



Policy Brief II (D 3.9)

Energytran

Policy recommendations concerning the social impact and environmental sustainability of the energy transition

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KEY MESSAGES CONCERNING THE ENVIRONMENTAL SUSTAINABILITY AND SOCIAL IMPACT OF THE ENERGY TRANSITION

Status of technology in the energy transition and progress towards SDG 5 – Gender Equality

- The energy transition must include inclusive policies that promote the equitable participation of women in the energy sector.
- Training and female leadership in renewable energies are essential to closing the gender gap in the energy sector.

Status of social impact in the energy transition and progress towards SDG 7 – Affordable and Clean Energy

- The energy transition is accelerating the push towards clean and renewable energy sources, which directly impacts SDG 7 by increasing access to affordable and clean energy for all. However, disparities in access remain, particularly in developing regions.
- While progress is being made in expanding renewable energy capacity, many communities still lack reliable infrastructure, which undermines the social benefits of the energy transition. Further investment in grid development and energy access programmes is essential.

Status of social impact in the energy transition and progress towards SDG 8 – Decent Work and Economic Growth

- The transition to renewable energy creates new opportunities for employment in clean energy sectors, contributing to SDG 8. This shift is helping to diversify economies and reduce reliance on fossil fuels.
- However, the transition also presents challenges for workers in traditional energy sectors. Retraining and reskilling programmes are necessary to mitigate job losses and ensure a just transition to green economies.

Status of social impact in the energy transition and progress towards SDG 9 – Industry, Innovation, and Infrastructure

- The energy transition drives innovation in clean technologies and sustainable infrastructure, contributing significantly to SDG 9. Investment in renewable energy systems and energy-efficient infrastructure is promoting sustainable industrial growth.
- In many regions, especially in developing countries, the lack of infrastructure and technological capacity remains a barrier to achieving the full potential of the energy transition. International cooperation and investment in innovation are needed to overcome these gaps.

Status of social impact in the energy transition and progress towards SDG 10 – Reduced Inequalities

- the energy transition can reduce inequalities by providing marginalised communities with access to affordable and sustainable energy. This contributes to SDG 10 by addressing energy poverty and improving social inclusion.
- Despite the potential for inclusivity, there is a risk that the benefits of the energy transition will not be distributed equitably. Targeted policies are required to ensure that low-income and vulnerable groups are not left behind.

Status of social impact in the energy transition and progress towards SDG 11 – Sustainable Cities and Communities

- The shift towards clean energy in urban areas contributes to SDG 11 by reducing urban carbon footprints and improving air quality, thereby enhancing the liveability of cities.
- However, cities in developing countries often face challenges in implementing renewable energy solutions due to financial constraints and insufficient infrastructure. Coordinated efforts between local governments and international stakeholders are key to overcoming these obstacles.

Status of social impact in the energy transition and progress towards SDG 13 – Climate Action

- The energy transition plays a central role in achieving SDG 13 by reducing greenhouse gas emissions and mitigating climate change. Increased use of renewable energy sources contributes to national and global climate goals. Despite progress, the pace of the energy transition is insufficient to meet the climate targets of the Paris Agreement. Accelerating the adoption of renewable energy and increasing energy efficiency are crucial factors in closing the gap in climate action.

Status of social impact in the energy transition and progress towards SDG 17 – Partnerships for the Goals

- The energy transition requires strong global partnerships to scale up investments, technology transfer, and knowledge sharing. SDG 17 emphasises the need for international collaboration to meet energy access and climate goals.
- Although significant progress is being made through international agreements and partnerships, there is a need for more inclusive and equitable collaboration to ensure that developing countries are not left behind in the energy transition.

Introduction

The energy transition is not just a technological challenge, but also an environmental, social and political one. While the necessary technologies for decarbonisation are available, societal consensus and policy frameworks need to evolve to implement them effectively. A just and environmentally sustainable energy transition must ensure that the benefits and burdens are distributed equitably among different social groups and regions, and that energy is generated by renewable sources, but also with the environment in mind. The energy transition in Ibero-America is occurring within a region marked by deep social and economic inequalities and diverse cultural contexts. As the region shifts towards clean and renewable energy sources, it is essential to manage this transition in a way that addresses these disparities and promotes social inclusion. Moreover, Ibero-America faces mounting pressure to meet global climate targets while ensuring that its populations, especially marginalised groups, are not left behind. In this regard, in the process of energy transition, it is essential to build social consensus and ensure equity in the distribution of its benefits. Territorial justice, gender inclusion, and the development of public policies and sustainable industrial models are crucial factors for a successful transition. Additionally, open science is emerging as a key tool for fostering innovation and citizen participation in decision-making. Achieving social consensus and ensuring equity in the distribution of the benefits derived from the energy transition are critical for its success.

