-mi long system) from the Ladakh region to centers in India. India's 2023 national budget allocated over $994 million USD (Rs 8300 crore) toward the project.[144] There are concerns that the project will alter pasture land availability, disrupt ecological systems, and imperil already scarce water sources. The national government has also failed to properly consult with local communities about the plans nor has the government offered to share the benefits of such an endeavor. This project ignores the socioecological impacts of the project and views Ladakh as a disposable region for the transition to renewable energy. Communities in Ladkah are fighting this top-down technocratic project by demanding autonomy through recognition of full statehood and inclusion under India's Constitution's Sixth Schedule. This would support Ladkah's local Indigenous communities' sovereignty over their territory, giving them political representatives. It is essential to create structures for local decision-making to protect local Ladkah communities' rights to their land and water from state and national commercial and political interests.

This case shows how the implementation of place-based knowledge and solar in Ladakh sharply differs from top-down mainstream conceptions of technological development and the energy transition. The national government's plans under Prime Minister Narendra Modi fail to engage with the Ladakh's communities' wealth of traditional knowledge and low-carbon living practices.[145]

144 Joshi, N and Kothari, A. (2024, December 26). Autonomy and pluriversal energy futures in Ladakh, India. *Sage Journals*. [LINK]
145 Ibid.

142 Joshi, N and Kothari, A. (2024, December 26). Autonomy and pluriversal energy futures in Ladakh, India. *Sage Journals*. [LINK]
143 Ibid.

CASE STUDY

Greensburg, Kansas, U.S.

Wind mill behind local arts center in Greensburg, Kansas. [Eric Ascalon, Wikimedia]

"The root of sustainability is based in common Kansas values. A Kansan thinks in terms of generations and harbors a sincere belief that decisions should build strong communities for our children… We understand the natural systems that power a sustainable economy and know what it means to live off, and with, the land…"

Greenburg's 2008 Sustainable Comprehensive Plan[146]

About:

Greensburg is one of a few communities in the U.S. that produces 100% of the renewable energy that the town has the capacity to consume.[147] A 10-turbine wind farm, owned and operated by Exelon Corp, began operating in 2010 and is capable of powering 4,000 homes, according to Exelon. The power generated from the wind farm, which is located five miles outside of town, funnels into the Kansas Power Pool, supplying energy to multiple municipalities while also securing power for Greensburg when there is no wind.[148] The town has also been intentional in their construction of energy-efficient buildings, geothermal heating and cooling systems, and other sustainable measures to save water and materials. These shifts allowed the city to halve its carbon footprint.[149] It is important to note that Greensburg's wind energy goes onto the electric grid, which supplies many different municipalities in Kansas. Because the town is still using grid power, which includes various other energy sources (including fossil fuels), Greensburg is not being directly powered by wind energy alone. However, this is an important case study to highlight because as more communities build local renewable energy and that energy is funneled into public power systems, the electric grid will be able to supply these clean energy sources to a greater number of people, thereby retiring more fossil fuel infrastructure.

Local Context:

After a devastating tornado in 2007 that killed 12 people and destroyed all but two buildings, the farming community of Greenburg, Kansas rebuilt their town with renewable energy technology and sustainable infrastructure.[150]

Funding:

Financial and building support has been provided by non-profits, government grants, and private donations, many of which have come from concerned citizens.

146 ICMA. (2008, May 19). *Greensburg Sustainable Comprehensive Plan.* [LINK]
147 Penner, D. (2013, April 2). This town was almost blown off the map — now it's back, and super green. *Grist.* [LINK]
148 Gowen, A. (2020, October 23). The town that built back green. *The Washington Post.* [LINK]
149 Ibid.
150 Kniggendorf, A. (2022, April 19). What is the Future of America's Greenest Town? *Reasons to be Cheerful.* [LINK]

CASE STUDY

Greensburg, Kansas, U.S.

Principles in Practice:

1. ***Energy Efficiency:*** Greensburg has not only transitioned to renewable energy, but the town has also become a leader in energy efficiency and other sustainable practices. Greensburg's public buildings, including the school, library, medical center, and city hall, were built to use less energy and water. According to a federal assessment, these conservation-oriented construction mechanisms have saved the town $200,000 USD per year in utility costs.[151] Water-saving measures, including low-flow toilets, drought-resistant landscaping, stormwater runoff capture, and a recirculating rainwater pond, have also saved the town thousands of gallons of water.[152] Some of Greensburg's other sustainable building techniques, which are unique to the community's biosphere, include the installation of angled windows that allow more sunlight to come through in the winter and reuse of materials. Greensburg's City Hall, for instance, was built from recovered brick and wood from an abandoned building near town, is powered with solar panels, and utilizes a stormwater collection system for reuse on the property.[153]

   To implement sustainable design beyond public buildings, Greensburg residents were also educated about energy efficiency, renewable energy, and their cost-saving benefits. These practices include energy-efficient insulation, windows, heating systems, and lighting, in addition to small solar panels. A NREL study estimated that implementing these types of mechanisms in a home in Greensburg would save 70% of the energy use, reducing energy costs by $1,260 USD in the first year (this number accounts for the added costs of the upgrades).[154]

2. ***Local Participation:*** While the decision to build back more eco-consciously was initially envisioned by a group of city leaders, the subsequent choices around the town's specific renewable energy and sustainability measures were commented on and guided by community members.[155] From the beginning, leaders recognized that without support from the community, the town would not be able to actualize its sustainability goals.[156] Town leaders' efforts to involve Greensburg residents in the sustainably-minded recovery process were key elements to the town's success in implementing the vision.[157]

3. ***Equity and Access:*** While the up-front expense of energy efficiency and renewable energy cost more than conventional building, the long-term cost-saving benefits are significant. A NREL study estimated that compared to before the tornado, Greensburg households are using 40% less energy on average.[158] This covers the up-front costs of renewable infrastructure over time, making the systems more accessible.[159] Greensburg's net-metering policy, which authorizes solar panels on roofs and wind turbines in yards, also facilitates residents' economic benefits, reducing their energy costs and providing them payment for feeding extra energy onto the grid.[160] The sustainability-minded recovery process and incoming funds allowed community members to participate in these long-term economic benefits without having to contribute the entire up-front costs.[161] Additionally, according to local leaders, because utility bills were projected to reduce so significantly with energy-efficient practices and renewable energy measures, previous renters were able to afford a mortgage.[162]

4. ***Self Determination:*** Unlike many other rural communities, Greensburg's population and businesses are not declining and closing—in 2022, the school district rose from 300 to 338 students.[163] Some local leaders in part attribute this to the sustainable design of the city which has resulted in energy cost-savings that have circulated into the community.[164] The sustainable comprehensive plan—the town's recovery plan after the tornado—acknowledges that sustainability is about making communities resilient across generations.[165]

