Best Practices and Insights to Expand Clean Energy Access and Adoption

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Abstract

This report was commissioned by the European Commission to serve as a technical repository of analysis and evidence-based practices in support of the Campaign on Sustainable Lifestyles, Fairness and Access to Clean Energy Technologies. The analysis presented draws on discussions and research shared during the Widening Participation in Clean Energy workshop held in Brussels, contributions presented at the official all-member meetings of the Campaign on Sustainable Lifestyles, and the IEA's analytical work in areas such as people-centred clean energy transitions, affordability, energy efficiency and clean energy access.

This work is organised into three chapters, each corresponding to one of the three components of the Declaration on Promoting Sustainable Lifestyles, Fairness and Access to Clean Energy Technologies. The analysis and case studies included demonstrate how the principles outlined in the Declaration can be implemented in practice across different country contexts.

The recent energy crisis and rising energy costs have underscored the importance of affordability, fairness and access to clean energy technologies, particularly for vulnerable households. At the same time, evidence points to the importance of both individual actions as well as broader policy frameworks, enabling infrastructure, and investment that support long-term behavioural change.

This report examines how policies, public engagement and sectoral transformation can create conditions for sustainable lifestyles that follow low-emissions practices and are resilient and inclusive. It draws on international evidence, including workshop discussions, IEA analysis and a wide range of global case studies, to identify key impacts and lessons learned from evidence and practice. It highlights how behaviour change is most effective when supported by coherent policy frameworks, targeted measures addressing affordability and structural changes across sectors such as buildings, transport and appliances. By identifying good practices and practical insights, the report provides guidance to support policymakers design inclusive strategies that enable sustainable lifestyles and ensure the benefits of the energy transition are shared by all.

Acknowledgements

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Table of contents

Introduction

CEM campaign on Sustainable Lifestyles, Fairness and Access to Clean Energy Technologies

Launched at the 15th Clean Energy Ministerial Meeting (CEM15) in Foz do Iguaçu, Brazil, the CEM Campaign on Sustainable Lifestyles, Fairness and Access to Clean Energy Technologies aims to "put people at the heart of clean energy transitions, raise awareness on behavioural change at all levels and embed social justice in clean energy transitions by enabling countries and partners to incentivise and share policies that support our societies to move forward in a fair way that leaves no-one behind".

The Campaign is led by the European Commission and co-led by Norway, the People's Republic of China (hereafter "China") and India.

As part of this campaign, senior representatives from across the globe meeting at the 16th Clean Energy Ministerial (CEM16) in Busan, South Korea, endorsed the Campaign's Declaration on Promoting Sustainable Lifestyles, Fairness and Access to Clean Energy Technologies principles. The Declaration has been endorsed by the European Union, China, India, Norway, Brazil, Finland and Spain.

Declaration on Promoting Sustainable Lifestyles, Fairness and Access to Clean Energy Technologies

CEM Members, including countries, partners, and other stakeholders, recognise the need to promote and facilitate behavioural and lifestyle changes to support the energy transition in a fair and inclusive manner. This means, ensuring that all individuals and communities, including persons in vulnerable situation, youth and women, can participate and benefit equitably. In this context, they declare the intention to take actions considering one or more of the following principles:

Part 1. Policy: Leading by acting

1. Incentivise and enable sustainable lifestyle changes and fairness, including for the persons in vulnerable situations in society. Encourage the development of policies and actions with clear objectives and targets.

2. Share and report on policies, good practices and other initiatives supporting sustainable lifestyle, fairness and affordable, reliable, efficient and sustainable low-emissions technologies which have been or will be put in place, motivating other members to follow the steps.

3. Undertake communication and awareness campaigns to promote and inform citizens about the benefits of sustainable lifestyle changes, including intergenerational fairness, as well as the access to affordable, reliable, efficient and sustainable low-emissions technologies.

Part 2. People: Empowering individuals and communities

4. Support educational programmes and cultural developments that support nature conservation, efficient use of energy and minimise environmental footprints for a sustainable future at all levels of education/training.

5. Involve and empower local communities in fostering sustainable lifestyles for improving our environment for present and future generations, involving cities and other local authorities, social partners and civil society as well as businesses.

6. Actively involve youth and women in promoting lifestyle changes and access to energy-efficient technologies. By empowering them and providing educational resources, we envisage to cultivate a sustainable future where every individual has the knowledge and tools to prioritise energy efficiency.

7. Support policies to ensure efficient use of energy and materials by households and/or companies through sustainable behaviours and technologies, thereby saving energy and preserving resources, while ensuring accessibility, affordability and equity in meeting everyone's basic needs.

Part 3. Sector: Transforming systems

8. Support the advancement of clean building practices, embracing techniques and technologies that prioritise efficiency, sustainability and affordability for all.

9. Enhance accessibility to low-emissions mobility in both urban and rural areas. By promoting sustainable transportation options affordable for all, we aim to create inclusive and environmentally friendly mobility solutions for all members of our community.

10. Support a universal transition to affordable, reliable, efficient and sustainable low-emissions energy technologies by investing or encouraging targeted measures and campaigns that promote fairness.

11. Implement actions to promote sustainable lifestyle and fairness in other areas related to the energy transition such as food production and consumption methods, textile production and consumption habits, recycling methods, clean cooking etc.

By endorsing this Declaration, CEM Members and other relevant stakeholders express their intention to implement policies and actions aligned with the principles

outlined herein, and, on a voluntary basis, may share information on their progress, including success stories that demonstrate their commitment to sustainable lifestyles.

Brussels workshop on Widening Participation in Clean Energy

The European Commission invited the IEA to host a workshop on Widening Participation in Clean Energy in support of the CEM Campaign on Sustainable Lifestyles, Fairness and Access to Clean Energy Technologies. This workshop was held in Brussels during 13-14 March 2025.

The workshop's programme was designed to explore how to widen participation in clean energy programmes, particularly among low-income households, and to ensure fairness in transitions.

The workshop brought together representatives from governments, think tanks, civil society, consumer advocacy organisations, youth, academia and international organisations. Participants included policymakers from the European Commission, Spain, Norway, Portugal, Belgium and Ireland; academic researchers from North America, Europe, Latin America, Africa, India and Southeast Asia. Representatives from the World Resources Institute, the Regulatory Assistance Project, the Council on Energy, Environment, and Water (CEEW), the Natural Resource Governance Institute and the Climate Action Network also contributed to the discussions.

Sessions covered innovative policy design for affordability outcomes, addressing barriers and empowering citizens to participate in clean energy programmes, and involving citizens through strategic communications. The programme also included a publicly livestreamed session co-hosted with Consumers International as part of Consumers International's Sustainable Lifestyles Summit. This session explored practical examples of community-driven solutions and partnerships between policymakers and local stakeholders that have helped advance clean energy rollout. The agenda also included a working session on tracking and measuring fairness in clean energy programmes.

About this report

This report has been commissioned by the European Commission as a technical repository of analysis and evidence-based practices to support the Campaign on Sustainable Lifestyles, Fairness and Access to Clean Energy Technologies. The analysis included in this report draws from the discussions and research shared as part of the Widening Participation in Clean Energy workshop in Brussels, research presented at the official all-member meetings of the Campaign on

Sustainable Lifestyles and IEA's analytical work in areas including people-centred clean energy transitions, affordability, energy efficiency, and clean energy access. It is structured into three chapters, corresponding to the three parts of the Declaration on Promoting Sustainable Lifestyles, Fairness and Access to Clean Energy Technologies. The analysis and case studies included in the report illustrate how the Declaration's principles can be put into practice in different country contexts.

The report is published in the context of an unprecedented global energy crisis caused by the conflict in the Middle East and the disruption of oil flow through the Strait of Hormuz. In March 2026, the IEA's Sheltering from Oil Shocks: Measures to Reduce Impacts on Households and Businesses report identified ten immediate measures that could be implemented quickly by governments, businesses and households who aim to protect energy security and household affordability, such as shifting to public transport, teleworking, or reducing reliance on vulnerable LPG supplies for cooking. The publication recommends that these short-term emergency actions are combined with longer-term structural measures to make these low-emissions behaviours permanent and create lasting resilience.

Therefore, this report focuses on how policies, infrastructure and technologies can create the longer-term enabling environment under which people can sustain low-emissions and resilient practices while supporting affordability and fairness. International experience shows that promoting behaviour change is not limited to voluntary individual actions during a crisis but is enabled by the wider policy and investment environment. Behavioural changes refer to ongoing adjustments in how consumers use energy in everyday life enacted by citizens and companies and facilitated, incentivised or mandated through clear and consistent government policies and investment.

While the report explores the potential of communication campaigns, information and education opportunities as tools to change everyday practices at the individual level, evidence shows their impact will be significantly greater if supported by robust policies, regulatory frameworks, infrastructure investments, and targeted support.

This report examines how a combination of structural changes across several key fields can create the long-term enabling conditions for behaviour change, including:

- **Buildings**: The buildings sector, responsible for 34% of global energy-related CO_2 emissions, is a critical area for advancing low-emissions practices. Evidence included in the report highlights the role that regulation, clear information and financial incentives can play for households to make efficiency upgrades and lower energy consumption, protecting them from the burden of future energy price spikes.

- **Transport**: The transport sector, which accounts for nearly 23% of global energy-related CO_2 emissions and is highly vulnerable to oil supply shocks, is another significant area for fostering resilient and low-emissions lifestyles. Analysis included in the report highlights the role of regulatory tools, alongside investment in public transport and active mobility infrastructure, in helping people shift to cleaner transport.
- **Appliances**: Appliance use has also had a significant impact on global energy-related CO_2 emissions. Experience included in the report shows that a combination of policy instruments, such as minimum energy performance standard, comparative labelling and financial incentives, can increase the uptake of low-emissions models.

This repository focuses primarily on measures that directly shape people's everyday practices. However, in line with the Campaign' principle on addressing textile production and recycling methods, the report also considers industry-related issues with strong consumer interfaces, including energy efficiency in the textile industry and policies to reduce e-waste from electronic products.

Across all three chapters, and in line with the CEM Campaign, the analysis and case studies examine how fairness can be embedded into policy design across sectors to ensure everyone benefits in the shift towards more sustainable lifestyles. Because sudden energy price spikes disproportionately harm low-income and vulnerable households, enabling low-emissions practices could foster these groups' resilience and their economic protection. Targeted instruments, such as tailored price mechanisms and accessible information, could also help lower-income households and other vulnerable groups adopt behaviour change actions. Research demonstrates that when behaviour change and clean energy transitions policies are financially burdensome or perceived as unfair, public trust declines. Policies and interventions designed around the specific needs of countries and different segments of society can build additional momentum and broaden participation in low-emissions and resilient practices.

Case studies

The good-practice examples included in this report were selected in collaboration with the co-leads of the Campaign (European Commission, Norway, China and India).

The selection methodology followed three criteria:

1. Each case study illustrates effective implementation of one of the Declaration's principles.

2. Case studies are geographically diverse, representing both advanced and emerging economies.

3. Priority was given to case studies with evaluation data that demonstrate positive socio-economic outcomes across diverse groups and highlight fairness.

The following table summarises the 55 examples included as case studies in the report. Additional good-practice examples are also mentioned throughout the analysis.

National behaviour change and awareness campaigns	• China – Notice of the National Development and Reform Commission on carrying out pilot work in low-carbon provinces, regions and low-carbon cities • France – Energy Sobriety (Sobriété Énergétique) • Japan – Cool Biz strategy • Germany – 80 million together for the energy transition (80 Millionen gemeinsam für Energiewechsel) • Burkina Faso – Promotion of Energy Efficiency campaign (Promotion de l'Efficacité Énergétique) • India – Mission LiFE • India – "Go Electric" Campaign
Product standards, labels and incentives	• European Union – Energy Labelling Framework Regulation • India – Standards and Labelling program (S&L) • Singapore – Green Labelling Scheme • Mexico – Appliance Replacement Programme (Programa de Sustitución de Equipos Electrodomésticos) • China – Appliance Policy Package • South Africa – 12L Income Tax Allowance on Energy Efficiency
Energy poverty, affordability and access	• United Kingdom – Warm Homes Plan • Spain – Energy Advice Points • Netherlands – Energy Aid • Ireland – Warmth and Wellbeing Scheme • Portugal – Energy Efficiency Vouchers (*Vale Eficiência*) • Tanzania – National Clean Cooking Strategy (2024-2034) • Norway – Husbanken/Enova Buildings Energy Efficiency Subsidies • Canada – Oil to Heat Pump Affordability Programme • European Union – Social Climate Fund • France – My Renovation Grant Programme (MaPrimeRénov') • India – PM Solar Home: Free Electricity Scheme (PM Surya Ghar: Muft Bijli Yojana) • India – UJALA Scheme • India – PM Clean Cooking Scheme (Pradhan Mantri Ujjwala Yojana) • Peru – Social Inclusion Energy Fund • Malaysia – Electric Motorcycle Usage Promotion Scheme

Networks and international knowledge exchange	• European Union – European Commission's Just Transition Platform Knowledge Hub • International Energy Agency – Global Commission on People-Centred Clean Energy Transitions • India – International Solar Alliance • India – Global Biofuel Alliance • Latin America – LEDS LAC Regional Platform • Europe – Energy Cities
Community-led low-emissions energy initiatives	• European Union – European Energy Communities Facility • India – GOBARDhan Scheme • Denmark – 100% renewable energy-powered energy community in Samsø • Kenya – Kipeto Wind Farm
Youth engagement and education programmes	• Denmark – Youth Climate Council • Norway – Generation Green Climate Ambassadors • Nigeria – Renew Watts Technologies • India – National Painting Competition on Energy Conservation
Gender-sensitive approaches	• Austria – Vienna's gendered approach to public transport planning • Kenya – Gender Mainstreaming National Energy Policy • Nepal – Girls4Rurals Initiative
Skills development and vocational training	• Côte d'Ivoire – Vocational training in the sector of renewable energies and energy efficiency • India – Skill Council for Green Jobs • Europe – RES-SKILL Project
Buildings and industrial energy efficiency	• China – General Code for Building Energy Efficiency and Renewable Energy Utilization • Indonesia – Green Building and Smart Building Regulations • Australia – Nationwide House Energy Rating Scheme • China – Guideline for Energy Efficiency Credit
Transport energy efficiency	• Mexico – No-Drive Day Programme (Hoy No Circula) • India – Corporate Average Fuel Efficiency • London – Low-Emissions Zone • China – Purchase Subsidies for New Energy Vehicles • Germany – Germany Ticket (Deutschlandticket) • Norway – 2022-2033 National Transport Plan
Recycling of critical minerals	• China – Specifications for the Comprehensive Utilisation of Waste EV Batteries • European Union – Updated List of European Waste with battery-related waste codes • India – National Critical Mineral Mission

Part 1. Policy: Leading by acting

- **Principle 1**. Incentivise and enable sustainable lifestyle changes and fairness, including for the persons in vulnerable situations in society. Encourage the development of policies and actions with clear objectives and targets.
- **Principle 2.** Share and report on policies, good practices and other initiatives supporting sustainable lifestyle, fairness and affordable, reliable, efficient and sustainable low-emissions technologies which have been or will be put in place, motivating other members to follow the steps.
- **Principle 3.** Undertake communication and awareness campaigns to promote and inform citizens about the benefits of sustainable lifestyle changes, including intergenerational fairness, as well as the access to affordable, reliable, efficient and sustainable low-emissions technologies.

Introduction

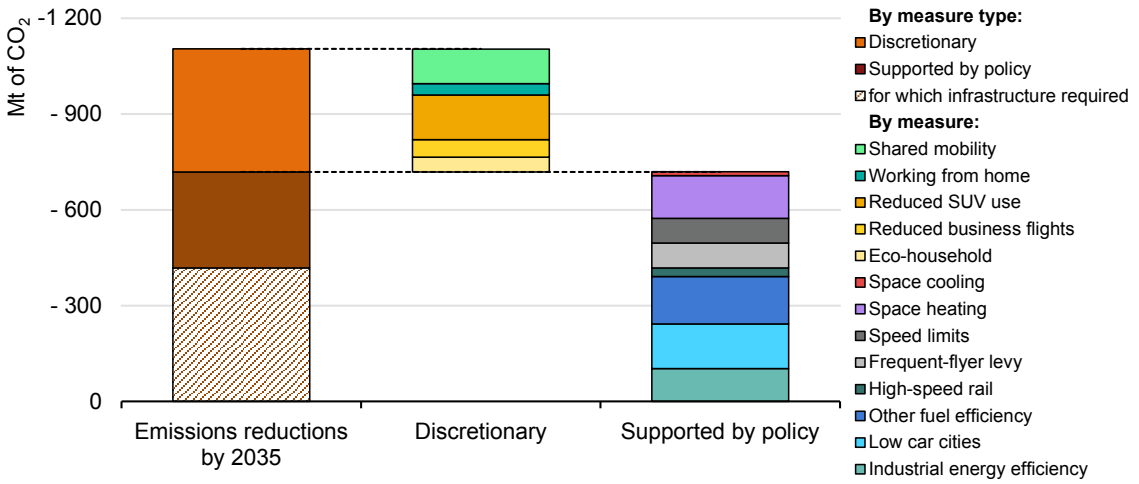
Experience from countries with different contexts demonstrates that a combination of policies, infrastructure, technologies and individual actions has supported behaviour change and resilience while maintaining a focus on affordability and social fairness. This chapter, prepared in support of the first part of the Declaration on Promoting Sustainable Lifestyles, Fairness, and Access to Clean Energy Technologies, examines how behaviour change has been integrated into broader policy frameworks in different contexts. It notes which policy tools have been deployed to encourage such change, with particular attention to vulnerable groups.

