Blueprint for Action on Just and Inclusive Energy Transitions

Global Commission on People-Centred Clean Energy Transitions: Designing for Fairness
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International Energy Agency

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Table of contents

Executive summary

In this *Blueprint for Action* the Global Commission has developed a guide for governments and other stakeholders on how just and inclusive clean energy transitions can be designed and implemented. Based on the voluntary ten Principles for Just and Inclusive Transitions, endorsed by G20 leaders in 2024, the Global Commission has provided examples to highlight how energy policies can be designed to support fairer outcomes.

The Global Commission has focused on key aspects of each principle which are outlined below, and selected policies from around the world to show how these are being addressed in different settings.

1. Energy planning for just and inclusive energy transitions

- Energy policy planning can maximise the gains of transitions by ensuring a coordinated approach across sectors.
- Engaging in a multi-stakeholder approach for planning can enhance effectiveness by reflecting and addressing the needs of diverse populations.
- Long-term planning across policy sectors can support long-term energy security and more affordable energy.

2. End energy poverty

- Clean cooking access is a public health issue and should be prioritised.
- Delivering basic energy access should be a focus for governments.
- Energy efficiency and targeted schemes help improve affordability for households.
- Energy poverty programmes can leverage the wider health impacts of energy policy.

3. Social dialogue and stakeholder participation

- Structurally building in a multi-stakeholder approach delivers better outcomes and results in greater levels of acceptance.
- Consultation and participation mechanisms are often most effective when done at the local level.
- Involving affected stakeholders and partners early can improve project success and create synergies.
- Providing clear information to consumers is the first step to empower them as active agents of transitions.

4. Social protection

- Targeted policies can address informal work and support informal workers and vulnerable groups.
- Clean energy policies offer wider opportunities to address existing inequalities and enhance the lives of vulnerable populations.

5. Policy inclusiveness

- Adapting policy design to the barriers faced by respective groups increases the effectiveness of programmes.
- Encouraging the involvement of women in the workforce and women-led businesses can help integrate gender perspectives in energy planning and policy.
- Targeting incentives can provide greater benefits for low-income households.

6. Respect rights

- Indigenous Peoples should not suffer unfair burdens from transitions but rather derive benefits from them and be directly engaged as decision-makers.
- Policies should be designed to integrate the experiences and address the needs of people with disabilities.

7. Invest in affordable and reliable solutions for just and inclusive energy transitions

- Addressing high cost of capital in emerging markets and developing economies (EMDEs) is essential to scaling up investment and ensuring clean energy benefits are felt across all regions.
- Tools such as carbon tax revenue recycling and fossil fuel subsidy reform can be used to provide additional finance targeted towards low-income communities.

8. Implement secure and sustainable solutions

- Policies can ensure that mining creates value for communities and that negative impacts are mitigated.
- Investing in the productive use of decentralised renewable technologies can generate local revenue and foster small and medium businesses' growth.

9. Sustainable and inclusive economic growth for all

- International co-operation is essential to ensuring safe and secure supply chains.
- Fostering local manufacturing of clean energy technologies can ensure resource-rich countries retain benefits.

10. Quality jobs and workforce development

- Well-designed industrial and labour market policy is essential to guide workforce transitions and the creation of quality jobs.
- Examining skills needs can help smooth transitions including by identifying workers with transferable skills.
- Ensuring workers can gain new skills in emerging areas can support workers through transitions.

Introduction

The 2024 Global Commission on People-Centred Clean Energy Transitions: Designing for Fairness, builds on the work of the 2021 Global Commission on People-Centred Clean Energy Transitions which brought together key voices to examine the social dimensions of clean energy transitions and to identify the elements of what will make transitions truly people-centred, fair, and inclusive.

The 2024 Global Commission, convened by IEA Executive Director Dr. Fatih Birol, is co-chaired by Alexandre Silveira de Oliveira, Brazil's Minister of Mines and Energy and Teresa Ribera, European Commission Executive Vice-President for a Clean, Just and Competitive Transition. It comprises energy, climate and labour leaders from governments around the world, along with high-level representatives from international organisations and labour, Indigenous, youth and civil society groups.

The first output of the Global Commission, Key Policy Design Considerations for Affordable and Fair Transitions, focused on policy design and was published ahead of the G20 Ministerial in Foz do Iguaçu in 2024. The 2025 Blueprint for Action moves the focus to policy implementation.

As this year's G20 President, South Africa, is placing a major focus on just and inclusive energy transitions. This builds on Brazil's 2024 G20 Presidency which elevated just and inclusive energy transitions as a priority on the global agenda. Under Brazil's Presidency, the G20 leaders endorsed ten voluntary Principles for Just and Inclusive Energy Transitions. The Global Commission believes that these principles form a powerful framework for how governments, each navigating their own set of circumstances, can proceed with clean energy transitions that provide benefits and mitigate harm.

The ten voluntary Principles for Just and Inclusive Energy Transitions:

1. Energy planning for just and inclusive energy transitions
2. End energy poverty
3. Social dialogue and stakeholder participation
4. Social protection
5. Policy inclusiveness
6. Respect rights

7. Invest in affordable and reliable solutions for just and inclusive energy transitions
8. Implement secure and sustainable solutions
9. Sustainable and inclusive economic growth for all
10. Quality jobs and workforce development.

Each of these principles contains multiple concepts, reflecting varying perspectives, contexts and experiences. This report by the Global Commission has three objectives:

1. To build on the framework developed by the G20 to show how these principles can go beyond words and be ambitiously implemented at regional level.
2. To show that it is not only possible to implement policies in line with these principles, but also to demonstrate existing practices in various countries that are already delivering on these goals.
3. To lay the groundwork for countries to think about tracking progress and defining success around implementation of the principles. This Blueprint for Action will be followed by an Indicators Handbook that provides examples of indicators to monitor progress for each principle.

The Blueprint for Action highlights key aspects of each principle, giving examples of how governments or other stakeholders have implemented the principle and where possible, what the outcome was. The examples in the Blueprint are by no means exhaustive, but the Global Commission has tried to be representative in showing examples from diverse locations and contexts. Such a wide pool of policy implementation examples demonstrates that while there are challenges in implementing clean energy transitions, in different regions, contexts and sectors, a wide range of actors are making progress.

Across the many examples of implementation included in this report, the Global Commission identified key components of success. Each of the programmes highlighted in this Blueprint deployed one or more of these components, which are:

1. Designing policies with specific objectives and targeting, which are clearly followed in how programmes are implemented.
2. A focus on stakeholder engagement that fosters real dialogue.
3. Sensitivity to local contexts in implementation and communication strategies.
4. Innovative use of technology or market mechanisms.

5. Robust coordination between government ministries and, more broadly, between government and other stakeholders.

These examples also seek to highlight an important component of the Just and Inclusive Energy Transition principles: that energy transitions present an opportunity to make people's lives better. With design and implementation strategies that intentionally seek to provide benefits—such as access to affordable energy, better health, targeted economic development, policymakers can align energy transition goals with concrete improvements in people's everyday lives.

Translating these principles into concrete actions will also be key to advancing global efforts such as the COP28 UAE Consensus where countries committed to work toward 'just orderly and equitable' energy transitions. The consensus calls on parties to contribute to various global efforts including doubling the annual rate of energy efficiency improvements and tripling renewable energy capacity by 2030.

Building on Brazil's voluntary Principles for Just and Inclusive Transitions, the G20 under South Africa's leadership has a unique opportunity to articulate a clear vision for how the international community can implement just and inclusive energy transitions while keeping with existing commitments to deliver much-needed climate finance to developing economies and supports social, economic and development needs.

1. Energy planning for just and inclusive energy transitions

Acknowledge the importance of long-term regional and domestic energy planning and policies across various sectors to guide actions and financing mechanisms that promote energy transitions and design and implement just and inclusive energy transition policies in individual countries, while ensuring energy security, affordability, accessibility, and markets stability and economic prosperity.

For energy transitions to be successful and beneficial for all, there are many considerations that need to be addressed through policy planning. These include widespread energy poverty and affordability concerns, ensuring just transitions for workers and communities, enabling the required infrastructure buildout and securing a role for communities in decision making that impacts their lives.

Clean energy transitions involve many different policy sectors. Aligning energy, social and industrial policy, education and labour planning, financial and regulatory systems, transportation and building policies, among many others, is complex and requires dedicated and inclusive planning approaches. These planning processes are important for energy security and reliability, to protect households and workers from negative impacts, and ensure these transitions result in better quality of life for people.

A coordinated approach to planning across different levels of governance including at national, regional and city level is key to ensure effective development and implementation of energy policies and plans. At the national level, aligning strategies with internationally agreed objectives such as Nationally Determined Contributions and Long-Term Low Emission Development Strategies is important for policy coherence and effective implementation. Regional and municipal authorities can localise national-level investments and commitments. Local government plays a key role in strengthening the end of the supply chain efforts to connect marginalised communities with more sustainable, cleaner, affordable, and reliable sources of energy. In particular, the proximity of local government, especially cities, to residents positions them as key counterparts to assess local energy needs and respond to implementation challenges.

Businesses play an important role in identifying current data gaps to ensure that transition policies are evidence-based and informed by high-quality data. Small and medium businesses will also be integral as key partners in developing and implementing effective clean energy transition plans and policies.

Many countries have established national strategies that plan their transition toward cleaner energy systems. There are also planning mechanisms at many regional and local levels. Highlighting the value of exchanging best practices between countries, as part of the G20 in 2024, Brazil launched a Global Coalition on Energy Planning. The coalition aims to foster knowledge exchange, capacity building and investments that support the implementation of clean energy transitions. Taking this initiative into the next G20 Presidency, South Africa supported the coordination of the First Energy Planning Summit in 2025. In this section, the Global Commission is highlighting examples of long-term planning approaches that have focused on engaging various sectors and stakeholders, recognising the importance of having many voices at the table. Key focus areas include:

- Energy policy planning can maximise the gains of transitions by ensuring a coordinated approach across sectors.
- Engaging in a multi-stakeholder approach for planning can enhance effectiveness by reflecting and addressing the needs of diverse populations.
- Long-term planning across policy sectors can support long-term energy security and more affordable energy.

Energy policy planning can maximise the gains of transitions by ensuring a coordinated approach across sectors

As countries transform their energy systems, some communities will be affected by the closure of industries and energy projects, layoffs, evolving skills needs, and loss of revenues. Taking early action to identify those who will be affected by these changes, and providing adequate support and opportunities can help ensure that these communities can benefit from transitions, rather than shouldering additional costs.

In Spain, a comprehensive strategy was developed in 2019 to support workers and communities affected by the phase-out of coal. The strategy laid the foundations for the creation of a national Just Transition Institute in 2020 that has formalised long-term planning in the energy sector and broad cross-sectoral participation. In recent years, just transition agreements between companies, trade unions and government, have provided tailored support for affected regions, including reskilling opportunities for workers, support for workers' relocation, and policies to spur clean energy job creation.

Spain's Just Transition Strategy

Objective: Optimise economic and employment opportunities from energy transitions, establishing an urgent action plan to maintain employment in coal regions and support affected communities.

Key implementation points:

- Robust socio-economic impact assessments were used to target support to the most affected areas. Evaluations were conducted based on data collected in affected communities and about workers, which included the impact of closure on local employment and wages and considered the cumulative impacts of previous closures.
- A structured forum for community members was established to propose measures to maintain local employment and diversification strategies that fit with the local needs.
- Tripartite dialogue was held with labour unions, employers and government that led to stronger commitments from business to attract new projects in affected regions, retrain workers for clean energy occupations and support them with job relocation.

Outcomes:

- By engaging in tripartite agreements with labour unions, employers and government, the agreements resulted in stronger commitments from business to attract new projects in affected regions, retrain workers for clean energy occupations and support them with job relocation.
- This led to support for new industrial projects and Small and Medium Enterprises as well as skills development programmes for clean energy and social protection measures enhanced outcomes for displaced workers.

In its approach to energy planning, Brazil also recognises that moving towards clean energy will have a significant impact on its workers and economy. With a goal to achieve net zero greenhouse gas emissions by 2050 and reduce dependence on fossil fuels, a new Brazilian National Energy Transition Plan is being developed. The plan aims to use energy policy as a key driver of positive social outcomes and to provide support and policies that help minimise negative impacts on communities and vulnerable groups while maximising socio-economic development, ensuring affordable energy access for all. Key features of the plan include recognising the cross-cutting nature of clean energy policies through a formalised multi-stakeholder approach and aligning them with existing development plans to improve outcomes.

Brazil's National Energy Transition Policy Framework

Objective: Develop a national energy transition plan, aligning energy transition goals with broader national priorities including improving social equity.

Key implementation points:

- Structured coordination between energy, economic, industrial, health, employment and social policy.
- Creation of a permanent National Energy Transition Forum, which brings together government agencies, civil society and the private sector.
- Monitoring mechanisms at the national level and efforts to widen public access to information and enhance accountability and transparency.

Engaging in a multi-stakeholder approach for planning can enhance effectiveness by reflecting and addressing the needs of diverse populations

Understanding the challenges faced by workers and communities in clean energy transitions and reflecting them in policy planning choices and design, will help ensure that energy transitions are a vehicle for broader positive social outcomes and that they are supported by those who will be affected.

In South Africa, one of the world's most coal-dependent countries, the government has set out ambitious targets to phase out coal and move toward renewable energy in the coming decades. To support the implementation of this transition, in 2020, the President established a Presidential Climate Commission. The mandate of the Commission is to oversee the country's response to climate change and help develop a common understanding of what a just transition means by bringing together government, civil society, labour union and industry representatives, to coordinate transitions across different sectors. The creation of this Commission by the President demonstrates high-level political commitment and the importance of a just transition at the national level.

South Africa's Presidential Climate Commission

Objective: National mechanism to coordinate various stakeholders' response to climate change and plans for transitions across sectors, including measures to support the most vulnerable.

Key implementation points:

- Creation of a commission to share various perspectives on the socio-economic, environmental and technological implications of climate change and energy transitions. This includes representatives from civil society, labour unions, industry and ministries of energy, environment, transport, finance, education, agriculture, rural affairs, planning, and trade and industry.
- Platform to engage key stakeholders on the National Employment Vulnerability Assessment and Sector Job Resilient Plans with a goal to support the most vulnerable groups.
- Collaboration with cities, municipalities and the Commission to appoint mayors as Commissioners to bring more local input into decision making.

In the South African Presidential Climate Commission, multiple stakeholders are engaged through key representatives. Broadening this approach to the wider population, Chile has engaged its citizens in energy decision making through public discussion platforms. The ongoing development of the National Decarbonisation Plan has led to a wide consultation process at both the regional and national level.

Chile's Decarbonisation Plan for the country's electricity sector

Objective: Ensure a collaborative approach and public engagement at regional and national level toward the transition to clean energy.

Key implementation points:

- Creation of a public platform and coordination of public consultation to encourage stakeholders and citizens to submit their views and increase accessibility in the policy-making process.
- A Citizen Participation Registry to enhance accessibility by allowing individuals and legal entities to register and participate in the process including in regional workshops.

- Multilateral engagement at regional level to help guide energy development at all stages from design to implementation and evaluation.

Outcomes:

- The publication of a draft Decarbonisation Plan which focuses on clean energy projects to maintain energy services and provide jobs, with an updated version expected in 2025 following further public consultation.
- Strategic Energy Plans are to be developed for all regions by 2030 and will be published following a consultation process with local stakeholders.

In Chile, while this process is organised at national level, partnerships with various stakeholders is a key lever to increase participation. For example, the Organisation of Consumers and Users of Chile which represents national consumer interests, is nearing the end of a process to establish a renewable energy one-stop-shop platform where citizens will also be encouraged to partake in the Decarbonisation Plan consultations.

In both South Africa and Chile, as well as many other countries and regions with clean energy transition plans, including stakeholders at the beginning of the planning process is meant to facilitate the co-design and public support of these plans. Using different methods to encourage public participation can result in a more inclusive approach that reflects the reality of people's lives.

Involving different stakeholders in energy planning is essential to reflect the needs and experiences of different populations, and ensure people can be active agents of energy transitions. In addition to convening affected stakeholders and engaging them in decision making, national policies can also address the needs of certain groups in a targeted way. In Kenya, for example, the importance of women as key energy users and promoting gender equality in energy access and decision making was recognised early in the planning process. A national policy and strategy were adopted to integrate women's and men's experiences, needs and perspectives into the design, implementation, monitoring, and evaluation of energy policies and programmes.

Long-term planning across policy sectors can support long-term energy security and more affordable energy

Energy security is a key issue for every country. As countries transition to clean energy, planning processes are also important to ensure energy security across a

number of fronts. These include ensuring that energy resources are coming on and offline in a coordinated way to avoid energy access issues and price spikes, promoting flexibility, storage, demand-response. Transparent planning also delivers clear market signals for investors which is important for the continued development of and investment into clean energy technologies. As workers are transitioning out of jobs in traditional energy infrastructure, planning processes will be critical to ensure there is a labour force able to maintain infrastructure and enable energy access for last-mile communities.

In 2023, the United Kingdom created a Department for Energy Security and Net Zero, which took over the energy portfolio of the former Department for Business, Energy and Industrial Strategy. The aim of this change has been to institutionalise a more integrated approach to the way energy responsibilities are organised within government, with the department now simultaneously coordinating plans to deploy clean energy, support workers transitioning away from fossil fuel jobs, develop industrial strategies for clean energy, address energy poverty, and protect consumers through fairer distribution of costs.

Rather than integrating these responsibilities within existing government structures, Australia has opted for the creation of an independent Net Zero Economy Authority. Its formation in 2024, followed calls from stakeholders for the creation of an official national body to oversee the transition to net zero economies.

Australia's Net Zero Economy Authority

Objective: Oversee the transition to net zero economies and promote orderly and positive net zero economic transformation with the aim of supporting impacted workers, building community engagement and catalysing investment.

Key implementation points:

- Board of climate and economic experts, trade union leaders and representatives of First Nations people to incorporate multi-stakeholder approach at steering level.
- Mechanisms to develop Regional Workforce Transition Plans in four regions: Queensland, Victoria, New South Wales and Western Australia in collaboration with various levels of government, employers, communities, and trade unions.
- Practical assistance provided via support in finding new employment, relocation and travel assistance, and skills, training and reskilling support to help ensure a just transition for impacted workers.

- Public consultations and meetings with affected workers and trade unions to start preparations towards just transitions and engage with key stakeholders in relation to plant closures.
- Multi-stakeholder engagement, including public consultation, to establish required interventions such as State sponsored Energy Industry Jobs Plans.