151 Gowen, A. (2020, October 23). The town that built back green. *The Washington Post.* [LINK]
152 Ibid.
153 Kniggendorf, A. (2022, April 19). What is the Future of America's Greenest Town? *Reasons to be Cheerful.* [LINK]
154 Gowen, A. (2020, October 23). The town that built back green. *The Washington Post.* [LINK]
155 Ibid.
156 Kniggendorf, A. (2022, April 19). What is the Future of America's Greenest Town? *Reasons to be Cheerful.* [LINK]
157 White, S. (2010, June 3). Out of the Rubble and Towards a Sustainable Future: The "Greening" of Greensburg, Kansas. *MDPI.* [LINK]
158 Gowen, A. (2020, October 23). The town that built back green. *The Washington Post.* [LINK]
159 Penner, D. (2013, April 2). This town was almost blown off the map — now it's back, and super green. *Grist.* [LINK]
160 Penner, D. (2013, April 2). This town was almost blown off the map — now it's back, and super green. *Grist.* [LINK]
161 Kniggendorf, A. (2022, April 19). What is the Future of America's Greenest Town? *Reasons to be Cheerful.* [LINK]
162 Ibid.
163 Ibid.
164 Ibid.
165 White, S. (2010, June 3). Out of the Rubble and Towards a Sustainable Future: The "Greening" of Greensburg, Kansas. *MDPI.* [LINK]

CASE STUDY

The Ecuadorian Amazon/Ceibo Alliance

Solar Panel in an Indigenous Community in the Ecuadorian Amazon. [Mike Kollöffel]

"Solar energy means autonomy and self-sufficiency for our communities. It strengthens our efforts to protect our forests, to revitalize traditional practices, and to reinforce leadership of our women and youth in our work to build resilient communities against future crises."

Alicia Salazar (Siona)
Ceibo's co-founder and member of the Leadership Council[166]

About:

In the Ecuadorian Amazon, Indigenous communities are spearheading efforts to protect their territories, preserve cultural heritage, and reduce dependence on fossil fuels by embracing sustainable solutions. The Ceibo Alliance, an Indigenous-led organization, connects the A'i Kofán, Siona, Siekopai, and Waorani peoples with one another.[167] With the support from the Ceibo Alliance, 16 villages in the Ecuadorian Amazon have implemented solar energy, strengthening the autonomy of their communities while protecting both their land and culture.

Local Context:

As of June 2022, "4,676 oil pools, pits and spills had been identified in the [Ecuadorian] Amazon."[168] The consequences of these disasters have left Indigenous communities grappling with the devastating impacts of resource exploitation. The extraction of oil poisons the land, water, and air, while, at the same time, fossil fuel dependence has left communities vulnerable to the volatility of energy prices and frequent blackouts that disrupt daily life.[169] This ongoing dependence has created a cycle of economic hardship and environmental degradation. Indigenous communities in the Amazon continue to work to break this destructive cycle and regain control of their territory and energy.

Funding:

Community-driven efforts to implement solar have been largely supported by Ceibo, which has received funding from organizations and foundations.[170]

166 Honnold Foundation. (n.d.). *Impact Spotlight*. [LINK]
167 Alianza Ceibo. (n.d.). [LINK]
168 Alarcón, I. (2024, August 12). In Ecuador, 'toxitours' show the scars left by oil in the Amazon. *Dialogue Earth*. [LINK]
169 Alianza Ceibo. (2024, May 13). *Para Nosotros y a Través de Nosotros Mismos: Energía Solar Indígena en la Amazonía.* [LINK]
170 Alianza Ceibo. (n.d.). [LINK]

CASE STUDY

The Ecuadorian Amazon/Ceibo Alliance

Principles in Practice:

1. ***Equity and Access:*** Solar systems are distributed according to community needs, not by financial means. Solar installations have been placed not only in family households but also in nursing homes, schools, and women's centers, ensuring that everyone can benefit from clean and reliable energy.

2. ***Indigenous Governance and Leadership:*** Each initiative begins with a comprehensive community assessment, empowering communities to actively shape solutions and take ownership of the projects that impact their lives. These energy systems not only support the daily lives of community members, but also protect the land and surrounding areas by empowering guards to use solar-powered devices to monitor and document activities that threaten their territories.[171] This approach strengthens both community resilience and land protection.

3. ***Energy Sovereignty:*** Community-led solar systems in this region have empowered communities to take control of their energy needs and reduced their reliance on external grids. Through capacity-building workshops, community members learn the skills needed to install, maintain, and repair these systems, thereby fostering long-term resilience and sustainability.

4. ***Cultural Preservation and Knowledge:*** By transitioning to clean energy, Ceibo helps minimize the environmental disruptions caused by fossil fuels, such as harmful emissions and noisy generators. Without these disturbances, traditional practices like hunting and fishing can continue undisturbed, ensuring the community's way of life is preserved while simultaneously improving its health and safety.

5. ***Community Well-being:*** Increased access to affordable and sustainable energy means that families no longer need to spend resources on external sources of power or oil. Instead, savings can be redirected into improving the community's quality of life—funding education, supporting women's entrepreneurship, and enhancing overall well-being.

171 Alianza Ceibo. (2024, May 13). *Para Nosotros y a Través de Nosotros Mismos: Energía Solar Indígena en la Amazonía.* [LINK]

Key Findings

While the above case studies vary in the initiatives', cooperatives', or communities' approach to implementing renewable energy, there are recurring key themes:

- In each case, there is an emphasis on equity, i.e., supporting low-income and unelectrified communities to gain access to affordable renewable energy.
- Many of the cases support energy sovereignty and self-determination by incorporating training and workforce development programs around renewable installation and maintenance, as well as prioritizing hiring local community members.
- Most of these examples are led by and/or geared towards supporting marginalized communities, including women, BIPOC, and Indigenous Peoples and uplifting place-based and Indigenous knowledge.
- The majority of the projects foster democratic structures by relying on local participation and governance, e.g., through collaborative learning organization, regular meetings with members who have voting power, community commenting periods, etc.

Processes around renewable energy implementation that center equity, democratic principles, and community and individual empowerment are essential to incorporate in all efforts undertaken by local, national, and international entities to bring about a Just Transition.

Overall, these case studies highlight the potential for community-led energy solutions to bring about equitable energy access. While the cases included above are only a few examples of localized renewable energy projects (many of which are decentralized and democratized), they all demonstrate how communities can lead and create their own energy futures. These examples showcase community-driven energy as not only a viable option but one that is already driving meaningful change across the world.

Recognizing the Barriers to Community-Driven Energy Solutions

In order to bring about decentralized and democratized energy solutions in a fair and inclusive manner, governments, financial institutions, and communities need to understand, incorporate, and implement climate justice principles. A Just Transition based on climate justice principles ensures that intersecting inequalities impacting energy workers and vulnerable communities are remedied and addressed. A Just Transition framework also upholds rigorous environmental standards and protections to halt biodiversity loss and mitigate the climate crisis.