In line with Principle 3, the chapter includes a focus on two public engagement approaches that already have been documented internationally: awareness campaigns on energy efficiency, and labelling tools to inform consumers' behaviour. To help with Principle 2, the chapter ends with an analysis about the role international knowledge exchange platforms and multilevel networks have played in advancing low-emissions policy action.

Integrating behaviour change into national and sub-national energy strategies

Policy actions at both national and sub-national levels have been used to enable and encourage people to make choices about how they consume energy.

CO_2 emissions reductions from behaviour change by measure and measure type in the Net Zero Emissions Scenario, 2035



Note: Mt of CO_2 = metric tonne of carbon dioxide.
Source: IEA (2024), World Energy Outlook 2024.

IEA analysis indicates that nearly two-thirds of behaviour change measures aimed at reducing emissions have relied heavily on policy support, new infrastructure and technology, rather than voluntary individual actions alone (IEA, 2023). Policy frameworks that combine regulatory mechanisms, energy-efficient infrastructure and technologies have been observed to deliver the majority of emissions cuts in the scenarios examined.

Studies of current policy frameworks have documented an increasing focus on behaviour change strategies to curb emissions and energy consumption. For example, recent research found that, among some of the highest-emitting economies, 80% encourage electric or hybrid vehicle uptake, and 75% promote public transport use in their nationally determined contributions (NDCs) (World Resources Institute, 2024). Efforts to reduce household energy demand through greater use of insulation or energy-efficient appliances are included in 60% of these national plans.

Existing national strategies integrating behaviour change have often included policies covering a range of sectors and promoting a variety of low-emissions behaviours. In China, for example, the Notice of the National Development and Reform Commission on carrying out pilot work in low-carbon provinces, regions and low-carbon cities has promoted public transport and energy-saving practices as part of a wider strategy to reduce emissions in Chinese cities. Similarly, in India, the Mission LiFE (Lifestyle for Environment) programme includes policy schemes to incentivise uptake of solar energy, energy efficiency, waste reduction and water conservation among households, with positive outcomes for reducing emissions and facilitating sustainable lifestyles.

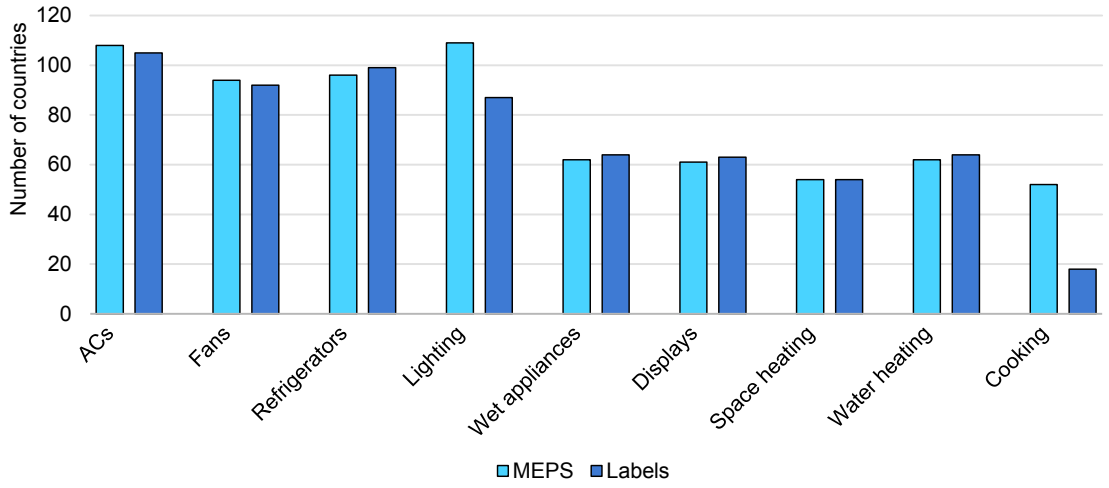
At the sub-national level, experience shows that cities and regional authorities have also played critical roles. For instance, the Hoy No Circula programme in Mexico that is aimed at reducing private vehicle usage, has been effective in reducing both pollution and traffic. Although it has benefited all social groups across the city, evaluations have found that the policy's requirements have been easier to meet for middle- and high-income households, which are better able to afford low-emissions vehicles that comply with the restrictions (Reyes et al., 2021). Several examples throughout this report demonstrate that affordability considerations have been included in the design of policies promoting behaviour change in order to ensure wider uptake and shared benefits across different socio-economic groups.

Policy tools to drive behaviour change

Experience shows that policymakers can implement various strategies to promote behaviour change in energy consumption and build long-term resilience. Key policy tools observed in practice can be divided into regulation, information and incentives (IEA, 2025):

- **Regulation** sets rules for energy performance and use. Key measures include setting minimum efficiency standards for products and buildings, capping or limiting energy emissions, phasing out inefficient technologies, introducing building codes, and embedding sustainability requirements in procurement and infrastructure. For example, a solution might be to introduce minimum energy performance standards (MEPS) for appliances. MEPS are specifications that establish a minimum threshold for energy performance that appliances and other energy-consuming devices must meet before being sold and used. MEPS are currently being applied in 128 countries that represent 97% of global electricity demand. MEPS can result in average energy reductions of 10% to 30% over 15 to 20 years for most regulated products across these countries.
- **Information** has been used to make people more aware of what they buy and their energy consumption. This approach uses energy performance certificates, labelling schemes, real-time energy feedback (such as through smart meters), and public campaigns to make efficient choices easier and more attractive. Comparative labelling, for instance, helps consumers choose between different energy-efficient appliances by providing clear, accessible information at the point of sale. One-stop-shops can assist households in navigating retrofit support. Promoting shifts in social practices through information campaigns has also been documented as effective. The Cool Biz strategy in Japan, for example, sought to modify office norms and culture to reduce the use of air conditioning and save energy.

Number of countries with minimum energy performance standards and mandatory performance labels for appliances, 2025



Source: IEA (2025), Energy Efficiency 2025.

In the transport sector, fuel economy standards are a widely used regulatory instrument that define the efficiency with which vehicles use fuel to deliver transportation services. They also set standards for related greenhouse gas emissions.

- **Incentives** such as grants, rebates, green loans and targeted subsidies have helped to make sustainable products, renovations and lower-carbon services affordable. Experience shows that behaviour policies have been most successful when incentives help to make efficient, lower-carbon options the most affordable choice. Retrofit grants in the buildings sector, for example, have accelerated renovation rates. When targeted to low-income households, such grants have ensured that benefits flow to those most at risk of energy poverty. In the appliances sector, incentives are usually provided as loans and grants to reduce the upfront investment costs of energy-efficient models.

Country case studies demonstrate that behaviour change policies have often used more than one of these tools at the same time. For example, the Sobriété Énergétique strategy, adopted by France in 2022, included both energy consumption reduction targets and information campaigns to promote efficiency.

Awareness and communication campaigns on energy efficiency

Awareness and communication campaigns have been used to inform, empower and encourage people to adopt more energy-efficient and resilient practices. Evidence suggests that communication campaigns have been associated with increased uptake of clean and efficient energy technologies by showcasing benefits and tackling common misconceptions (Coville et al., 2024). In Ireland, for

instance, the Sustainable Energy Authority carried out the Renewable Energy Information Strategy, which raised awareness and addressed misperceptions about renewable energy technologies through social media coverage and improved local communication strategies. The programme led to a steady increase in renewable energy installations across the country.

Such campaigns are often implemented at the national level. In Germany, for example, the awareness campaign 80 Millionen gemeinsam für Energiewechsel (80 million together for the energy transition) promoted energy-saving actions using visuals and social media content. This case has demonstrated that an effective campaign often benefits from a strong communication strategy. Social media, for instance, gives policymakers the chance to reach a large audience, including young people.

Existing practice indicates that these awareness campaigns have been more effective when engaging different relevant stakeholders, such as private companies and non-profit organisations, who can help amplify the campaign message and reach. In Burkina Faso, for instance, the Promotion de l'Efficacité Énergétique (Promotion of energy efficiency) campaign targeted energy-intensive companies, households, public- and private-sector employees, and students, successfully enhancing awareness and knowledge on energy-efficient practices and solar energy for more than 10 000 people.

Similarly, the Energy Savings Coalition in the Netherlands brought together trade associations, local governments and non-governmental organisations to strengthen outreach and provide nearly USD 11 million in grants supporting energy-saving initiatives. One project included a tool designed to offer small and medium-sized enterprises guidance on improving energy efficiency. These initiatives have demonstrated that governments, when engaging with multiple stakeholders, can tap into a variety of networks and reach more people, increasing effectiveness.

Emerging best practice approaches for delivering energy-saving campaigns

An analysis of over 20 energy-saving campaigns implemented in the aftermath of the 2022 energy crisis that followed the Russian full-scale invasion of Ukraine suggests a number of approaches that can support the design, implementation and tracking of such campaigns (IEA, 2022). These include:

Design

- Involving a dedicated coordination team in planning and strategy development can enhance campaign outcomes.

- Conducting pre-research before implementation can help show what are the main concerns and reluctances around the adoption of energy efficiency technologies.
- Clearly establishing objectives and identifying the target audience early helps boost campaign effectiveness.
- Using creative, consistent and straightforward messaging makes it easier for people to relate to the campaign.
- Promoting existing financial incentives, such as subsidies and grants, can encourage participation.

Implementation

- Partnering with industry organisations and local community groups can extend the campaign's reach.
- Demonstrating government-led energy-saving initiatives delivers a strong and credible message.
- Leveraging multiple communication channels ensures the campaign reaches a broader audience.
- Regularly updating campaign messages helps prevent audience fatigue and keeps engagement high.

Tracking

- Monitoring immediate results allows for timely adjustments to campaign strategies.
- Evaluating the long-term effects of the campaign provides insights into sustained impact.
- Sharing outcomes internally helps maintain support and momentum among stakeholders.
- Comparing the adoption of energy-saving measures against a baseline group helps measure effectiveness.

One-stop-shops have been used in several countries to help increase households' awareness of the multiple benefits of energy efficiency beyond the reduction of emissions. Such agencies typically provide a range of services, including tailored feedback to households on energy consumption patterns, advice on choosing the best mix of efficiency upgrades, assistance in applying for permits and grants, guidance in gaining access to affordable financing options, and quality assurance.

Experience shows one-stop-shops have been successful in supporting energy-saving practices because – in addition to increasing consumers' awareness of low-emissions behaviours – they have helped to make consumers aware of the economic benefits, such as energy efficiency and lower energy bills. The

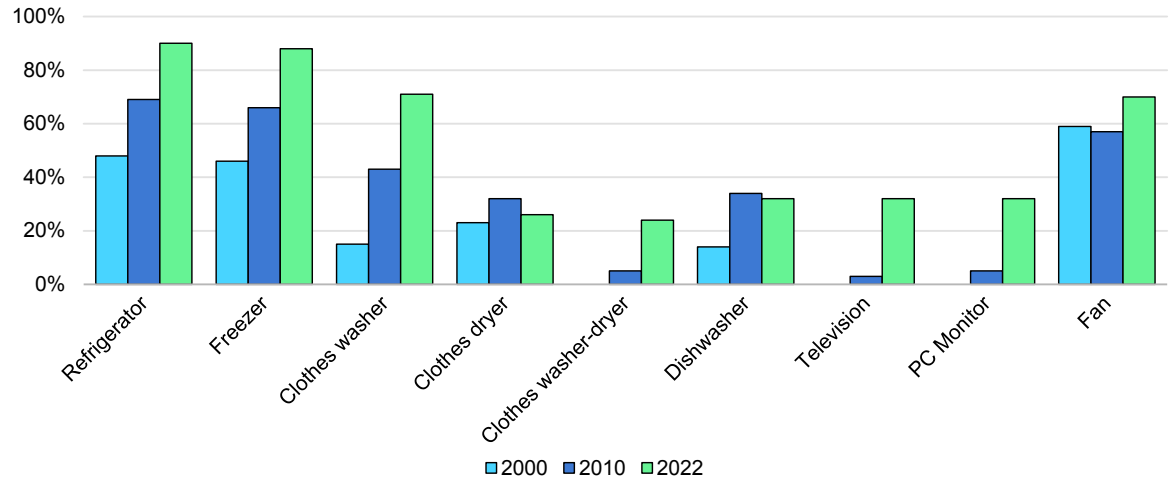
installation of Energy Advisory Points in Spain, for instance, contributed to reducing households' energy poverty and increasing energy efficiency across the country.

Appliance labelling tools for consumer engagement

Energy labelling has also been used as an information tool to empower consumers, reduce information barriers and facilitate well-informed purchasing decisions. It also has positive effects on innovation in the sector since, at the same or slightly higher price, consumers generally prefer to purchase a more efficient product. Such schemes also compel producers to innovate in order to comply with progressively stringent efficiency requirements. The European Union's labelling programme has incentivised manufacturers to improve the efficiency of their products in order to remain competitive. Research in the EU has suggested that surveyed consumers were willing to pay more for a higher-efficiency product.

Labelling schemes are already included as part of national energy efficiency policies in over 120 countries. However, their coverage is not the same for all appliances. For example, in 2022, 90% of the global energy consumption from refrigerators was covered by efficiency labels worldwide, but only 24% of washing machines were covered (IEA, 2023).

Share of global energy consumption covered by mandatory comparative labels for selected appliances in 2000, 2010 and 2022



Countries have adopted different approaches for their labelling systems. For example, the EU Energy Labelling Framework Regulation uses a rating scale from A to G, where each letter is also associated with a colour. In Singapore, the Green Labelling Scheme certifies products that comply with sustainability standards.

Programmes that have been operating the longest, such as those in the United States and the Energy Labelling Framework Regulation in the European Union, have contributed to reductions of approximately 15% in total electricity consumption (IEA, 2021). In 2018, labelling programmes in nine major economies reduced annual consumption by roughly 5% of global electricity demand, with more recent assessments confirming that these policies continue to deliver substantial savings.

Features of effective labelling schemes

Research about existing energy efficiency labelling programmes points to several features which have helped drive increased engagement:

- Using simple and salient energy labels, especially those highlighting "lifetime running cost" and "average lifespan", can increase the likelihood of consumers selecting higher-efficiency products, boosting uptake by 5-14% across product categories (The Behavioural Insights Team, 2023).
- Employing intuitive visuals such as rating scales and colour coding.
- Making label information relevant and actionable by including, wherever possible, messaging around personal financial benefits and estimated savings for consumers.
- Regularly updating label criteria and thresholds to keep pace with rapid technological progress, so that labels can remain meaningful and can continue to differentiate products effectively.
- Using labelling that endorses the top 20% of products in a class, which has proved to help maintain ambition and signal market leadership, as seen in successful schemes such as the United Kingdom's 'Energy Saving Recommended' label.

Incentives for efficient appliances

Case studies across different national contexts have demonstrated the role incentives can play in making energy-efficient appliances affordable and accessible for all households. Financial incentives, such as rebates, grants and vouchers, have been used as a tool to encourage customers to purchase high-efficiency appliances by reducing upfront investment costs. The Appliance Replacement Programme in Mexico, for example, has provided low-interest loans to encourage the replacement of inefficient refrigerators and air conditioners, which were identified as the key appliances for achieving the largest savings. Evaluation of the programme indicates that it has significantly stimulated the purchase of efficient appliances (about 1.5

million refrigerators and air conditioners were replaced) and led to substantial cuts in greenhouse gas emissions.

Similar programmes have focused on low-income households in order to help reduce energy poverty through energy savings. In Portugal, for instance, the Vale Eficiência programme provided 100 000 vouchers to low-income households to help replace appliances and conduct other energy efficiency upgrades.

There are also examples of financial schemes designed to promote the adoption of energy-efficient technologies by companies. In Switzerland, the Rebate programme for professional and commercial appliances has provided subsidies to businesses of up to 30% of the purchase price to buy high-efficiency refrigerators. This programme achieved savings of 119 million kWh, which is approximately the annual electricity use of 34 000 European households. In South Africa, the 12L Income Tax Allowance on Energy Efficiency has incentivised businesses to increase energy efficiency by giving tax reductions proportional to energy savings. The policy, which includes every type of company and technology, has shown how tax deduction can promote efficient use of energy by companies.

In a large number of national contexts, information tools have been used to help inform consumers' choices and lead to the purchase of highly efficient options (see analysis in Principles 1 and 3). In China, for instance, the Appliance Policy Package is a comprehensive programme which features a QR code and a consumer-facing app to inform consumers about annual energy usage, how to use products more efficiently, options for repair and replacement, recycling procedures, the latest testing results, and applicable government regulations.