Outcomes:

- Plans to engage with affected workers and the wider community in adequate time ahead of announced plant closures, such as the scheduled closure of the Torrens Island Power Station in June 2026, via public consultation and meetings with affected workers and trade unions.
- Preparations started for Regional Workforce Transition Plans which will be developed using a multi-stakeholder approach. These could include assistance and support in finding new employment, relocation and travel assistance, and skills, training and reskilling support to help ensure a just transition for impacted workers.

2. End energy poverty

Tackle all forms of energy poverty, with a focus on ensuring access to affordable, reliable, sustainable and modern energy, including clean cooking, for all.

Billions of people still live on the margins of the energy system. Around 750 million people still live without access to energy, 80% of whom live in sub-Saharan Africa. Efforts to improve energy access since 2000 have resulted in significant progress, namely in Asia and Latin America. However, in Africa, progress has been outpaced by population growth. This has consequences for households, for example limiting the ability to cool or warm homes or safely store food, posing health risks. The lack of access to electricity can also limit people's ability to access other opportunities and essential services such as education, healthcare and work.

At the same time, 2.3 billion people still live without access to clean cooking technologies. This poses severe health risks that disproportionately affect women and children who are most exposed to the toxic fumes from indoor fire-cooking. Access to clean cooking solutions and electricity, which reduces time spent gathering fuel, tending to fires and cooking, can also positively impact women's labour market participation and employment opportunities. The IEA estimates that the average household can save around 1.5 hours each day by switching to clean cooking solutions.

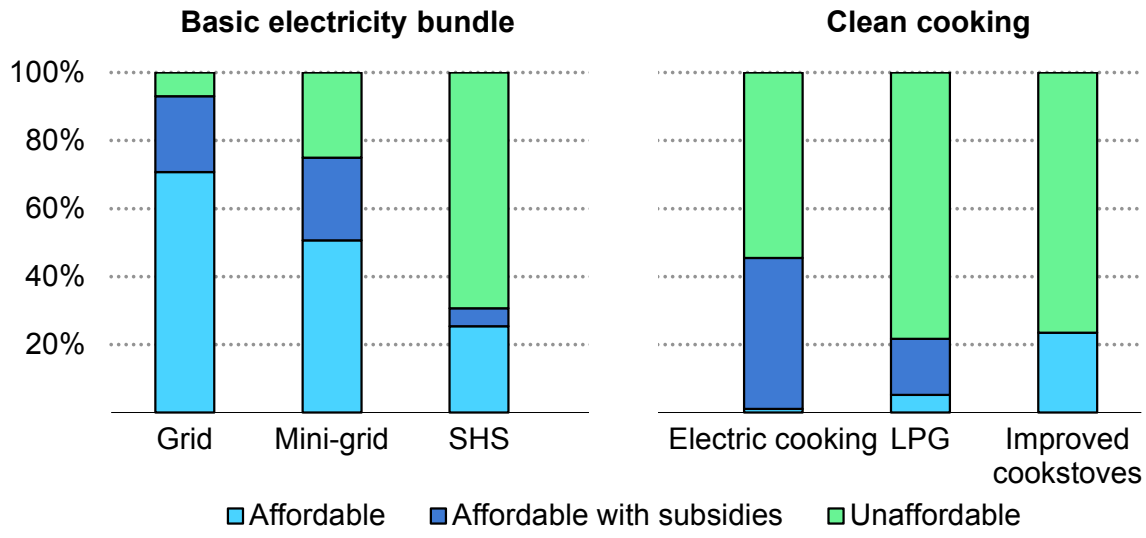
Of those who do have access to energy, many are not able to afford the amount they need. In advanced economies, the 10% lowest-income households tend to spend a higher proportion of their income (25%) on energy while consuming half as much as the 10% highest-income households. In emerging markets and developing economies (EMDEs), the lowest-income households consume only 25% of the energy consumed by the richest.

When energy is accessible but not affordable, households may not use it at all or will use too little of it to meet their needs. Similarly, when cleaner fuels and technologies are available but not affordable to many households, people won't be able to take advantage of the benefits they bring. IEA analysis shows that by 2050 a cleaner system will be more affordable overall, including for household consumption, policy support, and especially for lower-income households. This is key to helping to defray the cost of clean technologies, and make them more accessible to a wider population.

Addressing energy poverty requires careful policy planning, as there are a myriad of factors that impact access to energy. For example IEA analysis shows that only

half of households in Africa, that have been newly connected to electricity systems, can afford the cost of the basic electricity services without financial support. Likewise, most clean cooking devices are not affordable, with the exception of improved cookstoves, without financial support. Policies that integrate the need to both improve the access and affordability of energy and clean technologies, as well as recognise the social and health benefits they bring can lead to improved effectiveness and positive social outcomes at the household and national level.

Affordability of energy access projects based on existing subsidy regimes in Africa, 2022



Source: IEA (2024), Reducing the Cost of Capital.

The examples in this section demonstrate the efforts that many different governments and communities are already deploying to end energy poverty and ensure sustainable and affordable energy. The Global Commission is here highlighting the following aspects:

- Clean cooking access is a public health issue and should be prioritised.
- Delivering basic energy access should be a focus for governments.
- Energy efficiency and targeted schemes help improve affordability for households.
- Energy poverty programmes can leverage the wider health impacts of energy policy.

Clean cooking access is a public health issue and should be prioritised

Each year, indoor air pollution is linked to around 3.7 million premature deaths, with women and children disproportionally impacted. This indoor air pollution is primarily a result of burning coal, firewood and biomass in homes. Today more than 2 billion people still live without clean cooking technologies and the IEA estimates that bridging this gap to 2030 would require USD 8 billion of investment in equipment and infrastructure per year. The 2024 IEA Clean Cooking in Africa Summit was a historic mobilisation of government and private sector efforts, leading to pledges totalling EUR 2.2 billion. Despite this progress, investments are not scaling up quickly enough.

Making the upfront cost of clean cooking technologies affordable for households, especially in regions where cost of capital is higher, is essential to ensure widespread adoption. Ensuring these devices are affordable and that consumers have access to sufficient information on the benefits enhances effectiveness and adoption.

In Nigeria, a 2024 National Clean Cooking Policy was introduced to achieve universal access to clean cooking solutions by 2030. The policy focuses on the co-benefits of clean cooking, acknowledging that although significant investment is required to reach the 2030 target, the health, gender and environmental costs associated with inaction could be more than 500 times higher. To ensure effective implementation, the policy aims to involve all levels of government, the private sector and civil society in spreading awareness and enhancing the accessibility of clean cooking solutions. The policy seeks to further involve the private sector in the development and deployment of clean cooking solutions by providing various technical and financial assistance measures to foster local manufacturing, production and distribution of clean cooking devices.

Nigeria's National Clean Cooking Policy

Objective: Achieve universal access to clean cooking solutions by 2030 while improving affordability, health and livelihoods, creating jobs, and reducing emissions.

Key implementation points:

- Implementation will rely on the integration of the policy's goals into state and local government objectives and budgets. Local government and stakeholders will be key to raise awareness, build capacity and secure financing – fostering buy-in from communities.

- Provide training, technical assistance and financial incentives to local producers and distributors to foster localised manufacture of clean cooking devices.
- Expand awareness on the co-benefits of clean cooking through multi-media campaigns and inclusion of target groups by working with partners including the Nigeria Youth Congress, the National Council for Women Societies and the Representatives of Persons with Disabilities.
- Set up a National Clean Cooking Committee to oversee the implementation of the policy and sub-committees including gender mainstreaming, monitoring and evaluation, and information and awareness.
- Support retailers in storing LPG in hotels, boarding schools, prisons and humanitarian camps which require cooking for large numbers. For institutions looking to invest in clean cooking, leasing arrangements for equipment and fuel storage will be provided.

Outcomes:

- By fostering local manufacture, production and distribution of the stoves, the policy is expected to create over 10 million jobs for young people along the clean cookstove value chain by 2050.

Once households have access to clean cooking devices, they also need to be able to afford the fuel or electricity costs associated with running them. Greater engagement of local communities and community representatives for clean cooking deployment, such as local civil society groups in the case of Nigeria, is key to avoid running cost becoming a roadblock and to enhance the effectiveness of implementation.

In Peru, the government developed a comprehensive Universal Energy Access Plan for 2013-2022 (now updated for the 2023-2027 period) which included an initiative under the Energetic Social Inclusion Fund to finance and deliver LPG vouchers to rural and low-income households. This Fund was financed by charging additional costs to large and unregulated electricity consumers, such as mining and other energy-intensive industries, natural gas transporters and fossil fuel importers. To increase people's ability to access the vouchers, they were distributed using various means including mobile banking and direct discounts on energy bills and the programme relied on partnerships with local LPG vendors who already had developed social networks in targeted communities.

Fuel allowances and subsidies, such as in the Peru example, can help households afford the running costs of clean cooking devices. However, even with this support, some households may still struggle to completely switch to clean cooking. For

example, in South Africa, many households rely on pre-paid meters to run their devices, which help reduce financial strain by enabling them to pay as they consume rather than pay a large energy bill at the end of the month. However, in some cases households will switch back to diesel generators when they cannot afford to re-charge their meters. Identifying the barriers households may face to fully rely on these technologies, and monitoring their consumption habits over time is critical to inform the design of complementary support measures.

People living in conflict areas, refugees, and internally displaced people are particularly exposed to the health risks posed by a lack of access to clean cooking devices. The United Nations Refugee Agency estimated, in 2022, that more than 80% of refugees and internally displaced people living in camps relied on biomass for cooking. Poor access to clean cooking solutions is often linked to the fact that their stay is viewed as temporary. However, many displaced people and refugees remain in these camps for more than five years.

In Kenya, around 200 000 people live in the Kakuma refugee camp and the Kalobeyei Integrated Settlement in Turkana County with a host community of 60 000 people. Neither the refugees nor the host community has access to the national grid or clean cooking technologies.

Kenya's promotion of market-based energy access for cooking and lighting in the Kakuma Refugee Camp

Objective: Build a value chain for energy products and promote the supply, distribution and use of clean cooking and solar-powered solutions.

Key implementation points:

- Engagement of private sector partners to support the development of local distribution of technologies.
- Identification of market barriers in consultation with private sector players.
- Recruitment of solar and clean cooking companies willing to set up operations in Kakuma.
- Installation of last-mile distribution channels with local traders and training of last-mile entrepreneurs in the camp and host community to market the products in the camp.
- Awareness creation for improved cookstoves through market activation events (i.e. product demonstrations and roadshows), and development of marketing materials (i.e. radio advertisements, promo videos and banners).
- Development and construction of a stove production unit in the refugee camp.

Outcomes:

- Six solar companies set up operations in the camp selling 12 000 solar lanterns, 4 322 Solar Home Systems and 4 clean cooking companies selling more than 5 000 clean cookstoves.
- 38 000 people gained access to electricity.
- 375 jobs created along the value chain.
- 65 artisans were trained in producing liners that minimise cookstoves' transmission of direct heat and the fabrication of five types of cookstoves and 120 people were trained to sell the products.

The training and jobs created as a result of programmes such as this one are key for displaced people and refugees, who often have limited opportunities to generate income.

Delivering basic energy access should be a focus for governments

The IEA estimates that ensuring universal energy access by 2030 would cost around USD 55 billion each year, around two-thirds of which would be required in sub-Saharan Africa. While the scale of investment needed is significant, expanding energy access unlocks critical opportunities for households. Electricity access can meet basic needs such as keeping warm and cool in homes and improving general welfare through better access to information, healthcare, education and employment.

Brazil has adopted a holistic approach to expanding energy access through its Light for All programme, which was designed to make energy access a vehicle to reduce inequalities and improve socio-economic development, including in rural and remote areas. The programme combines initiatives to expand the grid and distribute decentralised renewable energy technologies. Overall, the programme has adopted a targeted approach, deploying intermediaries door-to-door to ensure that remote and isolated communities, including Indigenous communities living in the Amazon legal region, could be reached.

Brazil's Light for All Programme

Objective: Expand electricity access to remote and isolated communities including in the Amazon legal region.

Key implementation points:

- Tailored technology solutions including the expansion of grid connections and the distribution of solar kits to address the needs of specific communities, especially in remote and isolated locations.
- Door-to-door interventions which help identify households lacking access to energy.
- Employment opportunities for the maintenance of energy infrastructure in regions targeted by the programme.
- Targeted approach to provide energy access to schools, nurseries, health centres and hospitals that deliver essential services for residents.

Outcomes:

- Over two decades the programme has granted access to more than 18 million people. This includes approximately 9 million people living in rural areas who had incomes below the minimum wage.
- Connection objectives were exceeded by 24% in 2023 as a result of door-to-door identification of families without access.
- This resulted in various benefits for households, including job opportunities, household income and evening schooling increasing by at least 40% and more than 300 000 women starting or resuming their studies.
- In the next phase of the programme, the objective will be to deliver electricity to 500 000 more families by 2026.

To complement the programme, a Social Tariff on Electricity was designed, offering a discounted rate for electricity so that that those who consume, and likely earn, the least, are more heavily support by the tariff. This complementary measure was key to ensure that households who gained access to energy could also afford to consume it. To broaden the reach of the tariff, a 2022 reform automatically enrolled those registered under national social programmes as beneficiaries. This reform is expected to benefit more than 11.5 million families who were previously eligible but not registered in the programme. A study on the impact of this reform shows that it directly correlated with an increase in energy consumption, and that this increase was highest amongst the lower-income households in poorer urban areas.

As highlighted in the case of Brazil, expanding energy access can generate significant gains in terms of productivity and improved livelihoods and entrepreneurship. Energy access programmes that target women, low-income communities and micro and small businesses are especially impactful because they can significantly empower these groups. Across Kenya, Nepal, Nigeria, Senegal and Tanzania, the advancement of women's economic empowerment through renewable energy entrepreneurship has helped them build resilience as well as sustainable businesses, while also serving as agents of change in their last-mile communities.

Women driving the energy transition in Kenya, Nepal, Nigeria, Senegal, and Tanzania

Objective: Empower women as leaders, entrepreneurs, and workers in the clean energy sector by promoting inclusive energy markets and ensuring gender-responsive energy and climate policies.

Key implementation points:

- Training and mentorship in business management, entrepreneurship, digital literacy, and technical skills, equipped women entrepreneurs with smartphones and digital skills to more effectively reach last-mile communities
- Access to finance by working with financial institutions to design loan options to fit the needs of small-scale women entrepreneurs like loans with lower collateral, flexible payments, or group lending.
- Market access support to improve product quality, branding and packaging. Strategies such as collective marketing in Nepal and promotional campaigns in Kenya increased visibility and customer reach.
- Support women in Productive Use of Energy (PUE) initiatives and business formalisation, including registration and digitalisation.

Outcomes:

- In the last two years, more than 5 898 women entrepreneurs across Kenya, Nepal, Nigeria, Senegal and Tanzania have benefited from support. Of them, 43% reported gaining access to formal and informal finance, and 82% reported a 10% average growth in sales per year.
- In Kenya, businesses in horticulture and small-scale services used energy-efficient technologies to boost productivity. In Senegal, solar-powered PUE like water pumps and freezers reduced costs and increased income.
- More than 1.4 million last-mile consumers gained access to clean energy solutions and PUE solutions.

For some households, especially those living in informal settlements, receiving basic energy access means switching over from informal connections to formal and safe access. At the local level, municipal authorities can play a key role in identifying the households using energy in unsafe ways and can help improving access to energy services. By leveraging municipal assets and ensuring that existing energy programmes reach those most in need, cities can deliver positive outcomes for public health and the environment but also stimulate local economies, enhancing resilience and opportunity for marginalised urban residents.

Energy efficiency and targeted schemes help improve affordability for households

Programmes that expand energy access can have a profound impact on households' quality of life. However, their implementation needs to be complemented by policies that ensure households can afford to both purchase technologies that enable them to heat and cool their homes or store food appropriately, and consume sufficient amounts of energy to meet their needs. Among other tools, regulations such as performance standards or white certificates can be very effective in increasing access to affordable energy.

In the 1990s, Mexico established measures to increase appliance ownership and reduce energy costs. The government implemented minimum energy performance standards (MEPS), which require manufacturers to produce equipment to a regulated level of energy consumption. These standards help push inefficient appliances, which consume more energy and cost more, out of the market. Mexico's MEPS, were rolled out gradually and designed in collaboration with manufacturers and industry, which was a key feature of their implementation. This gave industry time to adjust to the changes in standards. The programme led to increased ownership of home appliances and decreased energy expenditure, particularly among lower-income households.

Mexico's implementation of minimum energy performance standards for appliances

Objective: Reduce the energy consumption of new appliances, ensuring that these more efficient models became more affordable for the broader population.

Key implementation points:

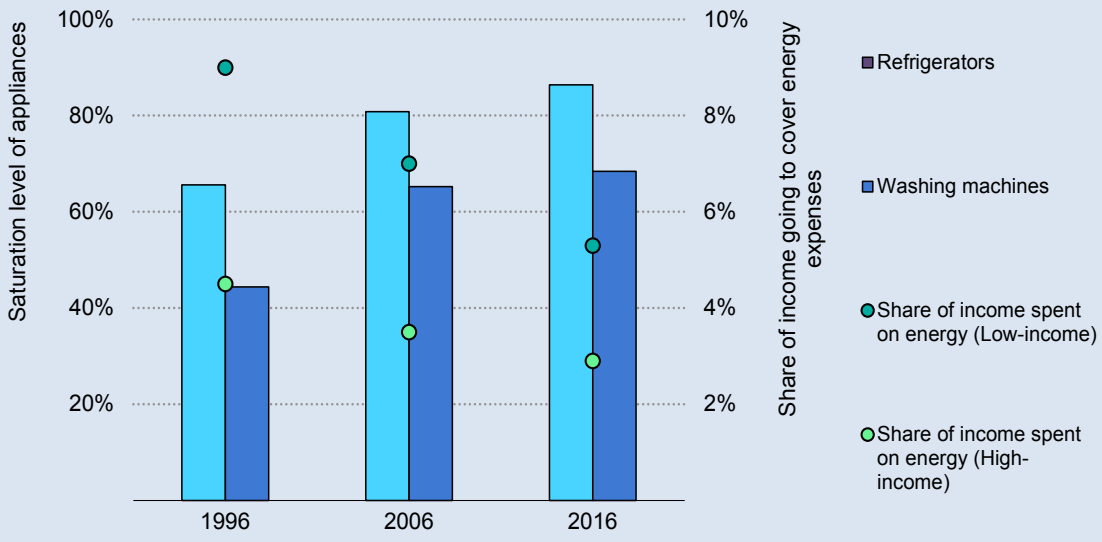
- Gradual introduction of standards to allow industry players to adapt production.