Achieving this vision, however, is not straightforward. Actualizing climate justice requires policy change *and* cultural shifts and societal transformation to address long standing structural injustices. The energy transition away from fossil fuels is deterred by current social, economic, and legal systems which are rooted in endless economic growth, colonialism, racism, and anthropocentrism. All of these systems reinforce unequal power structures and mindsets that drive interlocking crises. These dynamics concentrate wealth and prioritize short-term profits over long-term socio-ecological health, slowing progress and deepening existing disparities. For example, sacrifice zones—regions disproportionately exposed to pollution, environmental degradation, and extractive industries for the economic gains of others—are a result of institutionalized racism and colonization.[172] Low-income, Global South, Black, Brown, and Indigenous communities bear the primary burdens of energy extraction and industrialization.[173] Without addressing these systemic barriers, efforts toward a just future will fall short, reinforcing existing inequalities instead of fostering healthy and just communities for all.

Additionally, today's socio-environmental crises are intrinsically linked to dominant society's anthropocentric worldview, which perceives humans as separate from and superior to the natural world. This mindset leads to harmful environmental policies and overconsumption patterns that ignore planetary boundaries. Implementing equity and respect for all communities and the natural world in an energy transition requires transforming the structures of injustice entrenched in current social systems while building regenerative frameworks that prioritize the needs and voices of historically oppressed groups and marginalized communities and the well-being of all species and ecosystems.

Below is an exploration of some of the major challenges hindering progress toward a Just Transition rooted in climate justice.

Profiting from Pollution: The Actors Behind Fossil Fuel Dominance

The Fossil Fuel Industry

One of the most significant barriers to renewable energy progress is the deeply rooted power of the fossil fuel industry. Fossil fuel companies continue to use their global dominance to undermine progress toward a Just Transition; in

172 The Climate Reality Project. (n.d.). *Sacrifice Zones 101*. [LINK]
173 Ibid.

the first half of 2024 alone, federal oil and gas lobbying in the U.S. amounted to $72 million USD.[174] Similarly, in the European Union, the seven largest fossil fuel companies spent nearly $64 million euros (over $69 million USD) on lobbying efforts.[175] The fossil fuel industry's lobbying efforts have continuously focused on blocking stricter emissions standards, advancing new oil and gas projects, and opposing policies that promote electric vehicles.[176]

Additionally, the fossil fuel industry's presence at United Nations Climate Conferences continues to grow: over 1,773 fossil fuel lobbyists were provided entry to COP29 in Baku, Azerbaijan—more than all the delegates from the ten most climate-vulnerable nations.[177] At COP29, these lobbyists promoted oil and gas as "essential" and "clean".[178]

This interference extends beyond lobbying. The fossil fuel industry actively shapes public discourse through campaigns.[179] For decades, major oil and gas corporations have funded think tanks, front groups (organizations that are seemingly independent but work to serve a sponsor's interests),[180] and advertisement campaigns that focus on the benefits of fossil fuels and the challenges associated with renewable energy.[181] Since the early 1900s, scientists at the largest fossil fuel companies have acknowledged climate change in their internal research.[182] In Shell's 1988 confidential report, *The Greenhouse Effect*, the authors acknowledge that "man-made carbon dioxide, released into and accumulated in the atmosphere, is believed to warm the earth through the so-called greenhouse effect" and state that this process is "mainly due to fossil fuel burning and deforestation."[183] The report further outlines the potential consequences of greenhouse gas-induced warming, including rising water temperatures, sea level rise, and "climate change in general."[184] Despite these realizations about the dangers of GHGs, Shell and many other oil companies continued business as usual.[185]

Government's Role: Subsidizing Fossil Fuel Dependence

The fossil fuel industry's influence is further perpetuated through substantial government subsidies that divert essential funding and resources away from Just Transition solutions. This, in turn, prolongs society's reliance on dirty energy sources. According to the International Monetary Fund, global fossil fuel subsidies reached $7 trillion USD in 2022.[186] By providing financial advantages to fossil fuel companies, governments are artificially reducing the cost of fossil fuels, which maintains the industry's hold on the energy market. [187] While renewable energy alternatives are now less expensive than fossil fuels and therefore more economically viable,[188] governments' subsidies for fossil

174 Taylor, M. (2024, August 15). Oil and gas lobbying reaches $72 million in first half of 2024. *OpenSecrets*. [LINK]

175 Engelbrecht-Bogdanov, P. (2024, September 25). Transparency International EU and Fossil Free Politics Campaign demand tighter EU lobbying rules following investigations into fossil fuel access. *Transparency International EU*. [LINK]

176 Ibid.

177 Corporate Europe Observatory. (2024, November 15). *Fossil fuel lobbyists eclipse delegations from most climate vulnerable nations at COP29 climate talks.* [LINK]

178 Mulvey, K. (2024, November 15). Fossil Fuel Industry Flexes Its Muscle at COP29 with Lobbying, Greenwashing. *Union of Concerned Scientists*. [LINK]; Sirge Coalition. (2024, November 26).COP29: The COP of Uncertainty, Divisions and False Solutions. [LINK]; Frost, R. (2024, September 15). More than 1,700 oil and gas lobbyists at COP29: Which European delegations invited them? *Euro News*. [LINK]

179 Martinez, C., Kilbury, L., Martinez, J., et. al. (2023, December 5). These Fossil Fuel Industry Tactics Are Fueling Democratic Backsliding. *Center for American Progress*. [LINK]

180 Toxic-Free Future. (2012, February 6). *How to Spot a Front Group.* [LINK]

181 Artis, Z. (2024, May 10). Unveiling Big Oil's Campaign of Lies. *NRDC*. [LINK]; Martinez, C., Kilbury, L., Martinez, J., et. al. (2023, December 5). These Fossil Fuel Industry Tactics Are Fueling Democratic Backsliding. *Center for American Progress*. [LINK]; Supran, G and Oreskes, N. (2021, November 18). The forgotten oil ads that told us climate change was nothing. *The Guardian*. [LINK]

182 McKibben, B. (2015, October 14). Exxon's climate lie: 'No corporation has ever done anything this big or bad'. *The Guardian*. [LINK]

183 Shell Internationale Patroleum Maatschappij B.V. (1988, May). *The Greenhouse Effect*. [LINK]

184 Ibid.

185 McKibben, B. (2015, October 14). Exxon's climate lie: 'No corporation has ever done anything this big or bad'. *The Guardian*. [LINK]; Dr. Matthews, M.A. (Shell International Chemical Company Ltd.) (1959, October 8). The Earth's Carbon Cycle. *New Scientist*. [LINK]

186 Brown, C. (2024, August 22). Democrats Call for the Elimination of Billions in Oil and Gas Subsidies. *The Wall Street Journal*. [LINK]

187 Mountford, H. (2023, July 4). Why do governments continue to subsidize fossil fuels, undermining their own climate goals? *SDG Action*. [LINK]

188 IRENA. (2024, September 24). *Record Growth Drives Cost Advantage of Renewable Power*. [LINK]

fuels delay the transition away from dirty energy. This undermines the ability of renewable energy technologies to compete on a level playing field with fossil fuels.