Designing effective monitoring and evaluation frameworks for behaviour policies

In line with Principle 1's call for clear objectives and targets, monitoring and evaluation mechanisms help track programmes' progress and distribution of impacts across different social groups. Work by the Global Commission on People-Centred Clean Energy Transitions has documented the value of specific, measurable and time-bound targets, which are tracked through relevant indicators that capture social, economic and environmental impacts (IEA, 2025). In several policy case studies, indicators have informed programme design, monitored progress, assessed impacts, and driven both public and political support for clean energy transitions. When well designed and used, indicators and evaluation tools have helped governments to:

- Monitor the social and economic impacts of energy transitions, including risks and unintended effects.

- Showcase the wide-ranging benefits of clean energy, including health, equality, and jobs.
- Build public trust and reduce conflict by ensuring transparency and accountability.
- Encourage local support for clean energy and low-emissions programmes by making data accessible.
- Allow comparison across regions to identify trends, gaps and best practices.
- Track progress towards national and international goals and plans, such as the Sustainable Development Goals (SDGs) and Nationally Determined Contributions (NDCs).

In these examples, where possible, indicators were broken down by gender, age, ethnicity, region or other relevant categories. While the availability of disaggregated data remains a critical challenge, enhancing data this way represents a major opportunity for policymakers to target their interventions and to mainstream inclusion in their energy programmes. Moreover, disaggregated indicators help reveal distributional effects, highlighting population segments that may benefit from energy transitions as well as those that may be negatively affected.

Several existing policies that promote behaviour change have included monitoring and evaluation mechanisms. For instance, the Warm Homes Plan in the United Kingdom – an incentives programme to reduce energy poverty in English households through building retrofits and low-carbon heating systems – includes indicators to track and evaluate progress. The UK's Department for Energy Security and Net Zero has deployed a set of evaluation methodologies to feed these indicators, including residential surveys and regular data collection. Mixed qualitative and quantitative evaluation methodologies were found to be important for monitoring who benefited from the programme and to what extent. Qualitative evaluation methods provided additional insights about barriers, aspirations, opportunities and the effects of policies on daily life, including unforeseen consequences.

International knowledge exchange platforms and multilateral networks

Experience shows how mechanisms for knowledge sharing, policy learning and technical co-operation across national boundaries help to advance policy actions on behaviour change locally. Several international multilateral forums and networks have been established to support shared ambitions towards resilient low-emissions consumption and production goals.

Several networks have also been established at the regional level to foster diplomatic and technical co-operation. The LEDS LAC regional platform in Latin America, for instance, gathers governments, co-operation agencies, non-

governmental organisations, academia and the private sector to implement low-emissions development strategies. Beyond technical assistance, LEDS LAC facilitates knowledge sharing through policy toolkits and regional workshops.

City networks are another well-documented example of international platforms for knowledge sharing and action on emission reductions. Several networks, such as C40 Cities, are increasingly integrating technical assistance within their scope of action. In the last few years, energy-specific city networks have also been established. Energy Cities, for instance, is a network gathering hundreds of cities across 30 European countries to increase clean energy uptake and promote fair energy transitions. Activities range from co-operation on policy design and implementation to advocacy with policymakers.

Key features of international and multilateral forums

Evidence from existing international and multilateral forums highlights several common features in their operation and outputs:

- **Multi-stakeholder composition**: these platforms often bring together a diverse range of stakeholders, including representatives from different levels of government, civil society, research institutions and the private sector, as well as high-level representatives who can provide political legitimacy and visibility to the network's activities.
- **Regular in-person exchanges**: including periodic summits, workshops, or study visits, which serve as opportunities for peer-to-peer learning, relationship building between practitioners and visibility for new initiatives and common advocacy on the global stage.
- **Collaborative research products**: many networks jointly produce research outputs, such as policy guidelines, toolkits or case study databases. These compile common challenges and experiences from different contexts and have been used as reference resources for benchmarking or adapting approaches to different national circumstances.
- **Coordinated communications**: different stakeholders across the world sometimes organise synchronised outreach campaigns to communicate about jointly developed research findings and shared objectives.
- **Voluntary target-setting and tracking mechanisms**: some networks establish frameworks for participants to set shared goals or report on progress.
- **Digital tools and ongoing engagement**: beyond formal meetings, many forums have dedicated online platforms and repositories, host webinars, and support communities of practice at a technical level to ensure continuous exchange.

Several online knowledge exchange platforms and repositories have been developed at the global and regional level to document and share experiences across diverse contexts. The UN's Sustainable Development Goals (SDG) Actions Platform, for instance, serves as a global repository of initiatives on SDG implementation, including about 1 080 energy-related initiatives under SDG 7 ("ensure access to affordable, reliable, sustainable and modern energy for all"). These platforms have functioned as open-access libraries where policymakers can explore how others have designed policies promoting low-emissions behaviours, examine implementation challenges and lessons learned, and sometimes have access to comparative data that they can use to inform evidence-based benchmarking and decision making.

At a regional level, in 2021 the European Commission inaugurated the Just Transition Platform Knowledge Hub. The Hub includes good practices, tools, studies and capacity-building outputs to assist policymakers in promoting energy efficiency and a low-emissions economy. The repository has a special focus on vulnerable and underrepresented groups, addressing topics such as inequality, social inclusion and engagement of youth and women. Although the Hub only presents case studies implemented in EU member states, all interested stakeholders may access it free of charge, demonstrating how regional platforms can serve broader audiences beyond their immediate constituencies.

Case studies (Part 1). Policy: Leading by acting

Principle 1

Incentivise and enable sustainable lifestyle changes and fairness, including for the persons in vulnerable situations in society. Encourage the development of policies and actions with clear objectives and targets.

China – Notice of the National Development and Reform Commission on carrying out pilot work in low-carbon provinces, regions and low-carbon cities

Policy rationale: The policy aims to promote low-carbon development, and was issued and implemented by the National Development and Reform Commission in July 2010 (2010 No. 1587). The first batch of pilots covered five provinces (Guangdong, Liaoning, Hubei, Shaanxi and Yunnan) and eight cities (Tianjin, Chongqing, Shenzhen, Xiamen, Hangzhou, Nanchang, Guiyang and Baoding). It supports the integration of climate goals into local planning, encourages public awareness and education on sustainable living, and fosters behaviour changes that reduce carbon emissions. Through pilot programmes, it seeks to build a culture of low-carbon consumption and daily habits, making energy-efficient living a core part of urban and regional development. By July 2023, a total of 81 pilot cities had been designated nationwide across three batches.

Actions taken:

- Establishment of regulations that support system-wide energy efficiency improvements and decarbonisation.
- Electrification of public bus and taxi fleets.
- Improvement of inter-modal connectivity between rail and sea to enhance clean transport.
- Creation of a real-time energy monitoring system in several cities.
- Public awareness and education activities on low-carbon living, sustainable habits, and the use of eco-friendly products.
- Training activities for leading government managers to improve the level of attention to low-emissions initiatives in policymaking and implementation.

Outcomes:

- The policy showed different outcomes depending on the province or city where it was applied.

- Shenzhen, the first city in China to announce a city-level goal for both energy efficiency and consumption, has achieved full electrification of its public bus and taxi fleet by 2017, improved energy efficiency of telecommunications infrastructure, and set a target for energy consumption intensity reduction for 2020-2025 of 13%. In 2024, 202 residential districts were retrofitted, nine areas with outdated power infrastructure upgraded their power supply and distribution facilities to meet standards, and 150 smart grid upgrade projects were conducted in urban villages.
- All pilot cities had a significant decrease in carbon emission intensity.
- Most pilot cities reached energy intensity reduction targets.
- All pilot cities released low-carbon construction work plans.

France – Sobriété Énergétique

Policy rationale: The French Ministry for the energy transition launched the national strategy Sobriété Énergétique (Energy Sobriety) in 2022 against the backdrop of the energy crisis triggered by the war in Ukraine. Its core objective is to cut national energy consumption by 40% by 2050, paving the way for carbon neutrality and a reduced reliance on fossil fuels.

Actions taken:

- A national action plan presented by the prime minister in October 2022 after sectoral consultations with professional federations, companies and civil society, ensuring industry buy-in and operational feasibility.
- Concrete objectives of reducing gas and electricity consumption by 10% within two years and by 40% by 2050.
- Establishment of sector-specific working groups addressing industries, digital services, commerce, craft trades, tourism and building sectors, leading to tailored commitments and operational measures.
- Implementation of targeted and broad measures, including reducing heating and lighting, optimising digital tool use, and promoting sustainable mobility and behaviour shifts.
- Regular monitoring and progress reviews based on real energy consumption data and sectoral feedback supported by new indicators and transparency mandates.

Outcomes:

- Following the policy's launch, national energy use decreased, with electricity and gas consumption falling by 12% between October and December of 2022.
- The policy set a precedent for future demand-side management strategies, anchoring sobriety as a pillar of France's ecological and energy sovereignty strategy.

Mexico – Hoy No Circula

Policy rationale: The Hoy No Circula (No-Drive Day) programme was established in Mexico City in 1989 as a response to soaring air pollution levels that had been exacerbated by rapid urbanisation, heavy traffic and a challenging geography. Its core objective is to reduce ambient pollution by restricting private vehicle use based on license plate numbers, thereby lowering particulate matter, ozone and carbon emissions.

Actions taken:

The programme is based on the use of Hologram stickers that determine circulation restrictions:

- New vehicles and those between 0 and 8 years old are exempt from circulation restrictions; since 2020, this exemption has also applied to electric and hybrid vehicles.
- Vehicles between 9 and 15 years old can circulate on certain days, one working day per week and two Sundays per month.
- Vehicles older than 15 years are only authorised to circulate one working day per week.
- 1 500 of the most polluting small and medium-size buses were retired.
- In a second phase, the programme has been extended to 18 adjacent municipalities.

Outcomes:

- The programme has helped improved air quality in Mexico City, reducing CO_2 concentrations in ambient air by 79% in the first 25 years of implementation.
- Cleaner air has generated disproportionate health benefits for lower-income groups, who are often more exposed to pollution and have fewer resources to avoid or treat pollution-related illness.

- Despite having cut emissions, the programme did not substantially increase the uptake of public transportation, particularly due to cultural factors (owning a car is widely perceived as a status symbol) and insufficient improvements in the local public transport network.

Japan – Cool Biz

Policy rationale: In 2005, the Japanese Ministry of the Environment launched the Cool Biz campaign to reduce electricity consumption during summer by encouraging offices to set air conditioners to 28°C and adopt a more relaxed dress code. The policy addressed rising energy demand and carbon emissions linked to air conditioning use, emphasising a cultural shift in office attire and behaviour rather than imposing strict regulations. Government leaders modelled the relaxed dress code to normalise the change and encourage voluntary participation across the public and private sectors. A few years after its initial launch, the campaign became an important tool in periods of electricity supply constraint, notably after the 2011 Tohoku earthquake under the Super Cool Biz extension.

Actions taken:

- Central government ministries were instructed to set air conditioner thermostats at 28°C from June to September (later extended).
- Employees were encouraged to wear lighter clothing, such as short-sleeved shirts without jackets or ties, to tolerate higher indoor temperatures comfortably.
- Public campaigns included media outreach, websites and fashion events promoting office-appropriate summer wear.
- High-level government endorsement, including by Prime Minister Koizumi frequently appearing without a tie or jacket, helped break traditional dress norms.
- The campaign expanded nationally, with businesses encouraged to follow suit. It also stimulated the market for “Cool Biz” clothing.

Outcomes:

- In its first summer (2005), Cool Biz reduced CO_2 emissions by an estimated 460 000 tonnes, equivalent to the monthly emissions of about 1 million households.
- By 2006, reductions increased to approximately 1.41 million tonnes of CO_2, equivalent to emissions from around 2.5 million households in one month.

- A 2009 survey found that 91.8% of respondents knew about the campaign, and 57% had implemented its practices.
- Cool Biz demonstrated that reframing social and cultural behaviours can help reduce energy consumption without formal regulation.

European Union – Energy Labelling Framework Regulation

Policy rationale: The EU Energy Labelling Framework Regulation introduces rules and procedures for establishing energy labelling requirements for energy-related products to be placed on the EU market, regardless of origin. The objective is to provide consumers with information about the energy performance of products and to enable them to choose the more efficient option.

Actions taken:

- Introduction of energy efficiency labels for products ranging from A to G, based on energy savings, with requirements becoming progressively stricter over time.
- Indication of non-energy parameters, including noise emissions, water consumption, capacity, repairability, and reliability class.
- Requirement for a product information sheet.
- Adoption of delegated acts for each specific product group. The acts set out specific requirements for groups that have significant potential for energy savings, equivalent models that show considerably different energy performance within the product group, and products that do not have a negative impact on affordability in the product group.

Outcomes:

- Product labelling informed consumers' choices and product development. About 80% of EU consumers take the label into account when purchasing appliances.
- EU energy labels and eco-design allow households to save an average of EUR 285 per year[1] on bills and companies to benefit from EUR 66 million in extra revenue.
- The regulation triggered a shift towards more efficient technology. For instance, incandescent lighting technology was phased out and replaced by CFLs and eventually LEDs.

[1] Exchange rate: 1 Euro (EUR) = USD 1.16 (as of 3 June 2026).

India – Standards and Labelling (S&L) programme

Policy rationale: The Indian government launched the Standards and Labelling programme in May 2006. The programme aims to help consumers make an informed choice about various energy-consuming appliances, based on each appliance's energy efficiency performance. This scheme also helps consumers determine the cost-saving potential of their households and equipment.

Actions taken:

- The Standards and Labelling programme, which covers various appliance categories, provides consumers with clear information through star labels and encourages manufacturers to adopt higher-efficiency technologies. Recent additions, such as grid-connected solar inverters, reflect the programme's continued expansion.
- Minimum Energy Performance Standards (MEPS) are set for appliances.
- The programme covers 41 types of appliances, with 18 subject to mandatory labelling and 23 included on a voluntary basis.
- In the 2025-2026 fiscal year, a voluntary star labelling programme was introduced for EV chargers and evaporative air coolers.
- Rating criteria are periodically revised, and validity periods for appliances have been introduced to reflect improvements in energy performance.
- The programme includes consumer awareness campaigns, manuals and public information tools to help buyers understand and use energy labels effectively.

Outcomes:

- In the appliances sector, the S&L programme has provided the consumer with an informed choice about energy-intensive appliances and equipment.
- By December 2025, the scheme accounted for 13% of the total energy savings delivered by all energy efficiency initiatives.
- It also helped avoid nearly 70 million tonnes of greenhouse gas emissions and generated an estimated USD 7.1 billion in savings.
- Approximately 647.8 million star-rated appliances were sold during the 2024-2025 fiscal year.
- By March 2025, about 3 800 brands and 27 500 models had been registered under the programme.

Singapore – Green Labelling Scheme

Policy rationale: The Singapore Green Labelling Scheme (SGLS), administered by the Singapore Environment Council (SEC) since 1999, was introduced to help consumers identify environmentally preferable products and encourage manufacturers to adopt sustainable practices. The Scheme supports Singapore's Green Plan 2030. The aim of the SGLS is to promote the purchase of energy-efficient products and to drive market change.

Actions taken:

- Since the launch of the Scheme, over 3 800 products across 43 countries have been certified.
- Assessment criteria include energy and water efficiency, toxicity, recyclability, and carbon footprint.
- There are public-private partnerships to expand the scheme and integrate carbon transparency, including the development of a Product Carbon Footprint (PCF) framework for future carbon labelling.

Outcomes:

- The Scheme has become Singapore's leading environmental certification programme, influencing purchasing decisions and helping businesses gain competitive advantage.
- Demand has increased for sustainable and energy-efficient products.
- SEC has signed mutual recognition agreements with six countries across several product categories.
- The scheme led to significant cost savings for companies through more efficient resource usage, including energy consumption.

Mexico – Appliance Replacement Programme

Policy rationale: The Appliance Replacement Programme (Programa de Sustitución de Equipos Electrodomésticos) has been implemented by Mexico's Ministry of Energy (SENER), the Federal Electricity Commission (CFE) and the National Bank for Public Works and Services since 2009. It is designed to encourage energy efficiency by substituting outdated, inefficient home appliances with modern, energy-saving models.

Actions taken:

- The programme has provided direct subsidies and access to low-interest loans (repayable directly via electricity bills and based on household income) to promote the replacement of inefficient air conditioners and refrigerators older than 10 years with more efficient models, certified by Mexico's energy efficiency standards.
- Appliance vendors have been certified and monitored to ensure compliance with technical and service standards.
- The programme has incorporated a recycling component to ensure appropriate disposal of old appliances.

Outcomes:

- From 2009 to 2012, over 1.5 million refrigerators and air conditioners were replaced, leading to an estimated annual energy savings of 2 000 GWh (equivalent to the energy consumption of 570 000 households for a year).
- The initiative has helped cut approximately 1.5 million tonnes of CO_2 emissions each year.
- Beyond reducing energy use and emissions, the programme enhanced living standards for households and boosted domestic appliance production.
- Due to its success, the programme was relaunched in 2025.