- Initial targeting of appliances with the highest energy consumption to deliver greatest savings for households.
- Involvement of industry stakeholders in agreeing timelines for compliance.
- Mandatory labelling system to empower consumers to make informed choices about the energy performance of appliances they purchase.
- Varied compliance verification mechanisms including random market inspections and penalties to ensure compliance.

Outcomes:

- Starting in 1995, energy performance standards reduced the energy consumption of new refrigerator-freezers by more than half and of new washing machines by 20% on average in just the first eight years.
- In the first 20 years of implementation, ownership of refrigerators and washing machines increased by more than 30% but average household electricity consumption declined by at least 20%.
- Ownership rates increased fastest for lower-income households, as the standards improved energy efficiency without increasing prices, making energy services more accessible than before.

Ownership level of appliances and share of income to cover energy expenses per household, Mexico, 1996-2016



Source: IEA analysis based on Secretaria de Energia and CONUEE.

In Portugal, the government is employing tools to help lower-income households with energy affordability. Similar to both Brazil's approach to Social Tariff design and Mexico's use of efficiency to decrease costs, Portugal has designed a social

tariff for electricity in conjunction with efficiency vouchers targeting vulnerable households. This programme aims to help address energy poverty both by offering lower energy prices and helping households decrease their energy consumption and therefore their bills.

Portugal's Social Tariff for Electricity and Efficiency Voucher

Objective: Support lower-income households through coupled subsidies of their energy bills and vouchers for energy efficiency interventions.

Key implementation points:

- Automatic support delivered to consumers who are enrolled in key social programmes and consume below a certain threshold. Eligibility was made flexible for households that earn below an income threshold but are not enrolled in any social programmes.
- Vouchers (EUR 1 300) allocated to households benefiting from the Tariff to carry out home renovations and/or install efficient technologies that help lower energy bills.
- Eligibility to the voucher extended to certain means-tested families that were not beneficiaries of the Social Tariff in the second phase, with beneficiaries able to receive up to three vouchers based on the efficiency intervention they would implement.

Energy poverty programmes can leverage the wider health impacts of energy policy

Households living in energy poverty are exposed to greater risk of developing health issues as a result of the inability to afford to adequately cool, heat, insulate or ventilate their homes. Access to cleaner and more efficient energy technologies, can generate both significant health benefits and lower energy bills. By improving air quality and thermal comfort, energy upgrades can help reduce the development of chronic illnesses and avoid aggravating existing health conditions. Energy policies that are designed with these benefits as objectives from the start can have a significant impact.

In Ireland, energy poverty has been strongly linked with high winter mortality rates. In efforts to address the health implications of energy poverty, the government designed the Warmth and Wellbeing Scheme, which ran from 2016-2020. The programme was designed primarily to improve the health of low-income

households living with chronic illnesses through home retrofits. The retrofits were prescribed by healthcare professionals, making the connection between housing, energy and health even clearer.

Ireland's Warmth and Wellbeing Scheme

Objective: Improve health outcomes for lower-income households living with chronic health conditions and poor indoor environment quality.

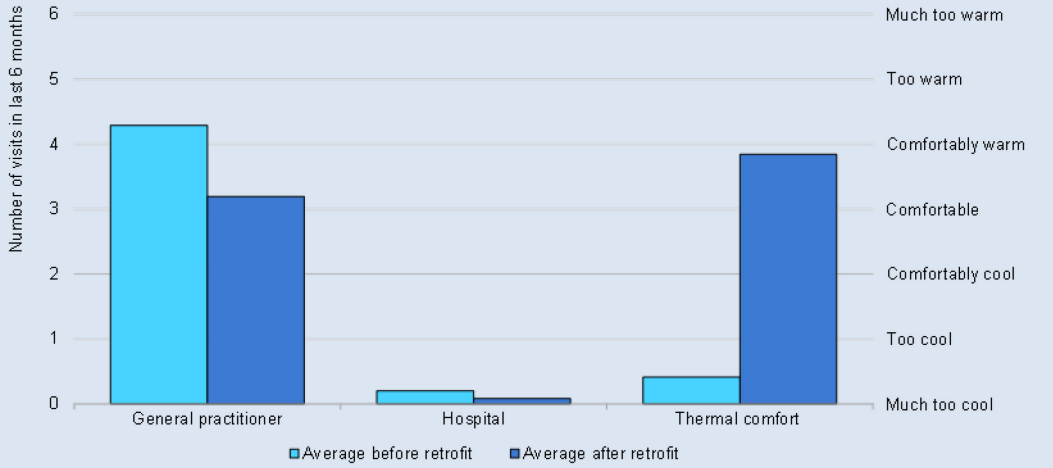
Key implementation points:

- Free energy efficiency upgrades to eligible households to remove cost barrier for home upgrades and better health.
- Energy and Health authorities selected areas to deploy the scheme based on local populations' exposure to energy poverty risks prior to implementation.
- Enrolment of participants in the programme was carried out by healthcare professionals rather than energy professionals. As the healthcare professionals prescribed free home energy upgrades based on health conditions, households who faced risks related to both energy affordability and health were targeted.
- An independent research body was recruited to track outcomes for three years from the start of the programme. This helped provide reliable and transparent assessments of the programme's effectiveness.

Outcomes:

- An evaluation of the programme that surveyed a third of participants shows that in the first year of the programme, participant GP visits and hospital admissions decreased by 26% and 60%, thermal comfort was rated nearly three times better and the difficulty in paying bills decreased by 37%.
- In the second year of the programme, the savings reported by participants were even greater, showing the long-term positive impact of home energy retrofits on health, bills and general welfare – especially for lower-income households who tend to receive outsized benefits.

Changes in health and well-being outcomes of energy efficiency upgrades through the Warmth and Wellbeing Scheme, Ireland, 2016-2017



Source: IEA analysis based on London School of Hygiene & Tropical Medicine (LSHTM) & University College London.

Other examples from New Zealand and Germany show the value of factoring in the wider health benefits of energy policy beyond energy savings. In New Zealand, a cost-benefit analysis of the Warmer Kiwi Homes scheme, which provides fully subsidised heat pumps and insulation for low-income households, showed that national fiscal savings from avoided hospital admissions and pharmaceutical prescriptions were as large as the value of energy savings generated.

In Germany, an initiative to renovate approximately 50% of the eastern region's existing housing stock over seven years led to 40 000 avoided hospital admissions, equivalent to a 6% reduction, which represents an estimated cost saving of at least EUR 180 million. By reducing the costs associated with hospital admissions and healthcare, the programme not only improved the condition of housing but also generated substantial public health benefits, particularly for older populations who may be more subject to health issues related to poor indoor air quality.

In Poland, a large national programme funded by the European Union, aims to improve sustainable development through investments in technical and social infrastructure. The programme focuses on decarbonisation, environmental protection, and building resilient transport systems, while also supporting healthcare and culture. Projects with the greatest contribution to reducing energy poverty will be given preference in access funding.

The issue of combating energy poverty in the above measure is included in the project selection criteria, where the beneficiary's declaration of implementing a

project in the area of energy poverty is rewarded by additional points while evaluating a project application.

In addition to expanding energy access in households, targeting critical infrastructure such as healthcare facilities and schools can widen the reach of energy access programmes and secure the provision of essential services for communities. In sub-Saharan Africa, some estimate that less than a third of healthcare facilities have reliable electricity access, limiting their ability to maintain lighting, appropriately store vaccines and medicine or use electronic equipment to run diagnostics and perform medical operations.

3. Social dialogue and stakeholder participation

Foster social dialogue and encourage meaningful and effective participation by all relevant stakeholders, including from affected communities, employers' organisations and trade unions in the decision-making processes related to energy transitions.

As clean energy transitions shift the way individuals, communities, businesses and all stakeholders consume energy, whether they perceive that they are empowered to contribute to determining how those changes take place affects their support and ability to embark in transitions more generally. This is especially relevant for communities living on or near sites where energy projects are being developed as well as workers whose jobs may be impacted by energy transitions.

Due to the wide-ranging impact of energy on societies, a broad set of stakeholders are affected by decision-making processes. Engaging with these different perspectives requires adapting means of communication to local contexts and sharing information in a transparent manner to foster accountability. Ultimately, involving affected stakeholders in decision making that affects them can help smooth the implementation of energy projects and ensure all stakeholders receive tangible benefits from them. Collaboration between levels of government including at national, regional and municipal level is key to increase the effectiveness of participatory processes.

Both social dialogue and stakeholder participation have an important role to play to ensure that clean energy transitions are fair. Social dialogue has been identified as a key enabler of decent work by the International Labour Organization (ILO) and is included in most ILO Conventions and Recommendations. This dialogue can take place in many forms including information exchange, consultation and negotiation between employers and workers' representatives as well as with government representatives most often on social and economic topics. Stakeholder participation, on the other hand, is much broader and can involve other key stakeholders such as non-government organisations (NGOs), think tanks, youth representatives and Indigenous representatives, and is not limited to labour-related topics. Both social dialogue and stakeholder engagement can act as positive enablers to ensure just energy transitions for workers and wider communities.

The Global Commission is highlighting examples of tools countries are already using to integrate social dialogue and stakeholder engagement in the

implementation of clean energy transitions. This includes inclusive participatory mechanisms where stakeholders are well-integrated into decision-making processes as well as establishing meaningful partnerships in project development, such as through equity ownership and community benefit agreements, which help build trust and secure benefits for communities.

At the local level, these initiatives show how consulting and engaging with stakeholders can improve policies by tailoring them to local contexts. This helps ensure communities are actively participating in discussions about the socio-economic and health benefits that clean energy transitions can bring. The examples also show that providing timely and sufficient information to affected stakeholders can help minimise potential costs and delays that arise from public opposition. In this section, the Global Commission is highlighting the points below:

- Structurally building in a multi-stakeholder approach delivers better outcomes and results in greater levels of acceptance.
- Consultation and participation mechanisms are often most effective when done at the local level.
- Involving affected stakeholders and partners early can improve project success and create synergies.
- Providing clear information to consumers is the first step to empower them as active agents of transitions.

Structurally building in a multi-stakeholder approach delivers better outcomes and results in greater levels of acceptance

Adopting a multi-stakeholder approach from the outset of a project can enable meaningful and long-term engagement of affected stakeholders in clean energy projects. Many governments have implemented such mechanisms for a variety of reasons such as to reinforce the legitimacy of decisions taken, to improve their social acceptability and to reduce the risk of costly conflicts and delays. These efforts can also lead to solutions that are better adapted to local needs and that increase their positive social, economic and environmental impacts. Additionally, a multi-stakeholder approach can help ensure a fairer distribution of benefits with a long-term engagement of communities in value creation.

Social dialogue is a key tool to cement industry and governments' commitment to support better outcomes for workers. In Chile, social dialogue has been embedded in the process of phasing out coal. Tripartite social dialogue involving trade unions representing four coal-fired power plants, indirect workers and employers led to better public support for training and capacity building in job transitions.

In Canada, the Sustainable Jobs Act aims to support workers and communities to make a just transition to a low-carbon and climate resilient economy. The Act includes the establishment of the Sustainable Jobs Partnership Council, tasked with providing advice to government and undertaking meaningful engagement with Canadians. In March 2025, the first members of the council were announced. This approach ensures that workers implicated in the transition, including groups historically underrepresented in the workforce, have a voice in putting forward advice to government.

Canada's Sustainable Jobs Partnership Council

Objective: Legislate inclusive and ongoing social dialogue mechanisms to ensure the Government of Canada hears from a diversity of voices and has an informed understanding of workers' needs in the transition to a net zero economy.

Key implementation points:

- Tripartite-plus approach, with Council members drawn from labour groups, industry, Indigenous nations and Peoples, and impacted communities, who will provide regular advice to the Government of Canada on its sustainable jobs approach, informing Sustainable Job Action Plans released every 5 years.
- The Partnership Council serves as an ongoing engagement mechanism for Canadian workers and communities to have their voices heard.
- The Partnership Council's advice on policies and programmes in support of sustainable jobs will be guided by principles that recognise local and regional needs, are inclusive and address barriers to employment, and advance the well-being of workers and communities.

Wider stakeholder engagement has also led to positive outcomes in many contexts. As the agricultural sector undergoes significant transformations in relation to efforts to reduce greenhouse gas emissions, experiences can inform transitions in the energy sector. In Denmark, a ‘Green Tripartite’ was formed, made up of representatives from national and local government, key trade unions, agricultural business organisations and environmental organisations. The tripartite formation was inspired by traditions from the labour movement and its mandate was to find long-term compromise and strategies to manage land, nature and drinking water resources as the agricultural sector addressed climate and environmental challenges. The negotiations have led to measures supporting both the sector’s competitiveness and more sustainable management of natural resources.

In Germany, in order to support plans to phase out coal, the government established a Coal Commission in 2018. The Commission brought together unions, civil society, government and industry in a tripartite structure, to develop plans to support workers affected by the closure of coal mines.

Germany's Coal Commission

Objective: Support national plans to phase out the coal industry with a structured approach to multi-stakeholder engagement.

Key implementation points:

- Institutionalised broad stakeholder engagement in coal phase-out processes, bringing together representatives from labour unions, employer associations, environmental associations, grassroots organisations, academia, and local government representatives from affected regions.
- Tripartite-style structure distributing voting power amongst 28 members meant to ensure stakeholders with conflicting views could negotiate about coal phase-out programmes that would reflect local needs and priorities.
- Several public hearings and in-person meetings with local communities to foster transparency and engagement from civil society. The bottom-up nature of these engagement processes aims to help reduce political resistance from affected communities while providing social legitimacy for the clean energy policies developed in those areas.

Coal-dependent regions face unique challenges in transitioning their local economies as a result of phase-out. While in Germany, tripartite agreements were led by government, various actors could take the lead in designing multi-stakeholder processes. In Slovakia's Upper Nitra region, for example, citizens designed their own just transition plan which ultimately shaped national policy. In 2017, the mayor of a town with strong ties to the region's mining industry initiated engagement with national government and local businesses, including the local mining company, to discuss the region's future. While it was initially met with pushback, the engagement eventually led to the adoption, in 2019, of a regional transformation plan crafted by locally led groups and negotiated through various public hearings.

Utilities can also play a key role in engaging affected stakeholders. In South Africa, the national utility Eskom is developing a guide to facilitate engagement with communities as it develops microgrid projects. Even though 94% of South African have electricity access, renewable microgrid solutions have been used to provide

energy to several rural areas that remain underserved. However, after project failures and recurring vandalism that were determined to be, at least in part, due to a lack of community ownership and maintenance, a new approach to community engagement was developed through the creation of the Facilitation Guide. Its purpose is to formalise a bottom-up approach to ensure local acceptance and long-term sustainability of projects.

Eskom's Social Facilitation Guide for Microgrid Projects, South Africa

Objective: Ensure a systematic approach to meaningful stakeholder participation throughout the lifecycle of off-grid microgrid systems for remote rural communities across South Africa.

Key implementation points:

- Guide providing a step-by-step social facilitation framework that ensures stakeholder engagement across each phase of the microgrid projects' lifecycles, including planning, construction, operations and feedback.
- Community Project Steering Committees established with elected community leaders and other critical local stakeholders so they have a voice at the decision-making table during implementation, fostering local ownership and accountability.
- Stakeholder mapping exercises allow for targeted engagement strategies and efficient resource allocation.
- Barriers to engagement, such as literacy levels, language, gender issues identified from the outset and addressed through accessible and targeted communication tools (e.g. posters/flyers, videos, community radio).

Consultation and participation mechanisms are often most effective when done at the local level

Engaging with affected communities, especially those who may be hard to reach such as households living in remote and isolated areas, requires building trust. Governments may adopt various strategies to ensure that information reaches these groups in an effective way.

In Mexico, a large-scale project used digital platforms to improve the accessibility of information while improving the energy efficiency of social housing. Online, households could find information including how to perform energy upgrades,

available financial support and the benefits of improving efficiency in homes. Renovations included commercial housing, where developers are involved in the construction process, and self-produced houses, where people who already live in the houses are involved in deciding and even making the upgrades. For many people, the programme provided a one-stop-shop platform with information on home upgrades, financial support and technical assistance. To ensure households without digital access also saw benefits, the programme partnered with housing organisations already working in remote communities to spread awareness on the affordability and health benefits of home renovations and foster uptake of the programme.

GIZ Mexico's renovation of social housing

Objective: Renovate new and existing social housing to improve energy efficiency and ultimately support households in making informed decisions, saving energy and improve their long-term living conditions.

Key implementation points:

- Involving households in the design and renovation of existing housing to foster their ownership over the energy technologies in their homes and their own energy consumption.
- Partnerships with organisations working on local housing issues who went door-to-door to spread awareness of the existence of the programme and held workshops to raise awareness around the benefits of energy efficiency. This helped households living in rural areas benefit from the affordability and health benefits of home renovations.
- A website was developed that centralised information so interested households could find technical assistance, available financing options, support in identifying the right construction material and tips on how to improve indoor thermal comfort. This content was also communicated on social media to increase its reach.

Outcomes:

- The programme delivered interventions in 7 300 homes. In total, the programme is estimated to have saved 9 000 tonnes of CO_2.
- By 2021, an estimated 30.5 million people had interacted with the online platform.

The example from Mexico shows that using tools such as digital platforms can increase the reach of initiatives. However, it is important to recognise that a one

size fits all communication strategy is unlikely to reach all stakeholders. As in the Mexico example, targeting specific groups by adapting the means of communication is important to broaden the reach of clean energy technologies.

In South Africa, an example of innovative public consultation, explores how strategic communication such as gamification can help make energy transitions more palatable to all stakeholders involved. During the public consultation, participants were given cards assigning them roles such as train driver or maintenance operator. In this case, the exercise helped identify groups that perceived themselves as excluded from decision making in energy transitions, in this case coal-dominated communities. The exercise also highlighted the distance that workers and affected communities saw between themselves and other stakeholders, such as governments and businesses. Using gamification to make conversations around energy transitions more accessible can help inform future consultation processes and make them more inclusive.