In addition, as the world moves away from fossil fuels towards renewable energy, a new generation of innovative and impactful technologies is rapidly emerging, and the energy transition needs to take into account its environmental impact in order to mitigate and reduce it: How can we address the effects of lithium mining on water resources and soil? How can we tackle the impact of wind farms on biodiversity or ensure the proper recycling of solar panels? How can we regulate the intensive land use and deforestation that may result from the use of biomass for energy production? Crucial discussions continue regarding how to implement renewable energy systems globally while ensuring an appropriate balance between environmental, social, and economic concerns.

This document summarises the key discussions, conclusions and recommendations arising from the report “Scientific cooperation between Europe and Latin America and the Caribbean: Towards a just and environmentally sustainable energy transition”.¹ This report is based on the Virtual Thematic Event: “The social impact of the Energy Transition”, held on October the 17th and 18th, 2024, and the Virtual Thematic Event: “Towards an environmentally sustainable Energy Transition,” held on October the 8th and 9th, 2025, within the framework of the ENERGYTRAN project.² The events gathered experts (researchers, policymakers, civil society, and the private sector) from Latin America, the Caribbean and the European Union to promote the exchange of knowledge, experiences, and best practices concerning the environmental sustainability, sociocultural and political dimensions of the energy transition, emphasising the need for a just and sustainable model. The discussions emphasised the importance of ensuring a fair, inclusive, and environmentally sustainable transition, taking into account citizen participation, the role of public bodies, and the need for appropriate regulatory frameworks. The panels included in the first event were: Panel 1. The social dimension of the energy transition. Panel 2. Energy transition and territorial justice in Ibero-America. Panel 3. Energy transition and gender equality. Panel 4. Industrial policy and Energy Transition in Ibero-America Panel 5. Public policies and energy transition in Ibero-America. Panel 6. Open science and energy transition. In the second event, four panels were held: Panel 1. Challenges of a sustainable energy transition. Panel 2. Environmental impact of renewable energies. Panel 3. Solutions to environmental challenges in energy transition. Panel 4. Policies and regulations for green energy transition.

¹ Available at www.energytran.oei.int

² Recordings, conclusions and presentations from the events are available at: www.energytran.oei.int

Key social and environmental factors in the energy transition

The social dimension: The energy transition must be perceived as beneficial to all sectors of society. Social conflicts arise from the different scales at which energy policies operate, requiring governance models that bridge local, national and global interests.

Territorial justice: The inclusion of local communities in decision-making is crucial. Renewable energy projects must take into account the social fabric and the need for participatory planning to foster democratic energy governance. Rural and marginalised communities are most affected by the environmental damage caused by fossil fuel extraction. Ensuring territorial justice involves equitable access to clean energy, resources and infrastructure to avoid exacerbating existing inequalities.

Gender equality: Women often face unique barriers in accessing energy resources and opportunities in the energy sector, and decision-making must be addressed. Women can have a significant role in energy prosumption and electromobility, helping drive a more inclusive transition. Incorporating gender-inclusive policies is essential to empowering women and ensuring that they have equal access to jobs, decision-making roles and the benefits of sustainable development.

Industrial policy: The role of the state is essential in structuring the transition through public interventions, regulations, and economic strategies that support sustainable industrialisation and reduce dependency on raw material extraction.

Public policy and governance: Developing robust public policies that promote transparency, inclusion, and accountability is essential to managing the energy transition fairly. This also includes fostering sustainable industrial models that prioritise environmental protection, social well-being and economic resilience for all communities. Updated legal frameworks are needed to manage new energy models efficiently. Decentralisation and municipal engagement can enhance policy effectiveness.

Open science: Knowledge sharing and collaborative scientific research are critical for fostering innovation, ensuring transparency and building public trust in social energy transition policies.

Challenges of a sustainable energy transition: Renewable energies are essential for a sustainable energy transition, but their implementation must take into account the environmental, social, and economic impacts specific to each region. New technologies must be combined with sustainability and equity goals, as well as a strong civic, political and social commitment to adapting energy production and consumption.