China – Appliance Policy Package

Policy rationale: This comprehensive policy package is a national energy efficiency programme for appliances, designed to encourage consumers to purchase the most efficient models available on the market.

Actions taken:

- The Appliance Policy Package introduced a label for appliances that displays information on the manufacturer, product model, energy efficiency rating, annual power consumption and other core information. It also includes energy efficiency rating (from 1 to 3, with 1 indicating the highest efficiency). The label also includes the annual performance factor and key technical details, such as the rated cooling capacity for air conditioners.
- Appliances are associated with a QR code that grants access to a consumer platform. The platform provides information on product use, repair and

replacement options, recycling, annual energy consumption, updated testing data, and relevant government policies.

- The package integrates both informational and regulatory measures. To foster competition in energy efficiency and enhance public awareness, annual National Energy-Saving Weeks are held to promote the use and recognition of energy labels.
- Rebate programmes are implemented on a regular basis. For instance, during 2024-2025, the “Old for New” trade-in subsidy initiative allowed consumers to replace outdated appliances with newer, more efficient models.

Outcomes:

- The policy currently covers 45 appliances and industrial components.
- The China National Institute of Standardisation shows that the energy efficiency label system has achieved a cumulative electricity saving of more than 4.28 trillion kilowatt-hours in the 20 years since its implementation.
- By the end of 2024, about 26 000 manufacturers and 3.56 million models were registered in the product database.

South Africa – 12L Income Tax Allowance on Energy Efficiency

Policy rationale: The Department of Mineral Resources and Energy and the South African National Energy Development Institute developed and launched this programme in 2013. It incentivises businesses to adopt energy efficiency measures by offering a tax deduction based on the energy savings achieved. The main objectives are to lower national energy consumption, ease demand on the electricity grid and support the country's climate change mitigation efforts.

Actions taken:

- Companies of any size and from any industry are eligible to receive a tax deduction by carrying out energy efficiency measures.
- Energy savings are measured over a 12-month period, from the start to the completion of the project.
- To qualify for the allowance, firms must have their energy savings independently measured and verified by a measurement and verification body accredited by the South African National Accreditation System.

- The South African National Energy Development Institute then issues a certificate confirming the verified savings, which is submitted to the South African Revenue Service to claim the tax deduction.

Outcomes:

- Since its launch, the 12L Income Tax Allowance has supported over 370 projects, resulting in substantial energy savings.
- A total of USD 3.3 billion in tax deductions has been claimed through the programme.
- Much of the energy savings were achieved within the mining and manufacturing industries.

United Kingdom – Warm Homes Plan

Policy rationale: Established in 2025, the Warm Homes Plan is designed to help upgrade and decarbonise up to 5 million homes by 2030 while reducing fuel poverty. Delivered and overseen by the Department for Energy Security and Net Zero, with responsibilities shared broadly across local authorities in the United Kingdom, the programme uses a comprehensive monitoring and evaluation framework to track energy efficiency deployment, reductions in energy poverty, and health outcomes across different social groups, to ensure that benefits reach low-income households and those territories with the least efficient housing stock.

Actions taken:

- The Government has committed an initial GBP 3.4 billion over the next 3 years towards low-carbon heating systems and energy retrofits for buildings, with GBP[2] 1 billion of this allocated to FY 2025-2026.
- The programme has allocated GBP 1.8 billion so far to support energy poverty schemes, helping over 170 000 households reduce energy bills through targeted subsides for renovation and other efficiency upgrades.
- It has allocated GBP 1.29 billion to the Warm Homes Social Housing Fund and GBP 500 million to the Warm Homes Local Grant, which is to be delivered between 2025 and 2028 through eligible social housing landlords and Local Authorities.

[2] Exchange rate: 1 Great British Pound (GBP) = EUR 1.16 = USD 1.35 (as of 3 June 2026).

- To track progress on the scheme's objectives, a mixed-method evaluation approach has been used, including resident and local authority surveys to assess health, comfort improvements, process satisfaction and accessibility, with results triangulated against energy performance databases and fuel poverty metrics.
- Qualitative and quantitative process evaluations of major funding streams include interviews, focus groups and analysis of stakeholder feedback. Evaluation data is disaggregated in order to understand the initiative's impacts on different social groups, with specific attention given to income levels, tenure type (social housing, private rental, owner-occupied) and regional variations.

Outcomes:

- In 2025-2026 alone, the programme will be upgrading up to 300 000 homes, which is more than double the number of upgrades delivered in 2024.
- From April 2025, the Plan has taken an average of GBP 150 off individual energy bills.
- Evaluations of similar previous schemes demonstrated substantial positive outcomes. For example, the 2021 evaluation of the Social Housing Decarbonisation Fund found that 82% of households were fuel-poor before installations, and 18% and 22% of residents reported that their physical and mental health, respectively, had improved after interventions.
- The programme's monitoring and evaluation framework demonstrates the value of tracking progress on broader socio-economic targets beyond emission reductions.

India – UJALA Scheme

Policy rationale: The Indian Ministry of Power launched the Unnat Jyoti by Affordable LEDs for All (UJALA) scheme in 2015. UJALA was designed to promote affordable and energy-efficient lighting in Indian households by accelerating the adoption of LED bulbs, tube lights and energy-efficient fans. Prior to UJALA, widespread use of incandescent lamps and compact fluorescent lamps resulted in high electricity consumption, household energy expenditure and peak power demand.

Actions taken:

- Implemented large-scale bulk procurement of LED bulbs, tube lights and energy-efficient fans to reduce costs.

- Enabled nationwide distribution through distribution companies and designated outlets to ensure last-mile reach.
- Launched Gram UJALA in March 2021, a variant of the programme that specifically targets rural areas, providing high-quality LED bulbs for just USD 0.11 in exchange for working incandescent bulbs.
- Adopted innovative financing and payment mechanisms to lower upfront costs for households.
- Established quality standards, testing and warranties to ensure product reliability and consumer trust.
- Stimulated domestic manufacturing and market transformation for energy-efficient lighting products.
- Conducted awareness and outreach campaigns to accelerate consumer adoption and a behavioural shift towards energy-efficient lighting.

Outcomes:

- Over the last decade, the distribution of approximately 368.7 million LED bulbs under the UJALA scheme has driven market transformation and delivered an estimated annual savings of USD 13.3 billion for households during the 2024 to 2025 fiscal year.
- During that fiscal year, this has also resulted in electricity savings of over 184 billion kilowatt-hours (which is enough to power 17 million average Western households for an entire year) and prevented 131 million tonnes of carbon emissions.

Principle 2

Share and report on policies, good practices and other initiatives supporting sustainable lifestyle, fairness and affordable, reliable, efficient and sustainable low-emissions technologies which have been or will be put in place, motivating other members to follow the steps.

European Union – Just Transition Platform

Policy rationale: The European Commission introduced the Just Transition Platform in 2021. It provides a database of case studies, toolkits (step-by-step guidance packages) and catalogues on just transitions across the European Union (collections of good practices on specific issues).

Actions taken:

- Since 2021, the Just Transition Platform has produced a set of knowledge resources, gathering more than 85 case studies, toolkits and catalogues.
- In 2024, the Just Transition Platform launched the Knowledge Hub, an online library that allows users to search for resources most relevant to their interests. This includes filtering by topics (e.g. financing, governance, energy communities), geographical scope and resource type.
- More than 88 case studies, toolkits and catalogues are available on the Hub. This includes resources such as "Boosting female entrepreneurship: A catalogue for just transition regions", "Supporting sustainable transport: A toolkit for just transition regions", and "Just transition measurement approaches: A catalogue for just transition regions".
- To complement the Hub, the JTPeers Experts Database, available through the same online resource, helps stakeholders identify and contact just transition specialists across the European Union for tailored advice on the design and implementation of just transition policies.

Outcomes:

- The Hub has provided stakeholders straightforward access to reliable, practical and actionable information on potential transition pathways and their impacts.

International Energy Agency – Global Commission on People-Centred Clean Energy Transitions

Policy rationale: In 2024, the IEA Executive Director convened a new Global Commission on People-Centred Clean Energy Transitions: Designing for Fairness. This brings together a diverse group of government ministers, trade union representatives, business leaders and other key constituencies from across regions to explore how to fully integrate the concept of fairness into the design of clean energy policies.

Actions taken:

- The first in-person meeting of the Global Commission took place directly before the G20 Energy Transitions Ministerial programme in Foz de Iguaçu, Brazil. The work of the Commission significantly informed G20 outcomes, in particular the development of the G20 Principles for Just and Inclusive Transitions.

- In 2025, leading up to COP 30, South Africa's G20 Presidency made just and inclusive energy transitions one of its priority areas. It invited the Global Commission to explore translating the G20 Principles for Just and Inclusive Transitions into policy design, implementation and tracking through the development of a Blueprint for Action on Just and Inclusive Energy Transitions and an Indicators Handbook for Just and Inclusive Energy Transitions.
- The Blueprint for Action is a guidebook for governments and other stakeholders to design and implement clean energy policies in line with the G20 Principles in their own domestic contexts. The document includes more than sixty case studies, representing different geographies and local contexts.
- Published as an official G20 Presidency document, the Indicators Handbook is designed to support countries in developing context-specific indicators to track, monitor and measure progress on the G20 Principles. It outlines a selection of indicators and evaluation methodologies drawn from practical applications in 35 case studies.

Outcomes:

- The multi-stakeholder constituency of the Global Commission has helped ensure that different perspectives were integrated in its written outputs, which are co-developed by members and the IEA Secretariat.
- The Indicators Handbook was launched in October 2025 at an in-person meeting of the Global Commission as part of the official G20 Energy Transitions Ministerial programme in Durban, South Africa. In the 2025 G20 Summit Declaration, G20 Leaders reaffirmed their commitment to the voluntary G20 Principles for Just and Inclusive Energy Transitions.
- The work of the Global Commission was included in the Plan to Accelerate Just and Inclusive Planning of the energy transition of the Brazilian COP30 Presidency's Global Climate Action Agenda.

Latin America – LEDS LAC Regional Platform

Policy rationale: The Low-Emissions and Resilient Development Strategies in Latin America and the Caribbean (LEDS LAC) Regional Platform is a network of Latin American governments, co-operation agencies, non-governmental organisations, academia and the private sector collaborating on the design and implementation of mitigation and adaptation objectives for development strategies

in Latin America. The Platform facilitates exchange and regional collaboration to accelerate climate action and people-centred clean energy transitions in the region.

Actions taken:

- The Platform operates capacity-building activities, such as workshops, webinars and technical assistance. These have included activities on gender and energy access, inclusive green growth and behaviour change in the transport sector.
- Thematic groups have been established on transport, bioenergy, resource efficiency and methane reduction, to share knowledge and develop solutions.
- The Platform collaborates with organisations such as UNDP, Euroclima and the NDC Partnership to establish strategic partnerships and coordinate regional action.
- The Platform produced a variety of knowledge products, including policy briefs.

Outcomes:

- In 2024, the Platform strengthened the capabilities of more than 1 300 professionals and 90 institutions.
- 25 technical assistance programmes have been delivered in 11 countries, including pilot projects and regulatory frameworks for NDCs and Long-Term Strategies.

India – International Solar Alliance

Policy rationale:

India and France launched the International Solar Alliance (ISA) in 2015 on the sidelines of COP21 in Paris. Through its strategic approach, which encompasses analytics and advocacy, capacity building, and programmatic support, ISA is on track to achieve its "Towards 1000" vision by 2030. This vision calls for 1 000 GW of installed solar PV capacity, USD 1 000 billion in investments, energy access for 1 000 million people, and 1 000 million tonnes of carbon emissions avoided.

Actions taken:

The ISA has nine comprehensive programmes across 53 member countries, including Scaling Solar Rooftops, E-Mobility & Storage, Solar Parks, Solarizing Heating and Cooling Systems, Solar PV Battery and Waste Management, Solar for Green Hydrogen, and a Regional and Global Interconnections Programme. Each focuses on a specific application that could help scale the deployment of solar

energy. The ISA has launched several key initiatives to advance global solar energy adoption, including:

- One Sun, One World, One Grid (OSOWOG), which is aimed at connecting solar energy supply across borders to create a unified global grid, enabling a constant clean energy supply.
- Solar Upcycling Network for Recycling, Innovation & Stakeholder Engagement (SUNRISE) to connect stakeholders interested in unlocking the value embedded in solar waste, transforming end-of-life challenges, creating low-emissions jobs, and promoting sustainable resource management.
- SolarX Startup Challenge, introduced at COP27 to support advanced market-ready solar innovations across ISA members.
- STAR-C Initiative to strengthen skills and institutions for solar deployment in developing economies, with the objective of establishing nearly 30 SAR-C Centres worldwide by the end of 2026.
- Global Solar Facility (GSF) to enable large-scale investment by de-risking projects and expanding bankable pipelines in capital-constrained regions, especially Africa.
- Viability Gap Funding Scheme to provide grants to solar projects in Least Developed Countries and Small Island Developing States by easing financial barriers. The Solar Data Portal has offered real- time data to inform investment.
- Five ISA knowledge products: Ease of Doing Solar 2025, Solar PV Skills and Jobs in Africa, Solar Compass: Special Issue on Integrated Photovoltaics, Global Floating Solar Framework, and Global Solar Trends & Outlook 2025.

Outcomes:

- As of February 2026, ISA had 125 member and signatory countries.
- Since its inception in 2015, the International Solar Alliance (ISA) has helped propel solar energy capacity in its member countries to 196.7 GW, a significant increase from 63.8 GW in 2015.
- ISA has successfully trained more than 4 500 professionals, bankers, and technicians across 55 countries.
- The Alliance is building a comprehensive ecosystem that mobilises investment, enhances capacity, informs policy and promotes technological innovation.

India – Global Biofuel Alliance

Policy rationale: Launched during India's 2023 presidency of the G20, the Global Biofuel Alliance (GBA) is a multi-stakeholder partnership that brings together governments, international organisations and industry. GBA facilitates capacity-building exercises, technical support for national programs, policy lessons-sharing, technology advancements, and the implementation of internationally recognised standards and codes. The Alliance is committed to advancing the development and deployment of biofuels worldwide by uniting the largest consumers and producers.

Actions taken:

- GBA developed a Joint Statement on Sustainable Biofuels that was formally adopted at International Energy Week '25 by IEA, IEF, WEF, WLGA and WBA. The statement calls for stable policies, collaboration and knowledge sharing and increased access to finance, among other drivers, to advance the global adoption of biofuels.
- GBA organised a roundtable in February 2025 on "Setting Up a Common Definition for Sustainable Biofuels to Accelerate Biofuels Adoption" and hosted another roundtable on this topic at COP29.
- In 2024, the GBA convened a panel discussion at the World Biogas Summit, hosted by the World Biogas Association in Birmingham, United Kingdom.
- The GBA participated in the "International Forum on Sustainable Biofuels" held in Turin under Italy's G7 presidency. The Italian G7 and Brazilian G20 presidencies jointly signed the Turin Joint Statement on Sustainable Biofuels.

Outcomes:

- Since its launch, GBA membership has expanded to 33 countries and 14 international organisations.
- India's Biofuels Programme achieved 19.5% ethanol blending.
- The Alliance facilitates collaboration with organisations such as the IEA, World Bank and UNIDO.

Europe – Energy Cities

Policy rationale: Energy Cities is a network of local authorities in Europe. The objective of Energy Cities is to empower cities and citizens to lead the transition towards carbon neutrality through peer learning and advocacy. In particular, it aims to ensure access to affordable, secure and sustainable energy for everyone by 2050.

Actions taken:

- Energy Cities has built a network of thousands of cities across 30 European countries to exchange best practices and co-create solutions.
- The network engages in policy advocacy by issuing policy recommendations for communities on energy issues, including financial incentives, one-stop-shops and co-ownership models.
- City representatives in the network have developed training programmes to foster capacity building.
- It has launched initiatives to support behaviour change in Europe, including the Energy Behaviour Forum, to exchange with peers on best practices and coordinate action.
- Energy Cities has published reports on enabling frameworks for energy communities and on barriers to implementation.
- The network has supported local pilot projects for community-based clean energy transitions.

Outcomes:

- Energy Cities has supported pilot energy initiatives in Romania, Croatia, Greece, Italy and Cyprus[3], to facilitate access to solar energies for citizens via one-stop shops.
- Energy Cities recently published a roadmap for how to implement enabling frameworks for energy communities, benefiting 11 EU countries.
- The network created SPARKLE, a programme offering e-learning courses on effective policymaking, communication and community engagement.

[3] The information in this document with reference to "Cyprus" relates to the southern part of the Island. There is no single authority representing both Turkish and Greek Cypriot people on the Island. Türkiye recognises the Turkish Republic of Northern Cyprus (TRNC). Until a lasting and equitable solution is found within the context of the United Nations, Türkiye shall preserve its position concerning the "Cyprus issue".
The Republic of Cyprus is recognised by all members of the United Nations with the exception of Türkiye. The information in this document relates to the area under the effective control of the Government of the Republic of Cyprus.