Involving affected stakeholders and partners early can improve project success and create synergies

Consulting local communities in the early stages of project development can help to secure approval and avoid potential conflicts. An analysis of wind energy project development, for example, shows that 85% of opposition, including protests and lawsuits, which can generate costs and delays, tend to occur in the early stages of project proposal and to be led mostly be community members. In addition to a lack of buy-in from local stakeholders, opposition can hinder timely delivery and create financial unpredictability while undermining the ability of projects to address local energy needs and deliver community benefits such as job creation and local economic development.

When involved early, communities can become valuable partners in project development. In the example below from Kenya, a partnership model was designed that gives communities near where projects are being developed a financial stake. This helps both to secure greater involvement from communities and ensure they receive economic benefits in the process.

The Kipeto Wind Farm in Kenya

Objective: Involve affected stakeholders early in a wind energy development project, to bring positive social impacts and cost-efficiency.

Key implementation points:

- In-depth consultations with Maasai communities undertaken early on by developers, and involving a local lawyer from the community to ensure the project respected cultural practices and land rights. This early dialogue approach helped adapt the project's key features, avoided costly conflicts, and aided trust building while minimising delays. Leased land instead of purchasing it, generating direct revenues for Maasai landowners while avoiding expensive acquisition costs.
- Leasing land instead of purchasing it, generated direct revenue for Maasai landowners while avoiding expensive acquisition costs.
- Structured dialogue and consultation created additional synergies, including the formalisation of land titles for some of the local families and the creation of a community fund designed to redistribute 5% of the wind farm's benefits.

Outcomes:

- The project has provided clean electricity for 300 000 people and reduced CO_2 emissions by 450 000 tonnes annually. It also generated hundreds of job opportunities during construction, with permanent positions filled by many local residents.

Engaging local stakeholders in project development can take various forms such as co-operatives, which are legally formalised not-for-profit entities producing and consuming energy, or broader community ownership of renewable energy assets by municipalities and local citizens. These models can help make the energy transition more participatory and bring tangible benefits to members.

A European-wide study of nearly 700 energy co-operatives shows that regions with active energy co-operatives, where citizens are actively engaged in decision making around energy, have significantly stronger performance across a range of social indicators such as environmental quality and access to advanced education compared to the European regional average.

In Denmark, the small island of Samsø has approximately 3 800 residents and, in 2005, became the world's first 100% renewable energy-powered island. Over time, this model contributed to significant socio-economic gains and public support for the clean energy infrastructure that was developed.

Denmark's 100% renewable energy-powered energy community in Samsø

Objective: Drive successful, inclusive, and lasting benefits through community-led project planning and implementation.

Key implementation points:

- National competition launched in 1997 under Denmark's Energy 21 plan to foster renewable energy leadership with minimal government intervention. Samsø's winning proposal was not only its technical feasibility, but also its emphasis on local engagement, ownership, and communication. The community's engagement from the start of the project turned a top-down policy initiative into a bottom-up transformation.
- Full transparency was ensured through open access to planning documents and consistent updates via local newspapers, letters, community meetings, and even citizen petitions.
- Decision-making processes structured to empower islanders' capacity to voice their needs through trusted institutional intermediaries, which coordinated local input and communicated it to higher authorities.
- Inclusive consultation during implementation with citizens involved in planning all major aspects of the transition, from the location of wind turbines to the establishment of district heating systems.
- Generous timeframe for deliberation allowed for trust-building, conflict resolution, and collective ownership of decisions.

Outcomes:

- Samsø attracted approximately EUR 57 million in renewable energy investments between 1998 and 2007, creating stable, local employment across sectors such as construction, operations, and tourism.
- Innovative ownership models, such as reserving shares in wind turbines and heating plants for ordinary citizens, enabled low-income residents to benefit financially.
- These models also significantly increased public support and social acceptance, with many turbines and plants owned by local co-operatives or individuals, rather than external investors.

Across various socio-economic contexts, energy community models, which allow citizens to collectively become autonomous energy producers and consumers, can provide direct benefits to residents through value-sharing. In Spain for example, the government provides funding to local transformation offices that help citizens, municipalities and small businesses create and manage energy

communities. These offices offer technical guidance, legal support and outreach, helping to lower barriers to entry and build local capacity. In parallel, a programme provides direct support to community-led energy projects, with a particular focus on smaller municipalities and areas facing demographic challenges. These initiatives aim to ensure that the benefits of the transition are more evenly distributed and that citizens are empowered not just as consumers, but also as co-producers and stakeholders in their local energy systems.

Lowering financial barriers to the development of energy communities is key to foster their growth. In Germany, a federal support scheme for Citizen Energy Communities financially supports costs of the planning phase of wind energy projects by citizens. The government grants a repayable share financing of 70% and up to EUR 300 000 of the planning and approval costs.

Providing clear information to consumers is the first step to empower them as active agents of transitions

Consumer groups are an important means of outreach because they help energy consumers to make choices based on adequate information and enable them to make the most of benefits available. By representing diverse consumer voices, including vulnerable consumers, these groups can help bring identify their needs and improve overall transparency.

In the Netherlands, Consumentenbond is an independent non-profit consumer association with more than 420 000 members. According to its members, lower costs, environmental benefits and energy independence are the three main drivers for consumers to engage in the Dutch energy transition. However, they also expressed confusion about the abundance of energy products and options they have to choose from. To address this, the association has developed awareness and education campaigns to build energy literacy and long-term behaviour change.

The Netherland's Consumer Group initiative to empower consumers in clean energy

Objective: Empowering Dutch citizens to make informed choices and access affordable clean energy solutions. and implementation.

Key implementation points:

- Developed smart comparison tools for switching energy contracts which have become widely used.

- Provides comparative product insights for clean energy products on an accessible online platform. The information is based on independent product testing conducted collectively with other European consumer associations (for example for air to water heat pumps.)
- Launched several awareness and education campaigns to make residential energy efficiency retrofits more accessible and to build energy literacy and long-term behaviour change.
- Run collective purchasing initiatives for solar panels, insulation and heat pumps, which significantly lower costs for individual households through bulk negotiation.

Outcomes:

- In 2024, 27 000 households switched energy suppliers to cleaner options using the online comparison tool.

Other initiatives such as one-stop-shops, or online information hubs which help centralise information about energy technologies and their use, are key to building consumer confidence in clean energy solutions. A programme is supporting consumer groups to implement and enhance the effectiveness of one-stop-shop solutions by providing them with advice, resources and connections with experts. In Nigeria, the implementation of the one-stop-shop has led to the development of tools that help inform consumer choices such as a solar calculator that helps households understand the amount of solar power they need to purchase depending on the size of their house and the energy consumption of their appliances. In Thailand, a one-stop-shop launched in 2025 provides consumers, especially households and small businesses, with credible information, a cost calculator and practical tools to access solar energy at a more affordable price.

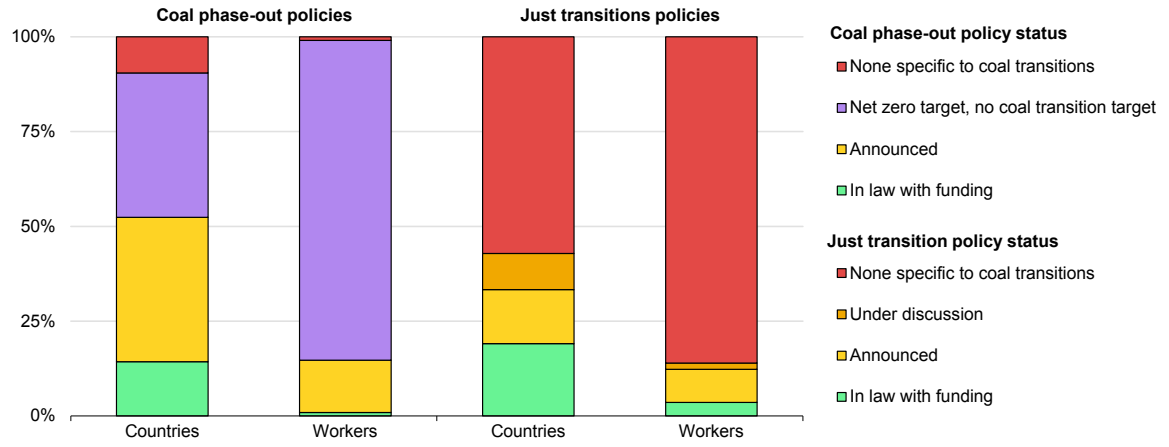
In addition to having access to clear information, consumers must be supported to participate in and benefit from clean energy throughout their consumer journey. This includes addressing the barriers consumers may face as they interact with energy technologies and services by providing suitable and affordable options, assistance in the use and installation of products and support for maintenance. Co-operation between energy market actors, system designers, regulators, and policy makers and consumer representatives can help ensure that consumer experiences are embedded in the design, regulation, and operation of energy systems. At the community level, tailoring solutions and messaging to the local context of consumers can also help build trust and maximise benefits.

4. Social protection

Strengthen the access to appropriate social protection systems for all as part of just and inclusive energy transitions in order to support workers and communities, with particular consideration to the poor and those in vulnerable situations.

Global energy systems are undergoing significant transformations, in some cases driven by clean energy transitions and other policies, in others by technological innovation and market changes. For example, many countries including India and the People's Republic of China (hereafter 'China') are seeing rising productivity in coal mines leading to employment decline even as output grows, requiring solutions and protections for workers. IEA analysis estimates that just 14% of coal workers were covered by just transition policies in 2023 across the most coal-dependent countries.

Coal phase-out and just transition policy coverage by status in the 21 most coal-dependent countries, 2023



Source: IEA (2024), World Energy Employment.

Clean energy investments provide opportunities to help compensate employment losses with new jobs created. However, these jobs may not be created in the same places or offer the same pay levels and conditions. As they go through employment transitions, workers will also need support to cushion income losses and access necessary training and new job opportunities. This is relevant for workers in the informal sector, who tend to be concentrated in emerging markets and developing economies (EMDEs). These workers are not covered by formal contracts, which include labour legislation and social security laws, exposing them to unsafe working conditions and increasing their vulnerability to potential loss of

employment and income. Expanding protections, especially to this group, is essential to ensure transitions provide opportunities that enhance livelihoods for all rather than exacerbate current inequities.

There are a number of examples of how countries are addressing the need to protect workers and communities as they design their energy transitions, which the Global Commission has highlighted in this and other sections. In some countries, efforts to protect workers at risk of job losses have focused on the coordination of energy, industry and labour market policy to help smooth workers' transitions out of and into new industries and help minimise potential earning losses. While wider labour issues are discussed under Principle 10, this section focuses on vulnerable workers and communities. The Global Commission is here focusing on the points below:

- Targeted policies can address informal work and support informal workers and vulnerable groups.
- Clean energy policies offer wider opportunities to address existing inequalities and enhance the lives of vulnerable populations.

Targeted policies can address informal work and support informal workers and vulnerable groups

As the deployment of clean energy technologies generates new employment opportunities, it can create pathways toward better social protection for vulnerable groups including informal workers. According to the International Labour Organization (ILO), 60% of the global workforce is informal. Informal workers can be more vulnerable to unsafe working environments including in the energy sector.

While not all workers want to enter the formal workforce, for a variety of reasons, workers should have the agency to make that choice. Formal work provides protections, by delivering quality jobs with formal contracts, better wages and access to social support schemes. Addressing informality by encouraging transition to formality is increasingly seen as an important dimension of inclusive development and growth strategies, and an important goal of employment policies.

All stakeholders have a role to play in addressing informal work. The following example from India was launched in collaboration with the largest representative of women in India's informal sector, to equip them with qualifications that can support them toward better employment, including formal employment, and earnings.

India's Surya- Market Aligned Green Skills

Objective: Train 1 000 low-income women salt pan workers in India to work in the renewable energy industry to improve their employment opportunities and quality of life.

Key implementation points:

- Delivery of training in line with the National Skills Council for Green Jobs syllabus which is nationally recognised.
- Tailoring of the training to focus on the solar renewable energy sector which was most appropriate for the region.
- Ensuring practical training covered installation, solar repair and maintenance as well as the handling and repairing of solar pumps to provide hands-on experience.
- Adding entrepreneurial training to provide young women and self-employed women with the skills to create startups.

Outcomes:

- The programme led to concrete results for this targeted group of vulnerable workers with 452 women taking part and 94 women securing jobs in the field.
- Self-Employed Women's Association members who completed the training programme saw improvements in their wages.

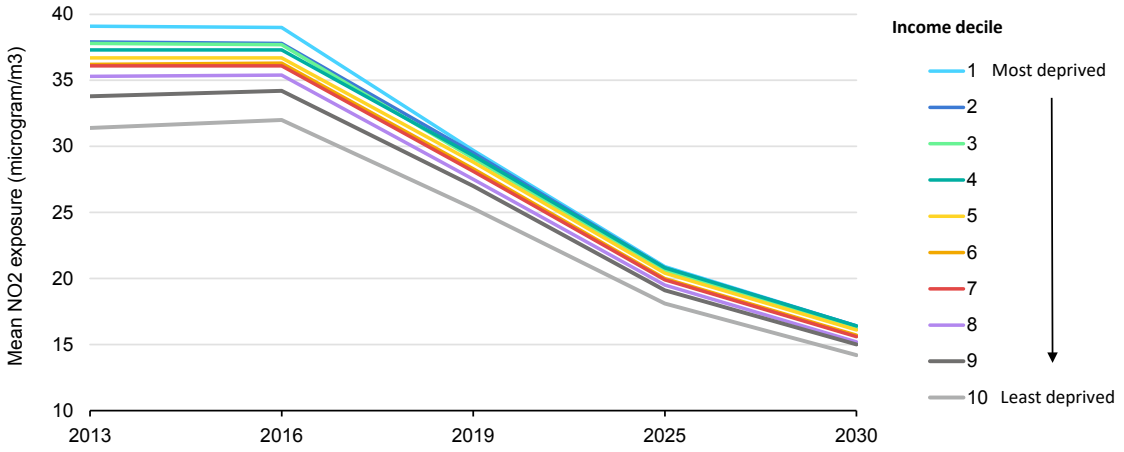
In addition to certifications and training, dialogue with informal workers helps to identify their needs. This is important to improve their access to social security and other basic services as well as improved workers' rights and working conditions, job stability and increased recognition of the role informal workers play in society. In Ghana's capital city Accra, an inclusive needs assessment was conducted through dialogue with 200 informal workers in the waste sector to provide them with a space to voice concerns. This process has informed strategies to address barriers to worker associations, leading to new mechanisms that improved job security and livelihoods, financial help, access to healthcare and childcare and gender-responsive sanitation for workers. The assessment also exposed a critical gap in access to social protection. As a response, in 2024, Accra initiated a social insurance scheme for informal waste workers.

Clean energy policies offer wider opportunities to address existing inequalities and enhance the lives of vulnerable populations

Well-designed policies can address both energy and social goals and can also be used to enhance well-being and address pre-existing inequalities.

In London, the adoption of low emissions zones has led to outsized health benefits for lower-income households, who tend to live in more polluted areas. Car ownership is also unevenly distributed, with households in high-pollution areas less likely to own cars than those in less polluted areas. Over time, the measure is narrowing inequalities between income groups while improving air quality for all residents.

Mean exposure to NO_2 per deprivation income decile in London, 2016 – 2030



In 2023, the Low Emission Zone was expanded to cover the entire city – making it the largest zone of its kind in the world. Overall, it is estimated that this Ultra Low Emission Zone delivered the greater benefits in underserved areas, especially those living near the city's busiest roads, which saw a 80% reduction in the number of people exposed to high levels of pollution. Residents have had to adapt to the measure, such as by replacing their vehicle with compliant models which can be costly and may place an unfair burden on those that can least afford the switch and who depend on their car. The development of complementary policies to support households impacted by this burden was a key attempt to minimise the cost of the policy on the most vulnerable households.

As such, the expansion included a GBP 110 m scrappage scheme to support low-income Londoners, disabled residents, charities, small businesses, and sole traders. Exemption periods were introduced for disabled drivers and community transport minibuses until October 2027 and October 2025, respectively, along with new exemptions for disabled drivers and wheelchair-accessible vehicles. London's cycling network was also developed and more than quadrupled in size between 2016 and 2024, with nearly a quarter of residents now living within 400 metres of a high-quality cycling route. London has also upgraded the entire transport fleet to meet or exceed the ULEZ emissions standards, delivering more than 1 300 electric buses.

In Germany, 35% of energy use in buildings is dedicated to heating and cooling, and 80% of heating systems are fossil-fuel based. In 2024, the government rolled out a national-scale policy to improve the energy efficiency of new and existing building stock. To ensure that lower-income households benefited from home upgrades that help lower their energy bills, a support programme provided them with free energy efficiency consultations. This support programme trained and employed people facing long-term unemployment to become energy saving consultants, enhancing both affordability and employment outcomes.

Germany's energy-saving check

Objective: Provide free at-home energy efficiency consultations for lower-income households while employing people facing long-term unemployment.

Key implementation points:

- Free at-home consultations remove financial barriers for low-income households to access energy efficiency service providers.
- During the consultations, households are provided with estimated energy savings potential and advice to reduce energy bills. Households may be provided with fully funded energy-savings devices, including free installation of those devices and replacement of inefficient refrigerators.
- Structured multi-visit approach ensuring implementation and follow-up monitoring. At first, consultants contact tenants by telephone and schedule an initial visit to perform an evaluation of the households' energy consumption and potential savings. During the second visit, consultants may support the implementation of minor efficiency measures based on the evaluation. A monitoring process is then set in place to run follow-up checks and assess the effectiveness of the proposed measures and adjust them if needed.

- Training people facing long-term unemployment as energy consultants. The programme simultaneously provides employment relief to a vulnerable group.

Outcomes:

- Since 2008, the programme provided 350 000 home visits, generated average annual savings of EUR 200 for low-income households and trained 650 people facing long-term unemployment as electricity saving consultants.

Although the programme delivered tangible benefits for participants, one of the challenges it faced was curbed awareness, which limited wider participation. The next example from Portugal's Telheiras municipality highlights that involving local partners in project implementation is an important feature of energy policies that aim to provide relief to vulnerable groups. In this case, local public authorities were involved in identifying vulnerable households who could join a community-owned solar initiative that would result in lower bills.

Portugal's Telheiras municipality community solar initiative

Objective: Produce community-owned solar energy to benefit vulnerable households.

Key implementation points:

- Households can reduce their energy bills by being credited part of the electricity generated by the solar installation. Beneficiaries are entitled to the benefits for at least 12 years on the condition they pay an annual membership fee.
- Local partners, including the local council, may finance upfront investment and the initial annual fee, as well as support subsequent annual fees to ensure that cost does not limit participation in the short and long term.
- Beneficiaries are entitled to a right to vote in meetings and decisions related to the project, fostering their ownership and engagement in its development.