Utilities

The fossil fuel industry's influence trickles down to utility companies, which, as critical consumers of fossil fuels, often operate under profit-driven models that prioritize shareholder returns over equitable access to energy.[189] By continuing to invest in fossil fuel infrastructure over renewable energy solutions, utilities play a role in upholding the fossil fuel industry's power.[190] Utilities continuing to operate under business as usual models in the fossil fuel economy interferes with the Just Transition.

Renewable energy has become more cost effective than fossil fuels in the long term for both consumers and utility companies due to lower operational costs.[191] Unlike fossil fuels, renewable energy sources like solar and wind do not require utilities and communities to constantly purchase fuels because renewables use regenerative energy sources that are naturally available. This eliminates fuel costs for both utility companies and communities and reduces maintenance needs. Improved efficiency and technological innovations also continue to lower costs for renewables, making clean energy more sustainable and economical over time.[192]

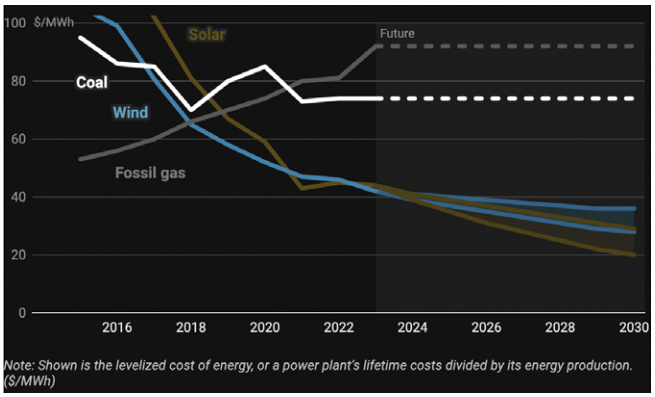

Figure A: Renewables continue to be more cost-effective than fossil fuels[193]

Nevertheless, utilities continue to rely on dirty sources of energy, building new gas plants and keeping coal plants active, while ignoring their significant health and climate impacts.[194] This is largely because fossil fuel infrastructure requires lower upfront costs (as it often uses existing pipelines and refineries) and has lower perceived risks (due to government subsidies and support from financial institutions).[195] When fossil fuel costs fluctuate, utilities can maintain stable profits by structuring their business models in ways that protect their earnings; when fuel costs rise, utilities often pass increased expenses directly onto consumers through rate adjustments rather than absorbing the costs themselves. This allows utilities to continue to profit and satisfy wealthy stakeholder needs while customers bear the financial burden of higher energy prices.[196]

189 Lusiani, N. (2024, September). Entrenched Power: How Shareholder-Owned Electric Utilities Hinder the Clean Energy Transition. *Roosevelt Institute.* [LINK]

190 Ho, C. (2024, October 9). Utilities Only Planning Enough Clean Energy to Replace Half of Fossil Fuel Generation by 2035, New Sierra Club Report Finds. *Sierra Club.* [LINK]; Carey, L. (2023 July 17). How utilities' fossil fuel investments are driving up rates for the most vulnerable. *Environmental Health News.* [LINK]

191 IEA. (2024, May 30). Rapid rollout of clean technologies makes energy cheaper, not more costly. [LINK]

192 IEA. (2024, May 30). *Rapid rollout of clean technologies makes energy cheaper, not more costly.* [LINK]; Columbia Business School. (2023, April 25). Study Finds Transitioning to Renewable Energy is More Affordable Than Utility Companies are Admitting. *CBS Newsroom.* [LINK]

193 Takemura, A. (2023, September 1). Chart: Renewables are on track to keep getting cheaper and cheaper. *Canary Media.* [LINK]

194 Fogler, C. and Beek, N. (2024, October). The Dirty Truth About Utility Climate Pledges. *Sierra Club.* [LINK]

195 Deep, A., Lee, H., Tahir, W., et. al. (2025, January 29). The Green Swap: Disentangling Climate and Development Impact to Mobilize Climate Finance. *Harvard Kennedy School.* [LINK]; Cohen, J. (2024, June 7). Solar Power vs Fossil Fuels: Investment Potential Comparison. *ArtINEnergy.* [LINK]; Greenpeace. (n.d.). *Ending fossil fuel subsidies.* [LINK]

196 Lusiani, N. (2024, September). Entrenched Power: How Shareholder-Owned Electric Utilities Hinder the Clean Energy Transition. *Roosevelt Institute.* [LINK]

Overconsumption

Overconsumption is a critical barrier to justly transitioning to clean, renewable energy. The capitalist system depends on endless growth to sustain profits and therefore requires over-consumerism and a population that is never materially satisfied.[199] This excessive consumption is also rooted in broader interlocking societal crises—fueled by disconnection, systemic inequality, and a lack of community—where material goods are sold as substitutes for genuine well-being and security.[200]

Western society's current patterns of consumption drive environmental exploitation, accelerating environmental degradation and harming communities most vulnerable to the impacts of the climate crisis.[201] Even as governments adopt clean energy policies, without a significant shift in western consumer culture, the global community will not be able to justly transition to clean renewable energy and genuinely address the climate crisis. Overconsumption will continue to drive the same environmental and social challenges the world faces today, undermining decarbonization efforts. A truly Just Transition requires not just the elimination of fossil fuels and rejecting false solutions,[202] but also a fundamental change in how western countries approach well-being and engage in consumerism.

While overconsumption is a global issue, it is important to recognize the stark disparities in consumer patterns between high- and low-income countries. High-income countries need to reduce their consumption and be aware of their global impact as their excessive consumerism not only drives environmental degradation but also places disproportionate burdens on lower-income nations.[203]

New Technologies and Artificial Intelligence

Ending the era of fossil fuels and extractive economies will also necessitate a thorough consideration of current and future energy demands. Despite advancements in renewable energy technology, a new wave of rising energy use is reinforcing the global community's reliance on fossil fuels. This increased demand for energy—due to factors including artificial intelligence (AI), industrial development, and climate change[197]—is driving the continued need for non-renewable sources to meet consumers' growing energy demands. According to the International Energy Agency (IEA), "electricity consumption from data centres, AI, and the cryptocurrency sector could double by 2026…this demand is roughly equivalent to the electricity consumption of Japan."[198] Without significant shifts in societal perceptions around consumption and changes to policy and infrastructure, the transition to renewables will struggle to keep pace with the ever-growing desire for energy and materials.