How to evaluate the social and environmental impact of renewable energies: Europe and Latin American and Caribbean countries face different challenges when assessing the social and environmental impact of the energy transition, which calls for tailored indicators and harmonised methodologies. Moreover, open-source tools offer opportunities to enhance transparency and collaboration.

Nature and needs-based solutions: The positive impact of using renewable energy sources on the environment is undeniable, but there are challenges that must be addressed to tackle the negative effects.

Policy and regulation: Regulatory challenges in the governance of energy resources need to be identified, because the adoption of technologies associated with the transition presents significant challenges at the policy and regulatory level. The existing legal frameworks in many Ibero-American countries are not wholly suitable when it comes to managing the production, distribution and use of new clean energy sources, so regulations need to be updated to facilitate the integration of these technologies, ensuring the safety, efficiency and sustainability of the process.

Policy recommendations

1. Strengthen participatory governance

A just and effective energy transition requires inclusive decision-making processes. It is crucial to develop participatory governance mechanisms that allow communities to play an active role in energy planning and implementation. This includes establishing consultation forums, citizen advisory panels and public hearings to ensure that diverse voices, particularly those of marginalised groups, are heard and taken into account in energy policy development. Additionally, fostering local energy cooperatives and community-led projects can enhance engagement and ownership with regard to energy transitions.

2. Enhance regulatory frameworks

Outdated legal and regulatory structures often pose significant barriers to the adoption and integration of clean energy solutions. Governments should modernise regulations to facilitate the development and deployment of renewable energy sources, grid modernisation and decentralised energy production. Key steps include streamlining permitting processes, establishing clear and stable investment incentives and ensuring regulatory alignment with international best practices to attract clean energy investment.

3. Promote gender-sensitive policies

Gender disparities persist in energy access, employment and decision-making. To address this, policymakers should implement targeted measures to promote gender equity in the energy sector. These include gender-sensitive budgeting, quotas for women in energy-related jobs and leadership roles, and the development of training programmes aimed at increasing female participation in STEM (science, technology, engineering and mathematics) careers related to clean energy. Ensuring equal access to energy resources for women and marginalised communities will contribute to a more inclusive transition.

4. Support state-led industrial strategies

Public-private partnerships play a critical role in strengthening national capabilities in clean energy technologies. Governments should actively support state-led industrial strategies that foster domestic innovation, manufacturing and supply chain development for renewable energy technologies. This can be achieved through financial incentives, R&D funding and industrial policies that encourage sustainable production models and the creation of green jobs. Aligning these strategies with long-term national development goals will help ensure a resilient and competitive clean energy sector.

5. Foster open science initiatives

Transparency and cooperation between academia, industry and policy-making institutions are essential when it comes to accelerating energy transition efforts. Promoting open science initiatives will enhance knowledge-sharing, innovation and public participation in energy research. Governments should facilitate open-access research platforms, encourage collaboration between universities and clean energy startups and integrate citizen science initiatives into energy policy development. By doing so, societies can develop evidence-based policies and increase public trust in the energy transition process.

6. Implement public policies for equity and citizen participation

Ensuring a fair and just energy transition requires policies that prioritise social equity. Policymakers should implement measures to prevent energy poverty, provide financial assistance for low-income households transitioning to clean energy and design inclusive energy programmes that reflect the needs of vulnerable populations. Public participation must be institutionalised through formal mechanisms that empower citizens to influence energy decisions, ensuring that the transition is both democratic and socially beneficial.

7. Develop flexible and updated regulatory mechanisms

As renewable energy technologies evolve, regulatory mechanisms must be adaptable and responsive to emerging challenges. Governments should establish dynamic regulatory frameworks that allow for innovation while ensuring grid stability and consumer protection. This includes implementing performance-based regulations, supporting energy storage solutions and enabling peer-to-peer energy trading through digital platforms. Regulatory flexibility will facilitate the seamless integration of renewables into existing energy systems.

8. Promote gender inclusion through incentives and training

A diverse and inclusive workforce strengthens the energy sector's resilience and innovation capacity. Policymakers should introduce incentives for companies that actively promote gender diversity in hiring and career advancement. Targeted training programmes, mentorship initiatives and scholarships for women and underrepresented groups in clean energy fields should be prioritised in order to close gender gaps in employment and leadership. Additionally, ensuring gender-responsive workplace policies, such as parental leave and flexible working arrangements, will help attract and retain diverse talent.