By improving the access to and resilience of the energy system, clean energy technology deployment can also provide support for populations displaced by natural events and conflict. In Northern Iraq, increasing water scarcity and difficulties in irrigation due to disruptions in electricity supply for modern irrigation systems has led to the displacement of 83 000 people and the abandonment of

agricultural land. In the same region, a project aims to provide renewable energy to households and farmers to create sustainable livelihoods for community members and returnees that had left due to droughts. The project dedicates specific support to farmers and agricultural small and medium enterprises to improve their skills, access finance and maintain assets. Since the start of the project, more than 85 solar power panels were provided to the communities. As a result, at least 14 000 people now have electricity, running water, cold storage and solar-powered irrigation systems through the use of solar. Projects such as this one create synergies whereby clean energy can help improve outcomes for populations affected by water scarcity challenges.

More broadly, identifying how energy and water systems can be managed in sustainable ways is essential as demand for both will keep rising over time. This includes designing policies such as tariffs and subsidies in a way that ensures these deeply interconnected resources remain accessible to consumers both physically and financially.

5. Policy inclusiveness

Incorporate intersectional perspectives on gender balance, including women empowerment, age, race, ethnicity and those in any vulnerable situations into energy planning and policies and ensure a fair distribution of costs and benefits.

Clean energy transitions can be a vehicle to reduce social inequities. Policies that place a central focus on improving the inclusion of those on the margins of energy systems ensures they truly benefit from transitions. This means addressing the specific barriers some groups may face in accessing those benefits including cost or broader social norms. In turn, this can improve the effectiveness of policy interventions by delivering outsized benefits for those who need it most.

Today, women constitute fewer than 20% of the global energy workforce, compared with 40% in the broader economy. According to the International Labour Organization (ILO), in 2023, 20% of youth worldwide were not engaged in employment or education. The energy sector can provide decent jobs across a number of different entry points. IEA analysis shows that skills shortages risk intensifying across various sectors in the coming decades.

As key energy sectors face skills shortages, targeting groups that have traditionally been underrepresented in the energy workforce can help bridge the gap. Certain energy employment strategies can target groups such as women and youth, addressing both current sectoral needs and providing positive employment outcomes for these groups.

In this section, the Global Commission highlights examples of policy interventions that help reduce barriers for specific groups including youth and women to ensure they benefit from and contribute to energy systems. Through various examples, the section also shows how policies can be designed to provide outsized benefits for low-income and vulnerable populations when they are appropriately targeted. Here, the Global Commission is highlighting the following points:

- Adapting policy design to the barriers faced by respective groups increases the effectiveness of programmes.
- Encouraging the involvement of women in the workforce and women-led businesses can help integrate gender perspectives in energy planning and policy.
- Targeting incentives can provide greater benefits for low-income households.

Adapting policy design to the barriers faced by respective groups increases the effectiveness of programmes

In Greece, financial constraints faced by young people has resulted in 70% of those aged 18-34 living in their parental homes. To help young adults into their own homes, a programme was designed to provide them with low-to-zero interest loans combined with energy efficiency incentives that could help lower the cost of purchasing a home and affording its energy cost.

Greece's Save and Renovate programme

Objective: Lower financial barriers for young people to access affordable and efficient housing.

Key implementation points:

- Low or zero interest rate loans for people between 18 and 34 years of age, pertaining to certain income threshold, to address energy poverty and promote the benefits of efficient homes.
- Incentives for energy-saving upgrades made available alongside financial support for homeownership, which empowers young people to both purchase homes at a lesser cost and lower their bills on the long term. Efficiency measures promoted include heating system upgrades and renewable energy installations.

Outcomes:

- The programme aims to upgrade more than 105 000 homes by the end of 2025.

In some countries, policies that support the deployment of clean energy technologies and training can broaden employment opportunities for youth in the energy sector. In Jordan, a project to train 45 youths in refugee camps, half of which were women, in solar PV cell cleaning has led to full time employment for them. These initiatives help provide young people with opportunities they may otherwise be excluded from.

Another project in Jordan aims to increase the participation of marginalised and vulnerable populations, including women, youth and refugees in sectors including renewable energy and energy efficiency. The programme builds on a national Green Employment Analysis and Green Skills Mapping with specific considerations for these groups, and has identified the energy sector has having

the highest potential for permanent job creation among key green sectors in Jordan. It also identified electricity and energy-related skills as most in-demand green skills by employers. In response to identified labour market needs, targeted training programmes have been designed to increase skilled labour for the energy transition in solar PV installation and maintenance, energy-efficiency building systems and heat pumps, energy auditing, and repair and maintenance of electric and hybrid vehicles. As a result, 500 job seekers are being equipped with practical, in-demand skills to enhance their employability and support Jordan's energy transformation. The skills training has minimum targets for refugees (50%), women (30% for the energy trainings), and youth (25%).

Iraq has passed a national-level housing policy that aims to improve construction materials and affordable housing finance models through energy-efficient building designs to meet the housing demand. One key component of the programme is targeted training for women and youth in sustainable housing and construction.

Iraq's Affordable and Green National Housing Policy

Objective: Improve housing accessibility, integrate energy-efficient building practices, and strengthen urban resilience.

Key implementation points:

- A modular training curriculum for women and youth on topics including solar energy, insulation, heritage-inspired design, and financial literacy to promote climate resilience and private sector growth in Iraq. Trainees gain practical experience by working with construction partners, enabling them to access employment.
- Concurrently, two compliance workshops and a tripartite seminar brought together inspectors, employers, and workers to develop gender-responsive inspection policies and advance Iraq's first Occupational Safety and Health (OSH) draft law, with broad stakeholder input and ILO support.

Outcomes:

- Twenty new labour inspectors received training on ILO standards, Iraq's legal framework, and construction sector inspections.
- Since 2017, more than 7 500 houses that were damaged during the Iraq War have been reconstructed and another 366 are to be delivered in 2025.

Encouraging the involvement of women in the workforce and women-led businesses can help integrate gender perspectives in energy planning and policy

Women can drive energy transitions, when they have equal opportunity to lead, participate in and benefit from them. In Senegal, the involvement of women's organisations and women-led businesses, in sustainable energy planning, consultations, and decision-making processes, has helped to mainstream gender in energy planning and policy.

Senegal Ministry of Petroleum and Energy creates inclusive policies to increase women's access to renewable energy

Objective: Equitable access to energy resources that creates more opportunities for women to overcome multiple challenges and contribute to their families' and their community's development.

Key implementation points:

- Aligned with Senegal's energy transformation plan, which aims for universal electrification by 2025 and a renewable energy share of 40% by 2035, addresses systemic barriers to women's economic participation. The Gender and Energy Task Force coalition of civil society, private sector, NGOs, media, and four government ministries, drives national advocacy around a Gender and Energy Pact.
- Women's businesses are supported through technical training, financial literacy, developing action plans, technology access, and financial profitability assessments.
- Mentoring and ongoing advice is provided to women's businesses.
- The plan strengthens women's agency and leadership and the capacities of the women's collectives to take up their causes and facilitation of dialogue between women and decision-makers from the National Assembly and ministries.

Outcomes:

- Political validation of the National Action Plan for Gender Equality, of the Ministry of Petroleum and Energy (MoPE).
- Establishment of the Gender Equality Unit of the MoPE.

- 195 women-led enterprises representing 899 women entrepreneurs across three value chains supported through agricultural co-operatives.
- Four ministries integrate gender-responsive practices into their policies and programmes.

Women make up a higher share of workers in renewable energy, especially solar and wind, than in the energy sector as a whole. Still, they remain less represented in occupations requiring vocational training, which are projected to grow in demand over the coming decades. In order to bring more women to the energy labour force, initiatives such as Equal by 30 have emerged to bring forward concrete public and private commitments and policies to advance gender equality in clean energy transitions. This joint initiative between the Clean Energy Ministerial (CEM) and the IEA, aims to increase opportunities for women in senior management roles, decision-making and leadership positions and to reduce the gender wage gap. Similarly, Kazakhstan is developing a national roadmap, in collaboration with the national renewable energy association, to increase women's participation in the renewable sector, create a dedicated job platform and launch a mentorship programme to support women leaders.

International coalitions like the Gender and Energy Compact have also helped to bolster action for gender equality and women's empowerment in the energy sector. With over 100 members including governments, private sector, academia, civil society, youth, and international organisations, signatories submit individual commitments to accelerate the achievement of the compact's key outcomes, ensuring women's active roles as leaders, employees, entrepreneurs, and consumers in a fair and inclusive energy transition. Endorsed by countries such as Canada, Ecuador, Iceland, Kenya, Nepal, and Sweden, the Compact has also been a strong advocate for the inclusion of gender indicators in the post-2030 energy framework. Among its achievements, signatories have collectively dedicated 19 128 jobs, 46% of the total, to women, and provided green jobs training to 43 219 women, accounting for 37% of all trainees.

In 2022, the Mayor of Bogota, in collaboration with local transportation and gender secretariats, decided to launch a public transportation company. Private transport companies were unwilling to invest in serving some routes connecting Bogota and its outskirts because of persistent non-payment from users. The mayor created La Rolita, an 100% electric bus fleet, with the objective of improving transport connectivity, air quality and employment outcomes for women.

Bogota's La Rolita programme

Objective: Train women bus drivers to operate a 100% electric fleet connecting previously poorly served routes.

Key implementation points:

- Co-design of the project between different ministries including transport, gender and state and the national bus rapid transit system Transmilenio.
- Social media was used to promote the company's call for drivers to increase reach.
- Call for drivers open to all levels of experience as the programme itself delivered and supported the cost of training and licences.
- Partnerships with various non-governmental organisations and organisations working with refugees, the homeless or people in drug rehabilitation programmes to increase their reach of vulnerable groups.
- Hosted community-level activities such as workshops for employees' families or trainings to maintain greenhouses, to serves as a vehicle for social inclusion.
- The project provided professional psychosocial support to women, as well as training on topics such as personal finances and self-care.
- To support the well-being of staff that attended the project's training programmes, food vouchers were given to 198 workers. Certain groups, such as pregnant women and people with disabilities, were selected to receive higher amounts to help mitigate financial burdens.

Outcomes:

- Overall, 95% of the people hired had no previous experience. This led women who were previously in informal employment to apply, improving their inclusion in the formal employment system.
- Since 2022, La Rolita has created more than 700 new jobs including for 200 single parents and more than 120 people between 18 and 28 years of age, and helped 400 citizens to enter formal employment.
- The programme's targeted training approach has resulted in an above average retention rate. Staff turnover is half the rate in companies across the sector (2% vs. 4-6%). The programme estimates that the return on investment cost of having trained workers becomes positive after the first 4 to 6 months of work.
- The company serves 55 000 users per day and operates nearly 200 buses.

Targeting incentives can provide greater benefits to low-income households

If households have access to energy but cannot afford to use it, they face difficult choices between heating and cooling their homes or purchasing other essential goods and services such as food or healthcare. Lower-income households face greater barriers in this regard, as they spend more of their income on energy than the wealthier households while using less. Given this imbalance, providing support to lower-income households can have a much bigger impact on their energy expenditure. When they are designed to target lower-income households, energy policies can therefore deliver outsized benefits.

An IEA analysis across G7 countries shows that policies which remove barriers to access such as high upfront costs for more efficient appliances and equipment can generate considerable savings for households. For example, the UK is implementing comprehensive strategies such as the Warm Homes Plan, which aims to upgrade 5 million homes, decarbonise building and tackle fuel poverty. This includes the Warm Homes: Social Housing Fund (WH:SHF) and Warm Homes: Local Grant (WH:LG) schemes, with almost GBP 1.8 billion for social housing landlords and local authorities to install energy efficiency upgrades in up to 170 000 households across England, including low-income social and private tenants.

Canada's Oil to Heat Pump Affordability programme, has been addressing barriers including high upfront costs and access to capital by providing targeted upfront grants to help median to lower-income households switch from oil-based heating systems to heat pumps.

Canada's Oil to Heat Pump Affordability Programme

Objective: Provide financial support for low and median-income households to switch from oil-based heating systems to electric heat pumps**,** and help reduce energy consumption and utility costs while reducing vulnerability to price fluctuations. The programme minimises barriers and streamlines process for the intended audience.

Key implementation points:

- Upfront grant covering most of the average cost of purchasing and installing a heat pump, targeted at low to median-income households using oil as primary heating system.

- Addresses households' main barrier in investing in energy efficiency: high upfront costs and lack of access to capital. To be eligible households must prove that they have purchased 500 litres of heating oil in the past year.
- Co-delivery agreements in many jurisdictions leveraged an additional CAD 5 000 (Canadian dollars) of funding for households and enhanced outreach to remote communities. This included a dedicated communication stream developed for Indigenous nations and Peoples.
- In some co-delivered programmes, participants benefit from direct install services wherein the programme delivery organisation handles all the logistics associated with planning and paying for home retrofits on behalf of the participating households.
- Flexible application options, including offline submissions and alternative proof-of-ownership documentation, available to increase the accessibility of the programme, particularly for remote and Indigenous nations and communities.

Outcomes:

- So far, with more than 16 000 households with new heat pumps installed, the programme has generated CAD 1 337 average savings per household per year and provided GHG reductions of over 44 661 metric tonnes, equivalent to more than 13 703 gasoline cars off the road.
- Estimated cost savings from switching to heat pumps are distributed equitably across income levels. The programme is not only reducing emissions and improving efficiency, but is also delivering tangible affordability gains where they are needed most.
- A higher number of applications by population in areas was observed where a co-delivery partner had been identified.

Addressing the needs of vulnerable households does not only promote equity, it can also enhance the effectiveness of energy interventions. Programmes that provide tailored, hands-on support to those with the greatest need often deliver large gains in energy savings, cost reductions, and well-being. In Amsterdam, home-based energy coaching visits and the distribution of devices that monitor energy use led to a 41% decrease in monthly energy bills. Beyond technical savings, households gained greater control over their energy use, particularly heating, and could re-allocate income to other essentials, such as food, housing, and healthcare.

The Commission is highlighting examples like this to demonstrate the effectiveness of interventions that are non-technology based, that can be relatively inexpensive to implement.

6. Respect rights

Respect, promote and consider respective obligations on human rights, and on the rights of Indigenous Peoples, local communities, persons with disabilities as well as labour rights in the planning and implementation of energy transitions policies and projects.

As energy transitions progress, projects are developed across lands that may be used or owned by communities, including Indigenous Peoples, whose inherent and legal rights must be observed and embedded into project design and implementation. Many countries are engaged in policies and programmes to ensure that those rights are upheld. Depending on how those intersections are managed by public and private actors, clean energy infrastructure projects can either represent a risk to the rights of those communities or a significant opportunity to enhance their socio-economic conditions. This principle is focused on respecting the rights of marginalised people and communities. Workers' rights, which are also included in this principle, are detailed in other chapters of the Blueprint.

The Global Commission highlights examples of programmes delivering tangible socio-economic benefits to Indigenous nations and Peoples, local communities, and people with disabilities. Strategies used in these programmes include financial partnerships, involvement in decision making and agreements on the distribution of benefits. The Global Commission is focusing on the following points in this section:

Indigenous Peoples should not suffer unfair burdens from transitions but rather derive benefits from them and be directly engaged as decision-makers.

Policies should be designed to integrate the experiences and address the needs of people with disabilities.

Indigenous Peoples should not suffer unfair burdens from transitions but rather derive benefits from them and be directly engaged as decision makers

The principles of Free, Prior and Informed Consent are included in the UN Declaration on the Rights of Indigenous Peoples. They provide guidelines around consultation and engagement with Indigenous nations and Peoples and form part

of the core international rights of Indigenous nations and communities to be considered when energy projects are being developed on their lands and waters.

Canada recognises the concept of free, prior and informed consent in natural resources projects; however, industry and Indigenous Peoples have expressed a need for clarity around the concept. Canada committed to advancing this work through the United Nations Declaration on the Rights of Indigenous Peoples Act (UN Declaration Act) Action Plan, where, among other commitments, it committed to increasing the economic participation of Indigenous Peoples and their communities in natural resource development.

Canada's UN Declaration Act Action Plan 2023-2028

Objective: Work to develop guidance on engaging with Indigenous Peoples on natural resources projects in order to obtain free, prior and informed consent and to increase the economic participation of Indigenous Peoples and their communities in natural resource development.

Key implementation points:

- Working in consultation and co-operation with Indigenous Peoples, and in collaboration with provinces, territories and industry in order to obtain free, prior and informed consent, prior to the approval of any project affecting their lands or territories and other resources.
- Providing practical recommendations for successful free, prior and informed consent implementation (including in situations where multiple regulatory processes are involved) consistent with commitments to adopt a whole-of-government coordinated approach to inclusion in decision making.
- Supporting the integration of specific, localised knowledge held by Indigenous Peoples in the design and governance of projects.
- Launching the Indigenous Loan Guarantee Programme in December 2024 to provide up to CAD 5 billion to support Indigenous ownership in natural resource and energy sectors. In March 2025, the Government of Canada announced that it would double the Indigenous Loan Guarantee Program to CAD 10 billion, and open it to sectors outside of energy and natural resources to catalyse more Indigenous-led infrastructure, transportation, and trade projects across the country.

In addition to obtaining consent from Indigenous nations and Peoples, projects can seek to build financial and governance partnerships that result in various benefits, as in the example of New Zealand.

New Zealand's Nga Awa Purua Geothermal Power Station

Objective: Build the geothermal power station using a multi-owner/partner approach in project governance in innovative ways.

Key implementation points:

- Co-ownership of the Nga Awa Purua Geothermal Power Station between Mercury Energy, a majority state-owned company and the Tauhara North No. 2 Trust, which represents Māori landowners. Through this joint venture model, Indigenous nations and communities have a formal and permanent role in the project's governance, going beyond mere consultation and relying on genuine co-decision making and transparency.
- Mandatory approval of more than 50% of community members required for the project to be approved by the Māori Land Court, which ensured embedding Indigenous rights and knowledge into the project's design and delivery.
- Landowning families benefiting from a direct redistribution of the project's revenues thanks to their 35% ownership stake, which are reinvested in social programmes such as education grants, medical support and care for the elderly.
- Training opportunities for youth.

Outcomes:

- The project led to stronger local economic autonomy.
- 140 000 households now receive clean electricity from the plants, which significantly reduces CO_2 emissions.
- Nga Awa Purua has also generated benefits including reforestation and protection of local biodiversity.