Principle 3

Undertake communication and awareness campaigns to promote and inform citizens about the benefits of sustainable lifestyle changes, including intergenerational fairness, as well as the access to affordable, reliable, efficient and sustainable low-emissions technologies.

Germany – 80 Millionen gemeinsam für Energiewechsel

Policy rationale: The Federal Ministry for Economic Affairs and Climate Action launched the awareness campaign, 80 Millionen gemeinsam für Energiewechsel (80 Million Together for the Energy Transition), in 2022 by as part of Germany's broader "Energiewende" strategy, its long-term national energy transition strategy. The core objective of the campaign is to mobilise the entire population to actively participate in the country's energy transition.

Actions taken:

- The campaign targeted households, companies and municipalities.
- It included the launch of Energiewechsel.de, an online portal with multilingual articles, videos, tutorials and FAQs.
- The government and local authorities organised webinars and regional information booths.
- The initiative promoted federal funding programmes, such as BEG (Bundesförderung für effiziente Gebäude) for heating system upgrades and building renovations.
- The campaign was integrated with Germany's Energy Efficiency Strategy 2045 and Climate Protection Act.

Outcomes:

- Citizens were encouraged to adopt energy-saving habits, such as lowering heating temperatures, switching to LED lighting and using energy-efficient appliances.
- The campaign helped promote the "Bundesförderung für effiziente Gebäude" (Federal Funding for Efficient Buildings), leading to increased applications for subsidies related to heating system upgrades, insulation and renewable energy installations.
- The campaign significantly raised awareness about energy efficiency, renewable energy and climate protection across households, businesses and municipalities.
- The multilingual outreach ensured inclusivity for Germany's diverse population.

Burkina Faso – Promotion de l'Efficacité Énergétique

Policy rationale: The campaign has been developed and implemented by the National Agency for Renewable Energy and Energy Efficiency of Burkina Faso. It is composed of ten actions designed to reduce energy demand during heatwaves, in order to ensure sufficient energy coverage during periods of extreme heat. The ten actions aim to promote energy efficiency and the adoption of energy-saving behaviours.

Actions taken:

- Experts from the National Agency for Renewable Energy and Energy Efficiency have conducted awareness campaigns on energy savings, including door-to-door outreach in neighbourhoods, markets and public squares.
- The campaign has offered training session on the efficient use of air conditioners to civil servants, private-sector employees and students.
- Experts from the agency have participated in major national events and on television and radio programmes to promote energy-efficient practices at scale.
- Energy managers advise on energy-saving practices in public institutions.

Outcomes:

- In 2023, the campaign trained over 5 000 young people in solar energy and energy efficiency, and over 2 000 young technical-sales professionals on energy efficiency.
- In 2023, over 2 000 solar sector stakeholders received training on best practices in energy savings and renewable energy as part of the West Africa Competitiveness Support Program – Burkina Faso component.
- Staff from eight public administrations (ministries) were trained in energy-efficient practices.

India – Mission LiFE

Policy rationale: The Indian government launched Mission LiFE (Lifestyle for Environment) in 2021 at COP26. Mission LiFE is an initiative to encourage sustainable habits and promote mindful consumption over wasteful use. The initiative focuses on seven core themes: saving water, conserving energy, reducing waste, managing e-waste, eliminating single-use plastics, promoting sustainable food systems and adopting healthy lifestyles. Mission LiFE acts as a link to achieving

the UN Sustainable Development Goals (SDGs), with a focus on Goal 12 (Responsible Consumption and Production) and Goal 13 (Climate Action).

Actions taken:

- India's Mission LiFE bridges India's ancient wisdom with modern sustainability goals by promoting responsible consumption and community-based environmental stewardship.
- On World Environment Day in 2024, Mission LiFE launched the campaign, Plant 4 Mother, which exhorts people to plant trees as a mark of love and respect for one's own Mother – as well as Mother Earth.
- Mission LiFE also introduced the Clean Coast Safe Sea campaign, which is aimed at improving ocean health through collective action.

Outcomes:

- The nationwide tree-planting campaign, Plant 4 Mother, has become one of the world's largest community-driven climate actions, with over 2.5 billion trees planted since its launch in June 2024. Over 1.4 million schools have joined the initiative through Eco clubs.
- The Indian government has notified the Eco-mark rules in September 2024. The scheme encourages the demand for products aligning with the principles of 'LiFE': promote lower energy consumption, resource efficiency and circular economy.
- Initiatives such as PM Surya Ghar, which are part of Mission LiFE, provide households with access to sustainable solar energy solutions, transforming consumers into energy producers.

India – Go Electric Campaign

Policy rationale: The Indian government launched the Go Electric campaign in 2021 to encourage the shift from vehicles with internal combustion engines to electric vehicles, as well as to promote electric cooking among households. The campaign includes various initiatives designed to make electric mobility and clean cooking more widely accepted and accessible to the public.

Actions taken:

- The Government of India set a target for electric vehicles to make up 30% of all vehicle sales by 2030, aligning with international climate targets.

- The campaign includes various initiatives with a budgetary outlay of approximately USD 8.85 billion (as of August 2025) to improve national charging infrastructure and manufacturing. This funding spans several major national programmes focused on advanced battery technology, automotive manufacturing and electric mobility.
- Go Electric introduced standardised guidelines in 2024 to help create a connected, user-friendly and nationally compatible public charging network.
- Fiscal incentives for consumers include reducing national sales taxes and waiving road taxes for electric vehicles.
- Local building codes were amended to mandate the inclusion of charging stations in new construction, and the government increased funding for related research and development.
- Alongside transport, the National Efficient Cooking Programme promotes induction cookstoves, which offer a 25% to 30% cost savings compared to traditional cooking methods.
- The government also launched an initiative to distribute 10 million highly efficient modern ceiling fans to reduce household energy consumption and lower electricity bills.

Outcomes:

- The policy initiatives strengthened confidence among electric vehicles manufacturers and spurred faster investment and consumer adoption of these vehicles. It also resulted in the successful expansion of the national charging network.
- As of February 2025, a total of 5.7 million electric vehicles had been registered in India (out of nearly 390 million registered vehicles), reflecting rapid adoption of clean mobility.
- Through the national cooking initiative, affordable induction cookstoves are being increasingly deployed across the country.
- To ensure continued efficiency and consumer protection, energy performance labelling for induction cookstoves will become mandatory starting in July 2026.

Spain – Energy Advice Points

Policy rationale: In 2017, the City of Barcelona launched the Energy Advice Points to tackle energy poverty through building retrofits and job training. These one-stop-shops provide information and advice to citizens on upgrading the energy efficiency of homes in Barcelona, with a focus on the most vulnerable households.

Actions taken:

- The City of Barcelona introduced 11 Energy Advice Points, integrated into municipal housing offices and staffed by multidisciplinary teams, including advisors, informants, energy agents and coordinators.
- The Energy Advice Points helped households experiencing energy poverty to implement energy efficiency improvements in their homes and thereby lower energy bills.
- The Energy Advice Points hire 20 unemployed people over the age of 45 every eight months and integrate them into a group of energy advisors. The initiative had trained 80 people for work as energy advisors by October 2019.

Outcomes:

- Energy Advice Points has prevented around 200 000 supply disconnections and managed more than 237 000 cases since 2017.
- In 2024, the programme assisted over 37 000 people, lowering the energy bills of over 15 000 households, 96% of which were in a situation of social vulnerability.
- Energy Advice Point advisors have processed 58% of applications for electricity and gas social tariffs.

Key impacts and lessons learned from evidence and practice – Part 1

Drawing on the available evidence and the international case studies presented in this chapter, there are a number of lessons that co-leads and partners of the CEM Campaign on Sustainable Lifestyles, Fairness and Access to Clean Energy Technologies may wish to consider when supporting action on behaviour change while maintaining a focus on fairness. These include:

- Fostering an enabling policy and infrastructure environment by offering a mix of policy tools, including regulation, information and incentives, can help people adopt low-emissions practices and create lasting resilience.
- Coordinating policy, communication, and affordability measures, such as minimum efficiency standards, labelling and targeted support, can facilitate uptake of low-emissions practices across different socio-economic groups, including more vulnerable ones.
- Crises, such as the energy crisis in the aftermath of the invasion of Ukraine, can act as catalysts for rapid societal mobilisation and acceptance of ambitious consumption reduction targets.
- Working with private and civil society actors to develop awareness campaigns that use audience research, clear messaging and multiple communication channels, with regular updates, can help keep the public engaged and support lasting everyday behaviour change and resilience.
- Establishing mechanisms to offer tailored support, from information on retrofit options to guidance on financing, can help households navigate practical steps involved in behaviour changes related to home energy use.
- Having a multilingual outreach helps to ensure inclusivity for populations across different regions in a country.
- Increasing awareness of the efficiency and long-term savings of appliances through clear and comparable labelling schemes can support behaviour change.
- Continuing to track efficiency standard thresholds for appliances can help ensure that markets progressively move towards more efficient options.
- Designing monitoring and evaluation frameworks that track behavioural outcomes across different socio-economic groups, such as shifts in appliance choices, mobility patterns or retrofit uptake, can support a better understanding of distributional trends.
- Using both quantitative data and qualitative insights in monitoring and evaluation frameworks can help clarify which behavioural barriers persist and where programme adjustments may be most effective.
- Sharing approaches that have been successful in encouraging behaviour change through participation in multilateral global platforms can support mutual learning between international partners.

Part 2. People: Empowering individuals and communities

- **Principle 4.** Support educational programmes and cultural developments that support nature conservation, efficient use of energy and minimise environmental footprints for a sustainable future at all levels of education/training.
- **Principle 5.** Involve and empower local communities in fostering sustainable lifestyles for improving our environment for present and future generations, involving cities and other local authorities, social partners and civil society as well as businesses.
- **Principle 6.** Actively involve youth and women in promoting lifestyle changes and access to energy-efficient technologies. By empowering them and providing educational resources, we envisage to cultivate a sustainable future where every individual has the knowledge and tools to prioritise energy efficiency.
- **Principle 7.** Support policies to ensure efficient use of energy and materials by households and/or companies through sustainable behaviours and technologies, thereby saving energy and preserving resources, while ensuring accessibility, affordability and equity in meeting everyone's basic needs.

Introduction

Evidence from diverse contexts has demonstrated that coordinated approaches combining strong public engagement, education, policy frameworks and targeted training for workers can foster low-emissions activities and build long-term resilience. This chapter, prepared in support of the second part of the Declaration on Promoting Sustainable Lifestyles, Fairness, and Access to Clean Energy Technologies, reviews documented approaches to empowering individuals and communities. Drawing on Principles 4 to 6, it examines how educational programmes, from primary schools to universities, have helped influence behaviours that support emissions reduction, with a focus on vocational education and training initiatives that address skills development for entry into the low-emissions energy labour market and access to emerging opportunities. It also explores experience in involving local communities and other stakeholders, including engagement in decision making, with a focus on youth and women, climate assemblies, multi-stakeholder engagement models, local energy

communities and the role of trusted intermediaries. Finally, in line with Principle 7, the chapter reviews current findings on the multiple benefits of energy efficiency beyond energy savings, including improved affordability, better health outcomes and positive impacts on the labour market.

Engaging local communities in decision making

Several case studies document the benefits of consulting and engaging local communities in decision making when developing policies to foster low-emissions activities, protecting them from energy shocks or price volatility. They suggest that clean energy programmes developed in meaningful consultation with local communities have helped ensure that such programmes are tailored to local contexts, enhance their long-term social acceptability, and reduce the risk of costly conflicts and delays. This consultation approach has also helped make sure that their design and implementation process addresses and mitigates unintended outcomes for affected communities. In Kenya, for example, the Kipeto Wind Farm project involved local communities early, resulting in positive social impacts, such as job creation and revenue for local landowners, as well as the diffusion of knowledge on clean energy topics. Similarly, the Mekong River Commission for Sustainable Development in Southeast Asia included several formal consultation mechanisms with local communities that were designed to mitigate risks and harness the local benefits of hydropower plant deployment in the Mekong River Basin.

Climate assemblies represent another documented approach to engaging local communities in decision making. These platforms have been used as forums in which citizens can debate issues and to make recommendations for policy action. Many countries have started to convene citizens' assemblies on the national, regional and local levels to increase participation in formulating low-emissions policies.

Several examples illustrate the influence that climate assemblies have had on national policymaking. Denmark has a Citizens' Assembly that is composed of 99 members selected to represent the Danish population. This assembly formulated 119 policy proposals related to the country's clean energy transition and shared these with the Minister of Climate, Energy and Utilities and with the Climate, Energy and Utilities Committee. In Austria, the Citizens' Climate Assembly discussed and developed a set of concrete measures to ensure the achievement of climate neutrality by 2040, submitting a total of 93 recommendations to the government and the Austrian climate cabinet. In both Denmark and Austria, governments have formally received and responded to the assemblies' recommendations, with evidence of incorporation into existing or planned energy policy measures.

Lessons from Ireland's citizens' assemblies

Experience from Ireland, in which four national citizens' assemblies addressing climate issues have been organised, demonstrates several guiding principles that can ensure the effective organisation and operation of such assemblies. These include:

- **Transparency regarding limitations**. It is helpful to clarify and disclose the limitations of the assembly process to all participants. Participants should be made aware that their recommendations may not be adopted, and that governments may not always explain the reasons for accepting or not taking forward specific recommendations.
- **Scope of assemblies**. Assemblies are generally most effective when they are not regarded as a universal solution for all policy challenges. For example, highly technical issues, such as the suitability of nuclear power infrastructure, may require specialised expertise beyond the general knowledge of citizens participating in an assembly.
- **Representative composition**. The composition of the assembly can aim to reflect the broader society. This can include ensuring representation across gender, age, geographic regions, job type and employment status, disability, migrant status, and other relevant social categories, so that the assembly provides a microcosm of society as a whole.
- **Inclusivity of perspectives**. For assemblies to be truly meaningful, it is helpful for citizens to hear and be exposed to a wide range of perspectives and voices. This can ensure that deliberations are comprehensive and that help outcomes reflect the diversity of views within society.

Multi-stakeholder engagement models

There are several examples of multi-stakeholder engagement models that have been established at the national, regional and municipal level to foster the legitimacy of clean energy transition policies**.** Policies advancing low-emissions activities affect societies in many ways. For example, they can generate shifts in the labour market by creating new jobs and increasing the demand for new skills. They may affect local communities differently, based on geographical features and access to resources.

Multi-stakeholder engagement models have helped integrate diverse, specialised knowledge and multiple perspectives, reflecting the impacts those policies may have on different sectors of society, such as government, civil society, labour, industry, academia, etc. In South Africa, for instance, the President established a Presidential Climate Commission to bring together a variety of stakeholders to

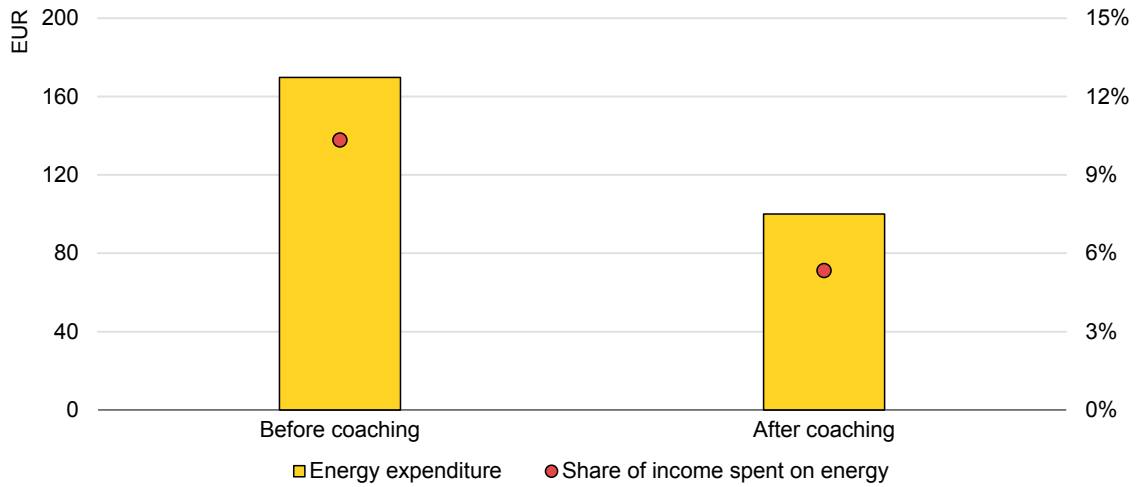
inform national climate policy and advise on key topics such as just transition, emissions reduction, and social inclusion, for example through climate adaptation strategies tailored to vulnerable groups.

The role of trusted intermediaries

Effective programmes often have made use of "trusted intermediaries", who have helped local communities – including hard-to-reach groups – overcome distrust and lack of knowledge about clean energy topics. Such intermediaries have included consumer associations and civil society organisations, as well as one-stop shops that provide tailored advice services independently from any commercial interest.