9. Encourage public-private sector cooperation for sustainable industrial models

Collaboration between the public and private sectors is essential when it comes to scaling up sustainable energy solutions. Governments should encourage partnerships that drive investment in green infrastructure, energy efficiency programmes and technological innovation. Joint ventures between public research institutions and private enterprises can accelerate the development of cutting-edge clean energy solutions. Moreover, establishing regulatory certainty and fostering stable policy environments will encourage long-term commitments from private investors.

10. Foster the use of open science for innovation and citizen involvement

Open science can serve as a catalyst for both technological advances and public engagement in the energy transition. By providing open-access datasets, publishing research findings in publicly available repositories and facilitating citizen-driven energy monitoring projects, governments and research institutions can democratise access to energy knowledge. Encouraging transparency and data-sharing among stakeholders will enhance collaborative problem-solving and ensure that scientific advances contribute directly to the transition towards sustainable energy systems.

11. Implement a socially and environmentally sustainable energy transition

A truly sustainable energy future, including the evolving concept of sustainability, the interconnections between global development goals, and the social, political, and ethical dimensions of energy transitions are highly complex processes. It is necessary to balance resource demands, local and global interests, and environmental limits to ensure a just and effective transition.

12. Assess the social and environmental impact of renewable energies

The environmental sustainability of renewable energy deployment includes land use, ecosystem disturbance and waste generation. Some ways to incorporate the environmental dimension into the energy transition include sustainability assessments, life cycle analysis, critical raw material supply and tools for evaluating both direct and indirect impacts in order to support evidence-based and environmentally responsible energy policies. Life cycle analysis, complemented by social and cultural approaches, enables a more comprehensive evaluation, although it requires subsequent adaptation for decision-making.

13. Promote innovative and local solutions to address environmental challenges in the energy transition

There are practical ways to promote an environmentally sustainable energy transition, such as integrating sustainability into education and community projects, implementing sustainable lithium extraction technologies and adopting circular bioeconomy practices. Local initiatives, when connected to broader strategies, can drive significant systemic change, demonstrating that a transition to a non-fossil fuel-based energy system is both feasible and environmentally responsible.

14. Develop policies and regulations for a just green energy transition

Knowledge was highlighted as a key factor in the energy transition. The transition depends not only on the adoption of new technologies, but also on the ability to adapt innovations to local contexts. This involves understanding not only the technical aspects, but also the social and cultural characteristics of each region, making local knowledge an essential asset for designing public policies that are effective and equitable. Training and development of local skills and citizen participation are essential to ensure that energy technologies are used in a sustainable manner.

Main conclusions

The energy transition is not solely a technological shift, but also a profound social, political and cultural transformation. Achieving a just and sustainable transition requires consensus-building among all stakeholders—governments, private actors and communities—to ensure inclusive and effective decision-making.

Territorial justice is essential to achieving equity in the distribution of the benefits of the energy transition. Community participation must be at the core of decision-making processes; without it, the transition cannot be considered fair or sustainable. The participation of local actors ensures that their needs and rights are respected, minimising social and environmental injustices.

Adopting a gender perspective is critical to prevent the perpetuation of structural inequalities. The energy transition presents an opportunity to empower women and marginalised groups, ensuring equitable access to resources, job opportunities and leadership roles in the new energy landscape.

State intervention and long-term planning are fundamental when it comes to shaping a sustainable and just energy framework. Public policies must prioritise environmental sustainability, social equity and economic resilience to guide the region's transition. Government leadership is key to fostering collaboration among sectors and ensuring transparency.

Decentralisation and the strengthening of local knowledge can enhance the adaptability of energy policies to different territorial contexts. Empowering local communities to implement tailored solutions can lead to more efficient and context-appropriate energy systems.

Open science plays a critical role in ensuring the transparency and effectiveness of energy transition initiatives. By promoting open access to research, data and knowledge, open science fosters innovation, citizen participation and global cooperation, which are essential for achieving an inclusive and equitable energy transition.

Environmental sustainability is a dynamic and evolving concept, shaped by history, culture and shifting societal values. Its meaning has shifted from post-war priorities such as peace and basic needs to contemporary approaches focused on justice, equality and solidarity. While no universal definition exists, the Sustainable Development Goals (SDGs) represent a global attempt to translate this complexity into measurable progress. The interconnectedness of the SDGs highlights the need for integrated approaches that manage synergies and trade-offs across different goals.