197 EPA. (n.d.). Climate Impacts on Energy. [LINK]

198 Çam, E., Hungerford, Z., Schoch, N., et. al. (2024). Electricity 2024 Analysis and forecast to 2026. *IEA*. [LINK]

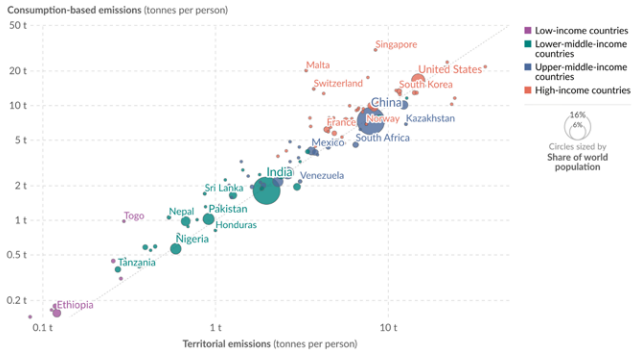

Figure B: Consumption-based vs. territorial CO_2 emissions per capita, 2022.[204]

199 Higgs, K. (2021, January 20). How the world embraced consumerism. *BBC*. [LINK]

200 Isham, A., Verfuerth, C., Armstrong, A., et. al. (2022, March 19). The Problematic Role of Materialistic Values in the Pursuit of Sustainable Well-Being. *Int J Environ Res Public Health*. [LINK]; Forbes, A. (2023, October 13). Materialism and Happiness Exposed: The Pursuit of Joy. *Of Mind and Body*. [LINK]

201 Giljum, S., Hinterberger, F., Bruckner, M., et. al. (2009, September). Overconsumption? Our use of the world's natural resources.*Friends of the Earth Europe*. [LINK]; Marín-Beltrán, I., Demaria, F., Ofelio, C., et. al. (2022, March 10). Scientists' warning against the society of waste. *Science of the Total Environment*. [LINK]; Wiedmann, T., Lenzen, M., Keyßer, L., et. al. (2020, June 19). Scientists' warning on affluence. *Nature Communications*. [LINK]

202 See definition of Renewable Energy

203 Vogel, J. and Hickel, J. (2023, September). Is green growth happening? An empirical analysis of achieved versus Paris-complaint CO2-GDP decoupling in high-income countries. *The Lancet Planetary Health*. [LINK]; Hickel, J. (2022, April 6). High-income countries are responsible for 74 percent of excess resource use causing ecological breakdown. *LSE*. [LINK]

204 Our World In Data. (2024, November 21). *Consumption-based vs territorial CO2 emissions per capita, 2022*. [LINK]

Table 1:

Global Disparities by Income Level

	High-Income	Upper-middle	Lower-middle	Low-Income
Percent Global Population[205]	7%	9%	13%	71%
Resources Used[206] (in Number of Earths Required)	3.67	1.94	1.26	0.67
GHG Emissions Per Capita (in tonnes CO2e)[207]	12.41	8.44	2.78	1.49
Access to Energy (share of population with access to electricity)[208]	99.98%	99.40%	91.13%	44.81%
Representation in Global Climate Conversations[209]	4291 (~30%)	4210 (~30%)	3594 (~25%)	1797 (~12%)

This comparison between high and low-income countries underscores the vast inequalities in countries' material and energy uses and environmental footprints. On average, high-income nations, which make up a small percentage of the global population, consume more than five times as many resources and emit more than eight times as much GHG emissions as low-income nations that account for a much larger share of the global population. Despite these discrepancies, low-income countries bear the greatest burdens of climate impacts.

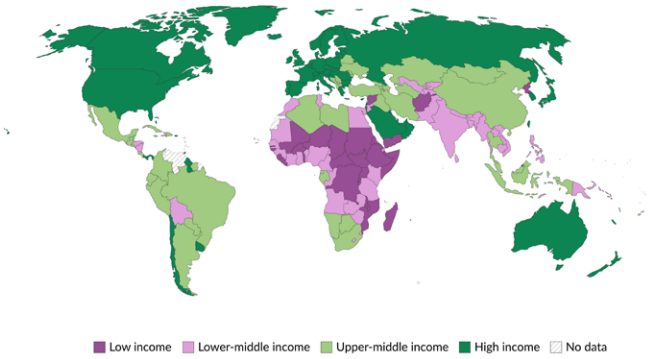

Figure C: World Bank Income Groups[210]

A Just Transition does not solely involve shifting the energy sources that are used to power societies, but also necessitates rethinking the amount of energy produced and consumed. Regardless of energy source, whether it be fossil fuels or renewable, if overconsumption and western lifestyle patterns are not addressed, the global community will continue to live outside of Earth's planetary boundaries, furthering the destruction of biodiversity and socio-ecological communities across the world.

205 Pew Research provided data for high income, upper-middle income, middle income, low income, and poor. For this report, data for "middle income" will be considered "lower-middle", and "low income and poor" will be considered "low income"; Kochhar, R. (2021, July 21). Are you in the global middle class? Find out with our income calculator. *Pew Research Center*. [LINK]

206 Earth Overshoot Day. (n.d.). *How Many Earths? How Many Countries?*. [LINK]; French Guiana, Guadeloupe, Martinique, and Réunion were omitted from the average for consistency purposes.

207 Jia, L., Lee, K., Wadhwa, D., et. al. (2023). Who contributes most to global greenhouse gas emissions. *World Bank*. [LINK]

208 Ritchie, H., Rosado, P., Roser, M. (2024, January). Access to Energy. *Our World in Data*. [LINK]

209 Income level categorization was based on data from Our World in Data. (2024, July 29). *World Bank income groups*. [LINK]. Representation in Global Climate Conversation used COP29 parties' registered participants from United Nations Climate Change. (2024, November 11). *Provisional list of registered participants*. [LINK]

210 Our World in Data. (2024, July 29). *World Bank income groups*. [LINK]

Financial Resource Disparities

Financial disparities further compound global imbalances in material use and energy consumption, creating another significant barrier to achieving a Just Transition. There are many nuances to be examined; however, in simplified terms, wealthy countries have been exploiting low- and middle-income countries for a very long time.[211] Having benefited from centuries of imperialism, fossil fuel extraction, and industrialization,[212] wealthy countries need to do their part in repairing the harm they have caused through exploiting the natural world and low- and middle-income countries. This responsibility includes significantly contributing to the climate finance needed by vulnerable countries and populations to implement a Just Transition, as well as ensuring robust national and global climate policy and action. Currently, there is a lack of urgency and commitment to addressing the root causes of the climate crisis, and countries continue to rely on false solutions and fossil fuel subsidies.[213] According to an International Institute for Sustainable Development report, as of 2024, only four countries included policies or targets to reduce fossil fuel production in their Nationally Determined Contributions.[214]