In a number of case studies, local energy coaches have acted as trusted intermediaries to provide tailored advice to households, helping them adopt small actions to save energy (e.g. use of LED bulbs, radiator foils and draught-proofing measures) and directing them to existing public subsidies for inefficient appliance replacement and home retrofits. Energy coaches have been effective in ensuring uptake of energy-saving tools and practices because they are often able to interpret complex regulations, tariffs, subsidy schemes, renovation options and rights into clear, everyday language, explaining step-by-step what people can do concretely to reduce energy consumption, regardless of household income.

Amount of the energy bill (left axis) and share of income spent on energy bill (right axis), before and after



Source: IEA analysis based on data from Llewellyn et al., 2025.

In the Netherlands, for instance, the government released dedicated financial support to municipalities through a nationwide network of local energy aid providers with the "Energiehulp" initiative. Independent non-profit foundations

operating locally were also trained to offer free energy coaching home visits. The lack of cost and the simple procedure for booking a session have helped ensure the success of this initiative. Evidence shows that Dutch households which received energy coaching generally have been successful in reducing their energy consumption, with reductions in energy bills.

Local ownership models

Several examples point to the role of community ownership of renewable energy assets in empowering people to take part in clean energy transitions and fostering behaviour change. Local energy communities are groups of individuals that work together to produce and manage energy collectively through open and democratic decision making. Due to this community ownership feature, such models can promote sustainable behaviours, since residents benefit directly from efficiency and energy-saving practices. A study of about 700 energy communities across Europe found that many have had a positive social impact on the regions where they were established, improving environmental and education indicators.

The European Union has also introduced a mechanism to facilitate the creation of energy communities. The European Energy Communities Facility includes specialised training opportunities and financing instruments to support energy communities across its jurisdiction. Recent data show that about 6 800 “strong” energy communities (i.e. that respect all the denomination criteria) have been established in Europe so far.

Lessons from energy communities

Evidence from energy communities highlights several possible lessons for their effective organisation and operation (IEA, 2024):

- **Access to financing and supportive regulatory environments** are frequently determining factors. Examples suggest that communities may benefit from startup funding and financial instruments that reflect their smaller scale, social objectives and participatory governance.
- **Transparency and data sharing** are recurrent enablers of effective operation. In a number of projects, digital tools that allow members to see production and consumption in near-real time have helped improve virtual self-consumption and align demand with local supply. Such tools have also been reported to contribute to a stronger sense of trust, accountability and local ownership.
- **Knowledge exchange and technical assistance** tend to accelerate development. Case studies highlight the usefulness of mapping exercises, guidance materials and advisory services that help communities move from

concept to implementation and scaling. Drawing on well-known organisational forms, such as cooperatives or local associations, has also made it easier to navigate legal, financial and administrative steps.

Youth engagement in low-emissions energy and climate actions

Climate change represents a major concern for youth worldwide: survey data indicate that 60% of young people acknowledge feeling worried about climate change,[4] in part because they are expected to be disproportionately affected by it. Studies show that children born in 2020 will experience up to seven times the number of extreme heatwaves over their lifetime relative to those born in 1960, even under moderate climate scenarios (Thomaes et al., 2023). A recent survey of more than 40 000 youth in 129 countries showed that 81.5% support their country declaring a decarbonisation target and 65.2% are in favour of net zero emissions by 2030, objectives significantly more ambitious than many current national commitments. Youth respondents in such studies often call for leadership roles in decision making and for concrete policy actions to address climate change, as well as access to education and training that prepares them for clean energy jobs.

Case studies from across the world illustrate the role that youth have played, both as decision makers and as low-emissions practitioners. One of the most common examples is through youth councils, which are youth-led advisory bodies or collaborative platforms that support public institutions in making climate and energy policies more inclusive of youth perspectives. Such councils have provided a formal space for young people to share their views, propose solutions and influence decisions.

The Youth Climate Council in Denmark is one example of a Youth Council established to represent young people's stances in climate-related decision making. In this case, youth participation takes place through regular meetings with the Minister of Climate, Energy and Utilities, allowing the Youth Council to present ideas, concerns and recommendations directly to policymakers. In 2023, the Council launched a set of recommendations on climate-friendly behaviours to inform the government's climate policy.

[4] For statistical purposes, the United Nations defines "youth" as persons aged between 15 and 24, accounting for 16% of the global population.

Several youth-led initiatives have also demonstrated ways in which youth can be engaged as actors to advance low-emissions technologies. For instance, the youth-led Renew Watts Technologies initiative in Nigeria has provided off-grid renewable energy technologies and capacity-building opportunities to local communities across the country, helping to improve energy access.

Evidence from youth-led initiatives also shows that they have played an important role in connecting research, advocacy and real-world solutions relating to clean energy transitions. They have helped translate scientific findings and policy goals into practical actions that communities can understand and apply, including by adopting more sustainable behaviours. There are also a number of examples of youth groups leading or participating in local energy communities across several countries, including Greece and Poland.

Education on sustainability in primary, secondary and higher education

Country experiences illustrate different ways in which education systems have engaged youth in low-emissions behaviours. In several cases, primary and secondary schooling have been entry points for introducing young learners to the environmental impacts and carbon emissions of daily habits. OECD data suggests that young people who understand environmental and sustainability issues are three times more likely to engage in pro-environmental practices such as saving energy at home (OECD, 2018).

The Greening Curriculum Guidance developed by UNESCO recommends setting age-appropriate learning outcomes (UNESCO, 2024). Activities such as school gardens or energy conservation projects are suggested to promote behaviour changes, including the ability for young people to identify ways to reduce personal carbon footprints through simple actions such as the use of efficient lighting.

Several school systems around the world already have implemented programmes in line with these education models. For example, the Green School Project 2.0, a school-based environmental education initiative operating across six states in India, has proposed an activity-based learning model to inform the behaviours of middle-school students and to provide them with technical skills to apply in the energy sector. In Norway, the Generation Green initiative included the appointment of climate ambassadors who held lectures in several middle and upper secondary schools across the country, improving education and awareness about climate change, mitigation and solutions. Just over half of countries around the world have incorporated education on emission reduction behaviour into their national education curricula.

Approaches to education on emission reduction behaviours in primary, secondary and university settings

According to UNESCO, existing examples of effective approaches to primary and secondary education on low-emissions issues in different contexts highlight the following key elements:

- Professional development for teachers, for example by introducing upskilling workshops and support material on environmental sustainability pedagogy.
- Personally relevant content, for instance by making students calculate their school's energy consumption and carbon footprint.
- Local project-based activities tied to local issues that are more tangible to students (e.g. developing an energy audit or action plan for their locality).
- Innovative teaching methods using a mix of tools, such as games, simulations and physical samples (e.g. miniature solar panels or air sensors).

At university level, some institutions have embedded training sessions on energy-saving practices. Evidence from existing initiatives suggests the following features can be useful:

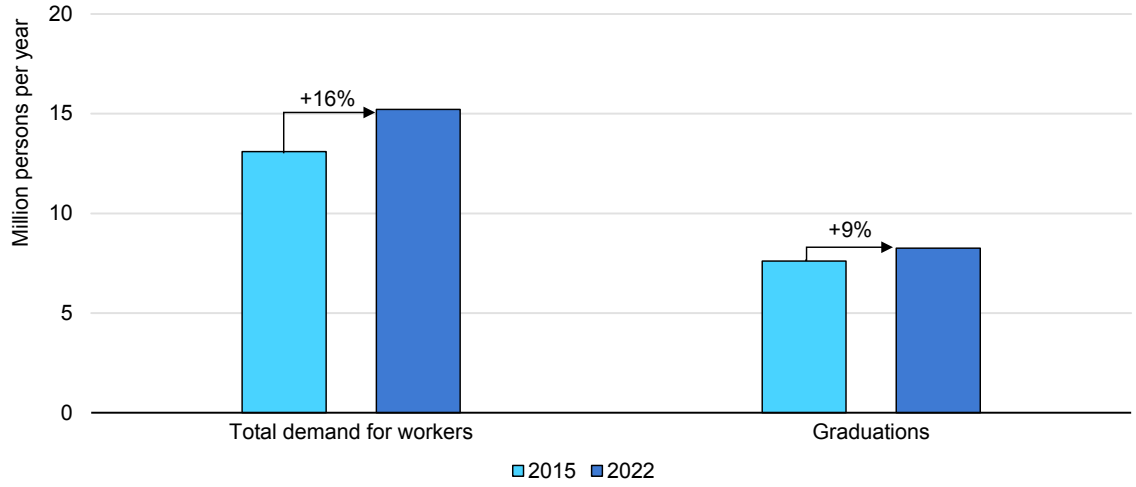
- Revising university curricula to integrate workshops and classes on low-emissions activities and energy-efficient behaviours.
- Focusing on teaching the environmental and energy issues identified as most relevant by students, for example through surveys.
- Using university campuses as living laboratories to encourage emissions reduction behaviours through carbon audits and waste reduction programmes, and promoting simple, energy-efficient practices on campus to help embed these behaviours into everyone's daily habits.

Vocational training

Vocational training has played a key role in equipping workers with the skills required for advancing low-emissions energy deployment. Demand for skilled workers in clean energy technology and energy efficiency is growing. Between 2018 and 2023, the number of job postings in skilled trades sectors, such as wind, solar, heat pumps, energy efficiency and batteries, grew at an average annual rate of 40%. Solar jobs experienced the fastest growth with a compound annual rate of 60%. Although the demand for clean energy professionals continues to rise, a growing number of energy companies are experiencing difficulties in recruiting workers with relevant vocational skills, such as electricians. According to an IEA survey of more than 400 energy firms undertaken in 2025, approximately 60% of firms reported hiring difficulties due to skills and labour shortages.

IEA analysis indicates that growth in the supply of graduates from energy-relevant vocational degrees is not keeping pace with industry demand for applied technical roles, a trend that could challenge the growth of low-emissions technologies. Annual demand for applied technical workers in industrial sectors commonly employing a high share of these workers – such as mining, manufacturing, utilities and construction – rose by 16% between 2015 and 2022. Such demand is driven both by expansion in the labour force and replacement of retiring workers and is much larger than the 9% increase in number of graduates in relevant specialties.

Annual demand for applied technical workers from industrial sectors, and graduations from energy-relevant vocational degrees, 2015-2022



Source: IEA (2025), World Energy Employment.

Several countries are already increasing vocational training to enhance their clean energy workforce. For example, India's Skills Council for Green Jobs has rolled out nationwide training programmes focused on renewable energy. It has already prepared over 100 000 students and workers, the majority specialising in solar energy roles. In Cote d'Ivoire, jobs in the solar power and biomass sectors are projected to grow by around 8 000 to 13 000 people by 2030. The government has therefore set out plans to support young people entering this labour market, including by developing vocational training programmes in collaboration with the private sector.

Various policy actions have also been put in place for reskilling workers from the fossil fuel sector to work in the clean energy industry. The European Union, for example, recently introduced the RES-SKILL Project to upskill and reskill coal workers through vocational education and training in order to secure jobs in the renewable energy sector.

Women in the low-emissions energy workforce

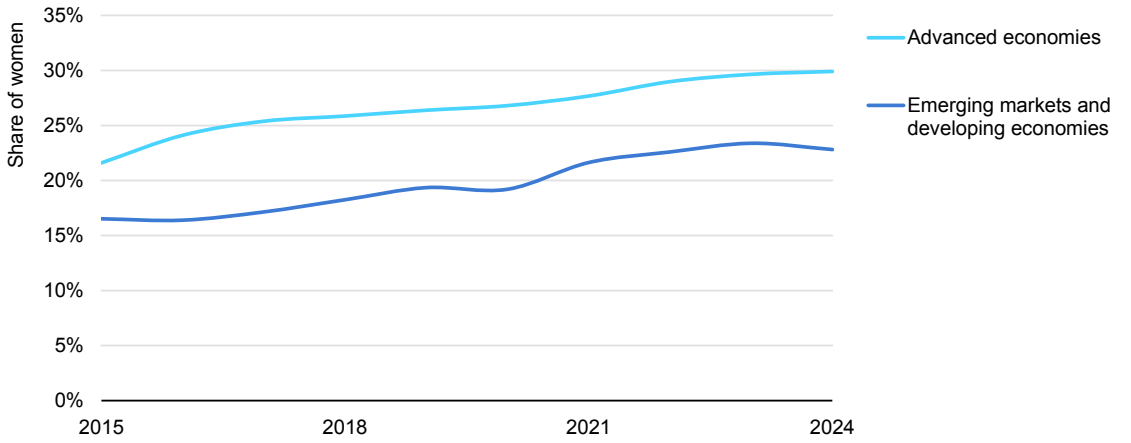
Analysis shows that women are underrepresented in the low-emissions energy workforce. Although their representation is higher in certain sub-sectors, such as scientific research, where women account for 45% of workers, women are underrepresented in the broader energy workforce. A range of factors has contributed to low representation, including negative perceptions of women in certain occupations, workplace cultures and low access to vocational pathways.

In a survey on energy training programmes, women cited the lack of flexible working-time arrangements, insufficient childcare policies and limited access to mentoring programmes as key barriers to participation (IEA, 2025). Additionally, STEM degrees are still often viewed as a career path for men, especially in emerging economies. This can be due to the persistence of rooted social norms leading to work specialisation differences between men and women. The lack of female role models and senior women in leadership positions in the energy sector can also discourage women from pursuing these training opportunities.

Several projects are being carried out to increase tailored training paths and provide women with low-emissions energy skills. For instance, the Girls4Rurals initiative in Nepal has empowered young women by developing their skills and knowledge on renewable energy. After completing the initiative's training opportunities, these women promote and distribute solar energy technologies in their communities, contributing to improvements in health and air quality conditions.

In the broader energy sector, on average only 18% of leadership roles are held by women, compared to 25% across the economy as a whole. Data also suggests that women are underrepresented in senior leadership positions in the low-emissions energy sector. These leadership roles include senior positions in policymaking, which can impact the design of gender-sensitive low-emissions policies.

Share of women in senior leadership positions in the renewables energy sector, 2015-2024



Source: IEA (2025), Gender and Energy Explorer.

Evidence suggests that programmes developed with gender dimensions in mind help ensure more effective and context-appropriate low-emissions solutions. Public transport planning in the City of Vienna, for instance, has incorporated gender perspectives during the policy design and monitoring phases. This has led to a higher uptake of clean transport options and positive social impacts for different groups across the city. Similarly, a formal gender mainstreaming process in Kenya informs national energy planning, helping ensure that women's experiences, needs and perspectives are integrated into the design, implementation, monitoring and evaluation of the country's energy policies.

Multiple benefits of energy efficiency

Over the past twenty years, actions to improve energy efficiency have resulted in more than 27 exajoules (EJ) of energy saved across IEA Member countries, representing around one-fifth of their overall energy consumption.

Current findings demonstrate that these improvements have also contributed to lowering worldwide greenhouse gas emissions over recent decades. Since 2010, advancements in energy efficiency have prevented nearly 7 gigatonnes of energy-related CO_2 emissions per year, equivalent to roughly 1.5 times the annual emissions of the United States. Accelerating energy efficiency progress could provide about one-third of all energy-related CO_2 emission reductions by 2030, representing the largest contribution from any sector or technology.

Placing energy efficiency at the heart of low-emissions strategies can also have positive effects on air quality, by reducing the presence of harmful gases in the air, such as particulate matter and nitrogen oxides. Increasing the thermal efficiency of houses and commercial buildings through retrofits, for instance, can

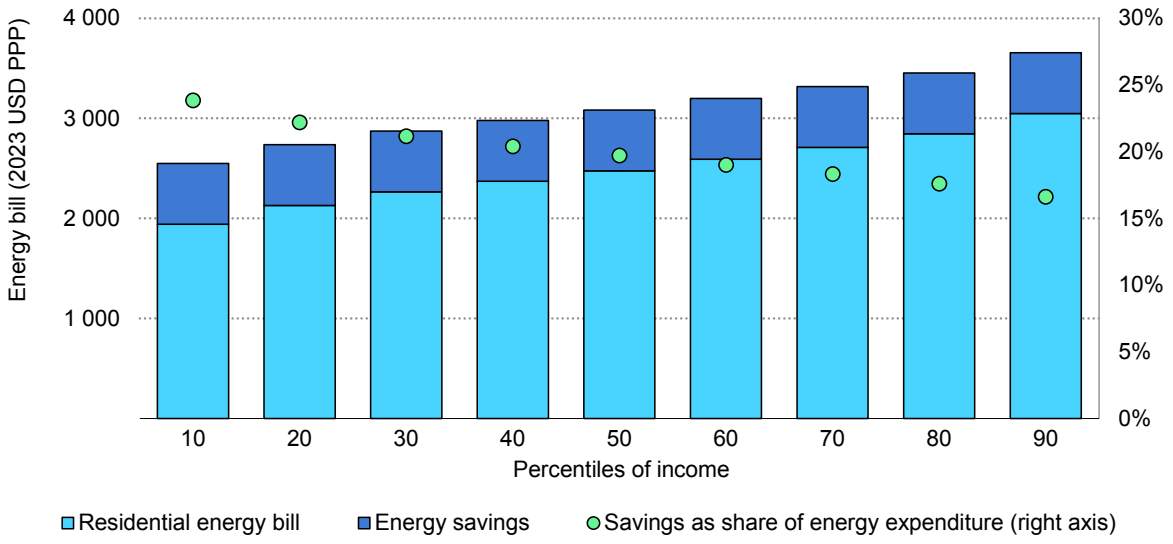
also help reduce indoor air pollutants. Air quality can also be improved by promoting low-emissions transportation modalities, such as cycling and the use of public transport in cities.