Policies should be designed to integrate the experiences and address the needs of people with disabilities

People with disabilities often have unique energy needs that must be addressed when designing policies. Projects and policies that provide tailored energy products and financial support mechanisms are essential to effectively and sustainably provide benefits to people with disabilities over the long term.

In addition to adapting policy design to the needs and experiences of people with disabilities, providing them with tailored technological solutions can help them to actively take part in energy transitions. In Liberia, a programme deploying solar

energy aims to incorporate the needs of people with disabilities into energy policy making and planning to enhance their access to essential resources and infrastructure.

Liberia's Mission of Hope for the Disabled

Objective: Combine solar energy deployment and employment opportunities for people with disabilities.

Key implementation points:

- Set-up of a computer lab run by solar energy to facilitate learning for people with disabilities.
- Installation of a solar-powered water pump, reducing the walking distance to water sources and providing water for a vegetable garden managed by members of the Mission of Hope for the Disabled community.
- Workshops and training sessions organised to raise awareness and sensitise the population on how to operate the pump in a sustainable manner.

Outcomes:

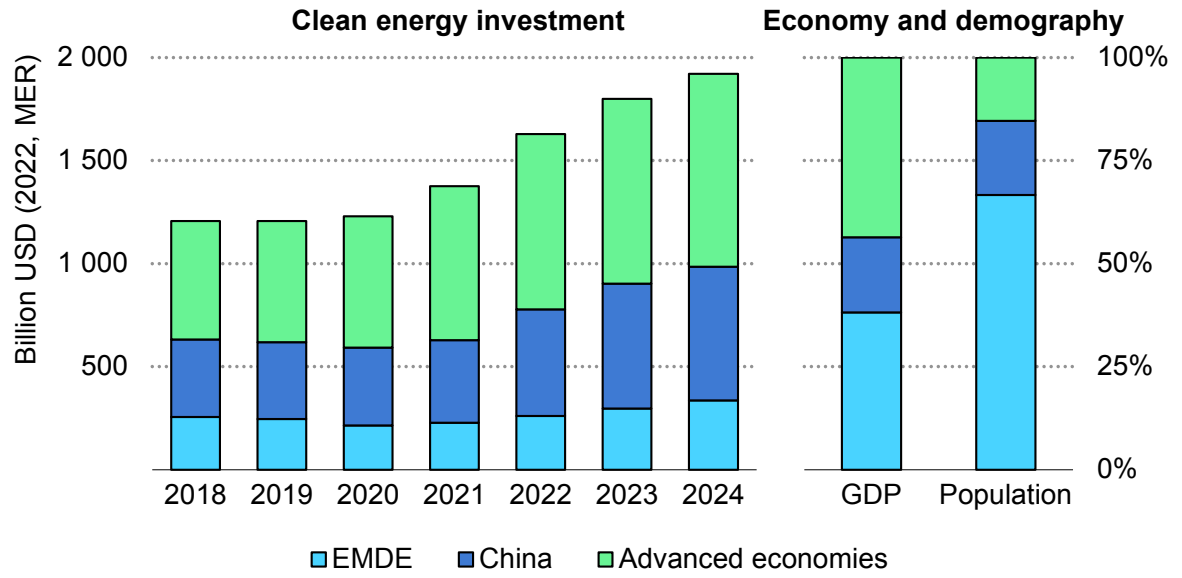
- The project enhanced social and economic inclusion of people with disabilities while providing access to renewable energy and providing an easy and affordable water supply all year round.

7. Invest in affordable and reliable solutions for just and inclusive energy transitions

Explore efficient, inclusive and just mechanisms for cost allocation in energy solutions and their impact on the cost of energy, with a focus on timely mobilisation of resources and working towards facilitating low-cost financing in developing countries for innovative technologies and business models, to widely share the benefits and to help mitigate the burden of energy transitions, especially on the poorest segments of the population.

Total global investment in energy now exceeds USD 3 trillion per year, almost half of which is directed towards clean energy. However, emerging markets and developing economies (EMDEs), with the exception of China, only account for 15% of clean energy spending globally.

Global clean energy investment



Source: IEA (2024), Reducing the Cost of Capital.

To address some of these issues, there are a number of policy tools that the Global Commission has identified. The first looks at lowering the cost of capital through innovative financial mechanisms to facilitate investments in clean energy

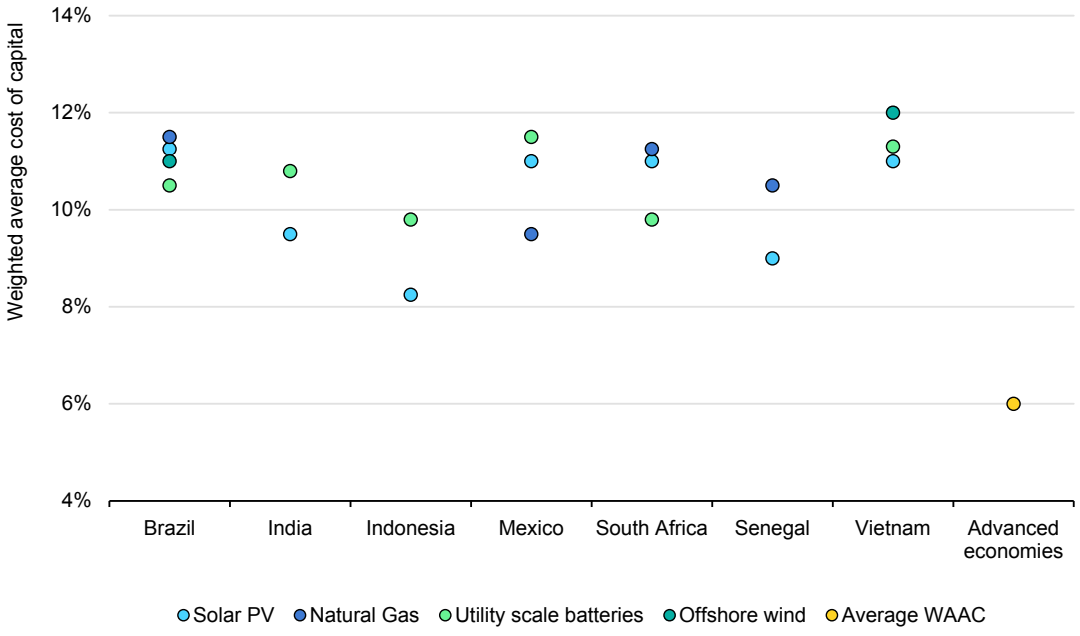
technologies both for businesses and households. The second focuses on targeting the use of carbon tax income and phasing out inefficient fossil fuel subsidies. In this section, the Global Commission in highlighting the following points:

- Addressing high cost of capital in EMDE is essential to scaling up investment and ensuring clean energy benefits are felt across all regions
- Tools such as carbon tax revenue recycling and fossil fuel subsidy reform can be used to provide additional finance targeted towards low-income communities

Addressing high cost of capital in EMDE is essential to scaling up investment and ensuring clean energy benefits are felt across all regions

EMDEs face unique challenges characterised by limited access to affordable capital, inadequate infrastructure, and having a high proportion of the population vulnerable to energy price increases. Despite having significant in-country clean energy resources, the high cost of capital across EMDE regions represents a major barrier to scaling up investment.

Cost of capital by project type in selected countries, 2022



Source: Based on IEA (2023), Cost of capital survey shows investments in solar PV can be less risky than gas power in emerging and developing economies, though values remain high.

Many governments in EMDE face fiscal constraints which increases their reliance on development finance institutions and international private finance. As private financiers often price in higher risks, this results in high cost of capital and, in turn, limits access to financing. As a result, there is increased dependency on concessional financing for these countries. As an example, IEA analysis of Kenya, Senegal and South Africa shows that these countries can experience a weighted average cost of capital nearly double that of Europe or North America for clean energy projects.

IEA analysis shows that lowering the cost of capital by one percentage point could reduce financing costs for net zero transitions in EMDE by USD 150 billion per year. Key actions to reduce the cost of capital include long-term planning, improved regulatory stability, targeted interventions to kick-start investments, and increasing international financial support including concessional funds. Addressing the perceived risk of investing in many EMDE contexts is key to create enabling environments for economic growth and development.

Different tools can be used depending on characteristics of projects. One example from Uganda looks at debt refinancing, or the ability of investors to buy back expensive debt with lower-cost capital over a project's lifetime. In 2007, the development of a large hydropower plant led to a more than 65% decrease in the marginal cost of power and freed up USD 180 million of government spending that was previously spent on tariff subsidies. The plant's original financing agreement included a planned increase in repayments for 2018. Due to the country's cost-reflective tariffs, this additional cost would have been passed onto consumers.

Uganda's Bujagali hydropower plant

Objective: Refinance the debt of the country's largest electricity supplier to prevent rising prices due to high cost of capital at the outset of the project.

Key implementation points:

- Refinancing the debt (buy back the debt with lower-cost capital) was sought by government with the support of several development finance institutions.
- The option to refinance the plant's debt was a first of its kind in sub-Saharan Africa. Its success was driven by the way it was tailored to the nature of the project, as hydropower plants are generally associated with a decline in risks and operational costs through their life cycle.

Outcomes:

- Refinancing pushed back the pay-back date and reduced the cost of repayment. Ultimately, the savings were passed onto consumers who benefited from lower tariffs.

Various actors have a role to play, not only in decreasing financial barriers but also in acting as catalysers for investment. It is estimated that about two-thirds of the 1.3 trillion climate finance goal will come from the private sector. Governments and multilateral development banks can help create the right enabling environments to attract the level of private sector investment needed including by enhancing regulatory stability, issuing public guarantees or supporting blended finance models. At the global level, dialogue between governments and development and financial institutions is essential to identify macro-economic barriers to clean energy investments in EMDE and provide context-based solutions.

Tools such as carbon tax revenue recycling and fossil fuel subsidy reform can be used to provide additional finance targeted towards low-income communities

As the primary goal of a carbon tax is generally to reduce emissions, the more successful a carbon pricing measure is in reducing carbon, the less a government should receive in revenues over time. Still, carbon taxes can provide additional government revenues and provide relief for targeted groups while decoupling growth from negative environmental impacts. Engaging communities in the process of designing how revenues will be distributed and ensuring that there is transparent reporting on how revenue is redistributed is key to their effectiveness. In 2012, California launched a carbon tax revenue recycling programme to benefit lower-income and marginalised communities.

California's Greenhouse Gas Reduction Fund in the United States

Objective: Reduce greenhouse gas emissions while directly benefiting disadvantaged and low-income communities through targeted recycling of cap-and-trade revenue.

Key implementation points:

- Legal requirement that at least 35% of all funds are dedicated to projects benefiting socio-economically deprived communities most affected by pollution source.
- Communities identified through a data-based mapping tool dedicated to environmental justice.

- Transparent deployment of the fund's revenue with the state tracking and publicly reporting on how funding benefits priority populations.

Outcomes:

- As of November 2023, the fund has reduced CO_2 emissions by more than 109 million tonnes while having 76% of its revenue dedicated to projects such as affordable housing and clean energy solutions targeted at low-income households, including residential energy efficiency, public transportation improvements and rebates for electric car purchases, as well as funding for solar energy communities.
- The predictable revenue stream from the cap-and-trade market has helped ensured multi-year planning and stability.

In the European Union, the Social Climate Fund (2026-2032) was created to help alleviate the social and economic impacts of the implementation of the cap-and-trade Emissions Trading System. The fund is intended to assist vulnerable households, micro-enterprises and transport users, among others, with investments that reduce fossil fuel consumption and help them adapt low-carbon technologies. A prerequisite for receiving support from the fund is for member states to propose structural measures and investments in energy efficiency and the renovation of buildings, clean heating and cooling and integration of renewable energy, as well as in zero- and low-emission mobility solutions.

Fossil fuel subsidies are intended to increase the affordability of energy, especially for lower-income households, by providing consumers the fuels they need at below-market-level prices. However, as they are often untargeted, large shares of the subsidy amounts are accounted for by higher-income households, who consume more energy. An IEA analysis estimated that only 14% of global fossil fuel consumption subsidies are targeted, and the poorest two income deciles receive only 10% of residential and transport fossil fuel subsidies. Phasing out inefficient fossil fuel subsidies and targeting them to lower-income households can avoid wasteful consumption and reduce environmental costs. Careful design of those reforms is essential to prevent them from reinforcing social inequities, especially for lower-income households who will disproportionately be affected by price increases in the short-term.

After energy prices spiked in 2022, the subsidy burden reached 14% of GDP in Indonesia, driving a significant increase in overall budget deficit. The government therefore decided to reform inefficient fossil fuel subsidies in order to free up fiscal resources and allocate them to the vulnerable households that most needed support.

Indonesia's fossil fuel subsidy reform

Objective: Reduce the fiscal burden of fossil fuel subsidies while addressing affordability concerns for lower-income households.

Key implementation points:

- Unified poverty database of social protection programmes used to allocate subsidies to the most vulnerable consumers, as was previously done for electricity subsidy reforms.
- Subsidies were provided to the 40% lowest-income households and the small businesses they owned and managed. This decreased the number of people receiving the subsidy by more than half but ensured it was received by those most in need.
- Beneficiaries received subscription cards linked to the banking system, which granted a monthly allowance of three LPG canisters per households and nine canisters per small business.
- In 2017, the subsidy programme was integrated into the social assistance programme through a unified welfare card system that merges energy subsidies and social protections.

Outcomes:

- The reform freed up USD 15 billion of government budget.

In 2014, Egypt also decided to reform inefficient fossil fuel subsidies, as they represented more than 20% of the national budget while the country faced critical fuel shortages. The subsidies mainly benefited higher-income households with estimates that in urban areas the 20% highest-income deciles benefited eight times more from the subsidy than the 20% lowest-income deciles.

Egypt's gradual fossil fuel subsidy reform

Objective: Redesign inefficient fossil fuel subsidies to expand resources for social protection, health and education.

Key implementation points:

- Gradual phase-out of the subsidy to soften the impact on prices and consumers.

- Redirected funding to support essential services including health and education that benefit all.
- Targeted support for lower-income households that would be most exposed to increasing energy prices through expanded social protection. This included the extension of food subsidies, increasing the public minimum wage, expansion of social security pensions coverage, a 50% increase of average benefits and taxes on higher-income households and businesses.
- Political consensus across government, business, academics and investors of the fiscal burden represented by the subsidies.
- Coordination with other national entities include the Central Bank to adjust interest rates to protect consumers' purchasing power.
- Free transport for lower-income households using army vehicles after significant increase in transport prices.

Outcomes:

- The reform decreased energy subsidy spending by 29% in the first year.

8. Implement secure and sustainable solutions

Implement effective and inclusive measures to ensure localised value creation and maximise the socio-economic, environmental and other benefits and their fair distribution, while making efforts towards mitigating negative socio-economic and environmental impacts of energy-related policies and infrastructure and the extraction, refining and processing of certain materials and minerals that are critical for energy transitions while respecting permanent sovereignty over natural resources and energy infrastructure.

Critical minerals are at the core of many of the energy transition's value chains; they are essential to the manufacturing of key clean technologies including solar and wind power, batteries, and electric vehicles. Demand for lithium tripled from 2017 to 2022, and demand for cobalt and nickel increased by 70% and 40% respectively. Investment in the development of critical minerals followed, growing 30% in 2022, and continued to grow 10% in 2023 despite sharp price decreases.

As demand for critical minerals grows, new or expanded mining projects can generate jobs and revenues but they may also result in negative environmental and social impacts. It is crucial to ensure the countries and local communities endowed with these resources are the ones to benefit the most and that policies help mitigate any negative impacts.

The United Nations Secretary General's Panel on Critical Minerals outlines seven Guiding Principles and five Actionable Recommendations to embed equity and justice in the race to net zero emissions. The principles highlight that without proper management, the increasing demand for critical minerals risks perpetuating commodity dependence, exacerbating geopolitical tensions and environmental and social challenges, including impacts on livelihoods, the environment, health, human security and human rights, and can undermine efforts towards the energy transition. The Global Commission is focusing on the following key points in this section:

- Policies can ensure that mining creates value for communities and that negative impacts are mitigated.
- Investing in the productive use of decentralised renewable technologies can generate local revenue and foster small and medium businesses' growth.

Policies can ensure mining creates value for communities and that negative impacts are mitigated

Mining operations can generate negative social and environmental impacts for local communities. This is particularly true for Indigenous nations and communities, which are estimated to live on or nearby more than half of the world's ongoing mining projects. Proximity to mines can increase health risks through exposure to toxic metals and substances. Mining operations are often in water-stressed regions, where users compete for access to water. Policy design informed by inclusive consultation processes between government, industry and the public is important in determining whether risks for communities will be mitigated against or amplified. In Mexico, a reform to the National Mining law aims to mitigate the negative impacts of operations by defining several components of company responsibility and requiring them to compensate affected communities.

Mexico's 2023 reform of the National Mining Law

Objective: To legally require companies to internalise the costs of negative social and environmental impacts they cause for Indigenous nations and local communities.

Key implementation points:

- The reform made it mandatory for companies to finance consultation processes and social impact assessments and obtain the free, prior and informed consent of Indigenous nations, Afro-Mexican and other local communities to operate on their land in order to obtain concessional rights. Carrying out environmental impact assessments and adopting restoration and post-mining closure plans are also included in those preconditions.
- Mining companies are obliged to direct at least 5% of their net profits toward local and affected communities to ensure that communities receive economic benefits from projects.
- Mining companies are prohibited from operating in protected natural areas or areas where they would compete with scarce water resources.
- Mining facilities are required to recycle 60% of treated wastewater to further prevent competition with local water needs and environmental degradation.
- Concession rights can be revoked in case of severe harm to natural resources and their repercussions on the ecosystem and on public health.

Investing in the productive use of decentralised renewable technologies can generate local revenue and foster small and medium businesses' growth

The use of decentralised renewable energy technologies can provide opportunities for local economic growth by generating jobs and income. In communities where there is little or no access to energy, these decentralised technologies can support existing businesses and lead to new economic opportunities by providing cheaper energy and enhancing productivity. At the community level, these solutions can simultaneously foster local entrepreneurship and improve productivity.

In Kenya, to accelerate the expansion of energy access, the Kenya Mini Grid Facility Programme helps small and medium sized entrepreneurs (SMEs) and businesses to adopt renewable energy practices and create jobs. Of the SMEs that participated in the programme and adopted renewable energy to run their operations, 84% reported increased revenue and 40% indicated wages had risen compared to the pre-mini-grid period.