Breaking Cycles of Debt

Systemic inequities are further compounded by the economic burdens placed onto low- and middle-income countries. These nations, which have contributed the least to climate change, face the most severe climate impacts (i.e., extreme weather events, rising food insecurity, and public health challenges). In order to respond to and rebuild from these negative climate impacts, low-income countries often turn to climate finance. This finance, which is ostensibly designed to support such countries' efforts to address and respond to the climate crisis, often exacerbates the problem. Over 70% of climate finance is in the form of loans, which drives already vulnerable countries into cycles of debt.[215] To meet debt obligations and support basic needs, low-income countries rely on cheap energy sources like oil and gas.[216] In short, the more indebted these countries become, the more they are pushed into short-term "survival" strategies—one being continuous fossil fuel dependence. This creates conditions that are not conducive to a clean energy transition as countries, especially low- and middle-income countries, are not able to dedicate the necessary time and investment to renewable energy infrastructure and solutions. In order for all countries to prioritize a Just Transition, finance models need to prioritize grants instead of loans. These should be offered as reparations owed by high-income and the most carbon polluting countries—not as loans. Having benefited from centuries of fossil fuel extraction and industrialization at the expense of developing nations, affluent countries are responsible for ensuring that all nations and communities are able to be a part of and benefit from the Just Transition.[217]

215 Thériault, A. (2024, July 9). Rich countries overstating "true value" of climate finance by up to $88 billion, says Oxfam. *Oxfam.* [LINK]

216 Alayza, N., Laxton, V., Neunuebel, C. Developing Countries Won't Beat the Climate Crisis Without Tackling Rising Debt. *World Resources Institute.* [LINK]; Woolfenden, T. and Sharma Khushal, S. (2022, October). *The debt and climate crises: Why climate justice must include debt justice.* CAN International and Debt Injustice. [LINK]; Colenbrander, S. (2023, September 13). Debt relief must break dependence on fossil fuel exports. *Climate Home News.* [LINK]

217 Evans, S. (2021, October 5). Analysis: Which countries are historically responsible for climate change? *CarbonBrief.* [LINK]; Pardikar, R. (2020, October 28). Global North Is Responsible for 92% of Excess Emissions. *Eos.* [LINK]; Wrigley, J. (2022, July 16). It's time for the Global North to take responsibly for climate change. *University of Manchester.* [LINK]

211 Hickel, J., Dorninger, C., Wieland, H. el al. (2022, March). Imperialist appropriation in the world economy: Drain from the global South through unequal exchange, 1990–2015. *Global Environmental Change* 73. [LINK]

212 Evans, S. (2021, October 5). Analysis: Which countries are historically responsible for climate change? *CarbonBrief.* [LINK]; Pardikar, R. (2020, October 28). Global North Is Repsonsible for 92% of Excess Emissions. *Eos.* [LINK]; Wrigley, J. (2022, July 16). It's time for the Global North to take responsibly for climate change. *University of Manchester.* [LINK]

213 WECAN. (n.d.). *The Need for Real Zero Not Net Zero: Shifting from False Solutions to Real Solutions and a Just Transition Second Edition.* [LINK]

214 Jones, N., Parra, P. (June, 2024). How the Transition Away From Fossil Fuel Production Can Be Included in New Climate Commitments and Plans. *IISD.* [LINK]

The Complexities and Considerations of Renewable Energy

The transition away from fossil fuels toward renewable energy involves many complex issues that must be navigated to avoid inflicting further harm and/or replicating the same extractive and exploitative models as the fossil fuel industry. Some concerns include the potential for human and Indigenous rights violations, as well as detrimental environmental impacts, caused by the renewable energy industry. There are also economic, social, and ecological frameworks and considerations that need to be incorporated into conversations and decisions around the implementation of renewable energy to ensure a just and equitable transition.

Implementing a Just Transition requires countries and communities to actively avoid the same extractive practices historically—and currently—associated with fossil fuel industries. Instead, a just energy transition needs to promote ethical processes that respect planetary boundaries and the health of ecological webs and adhere to robust human and Indigenous rights standards. Below are some practices and considerations for the the global community as it navigates the expansion of renewable energy:

Adopting Policies to Minimize Harm

A critical aspect of clean energy technologies is their dependence on the extraction of raw materials—minerals such as lithium, cobalt, and nickel.[218] These minerals are essential for producing solar panels, wind turbines, and electric vehicle batteries, all of which are central to the clean energy transition. However, the extraction of these materials can have significant environmental and social consequences, including habitat destruction, pollution, and human rights violations. For example, in Chile—one of the largest producers of lithium, a mineral needed for batteries and electric vehicles—companies' mining operations are negatively impacting local communities and ecosystems.[219] Lithium mining in and surrounding the Atacama Region in Chile is particularly harmful as it uses a water-intensive brine evaporation process, which depletes communities' water resources, degrades wetland areas, threatens endangered species, and disrupts the livelihoods of Indigenous communities whose traditional ways of life depend on the water and land.[220]

According to the IEA, demand for these critical minerals is expected to triple by 2030,[221] underscoring the urgent need for policies that address both the ecological and social costs associated with their extraction.[222] In response, it is crucial for countries to adopt Just Transition frameworks and policies that not only promote renewable energy but also ensure that mineral extraction is done in a way that respects both environmental limits and the rights of affected communities.

218 The Wilderness Society. (2023, October 4). *FAQ: What are the environmental impacts of renewable energy?* [LINK]; Senyapar, H. and Bayindir, R. (2024). The Negative Social Impacts of Renewable Energy: A Key Consideration for a Successful Energy Transition. *IEEE.* [LINK]

219 Greenfield, N. (2022, April 26). Lithium Mining Is Leaving Chile's Indigenous Communities High and Dry (Literally). *National Resource Defence Council.* [LINK]

220 Ibid.

221 IEA. (n.d.). *A new frontier for global energy security. Critical Minerals.* [LINK]

222 Climate Action Network International. (2024). *Civil Society Recommendations for the United Nations Secretary-General's Panel on Critical Energy Transition Minerals.* [LINK]

Ensuring Environmental Protections in Mining Practices

Mining is not good for the Earth or communities, and, whenever possible, materials should be recycled from minerals already above ground. That said, until society can fully deploy degrowth frameworks,[225] it is vital to ensure that mining activities result in the least socio-environmental harm possible. Any mining activities involved in renewable energy needs to be conducted with strict environmental regulations and social safeguards in place to minimize long-term ecological damage and uphold community rights. Governments need to ensure that any mining process involves a robust Environmental Impact Assessment (EIA), which should not only evaluate potential environmental consequences but also account for social, health, cultural, and economic impacts on communities.