The environmental and social challenges related to lithium extraction in South America occur in a context of rising global demand for the energy transition. Building a fair and sustainable EU–LAC lithium value chain requires balancing European supply security with Latin American sustainability and governance concerns, particularly regarding water use in fragile salt flat ecosystems. Deeper cooperation, better regulation and technological innovation, such as direct lithium extraction, are needed to reduce environmental impacts and ensure social legitimacy through the inclusion of local communities.

For some experts, addressing climate crisis represents an opportunity for a deep transformation of humanity's relationship with energy, how it is produced, consumed, and valued. Despite the urgency, fossil fuels still dominate the global mix, while their continued subsidies undermine climate goals. Renewables,

though essential, also have environmental costs, requiring smarter use rather than expansion alone. According to this line of thinking, it would be necessary a more equitable energy distribution, efficiency, and reduced consumption, advocating systemic changes (like electrification, circularity, and, even, degrowth) to achieve well-being within planetary limits.

Comparing the importance of eco-indicators across regions and technologies is complex due to methodological differences and varying socio-economic contexts. Furthermore, the variability of impacts is influenced by differences in infrastructure, regulation, and economic development. To support sustainable energy policies, it is important to develop flexible methodological frameworks and open-source tools that enable the evaluation of direct and indirect impacts, including the extraction of critical raw materials.

There are good practices and lessons learned in Europe, Latin America and the Caribbean that can be extrapolated to other geographical areas and thematic fields. The micro level must be closely connected to the macro level, so that small initiatives can lead to major transformations. These initiatives demonstrate that the transition to a non-fossil fuel-based energy system is indeed possible and that this transition can be environmentally sustainable.

While the positive environmental impact of transitioning to renewable energy is undeniable, there are challenges within the energy sector that must be addressed to mitigate the negative environmental effects that this transition can also generate, ensuring that they do not end up offsetting the positive aspects and render the energy transition unsustainable. If we truly want an authentic energy transition, it must be sustainable from a social, environmental and cultural point of view.

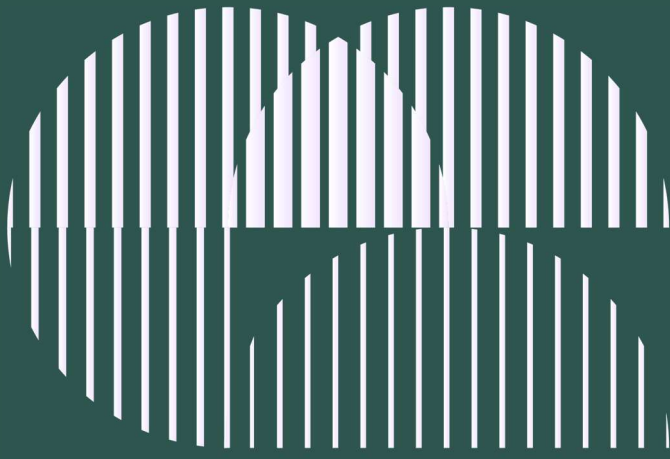
It is not only important what is being researched (for example, new technologies and innovations contributing to the energy transition), but also who is doing it, how and why. Participatory practices, co-generation of knowledge and transformative solutions are excellent examples of this approach.

In addition, a sustainable energy transition from an environmental perspective involves more than just changing the energy matrix: it requires doing so in a way that respects ecosystems and minimises negative impacts. The energy transition must be environmentally sustainable and equal, or it will not be a true transition.

The production system based on the circular bioeconomy can contribute to an environmentally sustainable energy transition. The use of agricultural, forestry and urban waste as energy raw materials offers a real alternative to the intensive use of land for monoculture crops for biomass energy production. This approach can also support rural development and green employment in the region and incorporate ancestral knowledge and skills.

Finally, policies at international, national and regional level are crucial when it comes to promoting an inclusive and successful energy transition. It is essential to involve municipal governments and communities in the planning and implementation of public policies. The decentralisation of energy governance can allow for better adaptation of policies to local needs and encourage citizen participation, which in turn facilitates better acceptance of these technologies.

A successful energy transition in Ibero-America requires a multidimensional approach that integrates participatory governance, regulatory modernisation, social inclusion and scientific innovation. Through these policy recommendations, governments can ensure that the transition to clean energy is not only environmentally sustainable, but also socially just and economically viable. The ENERGYTRAN project highlights the importance of aligning energy policies with the principles of inclusivity, transparency and long-term sustainability in order to build resilient and equitable energy systems for the future.



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