In Kazakhstan, the private sector is expected to provide more than 96% of the estimated USD 610 billion required to achieve carbon neutrality by 2060. To boost the role of businesses in the transition, the government has set up a fund which supports SMEs to deploy clean and efficient energy technologies.

Kazakhstan's DAMU Entrepreneurship Development Fund

Objective: Promote low-carbon urban development in Kazakhstan by empowering SMEs to implement renewable energy and energy efficiency technologies.

Key implementation points:

- Financial support mechanisms facilitated collaboration with the Ministry of Industry and Construction, a state-owned investment fund, and commercial banks.
- Main incentives include an interest rate subsidy of up to 10% per year, reduced borrowing costs and a loan principal subsidy of up to 40% which lower the financial burden on SMEs significantly. Eligibility was also based on whether SMEs were involved in sectors such as heating, electricity, lighting, water, and related services.

- Rigorous financial, technical, and economic assessments were performed to ensure the projects were bankable and can secure private sector financing.

Outcomes:

- The project incentivised 50 SME-led green initiatives, mobilising nearly USD 13 million in investments and achieving a total reduction of 1.1 million tonnes of CO_2 over their lifecycles.
- These projects introduced practical energy-efficient solutions that reduced energy consumption, enhanced indoor comfort, and lowered operational costs for businesses.
- Beyond emissions mitigation, the project also generated jobs, improved living and working conditions, and expanded economic opportunities for SMEs, supporting Kazakhstan's broader transition to a green economy.

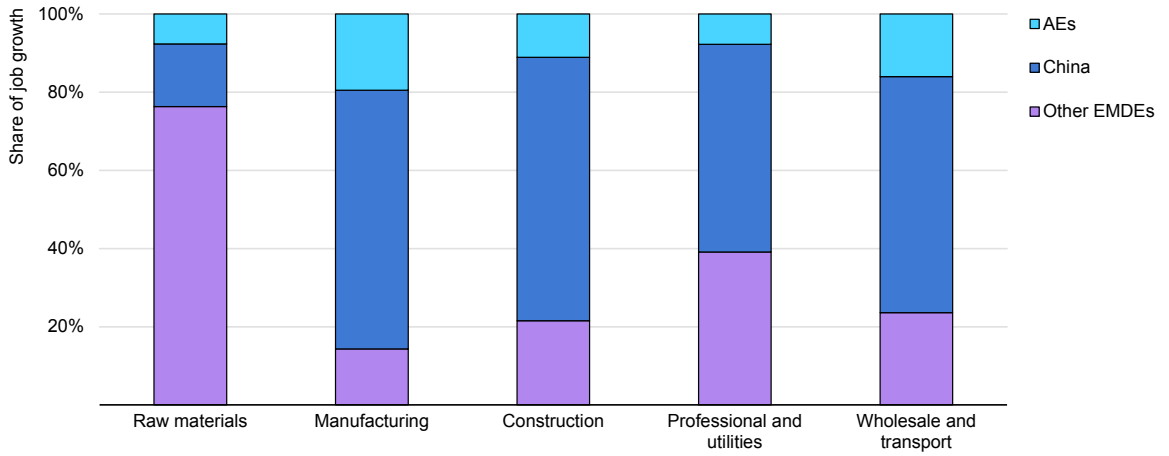
In addition to the fund, Kazakhstan also embedded support for the use of small-scale renewable energy facilities in national law. This change provides a legal obligation for energy supply organisations to conclude power purchase agreements with small-scale producers, which provides security for small producers that the electricity they generate will be purchased. In addition, the law streamlines grid connection processes and compels energy transmission companies to grant access to their networks. These changes make it easier, more profitable, and more secure for small-scale producers to enter and thrive in Kazakhstan's energy market.

9. Sustainable and inclusive economic growth for all

Promote social and economic development through reliable, diversified, sustainable and responsible supply and value chains, inclusive international co-operation and local value creation and beneficiation at source for all, including in developing countries and economies in transition.

There are ongoing risks that global supply chains for key critical mineral production and clean energy technology manufacturing will remain concentrated in a few countries. For example, in 2024, nearly 80% of job additions between 2019 and 2023 in raw materials were in emerging markets and developing economies (EMDEs) other than China. However, higher-value clean energy jobs in manufacturing, utilities or transport had a much smaller footprint in EMDE.

Global clean energy job growth by activity and region, 2019-2023



Source: IEA (2024), World Energy Employment.

Diversifying supply chains is essential to bolster global energy security and ensure that countries where resources are located can benefit in terms of revenue, job creation and broader socio-economic development.

In countries where the energy system has been shaped by fossil fuel resources, transitioning energy systems can pose specific challenges. While many energy producing countries are expecting to attract significant investments in clean energy, they simultaneously need to decommission fossil energy plants to avoid

leaving local communities with ageing and polluting legacy infrastructure. This can be costly and requires technical knowledge. The limited access to finance that producing economies may face, alongside competing development priorities, creates further challenges to their economic transformation. In this paper examples show that many countries have already engaged in transforming their energy systems and are working to design policies that can address several social priorities at once and provide benefits for populations, including groups that operate on the margins of today's energy systems.

The Global Commission is spotlighting some key tools countries are using to implement this principle. The first is enforcing traceability mechanisms that help set global standards for the exploitation of critical mineral resources. This is to ensure they respect labour rights, prevent local environmental degradation and lead to fair distribution of socio-economic costs and revenues. The second, is to foster opportunities for local revenue generation and business growth. These tools can support countries in seizing the opportunity clean energy transitions bring to reshape global supply chains and lead to fairer market dynamics. In this section, the Global Commission focuses on the points below:

- International co-operation is essential to ensuring safe and secure supply chains.
- Fostering local manufacturing of clean energy technologies can ensure resource-rich countries retain benefits.

International co-operation is essential to ensuring safe and secure supply chains

Critical mineral value chains are spread across geographies. Increasing the traceability of how they are sourced, refined and produced is important to respect rights and creating local value. Some regions have already developed frameworks for traceability particularly in the critical raw material sector. Amongst other obligations, the European Union, requires supply chain mapping from the extraction stage based on information provided by the supplier or publicly available. Colombia established a unified registry of mineral traders and a traceability platform run by the National Mining Agency to track minerals from extraction to sale including though physical mine visits and inspections.

Industry also has a role to play in fostering greater transparency regarding clean energy supply chains, as businesses are well-placed to help develop standards that can be used across the various jurisdictions where they operate. Several international and industry-led initiatives have emerged to increase the traceability of certain materials as well as the clean energy technologies for which they are sourced. Since 2019, the Global Battery Alliance, which brings together more than 140 partners from business, government, civil society and academia, has been working on the elaboration of an international Battery Passport. This passport is

meant to provide information on the whole supply chain of batteries and foster standardisation at the global level.

International co-operation in energy supply chains goes beyond manufacturing and distribution and also includes the management of technologies' end-of-life cycle. As energy equipment such as solar photovoltaics or batteries reach the end of their usability, there is a risk their waste ends up in landfills, particularly in EMDEs. Managing the end-of-life of key energy transition technologies to minimise such outcomes can be done by increasing production responsibility, regulating leakage risks, improving collection rates and investing in research and development to support emerging recycling technologies. In turn, recycling can also help meet growing critical mineral demand and minimise supply disruption risks by decreasing the geographic concentration of resources.

Increased transparency across clean energy value chains is important to ensure energy transitions foster responsible business practices. In addition, access to reliable, consolidated data on material trade flows and value chain impacts can support evidence-based policy making and corporate decision making, which reinforces the need for more effective international co-operation.

As transitions move forward, not all countries will have the same capacity to invest in the research and development of technologies. Technology and knowledge exchanges between countries are an important form of international co-operation which can help bridge this gap.

In 2013, Japan's Ministry of the Environment introduced the Joint Crediting Mechanism (JCM) Financing Support Programme. Its purpose was to distribute aid to support developing countries across the world to reduce GHG emissions through advanced clean energy technologies and infrastructure such as solar PV systems or energy-efficient industrial boilers. The initiative was designed to ensure country ownership was embedded across projects and in alignment with the priorities of the beneficiary country.

Joint Crediting Mechanism Financing Support Programme, Japan

Objective: Facilitate technology transfer and international co-operation to accelerate clean energy transitions in emerging economies.

Key implementation points:

- Japan's Ministry of the Environment and partner institutions co-finance up to 50% of project costs prioritising small and medium-scale projects often located in rural or undeserved regions.

- Bilateral co-operation and country ownership embedded in the JCM, which is implemented via bilateral agreements that align with national priorities and ensure host countries co-own implemented projects and benefit from their outcomes.
- Funded projects prioritise local contractors and workforce to ensure job creation and local economic development.
- Japanese ministries organise capacity building and technical assistance programmes, including gender sensitive training, for local workers contributing to inclusive skills development and building long-term domestic capacity on clean energy.

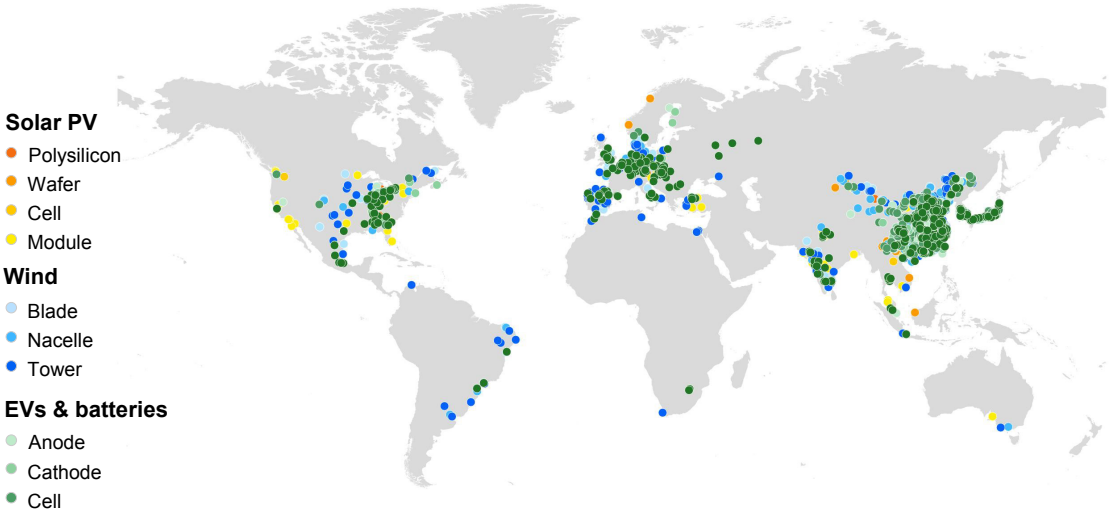
Outcomes:

- Since 2013, Japan has established the JCM with 29 partner countries, and more than 250 projects have been selected as beneficiaries.
- An online knowledge sharing platform provides examples of lessons learned from funded projects, as well as open access to project methodologies.

Fostering local manufacturing of clean energy technologies can ensure resource-rich countries retain benefits

While 40% of clean energy jobs are in EMDE other than China, they are often in lower-value parts of the supply chains such as raw material extraction. Overall, clean energy represents a smaller share of their economy-wide growth in these countries than in China or advanced economies. While EMDE have captured significant shares of jobs in the raw material sector, some regions, especially in Africa, have not yet found a foothold in clean energy manufacturing.

Clean technology manufacturing facilities in operation, 2023



Source: IEA (2024), Energy Technology Perspectives.

In 2023 the African Renewable Energy Manufacturing Initiative was created to support the development and growth of local manufacturing companies, with a focus on retaining economic revenue and job gains in the region.

Africa Renewable Energy Manufacturing Initiative

Objective: Attract investment for the manufacturing of clean energy technologies in Africa to foster local economic growth and job creation.

Key implementation points:

- Help mature companies to better access consulting and financing opportunities and support the development of pilot projects that make a business case for manufacturing clean energy technologies in the region.
- Foster the growth of engineers and technicians in Africa by providing support for training, employment and career development.
- Develop country-specific guides spelling out the landscape of existing laws, policies, institutions and financing options to facilitate the engagement of businesses, investors and other actors involved in renewable energy manufacturing.
- Collaboration with government stakeholders to foster enabling environments for manufacturing businesses.

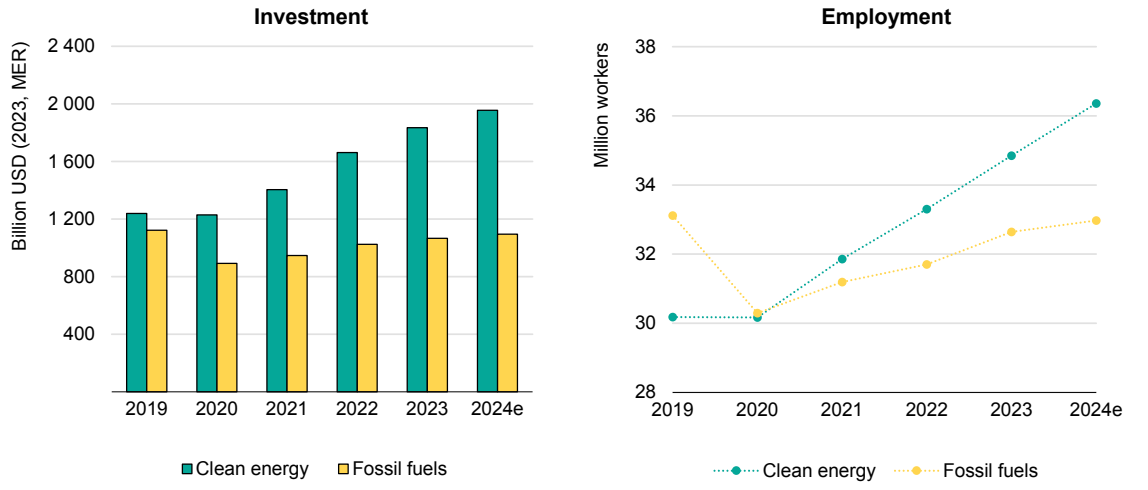
In several countries, the adoption of local content policies that require mining companies to use local procurement of goods and services has been one way of retaining the value of operations locally. In South Africa for example, local content policies require that 80% of total expenditure on services must come from South African companies and that 70% of total expenditure on mining goods must be spent on domestically manufactured goods.

10. Quality jobs and workforce development

Create decent work and quality jobs in accordance with nationally defined development priorities and enable sectoral labour mobility and workforce transformation through reskilling and upskilling to create avenues of employment, while creating greater opportunities for all, noting the ILO guidelines on a Just Transition for all in this regard, as relevant.

Economy-wide employment rose by 2.2% in 2023 compared to 3.8% for energy employment. Although both were up in 2023, clean energy investments have outpaced those in fossil fuels since 2019. In 2023, clean energy jobs grew to 34.8 million, widening the gap over fossil fuel employment, which totalled 32.6 million. As these trends shift towards clean energy skills and occupations, there are concerns about whether these jobs will provide opportunities for decent work offering good wages and conditions, and if the global energy workforce is equipped with the skills needed to fill those positions.

Global investment and employment, in clean energy and fossil fuels, 2019-2024



Note: 2024 values are estimated.

Source: IEA (2024), World Energy Employment.

The ILO Declaration on Fundamental Principles and Rights at Work, agreed by governments, employers' representatives and workers' representatives lay out fundamental labour rights including freedom of association and the right to

collective bargaining. These principles are central to ensuring a just transition for workers, as changes in the energy system shift demand for labour and skills.

An IEA survey of nearly 200 energy employers across 27 countries in Europe, the Americas, Africa and Asia Pacific, shows that more than 75% report difficulties in hiring skilled installation and repair technicians, trade workers and project supervisors. These positions represented more than 50% of clean energy jobs in 2023 and are set to experience the largest growth in the coming years. To address this, the energy sector will need to attract larger numbers of people into these jobs and provide them with adequate and accessible training. While national level planning is key to prevent skills shortages, investing in cities to roll out skills and jobs programmes can also boost workforce development in urban areas, where jobs tend to be concentrated.

The Global Commission recognises several key tools to ensure quality jobs and workforce development. Industrial policy is important in spurring the creation of good jobs, especially in communities facing economic transformations as a result of industry phase-out. To inform the design and effective implementation of such policies, national skills mapping exercises can provide a robust basis to identify the existing strengths and gaps of the workforce and target the development and delivery of training locally. At the sectoral level, assessing the workforce supply that will be needed to match the demand created by upcoming investment in energy infrastructure and technology deployment avoids the risk of a gap between the qualifications demanded by employers and those supplied by workers. Finally, providing continuous support to upskill workers as demand for skills and occupations evolves, including digital skills, is essential to preserve jobs. The Global Commission here focuses on the points highlighted below:

- Well-designed industrial and labour market policy is essential to guide workforce transitions and the creation of quality jobs
- Examining skills needs can help smooth transitions including by identifying workers with transferable skills
- Ensuring workers can gain new skills in emerging areas can support workers through transitions

Well-designed industrial and labour market policy is essential to guide workforce transitions and the creation of quality jobs

Cohesive design of energy, industry and labour market policy tools can help communities secure good jobs while reshaping their economies in a sustainable way. In Australia, the government's decision to move away from coal is expected to have significant implications for certain communities.

For example, Collie, a small town in Western Australia, has deep rooted economic ties to the coal industry with around 20% of the local population working in the coal industry and related supply chains. As measures were set out to shut down its state-owned coal-fired power plants by 2029, the government initiated the design of Just Transition Plans to ensure the transition would result in positive outcomes for the community. The plans were designed to foster the creation of decent, well-paid jobs and worker protection, integrating the dimensions of energy, labour and industrial policy at its core.

Australia's Collie community transition away from coal

Objective: Ensure a just transition for affected workers and the wider community via a community-led approach and a locally designed just transition plan.

Key implementation points:

- Creation of a Just Transition Working Group with meetings held locally with support from the State which ensured a community-led approach.
- Financial support provided via the Collie Transition Package and Collie Industrial Transition Fund (AUD 700 million [Australian dollars]) to create new jobs, retrain workers, expand the Collie Jobs and Skills Centre and attract and develop other sectors in the area.
- Strong focus on local economic diversification with efforts to maximise opportunities for local SMEs including Aboriginal businesses that helped support the wider community to ensure social acceptance and maximise benefits.

Outcomes:

- There is now a local Just Transition Plan following years of multilateral discussions between workers and trade unions, employers, the government and the wider local community.
- Investment from new industries including an AUD 1 billion battery energy storage system with work already underway, a green magnesium plant and a green steel electric arc furnace. Combined, these could bring thousands of jobs to the local area.