Mining and Transportation

Rechargeable batteries, which include electric vehicle batteries, account for 87% of the total global demand for lithium. Battery demand for automotive lithium ion, specifically, is rapidly growing.[223] Restructuring transportation systems can drastically reduce the amount of lithium mining required to decarbonize the economy. According to a 2023 UC Davis report, *Achieving Zero Emissions with More Mobility and Less Mining*, the U.S. can reduce lithium demand up to 92% in 2050 compared to lithium intensive scenarios by reducing car dependence, making electric vehicle batteries smaller, and increasing lithium recycling. By shifting policy priorities and financial spending, the U.S. transportation system can incentivise public and active transit, as well as more responsibly built electric vehicle batteries and source the materials for such batteries.[224]

223 Riofrancos, T., Kendall, A., Dayemo, K.K., et al. (2023, January). *Achieving Zero Emissions with More Mobility and Less Mining*. Climate and Community Institute. [LINK]
224 Ibid.

Adhering to Free, Prior, and Informed Consent

Free, Prior, and Informed Consent (FPIC) is a critical framework designed by Indigenous Peoples that ensures communities' rights to participate in and guide decisions that impact their lands, waters, and ways of life.[226] Many Indigenous communities have faced displacement, land degradation, and cultural loss due to large-scale energy and infrastructure projects in which mining companies failed to engage local communities in decision-making.[227] In Desa Mekar Jaya, Indonesia, for instance, women are often excluded from discussions about the land use and investment involved in industrial-scale palm oil plantations in the community.[228] By failing to engage with all impacted community members properly, companies may fail to address the unique risks and needs that women face in this area, such as exposure to pesticides that pose adverse reproductive health risks.[229] For FPIC to be meaningful, the process must be a binding requirement rather than a superficial formality.[230]

Indigenous Peoples are also invaluable stakeholders in the Just Transition to renewable energy. Indigenous Peoples' ancestral ownership accounts for approximately one quarter of the world's surface, and Indigenous communities' knowledge and experience offers vast wisdom for transitioning to renewable energy.[231] In the effort to expand re-

225 What is Degrowth? *Degrowth*. [LINK]
226 Earthworks. (n.d.). *Free, Prior and Informed Consent (FPIC)*. [LINK]; United Nations Department of Economic and Social Affairs Indigenous Peoples. (2016, October 14). *Free Prior and Informed Consent – An Indigenous Peoples' right and a good practice for local communities – FAO*. [LINK]
227 OxFam Australia. (n.d.). Mining. [LINK]; Ninomiya, M., Burns, N., Pollock, N., et. al. (2023, June). Indigenous communities and the mental health impacts of land dispossession related to industrial resource development: a systematic review. *The Lancet Planetary Health*. [LINK]
228 Tagliarino, N., La Viña, C., Szoke-Burke, S. (2016, May 9). Strengthening Indigenous Land Rights: 3 Challenges to "Free, Prior and Informed Consent. *World Resources Institute*. [LINK]
229 Ibid.
230 Portalewska, A. (2012, November 27). Free,Prior and Informed Consent: Protecting Indigenous Peoples' rights to self-determination, participation, and decision-making. *Cultural Survival*. [LINK]
231 Indigenous Peoples Rights International and Business & Human Rights Resource Centre. (2024, October 15). *Exploring shared prosperity: Indigenous leadership and partnerships for a just transition*. Indigenous Peoples Rights International and Business & Human Rights Resource Centre. [LINK]

newable energy, government entities and the private sector must recognize Indigenous peoples as equal partners in negotiation and implementation processes. This will require that state and private entities create core processes that respect Indigenous Peoples' rights and incorporate Indigenous knowledge and decision-making. Benefit-sharing and co-ownership models support Indigenous Peoples receiving mutually agreed benefits and equity stake of renewable energy projects. To ensure these benefits, governments and companies need to invest in building trust—including training staff to effectively engage Indigenous Peoples—and providing Indigenous communities with the access to independent technical expertise necessary to assess financial risks and account for financial inflows of such projects. Investors in renewable energy projects must require evidence of FPIC and support equitable benefit-sharing from their investee companies. Governments must also directly support Indigenous-led renewable energy projects.[232]

Implementing Fair Labor Standards and Community Benefits

A Just Transition cannot happen without a ready workforce. Workers and communities have the opportunity to directly benefit from the shift to renewable energy by securing stable, well-paying jobs. As demand for renewable energy infrastructure and critical mineral extraction increases, it is essential to have strong labor protections and community-centered policies that ensure fair wages, safe working conditions, and equitable job access.

To support this, governments and companies need to prioritize training and hiring local workers, particularly those from communities historically impacted by fossil fuel extraction. Workforce development programs should equip workers with the skills needed for clean energy and mining jobs, ensuring that economic opportunities remain within the regions where these industries operate. Some countries, including Spain, Poland, and Germany, have introduced worker transition programs that provide rehiring support, income compensation, and health support for those shifting from fossil fuel industries to renewable energy and mining sectors.[233] These programs help mitigate job losses and ensure that workers are not left behind in the transition to renewable energy.

Realizing a Circular Economy and Recycling Initiatives

One of the most effective ways to reduce the ecological footprint of renewable energy technologies is through a circular economy model. Rather than perpetuating the cycle of resource extraction and waste, a circular economy focuses on reusing, refurbishing, and recycling products to extend their lifespan. By prioritizing circularity in renewable energy, governments and industries can significantly reduce the demand for mined minerals, like lithium, cobalt, and nickel.

Recent studies suggest that by 2040, circular economy policies could cut demand for new minerals by 25-55%, substantially reducing the environmental and social impacts of resource extraction.[234] Innovations in material efficiency and design are already helping extend the lifecycles of products like batteries, solar panels, and wind turbines.[235]

232 Indigenous Peoples Rights International and Business & Human Rights Resource Centre. (2024, October 15). *Exploring shared prosperity: Indigenous leadership and partnerships for a just transition.* Indigenous Peoples Rights International and Business & Human Rights Resource Centre. [LINK]

233 Dahl, C., Squire, C., Cui, R. (2023, May). Policy brief: the cost of a just transition. *UMD Center for Global Sustainability.* [LINK]

234 Earthworks. (2022, September). *Circular minerals economy.* [LINK]; Dominish, E., Florin, N., Wakefield-Rann, R., (2021). *Reducing new mining for electric vehicle battery metals: responsible sourcing through demand reduction strategies and recycling.* Report prepared for Earthworks by the Institute for Sustainable Futures, University of Technology Sydney. [LINK]

235 Robertson-Fall, T. (2022, November 3). Part 2: Using a circular economy approach to redesign renewable energy infrastructure. *Ellen MacArthur Foundation.* [LINK]

Advancements in battery technology, for instance, are extending product lifetimes from the typical 8-15 years to over 20 years, which reduces the frequency of replacements and the need for new raw materials.[236] To fully scale these efforts, the clean energy sector needs to establish clear, standardized recycling pathways to ensure that used products are efficiently reintegrated into the supply chain, thus closing the loop on material consumption.