Evidence suggests that energy efficiency has contributed to healthier living spaces by maintaining comfortable temperature and humidity levels and enhancing both indoor and outdoor air quality. According to the World Health Organization, more than 3.2 million people died in 2020 from diseases caused by household air pollution (WHO, 2025). Energy efficiency household measures are associated with a decrease in respiratory diseases caused by air pollution. In Ireland, for instance, the Warmth and Wellbeing Scheme provided free energy efficiency upgrades to low-income households living in poor air quality conditions. Survey evidence indicated the Scheme had remarkably positive impacts on participants' health, including reported reductions in GP visits of around 26% and a 60% reduction in hospital admissions. This example demonstrates that policies promoting affordable energy efficiency solutions can also deliver positive health outcomes.

Similarly, the Warm Up Homes: Heat Smart programme in New Zealand subsidised the costs of house retrofitting and the installation of clean heating for eligible households. A study found that health benefits account for 99% of the total benefits brought about by the programme. These improvements in health conditions in turn have had a positive ripple effect on private and public finances, with the Warm Up Homes programme expected to generate more than NZD 1.2 billion in health savings.

Evidence illustrates the role energy efficiency has played in improving energy affordability by reducing energy bills for households, addressing energy poverty, and improving access to essential energy services. During the past 25 years, improvements in energy efficiency have led to household energy bills that are up to 20% lower in advanced economies than they would have been without such measures. The impact is even greater for lower-income households, where savings can reach 25%, as these groups allocate a higher proportion of their income to energy costs.

Average annual household savings on energy bills due to efficiency gains since 2000 and share of household income saved, by income decile, in advanced economies



Source: IEA (2025), Energy Efficiency 2025.

Advances in energy efficiency have also had positive effects on the labour market, creating jobs in a wide range of occupations, from the buildings sector to transport. More than 18 million people are currently employed in energy efficiency-related jobs. Employment in this sector increased by 6% between 2023 and 2024, following an upward trend that has been ongoing since 2019. In 2024, the buildings and appliances sectors accounted for 60% of jobs in energy efficiency. The final section of this report will explore different mechanisms that policymakers in different countries have used to foster energy efficiency in different sectors, delivering positive social impacts in several domains.

Case studies (Part 2). People: Empowering individuals and communities

Principle 4

Support educational programmes and cultural developments that support nature conservation, efficient use of energy and minimise environmental footprints for a sustainable future at all levels of education/training.

Côte d'Ivoire – Vocational training in renewable energies and energy efficiency

Policy rationale: In 2019, the government of Côte d'Ivoire set a goal to rapidly increase electricity generation capacity by 2030. This has led to a need for additional workers in the clean energy sector. Government policy aims to support young people entering the clean energy labour market, including by developing vocational training programmes in collaboration with the private sector.

Actions taken:

- As part of the reform partnership between the Government of Côte d'Ivoire and the German Federal Ministry for Economic Co-operation and Development within the G20 Compact with Africa initiative, a project was launched to increase local technical expertise and management skills in renewable energy and energy efficiency.
- The project bolsters the capabilities of teachers in vocational schools and universities, allowing them to support a larger-scale dissemination of practical skills.
- Vocational schools and universities are advised on organisational areas that align training programmes with market needs.
- The initiative facilitates dialogue and networking between the private sector and training organisations.

Outcomes:

- In the first two years after the project was introduced, three cross-sectoral formats were established. In 2020, 45 companies had liaised with training institutions, while 37 teachers had received training in solar PV, energy efficiency and supporting skills.
- Renewable energy and energy efficiency have been integrated into the training curricula for jobs in the industrial and construction sectors.
- Around 400 workers (including 69 women) from 76 companies have received training.

- The project, which ended in 2023, was followed by another initiative in collaboration with GIZ. This programme, which will promote vocational education that includes on-the-job training, will run until 2027.

European Union – RES-SKILL Project

Policy rationale: The RES-SKILL Project is a collaborative partnership between vocational and education training providers, industry representatives, social partners, and regional development agencies from Germany, Greece, Austria, Romania, Bulgaria and Poland. The objective of the project is to strengthen vocational education and training for coal workers who may be affected by clean energy transitions, in order to secure jobs for them in the renewable energy space.

Actions taken:

- As part of the training effort, the project employs a three-step methodology: 1) identifying the main occupation profiles in the coal industry and renewables sector, 2) documenting skills in the coal industry and renewables sector, and 3) developing transition profiles based on skills matching.
- The programme develops a tailored curriculum and training content to support the integration of coal workers into renewables jobs and supports vocational and education training providers to integrate RES-SKILL materials into their offerings.
- The project improves coordination between vocational and education training providers and employers to identify opportunities that facilitate coal workers' transition to the renewables sector.
- RES-SKILL facilitates the identification of synergies and misalignments on skills between the job descriptions of coal and renewables sector workers to better target training.
- The project develops resources to set up Joint Competence Centres to reorient the careers of coal workers.

Outcomes:

- The project has provided learning opportunities, self-assessment tools and other pedagogical materials to coal workers, contributing to training the clean energy workforce in the EU. Educational resources are now available in six languages.
- The project has introduced six national info-days to promote public debate on enhancing the quality and effectiveness of training for coal workers.

India – Skill Council for Green Jobs

Policy rationale: The Skill Council for Green Jobs (SCGJ) was launched in 2015 by the Government of India in line with the National Skill Development Mission. The goal of the initiative is to identify the skills needed by service users, manufacturers and service providers within the low-emissions sector and to implement nationwide, industry led, collaborative skills development and entrepreneurship initiatives.

Actions taken:

- Enhancing partnerships with educational institutions for integrating vocational learning.
- Developing curricula and certifying skills for roles in solar PV, wind, small hydro and waste management sectors.

Outcomes:

- To date, 620 000 candidates, 5 500 trainers and 900 certified assessors have been trained across the country under the initiative.

Principle 5

Involve and empower local communities in fostering sustainable lifestyles for improving our environment for present and future generations, involving cities and other local authorities, social partners and civil society as well as businesses.

European Union – European Energy Communities Facility

Policy rationale: Launched in 2024, the European Energy Communities Facility is an incubator and network of energy communities led by the European Commission and implemented by a consortium of organisations: REScoop.eu, Energy Cities, FEDARENE and GNE Finance. The aim of the project is to facilitate the establishment of energy communities across Europe by providing financial support and other resources to local initiatives.

Actions taken:

- The Facility allocates funds to support energy communities, mainly through lump sum grants.
- The project supports the development and implementation of business plans for energy communities to scale up investments in clean energy.

- The project has led to the creation of a European network of national experts to bridge communication between the European Union and local energy community initiatives.
- The consortium of organisations is supported by a network of 29 national experts who act as country focal points, promoting the Facility, advising applicants, and guiding energy communities through the different stages of the project, including access to training and capacity-building materials.

Outcomes:

- The Facility devoted more than EUR 7 million to emerging energy communities across Europe, ensuring grants of up to EUR 45 000 for each community.
- The Facility has provided at least 140 energy communities with business plans and implementation guidelines.

Denmark – 100% renewable energy-powered community in Samsø

Policy rationale: This community-led renewable energy project was established in the small island of Samsø in 1997 by the Samsø municipality in collaboration with the Danish Ministry of Environment and Energy.

Actions taken:

- Initially, a national competition was launched in 1997 under Denmark's Energy 21 plan to foster renewable energy leadership with minimal government intervention. Samsø's won with a proposal that emphasised local engagement, ownership and communication.
- The project featured consultation, involving citizens in the planning of all major aspects of the transition, from the location of wind turbines to the establishment of district heating systems.
- The project ensured full transparency through open access to planning documents and consistent updates via local newspapers, letters, community meetings and citizen petitions.
- The governance framework included decision-making processes structured to empower islanders' capacity to voice their needs through trusted institutional intermediaries, who coordinated local input and communicated it to the authorities.
- The generous timeframe provided for deliberation allowed for trust building, conflict resolution and collective ownership of decisions.

Outcomes:

- Samsø attracted approximately EUR 57 million[5] in renewable energy investments between 1998 and 2007, creating stable, local employment across sectors such as construction, operations and tourism.

India – GOBARDhan Scheme

Policy rationale: The Galvanizing Organic Bio-Agro Resources Dhan (GOBARdhan) Scheme, launched in 2018 by the Ministry of Jal Shakti, is an intervention focused on converting biodegradable agricultural and household waste into clean biogas and organic fertiliser. The programme brings India's "waste-to-wealth" vision to life by combining sanitation improvements, renewable energy production, and job creation. It helps rural communities build shared biogas plants, allowing them to productively use organic waste and build a circular economy. At the same time, the initiative improves local sanitation, expands access to clean energy, reduces pollution, and boosts farmers' incomes.

Actions taken:

- Financial assistance for setting up community and cluster biogas plants.
- 500 new "waste-to-wealth" plants under the GOBARdhan initiative established to actively promote a circular economy.
- Across the country, eight Biogas Development and Training are providing technical advice and training, field inspections, information and publicity assistance to state and local agencies implementing the programme.

Outcomes:

- As of February 2026, about 1 000 Compressed biogas projects and 190 community-based Biogas projects were functional across more than 230 districts in India.
- The projects are contributing to the rural economy by generating employment, augmenting farmers' income, establishing manure supply chains and supporting rural infrastructure development.

[5] Exchange rate: 1 Euro (EUR) = USD 1.16 (as of 3 June 2026).

Kenya – Kipeto Wind Farm

Policy rationale: The Kipeto Wind Farm was initially conceived by local developers in Kenya and subsequently financed by the national electricity utility, Kenya Power, in 2016. The project involved affected stakeholders early, in order to promote positive social impacts and cost-efficiency.

Actions taken:

- Developers conducted in-depth consultations with Maasai communities, 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.
- Land was leased instead of purchased, generating direct revenues for Maasai landowners while avoiding expensive acquisition costs.
- The initiative fostered structured dialogue and consultation to create 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 has generated hundreds of job opportunities during construction, with permanent positions filled by many local residents.

Principle 6

Actively involve youth and women in promoting lifestyle changes and access to energy-efficient technologies. By empowering them and providing educational resources, we envisage to cultivate a sustainable future where every individual has the knowledge and tools to prioritise energy efficiency.

Denmark – Youth Climate Council

Policy rationale: The Danish Youth Climate Council was established in 2019 to ensure meaningful engagement of youth in shaping Denmark's climate and energy future. Functioning as a formal advisory body to the Ministry of Climate, Energy and

Utilities, the Council provides a structured platform for youth to contribute to national decision making.

Actions taken:

- The Council was granted advisory status to the Ministry of Climate, Energy and Utilities.
- The Council has developed policy recommendations across three thematic areas: electrical energy, bio-based energy and energy efficiency. It has engaged regularly with the Danish Climate Minister to present youth-led proposals.
- The Council convened over 60 events in a single year in 2023, including school and municipal talks, public debates, panel discussions and contributions to major industry conferences.
- Local Youth Climate Councils were promoted across Danish cities and municipalities to strengthen decentralised participation.
- The Council has established media presence through op-eds, interviews, and coordinated social media campaigns.

Outcomes:

- The policy recommendations submitted to the Ministry have contributed to national discussions on energy, particularly in relation to electrical energy, bio-based energy and energy efficiency.
- The Council has enhanced public awareness on energy issues through outreach and communication efforts.

India – National Painting Competition on Energy Conservation

Policy rationale: The Ministry of Power launched the National Awareness Campaign in 2005 to promote energy conservation in the country. This national competition aims to inspire societal change through the creative expression of young minds. Organised in three stages – school, state and national level – the competition targets students in 5th to 10th standards across two groups.

Actions taken:

- The National Awareness Campaign was implemented throughout the country with the support of 11 Central Public Sector Undertakings (CPSUs') working under the administrative control of the Government of India and all of the 33 State

Designated Agencies (SDAs') established under the Energy Conservation Act 2001.

- Winners of the national level competition are honoured by eminent dignitaries, including the President and the Prime Minister of India, on 14 December, the National Energy Conservation Day.

Outcomes:

- Early-age engagement has been an effective in mainstreaming energy conservation values.
- Creative platforms together with policy instruments have been driving mass awareness and behavioural change at scale.

Norway – Generation Green Climate Ambassadors

Policy rationale: Generation Green is a national climate lecture tour taught by young climate ambassadors in Norwegian middle and high schools. The goal of the initiative, launched in 2011, is to enhance and develop target groups' knowledge about climate change, focusing on solutions and concrete behaviour change.

Actions taken:

- The climate ambassadors teach lectures on climate change, energy transitions and low-emissions behaviours. The content is developed with the professional, academic and technical assistance of the Bjerknes Centre for Climate research (University of Bergen), StormGeo, Tobias Thorleifsson, the Ministry of Education and Research, the Norwegian Centre for Science Education, and the Norwegian Environment Agency.
- Lectures balance education and positive storytelling, in order to create a connection between the ambassadors and the students.
- Lectures cover a broad set of topics, such as renewable energy technologies, city planning, mitigation, transportation and entrepreneurship.

Outcomes:

- Since 2011, the climate ambassadors have held more than 2 000 lectures and reached about 200 000 students.
- The project received outstanding feedback from schools. Almost all students surveyed declared they were satisfied or very satisfied with the experience.

- The initiative managed to challenge the stereotypes and assumptions about what it means to be involved in environmental and climate action.
- An increasing number of schools are making the lecture a regular part of their curriculum and expect climate ambassadors to visit each year.

Nigeria – Renew Watts Technologies

Policy rationale: Founded in 2022, Renew Watts Technologies is a youth-led organisation that promotes climate change awareness and advocacy, fosters the adoption of clean energy technologies, and equips young people with renewable energy skills through training activities.

Actions taken:

- The organisation has trained and educated young people with climate and clean energy skills.
- Renew Watts has implemented off-grid solar energy technologies to serve marginalised and underserved communities.
- The organisation has adopted innovative solutions to address specific local needs, such as a sustainable solar-powered charging booth and a power bank kit that provides clean energy.

Outcomes:

- More than 6 000 young people have been trained with clean energy skills in 12 different schools.
- The project has increased its reach, involving 46 countries in its training activities.
- An informative webinar takes place every month to educate on renewable energy.
- The project has improved energy access for about a thousand households per year.

Austria – Vienna's gendered approach to public transport planning

Policy rationale: The City of Vienna provides an example of integrating gender dimensions in transport planning. Launched in 2003, this programme recognises gender differences in travel patterns and structurally integrates the specific needs of women, especially as they relate to caregiving, part-time work and safety. Many of the actions taken also benefit other vulnerable groups.

Actions taken:

- Redesigned public transport with ramps, elevators and step-free metro/tram access has made transit more accessible for women. Wider sidewalks have been introduced to provide more space for strollers and shopping carts, as well as benches for caregivers.
- The City of Vienna has also introduced a EUR 365 public transport pass, which particularly benefits women who rely on transit for daily trip "chaining", i.e. making multiple stops or errands into a single journey.
- The frequency of public transport services in off-peak hours was increased to better serve people with caregiving responsibilities and part-time work. Bus stops were redesigned to be safer, with transparent shelters, better sightlines and emergency call buttons to prevent harassment. Public spaces were also improved with brighter LED lighting to ensure visibility and security in high-risk pathways leading to transit stops and underground passages.
- Participatory initiatives, such as Lokale Agenda 21 and Klimateams, engage women and underrepresented groups in transport planning through mechanisms such as participatory budgeting and citizen juries.

Outcomes:

- The impactful outcomes from these policies have illustrated the value of integrating gender considerations into policy design. Between 1993 and 2019, daily car trips were reduced by 32% as new pedestrian, cycling and transit options improved. There was a 9.5% increase in women's perception of safety in public spaces between 2008 and 2013 due to better lighting and open walkways.
- In addition to benefiting women, these policies have had positive social impacts on the elderly, persons with disabilities and low-income residents, all of whom rely more on accessible and affordable public transport.
- Enhancements to public transport shelters and shaded waiting areas have addressed heat vulnerability, delivering tangible benefits for women and other groups disproportionately affected by extreme weather events.

Kenya – Gender mainstreaming in the National Energy Policy

Policy rationale: Since 2006, Kenya's Ministry of Energy has sought to embed gender considerations within the energy sector by promoting gender-blind policy frameworks and addressing the lack of gender-disaggregated data. The overarching objective is to foster more inclusive and equitable outcomes in clean energy transitions through improved policy formulation and monitoring mechanisms.