At the time of its closure in 2012, Lindø Shipyard in Denmark employed almost 2 700 workers. To prevent negative local economic downturn and talents leaving

the region, as many of the affected workers were highly skilled, action was taken to bring new industries to the area to create new jobs and allow for job-to-job transitions.

Denmark's transition from shipping to wind industries

Objective: Provide individual solutions for affected workers to prevent collective redundancies and regional economic downturn and ensure a just transition through industrial policy and public funding to attract new industries and reskill/upskill workers to for job-to-job transitions

Key implementation points:

- Strong co-operation between local policy makers and social partners allowed for a smooth transition for ex-shipyard workers (almost 3 000) to new positions in offshore renewables.
- Creating and developing a clear and ambitious regional industrial policy, developed with key stakeholders, based on specific local attributes such as access to a large number of skilled workers in a strategic location.
- Access to public finance, including via the European Union European Globalisation Fund (EUR 20.4 million), to help reskill and upskill affected workers.
- The establishment of a joint secretariat helped coordinate and manage the transition with the trade unions.
- The provision of tailored support for individuals ensured no worker was left behind.
- Individual reskilling and upskilling plans enabled skilled workers to find similar jobs in the region including in new offshore energy businesses.

Outcomes:

- The closure of Lindø Shipyard in Denmark led to the successful transition to the Port of Odense offshore energy manufacturing hub.
- The renamed Odense Port hosts more than 100 companies leading in offshore wind and offshore energy with more than 3 200 people employed and plans to employ another 6 000 in the future.
- Successful job-to-job transitions ensuring social acceptance and preventing brain drain and economic downturn in the region.

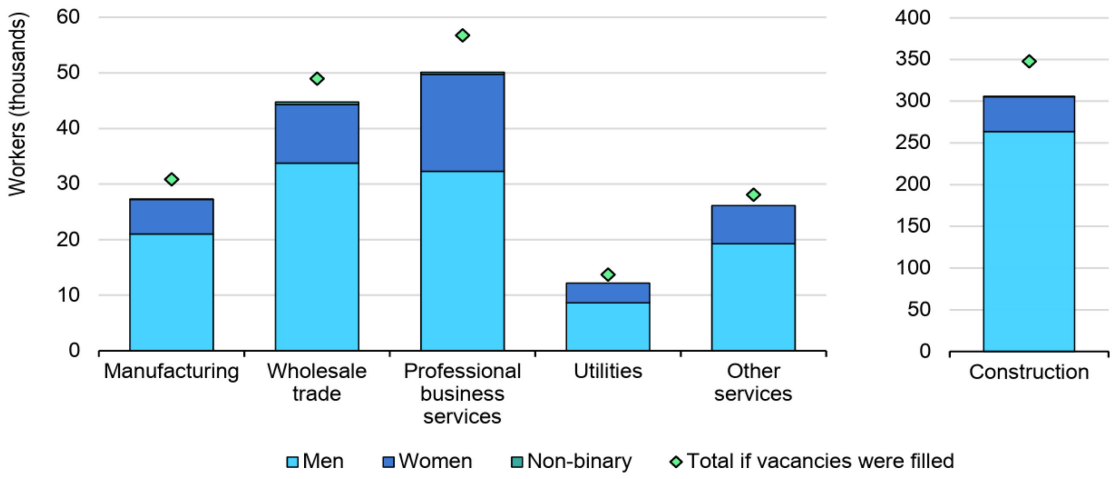
Examining skills needs can help smooth transitions including by identifying workers with transferable skills

Addressing skills shortages and ensuring a skilled workforce is key to ensure energy security and avoid losing out on economic and social gains. Many countries are working on mapping to understand skills transferability between clean energy and fossil fuel jobs. The Global Commission is showing examples of programmes that countries are using to identify skills and help workers in transition find employment.

In Canada, a report on the country's energy efficiency workforce found that labour shortages are a top challenge, with 73% of employers reporting difficulty finding qualified workers. Additionally, there is low public awareness of career opportunities in energy efficiency, limiting the talent pipeline. The workforce is ageing, with nearly one-third of workers over the age of 55. This is raising concerns about future retirements exacerbating current shortages. Employment in the sector is projected to grow by 17.6% between 2023 and 2030, outpacing national averages.

Concerns about labour shortages and maximising job creation can be addressed by tapping into underrepresented labour pools, including women and Indigenous Peoples, through targeted marketing campaigns, and greater promotion of skilled trades as rewarding and stable career paths.

Total employment in energy efficiency by gender and potential employment if vacancies were filled, Canada, 2024



Source: IEA (2024), Energy Efficiency.

In South Africa, a comprehensive mapping of the skills needed for the renewable energy value chain is helping guide the roll out of training and form partnerships between educators, government and the private sector.

South Africa's skills mapping for renewable energy value chain jobs

Objective: Map and identify the skills required in solar and wind, and quantify the job gains to be achieved, to reskill coal workers and deliver appropriate training coordinated between educators, government and industry.

Key implementation points:

- An initial skills mapping exercise, carried out with local partners, formed the basis for implementation, by identifying existing skills of workers in the coal sector, job opportunities in the renewables sector and how to transition from one to the other.
- Creation of partnerships between local knowledge partners, the Nkangala Technical and Vocational Education Training College, government, private sector and Res4Africa Foundation. These partnerships helped ensure a full transition for students from training to employment.
- Provided students with internships with the industry partner to ensure smooth transitions toward employment.

In the United Kingdom, a comprehensive strategy was set out to create decent jobs and prevent skills shortages in energy transitions by training workers based on future forecasted demand in key sectors.

United Kingdom's Transition Plan for Clean Energy jobs

Objective: Ensure the United Kingdom meets the need for a skilled workforce by 2030 and that good jobs are spread across the country. This includes the provision of training for additional 55 000 jobs in offshore wind, 100 000 in related infrastructure and operations companies and 120 000 in the nuclear sectors as well as the reskilling of 3 million people in high carbon sectors.

Key implementation points:

- Establishment of an Office for Clean Energy Jobs within the Department for Energy Security and Net Zero to ensure that clean energy jobs are not only

abundant but also of high quality, focusing on fair pay, favourable terms, and good working conditions.

- Extensive engagement with industry and trade unions to support their work to ensure the quality of jobs.
- Collaboration with Skills England to support workers from high carbon sectors to move to clean energy jobs by targeting skills interventions to reskill and upskill workers.
- Provision of funding to local partners to identify the skills support needed in their area and use of their output to tailor further funding for targeted measures such as new training centres and courses while placing a special focus on regions with a history of reliance on fossil fuels.
- Development of an Energy Skills Passport to align standards, recognise transferable skills and qualifications and map out career pathways for suitable roles in order to help oil and gas workers identify routes into clean energy sectors.

Equipping workers from traditional energy sectors with clean energy skills can help address concerns around skills shortages while providing those affected by energy transitions with alternative opportunities. Following concern from industry on the lack of technical capacity and the shortage of skilled workers in relation to electric vehicle (EV) maintenance and operation Panama embarked on a programme to retrain mechanics and technicians in traditional energy sectors with skills needed in electro mobility and distributed generation. Training was designed based on dialogue with industry and a survey that helped identify the needs of workers to improve their learning experience and limit dropouts. A mobile classroom that travelled to several cities, and virtual classes, helped target groups that were harder to reach.

Providing workers with the skills needed for energy transitions can also create opportunities to integrate traditionally underrepresented workers in the energy workforce. In Nigeria, targeted training programmes are supporting efforts to guide the transition away from petrol and diesel and to create quality jobs and help the local workforce navigate clean energy reforms. Collaboration between government, industry and trainers to align the curriculum with industry demand, and match trainees with employment opportunities, and the targeting of economically marginalised groups, has led to increased employment in the automotive sector, especially for youth and informal workers.

Ensuring workers can gain new skills in emerging areas can support workers through transitions

The digital transition of the European energy sector requires new skills, the reskilling and upskilling of workers, and the attraction of new workers to the sector. The European Union (EU) funded a project from 2020 to 2023 which brought together stakeholders from nine EU countries to match the current and future demand of skills for the digitalisation of the energy sector with Vocational Education and Training (VET) systems to identify policy recommendations.

The European Union's new Large Scale Partnership for the Digitalisation of the Energy Value Chain, under the EU Pact for Skills Initiative

Objective: Develop a long-term strategy for the education in digitalisation of the European energy sector with key stakeholders to support training and education and ensure a skilled workforce for the future.

Key implementation points:

- Mapping effective vocational and education training, retraining and lifelong learning programmes to better understand skills gaps and needs and in turn provide policy recommendations.
- Exchange of information on new and improved qualifications in national VET and sectoral upskilling and reskilling structures to share best practice.
- Knowledge sharing on workforce planning, and related skills needs, linked to the deployment and implementation of new technologies and trends to share best practice.
- Creation of a framework for education providers to define and update educational programmes with a monitoring system to track relevant new developments and environments in the field.
- Completion of surveys to understand the challenges faced by industry towards the digitalisation of the energy system including the identification of skills needs and skills gaps with validation via in-depth interviews with industry executives.

In another example, the Korean government launched a national campaign to increase digital and artificial intelligence (AI) skills.

Korea's Artificial Intelligence and Digital (AID) 30+ Project

Objective: Create a lifelong learning system on artificial intelligence and digital skills for individuals over 30 years old with the goal of helping individuals retrain and upskill.

Key implementation points:

- Expand the role of universities in lifelong learning and support 100 leading education institutions to act as Lifelong Learning Hubs.
- Provide free digital education via digital lifelong education vouchers for 10 000 adults.
- Make the registration process for digital training more accessible.
- Actively encourage current college students to use learning vouchers to develop their digital and AI skills.
- Provide specific support for people with disabilities to support their digital independence.
- Revitalise traditional lifelong learning pathways to incorporate AI and digital-related majors into the self-study degree system.
- Establish a new national education certification and career development system covering digital education, certification and career development.

Moving toward implementation and tracking

This Blueprint for Action demonstrates how governments and stakeholders are already designing and implementing policies in line with the ten voluntary Principles for Just and Inclusive Energy Transitions. However, policies do not always work the way they were intended to in the design stage. Monitoring and tracking outcomes of policy implementation is critical to understanding the effectiveness of interventions. Evaluations carried out on the ground can help identify negative impacts to improve the design and roll out of programmes. Countries can use lessons learned through project implementation to inform better policy design.

The Global Commission believes that an important element of policy implementation is to consider how to track and evaluate policy actions. To accompany this Blueprint, the Global Commission is developing a menu of indicators for each principle to give examples of how to measure success.

Indicators for just and inclusive energy policies

As energy challenges differ from country to country, it is neither feasible nor desirable to prescribe a single universal set of indicators and evaluation techniques to track the operationalisation of the Principles for Just and Inclusive Energy Transitions. Each country is best placed to determine which dimensions of just and inclusive energy transitions are most urgent for them to address, and to define how progress in those areas can and should be measured.

The *Indicators Handbook* will explore methods to evaluate the impacts of policies and measures put in place in support of the G20 principles. This will include direct impact measures such as access and energy poverty metrics, distribution of costs and benefits of policies, and metrics of clean energy and energy efficiency deployment. It will also consider wider impacts such as employment, economic development, thermal comfort and environmental quality.

Many such indicators already exist, ranging from the UN Sustainable Development Goals to many national indicator-based targets for emissions abatement, energy and climate goals, and jobs and just transitions. The *Indicator Handbook* will build on these while also placing particular emphasis on means to track impacts on specific population groups or communities.

Leveraging these existing metrics will help ensure alignment with internationally recognised standards, while avoiding duplication of efforts and building on the experience already available across institutions and countries.

Many countries face barriers to collecting, accessing, and using disaggregated data that reflects real lived experiences. These gaps often stem from issues with data quality, resource limitations, insufficient granularity (e.g. lack of income-disaggregated figures), or limited community engagement in the data collection process. The *Indicators Handbook* will propose solutions to help governments overcome these barriers, drawing on lessons learned and best practices from other countries' experiences.

Ultimately, by engaging in a continuous monitoring process, governments not only track progress toward the operationalisation of the ten principles but also enhance transparency and strengthen accountability to citizens, fostering a just and inclusive energy transition built together with people. This *Indicator Handbook* is designed to provide support to governments to help them throughout this process.

General annex

Annex A- Voluntary Ten Principles for Just and Inclusive Transitions

1. Energy planning for just and inclusive energy transitions

Acknowledge the importance of long-term regional and domestic energy planning and policies across various sectors to guide actions and financing mechanisms that promote energy transitions and design and implement just and inclusive energy transition policies in individual countries, while ensuring energy security, affordability, accessibility, and markets stability and economic prosperity.

2. End energy poverty

Tackle all forms of energy poverty, with a focus on ensuring access to affordable, reliable, sustainable and modern energy, including clean cooking, for all.

3. Social dialogue and stakeholder participation

Foster social dialogue and encourage meaningful and effective participation by all relevant stakeholders, including from affected communities, employers' organisations and trade unions in the decision-making processes related to energy transitions.

4. Social protection

Strengthen the access to appropriate social protection systems for all as part of just and inclusive energy transitions in order to support workers and communities, with particular consideration to the poor and those in vulnerable situations.

5. Policy inclusiveness

Incorporate intersectional perspectives on gender balance, including women empowerment, age, race, ethnicity and those in any vulnerable situations into energy planning and policies and ensure a fair distribution of costs and benefits.

6. Respect rights

Respect, promote and consider respective obligations on human rights, and on the rights of Indigenous Peoples, local communities, persons with disabilities as well as labour rights in the planning and implementation of energy transitions policies and projects.

7. Invest in affordable and reliable solutions for just and inclusive energy transitions

Explore efficient, inclusive and just mechanisms for cost allocation in energy solutions and their impact on the cost of energy, with a focus on timely mobilisation of resources and working towards facilitating low-cost financing in developing countries for innovative technologies and business models, to widely share the benefits and to help mitigate the burden of energy transitions, especially on the poorest segments of the population.

8. Implement secure and sustainable solutions

Implement effective and inclusive measures to ensure localised value creation and maximise the socio-economic, environmental and other benefits and their fair distribution, while making efforts towards mitigating negative socio-economic and environmental impacts of energy-related policies and infrastructure and the extraction, refining and processing of certain materials and minerals that are critical for energy transitions while respecting permanent sovereignty over natural resources and energy infrastructure.

9. Sustainable and inclusive economic growth for all

Promote social and economic development through reliable, diversified, sustainable and responsible supply and value chains, inclusive international co-operation and local value creation and beneficiation at source for all, including in developing countries and economies in transition.

10. Quality jobs and workforce development

Create decent work and quality jobs in accordance with nationally defined development priorities and enable sectoral labour mobility and workforce transformation through reskilling and upskilling to create avenues of employment, while creating greater opportunities for all, noting the ILO guidelines on a Just Transition for all in this regard, as relevant.

Annex B- Members of the Global Commission

The Global Commission for the People-Centred Clean Energy Transitions was convened by the Executive Director of the IEA, Dr Fatih Birol, in January 2021.

Co-Chairs

Teresa Ribera Rodriguez
Executive Vice-President for Clean, Just and Competitive Transition, European Commission

Alexandre Silveira de Oliveira
Minister of Mines and Energy, Brazil

Members

Sara Aagesen
Deputy Prime Minister and Minister for the Ecological Transition and Demographic Challenge, Spain

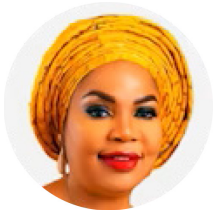
Rachel Kyte
Special Representative for Climate, United Kingdom

Lars Aagard
Minister for Climate, Energy and Utilities, Denmark

Dan Jørgensen
Commissioner for Energy and Housing, European Commission

Diego Pardow Lorenzo
Ministry of Energy, Chile

Fareed Yasseen
Special Climate Envoy, Iraq

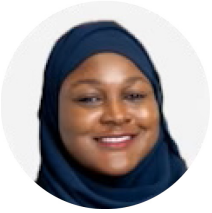


Nkeiruka Onyejeocha
Minister of Labour and Employment, Nigeria

Edwin de Palma
Minister of Mines and Energy, Colombia

Zulfiya Suleimenova
Special Representative of the President of Kazakhstan on International Environmental Cooperation, Kazakhstan

Paulina Hennig-Kloska
Ministry of Climate and Environment, Poland



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Yvonne Aki-Sawyer
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Jean-Pierre Clamadieu
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John W. H. Denton AO
Secretary General, International Chamber of Commerce

Chief Sharleen Gale
Chair, The First Nations Major Projects Coalition (FNMPC)

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Special Advisor to the Secretary-General on Climate Action and Just Transition, United Nations

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Helena Leurent
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President, Congress of South African Trade Unions (COSATU)

Sheila Oparocha
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The content of this Blueprint benefited from the inputs of Natural Resources Canada, the German Federal Ministry for Economic Affairs and Energy and the Portuguese Ministry of Environment and Energy and the South Africa Council of Scientific and Industrial Research.

Annex C - Abbreviations and acronyms

EMDE	Emerging markets and developing economies
ILO	International Labour Organization
GBP	page 51 – not given in the text what that means
ULEZ	Ultra Low Emission Zone (not directly given in the text either, page 51)
IEA	International Energy Agency (or not necessary here because obvious?)
PV	Photovoltaic (not directly given in text, page 56)
OSH	Occupational Safety and Health
MoPE	Ministry of Petroleum and Energy
CEM	Clean Energy Ministerial
NGO	Non-governmental organisation
CAD	Canadian Dollar (not directly given in text, but maybe obvious? Page 61)
GHG	Greenhouse gas
USD	United States Dollar
GDP	Gross domestic product
LPG	Liquid petroleum gas (not directly given in text, page 74)
SMEs	Small and medium enterprises
JCM	Joint Crediting Mechanism
AUD	Australian Dollar
EUR	Euro
EV	Electric vehicle
EU	European Union
VET	Vocational Education and Training
AI	Artificial intelligence
UN	United Nations

Glossary

bbl	barrel
bbl/d	barrels per day
bcm	billion cubic metres
bcm/yr	billion cubic metres per year
cm/s	centimetres per second
gCO_2	gram of carbon dioxide
gCO_2/kWh	grams of carbon dioxide per kilowatt hour
GJ	gigajoule
Gt/yr	gigatonnes per year
$GtCO_2$	gigatonne of carbon dioxide
$GtCO_2$/yr	gigatonnes of carbon dioxide per year

See the IEA glossary for a further explanation of many of the terms used in this report.

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