Supporting Community-Driven Energy Solutions

Empowering communities to own, manage, and benefit from renewable energy projects ensures that the transition to clean energy is equitable and locally driven. Community-led solutions—such as energy cooperatives, microgrids, and locally-owned solar and wind projects—allow residents to take control of their energy futures rather than relying on large corporations or centralized utilities.

Locally-owned renewable energy systems not only provide economic and social benefits—such as job creation and lower energy costs—but also contribute to increased energy resilience. Microgrids, for example, are particularly valuable in rural, Indigenous, and disaster-prone areas, as they can operate independently of larger power networks.[237] This ensures that communities have a more reliable energy supply, even in the face of extreme weather events.[238]

Prioritizing Gender Justice

The renewable energy sector remains male-dominated. According to a 2019 study conducted by the International Renewable Energy Agency, 32% of the renewable energy workforce is female, and only 21% of the wind energy sector workforce is female.[239] Ensuring women in all of their diversity are involved at all levels of renewable energy solutions, from planning and engineering to implementation, is essential for achieving overall climate justice. By enhancing participation and incorporating diverse perspectives, energy outcomes are more likely to be socio-ecologically sound, effective, and equitable. Studies demonstrate that communities *and* ecological systems significantly improve when women hold leadership positions at all levels.[240]

Part of this effort involves dismantling barriers to leadership and innovation; women-led efforts continue to be underfunded and underrepresented. According to a 2024 report, women-led startups in the U.S. and Europe receive just 2% of venture capital funding.[241] In addition to financial obstacles, women often face challenges within the energy sector itself, where lack of mentorship, biased hiring, and exclusionary workplace cultures hinder women's access to work environments where they can thrive and lead.[242]

236 Dominish, E., Florin, N., Wakefield-Rann, R. (2021, April). Reducing new mining for electric vehicle battery metals: responsible sourcing through demand reduction strategies and recycling. *UTS*. [LINK]

237 White, S. (2023, December 18). Unlocking the Power of Microgrids in Today's Energy Landscape. *Conservation Law Foundation.* [LINK]

238 Tumilowicz, N. (2024, December 18). Microgrids: Enhancing Grid Resilience and Shaping the Future of Energy Distribution. *Microgrid Knowledge.* [LINK]

239 IRENA (2019), *Renewable Energy: A Gender Perspective.* IRENA, Abu Dhabi. [LINK]

240 Mavisakalyan, A. and Tarverdi, Y. (2019, January). Gender and climate change: Do female parliamentarians make difference? *European Journal of Political Economy*, 56.; [LINK]; Norgaard, K. and York, R. (2005, August 4). Gender Equality and State Environmentalism. *Gender & Society*, 19, 4. [LINK]

241 Masterson, V. (2024, March 28).Women founders and venture capital – some 2023 snapshots. *World Economic Forum.* [LINK]

242 Plummer, D. (2025, March 7).Watt's Holding Women Back? The Gender Divide In Energy. *Forbes*. [LINK]

Centering Location-Based Energy Solutions and Biomimicry

The efficiency and sustainability of renewable energy is heavily influenced by local climate, geography, and weather patterns, making it essential for governments and communities to design energy systems that align with regional environmental conditions. A successful transition requires a diverse energy generation mix tailored to each area and harnesses the most effective geographic and climatic conditions while minimizing disruption to local ecosystems.

In addition to leveraging the use of region-specific assets, governments and communities can apply nature-inspired designs to energy systems and sustainable buildings to increase their efficiency and lessen their environmental impacts. This approach, known as biomimicry, draws from natural processes to improve the way energy is generated, stored, and distributed. By studying how organisms and ecosystems work, and how they have developed through evolution, biomimicry uses natural laws to create innovative technologies that are conducive to life and are neither destructive nor harmful to ecosystems.[243]

For example, in Zimbabwe, architects have designed a commercial office and shopping center, Eastgate. The building's design replicates termite mounds to create natural ventilation systems. This passive cooling system relies on the natural movement of air (referred to as convection currents) to regulate indoor temperatures, thereby significantly reducing the need for air conditioning units.[244] Unlike typical buildings, which depend on energy-intensive HVAC systems,[245] Eastgage's design cuts energy consumption and lowers operational costs.[246] Additionally, the architects' use of locally sourced materials further reduces the building's environmental footprint. [247]

Eastgate building in Harare, Zimbabwe. [iStock, GettyImages]

Termite mound in the Kalahari Desert, Namibia. [Alexander Klink, Wikimedia]

Biomimicry offers an alternative approach to current governance and technological innovation models, which don't prioritize systems that are conducive to healthy ecosystems. Nature-inspired solutions embrace living in harmony with the natural world and designs that work with, rather than exploit the environment. Integrating biomimicry into technological designs, as well as environmental policy, opens up new possibilities for engaging with and relating to the natural world within healthy planetary boundaries. Approaches such as these move the global community toward imagining non-extractive ways of living and thriving, all while underscoring the interdependence of all life and redefining humanity's relationship with the Earth.

243 Biomimicry Institute. (n.d.). *What is biomimicry?* [LINK]
244 Rethinking the Future. (n.d.). *Eastgate Center, Zimbabwe: A Marvel of Sustainable Architecture*. [LINK]
245 GFT. (2024, July 5). Optimizing Energy Consumption of HVAC Systems in Commercial and Industrial Settings is vital. [LINK].
246 Rethinking the Future. (n.d.). *Eastgate Center, Zimbabwe: A Marvel of Sustainable Architecture*. [LINK]
247 Pacheco, T. (2024, June 13). Biomimicry: Imitating Nature to Preserve It. *MoeveGlobal.* [LINK]

Conclusion

The global community needs to rapidly move toward a Just Transition rooted in climate justice principles to avert the worst effects of the climate crisis. It is essential in this process that marginalized communities are leaders in clean and just energy solutions. This requires not only moving away from fossil fuels but also transforming economic, political and social systems to be more equitable, inclusive, and regenerative. In order to effectively implement climate justice principles and practices, societies need to address barriers to a Just Transition. This includes (but is not limited to) the power of the fossil fuel industry and its political influence, as well as the capitalistic structures that drive over-consumption. Additionally, while the energy transition is necessary, governments need to do their due diligence to ensure that renewable energy solutions do not cause harm.

Communities across the world recognize that a transition away from fossil fuels is not only urgent but also inevitable, with many taking it upon themselves to implement socially and environmentally just solutions. These communities, while at different stages of implementing climate justice principles, highlight the importance of local leadership and diverse, innovative economic models. The examples presented in this report demonstrate lessons for how the global community can implement a Just Transition based on climate justice principles. Looking forward, governments, businesses, and civil society can work together to scale effective and lasting solutions, creating just pathways for economic transformation that do not perpetuate past and present injustices, but instead build a just, equitable, and inclusive future for all.