Actions taken:

- Strategic partnerships to support gender mainstreaming efforts with the International Network on Gender and Sustainable Energy (ENERGIA), Practical Action Kenya, the East African Energy Technology Development Network and the University of Nairobi.
- A comprehensive Gender Audit of the energy sector, assessing institutional arrangements, the gender-energy interface, national policy frameworks, energy access in relation to development priorities, and financing for gender-responsive measures.
- Identification of key gaps, including gender-insensitive policy design and the absence of gender-disaggregated data.
- Engagement with Kenyan civil society organisations and international non-governmental actors to build momentum and support for inclusive energy policy.
- Development of gender-disaggregated indicators to inform policy formulation and track progress on inclusivity objectives.

Outcomes:

- The Ministry of Energy utilised data derived from gender-disaggregated indicators to inform national energy planning processes. This evidence base contributed to the formulation of key policy documents, including the National Energy Policy 2025-2034 (2024), the Energy and Gender Policy (2019), and the National Cooking Sector Study (2019). These efforts also enhanced institutional capacity to implement gender-sensitive energy programmes.
- To institutionalise gender mainstreaming, a Gender Focal Point was appointed within the ministry to coordinate efforts across departments. Furthermore, in 2021, the Energy Sector Gender Committee was established, comprising Semi-Autonomous Government Agencies, civil society representatives and the Council of Governors, to support the implementation of the sector's gender policy.

Nepal – Girls4Rurals Initiative

Policy rationale: Launched in 2018, Girls4Rurals is a youth-led initiative that has been developed to strengthen the role of young women in rural Himalayan communities as part of Nepal's clean energy transition. Central to its approach is the promotion of inclusive education, local capacity building and gender-responsive entrepreneurship. The initiative seeks to enhance awareness of renewable energy and climate action, foster market development for clean energy technologies and support youth-led environmental impact. By equipping girls with relevant skills and knowledge, the programme contributes to both gender empowerment and climate resilience in remote regions.

Actions taken:

- Training programmes have been delivered to enable young women in Himalayan communities to act as distributors of solar photovoltaic systems, thereby expanding access to renewable energy technologies at the local level.
- A digital platform has been established to facilitate peer learning and knowledge exchange among Nepalese girls in rural areas, supporting community engagement and collective action.
- Educational campaigns have been launched to raise awareness among teenagers regarding the health benefits of clean energy, encouraging their participation as advocates within their communities.
- A Green Entrepreneurship scheme has been introduced, supporting women tailors to convert manual sewing machines into automated systems and maintain them. This intervention has reached approximately 6 000 tailors across Nepal.
- Training and outreach activities have promoted the adoption of induction stoves in rural households, with a focus on reducing respiratory health risks and encouraging sustainable cooking practices.

Outcomes:

- Girls in rural areas have been empowered to take on leadership roles as clean energy entrepreneurs and advocates.
- Health outcomes for women have improved through the uptake of clean cooking technologies.
- Access to renewable energy products has expanded in remote communities through grassroots distribution models.

Principle 7

Support policies to ensure efficient use of energy and materials by households and/or companies through sustainable behaviours and technologies, thereby saving energy and preserving resources, while ensuring accessibility, affordability and equity in meeting everyone's basic needs.

Netherlands – Energy Aid

Policy rationale: Following the 2021 energy crisis, the Dutch government earmarked dedicated financial support to municipalities through a nationwide network of local "energy aid" providers (Energiehulp). The aim of the Energiehulp initiative is to provide households with free energy coaching, with the objective of reducing energy consumption and lowering household energy bills. Trusted intermediaries advise households on energy-efficient solutions and behaviours.

Actions taken:

- The initiative has provided free activities to train volunteers on energy efficiency and energy consumption reduction.
- Expert volunteers have carried out home visits to provide advice on energy efficiency (i.e. house insulation and lighting) and tips on how to reduce energy consumption.
- The socio-economic impacts of the initiative have been monitored to assess effects on energy poverty and affordability.

Outcomes:

- As of 2023, more than 1 300 households in the main pilot cities had benefited from the Energiehulp programme, with 75% of participating households coming out of energy poverty after interventions.
- Statistically significant improvements were observed in relation to wellbeing in supported households, including drops of 18% in pharmaceutical spending, 32% in asthma medication use and 53% in rheumatoid medication.
- Qualitative findings also reported improved thermal comfort, reduced social isolation and an increased engagement in neighbourhood life.

Ireland – Warmth and Wellbeing Scheme

Policy rationale: The Warmth and Wellbeing Scheme was launched in 2016. It was developed by the Department of Communications, Climate Action and Environment and the Department of Health, and is operated by the Sustainable Energy Authority of Ireland and the Health Service Executive. The Scheme provides targeted incentives for home retrofitting to enhance health outcomes for low-income households experiencing chronic illnesses and substandard indoor environmental conditions.

Actions taken:

- The policy provided free energy efficiency improvements to qualifying households to eliminate financial barriers to home upgrades and to promote better health.
- Before launch, energy and health authorities identified target areas for the programme, based on the local population's vulnerability to energy poverty.
- Programme participants were enrolled in the programme by healthcare professionals, rather than by energy specialists. By prescribing free home energy improvements according to medical needs, the scheme focused on households facing both health and energy affordability challenges.
- An independent research organisation was engaged to monitor and evaluate outcomes for three years from the programme's inception, ensuring transparent and reliable assessment of its effectiveness.

Outcomes:

- An assessment of the programme, which included feedback from one-third of participants, found that, during the programme's first year, there was a reported 26% reduction in GP visits and a 60% drop in hospital admissions among participants. Additionally, thermal comfort ratings nearly tripled, and the number of households struggling to pay bills fell by 37%.
- In the second year of the Scheme's evaluation, participants reported even greater savings, highlighting the sustained positive effects of home energy retrofits on health, energy costs and overall wellbeing, particularly for lower-income families.

Portugal – Vale Eficiência energy efficiency vouchers

Policy rationale: The Vale Eficiência programme, launched in 2021 and operated by the Portuguese Directorate-General for Energy and Geology, is a subsidy policy designed to lower the cost of building and appliance efficiency upgrades for low-income households.

Actions taken:

- The programme supports interventions such as the replacement of old windows, the application of efficient space heating and/or cooling systems, and the installation of solar panels.
- By 2025, more than 100 000 efficiency vouchers of up to EUR 1 300 each had been delivered to low-income households facing energy poverty. The vouchers help cover the expense of appliance replacement and building renovation.
- A new phase of the programme was inaugurated in May 2024, delivering an additional 20 000 vouchers.

Outcomes:

- By 2024, over 23 000 households applied and about 13 000 efficiency vouchers had been awarded.

Key impacts and lessons learned from evidence and practice – Part 2

Drawing on the available evidence and the international case studies presented in this chapter, there are a number of lessons that co-leads and partners of the CEM Campaign on Sustainable Lifestyles, Fairness and Access to Clean Energy Technologies may wish to consider in their efforts to empower individuals and communities to take part in low-emissions activities, and foster systemic resilience. These include:

- Designing national or sub-national consultation processes can help support greater social acceptability of low-emissions measures.
- Utilising multi-stakeholder forums can help design policies that integrate diverse perspectives on how low-emissions policies affect different groups, including more vulnerable ones.
- Including trusted intermediaries, such as community members trained as energy coaches, can support widespread adoption of low-emissions technologies and

behaviours by building trust and closing information gaps, especially for hard-to-reach and vulnerable groups.

- Creating an enabling environment, for example through supportive regulatory frameworks, accessible financing, data sharing tools and technical assistance, can facilitate energy community ownership models.
- Encouraging and supporting youth-led efforts can help to develop innovative low-emissions solutions.
- Integrating learning on sustainable lifestyles in education systems can help encourage low-emissions habits from an early age.
- Providing upskilling and reskilling opportunities, in collaboration with labour and industry stakeholders, can help scale the workforce needed for harnessing low-emissions technologies.
- Removing barriers that limit women's participation and ensuring gender perspectives are included in low-emissions policymaking can support more effective outcomes.
- Improving communication about how energy efficiency supports affordability, health, and jobs can encourage wider adoption.

Part 3. Sector: Transforming systems

Principle 8. Support the advancement of clean building practices, embracing techniques and technologies that prioritise efficiency, sustainability and affordability for all.

Principle 9. Enhance accessibility to low-emissions mobility in both urban and rural areas. By promoting sustainable transportation options affordable for all, we aim to create inclusive and environmentally friendly mobility solutions for all members of our community.

Principle 10. Support a universal transition to affordable, reliable, efficient and sustainable low-emissions energy technologies by investing or encouraging targeted measures and campaigns that promote fairness.

Principle 11. Implement actions to promote sustainable lifestyle and fairness in other areas related to the energy transition such as food production and consumption methods, textile production and consumption habits, recycling methods, clean cooking etc.

Introduction

Examples from different countries show that policymakers have used various tools to create the longer-term enabling environment for people to adopt low-emissions and resilient practices. These range from regulatory frameworks and financial incentives to infrastructure development and targeted support for low-income groups.

This chapter, prepared in support of the third part of the Declaration on Promoting Sustainable Lifestyles, Fairness, and Access to Clean Energy Technologies, explores international evidence in transforming energy systems. Drawing on Principles 8 and 9, it explores policy mechanisms which have been used to increase energy efficiency in buildings and transport, with a particular attention to measures targeting low-income households.

In line with Principle 10, the chapter also includes practical examples of policy implementation in two areas: energy efficiency in the textile industry and recycling of critical minerals from e-waste.

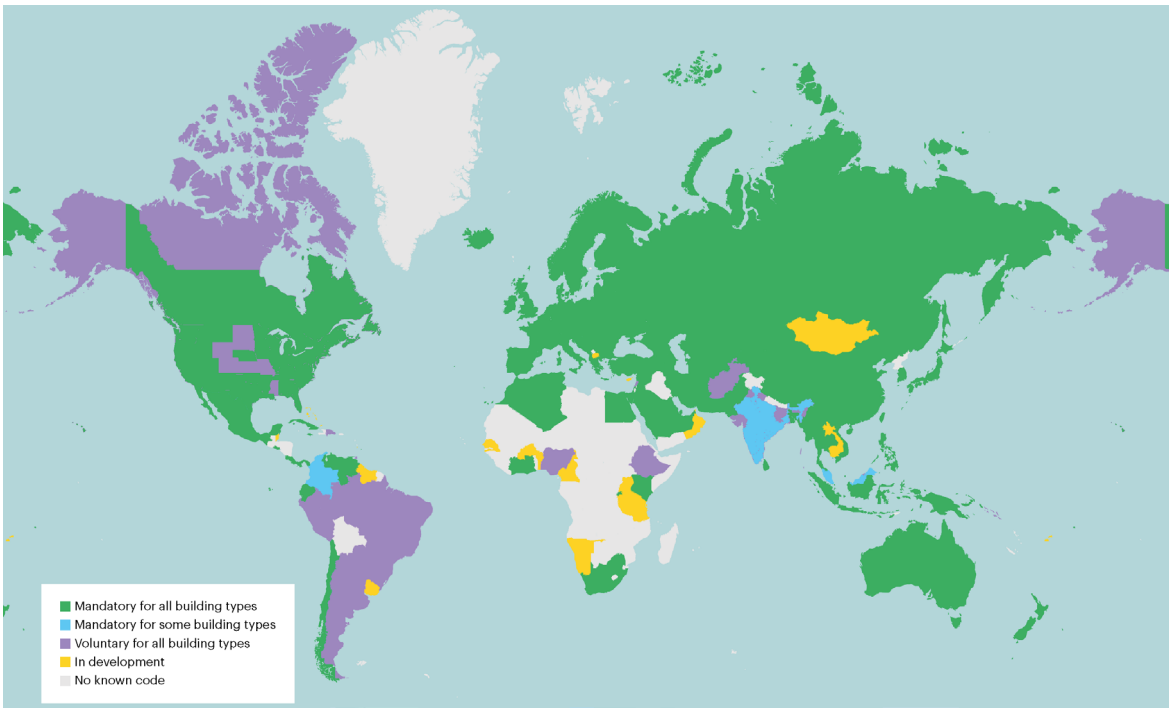
To inform Principle 11, the chapter ends with an analysis existing initiatives designed to expand energy access and address the upfront costs of low-emissions technologies, with the aim of improving affordability for households across all income levels.

Regulation for building efficiency

In 2023, buildings were responsible for 34% of global energy-related CO_2 emissions. Regulations have increased energy efficiency in buildings through the setting of minimum standards**.** Building energy codes, which set minimum requirements for energy use, are by far the most adopted type of regulation for fostering efficiency in buildings. This regulatory instrument can introduce requirements for the general energy efficiency of an entire building (performance-based codes). It can also require energy efficiency upgrades for individual components, such as insulation, lighting systems or heating and cooling systems (prescriptive codes).

By the middle of 2025, there were 95 compulsory energy codes or standards applicable to residential buildings and 97 for non-residential buildings across the globe. However, approximately half of all countries still lack mandatory measures for energy efficiency in buildings. Consequently, 2.6 billion square metres of new floor area (i.e. equivalent to 26 million homes with surface areas of 100 m^2) were constructed in 2023 without being subject to energy performance regulations.

Mandatory and voluntary building energy codes, 2025



Notes: The map tracks known national building energy codes and those where a national mandate for adoption exists. In cases where the national mandate exists, the map shows its status and not its adoptions at the sub-national level (e.g Brazil, Mexico, India). In cases where building energy codes are not mandatory at the national level, the map shows implementation at the sub-national level jurisdictions (e.g. the United States, Canada, Belgium).

Source: IEA (2025) Energy Efficiency 2025.

In some countries, building energy codes have also included requirements concerning on-site renewable energy production. The General Code for Building Energy Efficiency and Renewable Energy Utilization (GB 55015-2021) in China, for instance, prescribes a number of minimum efficiency standards and the adoption of on-site renewable energy technologies. In particular, it calls for the utilisation of renewable energy to generate electricity in newly constructed, extended, and reconstructed buildings. This code has demonstrated that the integration of renewable energy technologies in building energy codes can further reduce carbon emissions. In addition, on-site clean energy technologies can enhance energy security through the decentralisation of electricity generation.

Several country examples show that building energy codes can also foster the adoption of smart technologies to improve the energy efficiency of buildings. A variety of technologies have been developed to enable more dynamic energy management. The use of sensors and controllers, for example, can help collect data from building equipment (e.g. energy use, humidity, temperature and lighting). Building energy management systems are another effective tool. These systems gather information about the indoor environment, such as lighting and CO_2, and control building energy use accordingly. In Indonesia, the Green Building and Smart Building Regulations require new and existing buildings to integrate automation, energy management, cybersecurity and smart-system features, with mandatory, recommended or voluntary classifications based on the type of building. Regulations have been able to boost innovation in building efficiency practices and accelerate the adoption of smart technology instruments.

Examples of building energy codes already in place demonstrate that policymakers can also choose to target specific building types. In India, the Energy Conservation and Sustainable Building Code sets energy efficiency standards for new commercial and office buildings featuring high power demand. The Code outlines a classification of the targeted buildings and specific requirements for each building type. It also contains provisions on the utilisation of clean energy systems, water management controls and indoor environment quality. Developing building type-specific regulations can help tailor efficiency solutions to building features.

Several information policy tools relating to building energy performance have been used in different contexts to help consumers choose the most efficient options when purchasing or renovating buildings. Examples of such information tools include:

- **Energy performance certificates,** which indicate the energy performance of a building and its energy demand, displaying its level of efficiency.
- **Disclosure programmes**, which make data on building energy efficiency publicly available.

- **One-stop-shops**, which provide energy audits, advice on building efficiency upgrades, and financing assistance to households.
- **Renovation passports**, which are step-by-step roadmaps to guide the renovation of a specific building. Renovation passports are planned in consultation with the building owners and are elaborated according to the results of an on-site energy audit. Renovation passports are already in place in several European countries such as France (Passeport Efficacité Énergétique) and Germany (Individual Renovation Roadmap).

Energy performance certificates are the most common information policy instrument and have already been implemented in many countries across the globe. The European Union, for example has established an Energy Performance Certificate system under the EU Energy Performance of Buildings Directive. This system mandates that all residential and commercial buildings be evaluated and rated for energy efficiency. A standardised rating scale, normally from A to G, is employed to indicate a building's energy efficiency.

Australia has implemented a similar information tool, the Nationwide House Energy Rating Scheme. This star rating system has been created to meet national efficiency requirements. Star rating assessments are usually conducted by professionals in an innovative way, by using an ad-hoc software.

Incentives for building energy efficiency

Country case studies demonstrate the role that financial and non-financial incentives have also played in supporting implementation of building energy efficiency measures. Different types of incentives have sometimes been used simultaneously to increase the uptake of improvements.

Financial incentives include mechanisms such as:

- Green mortgages, a special type of home loan that incentivises buyers to purchase energy-efficient homes or invest in energy-saving upgrades.
- Preferential loans, based on home energy performance.
- Tax rebates and grants to make building energy efficiency upgrades more affordable for consumers.

Experience shows that grants can lower upfront costs and increase the affordability of energy efficiency technologies for buildings, enhancing the appeal of energy efficiency upgrades for consumers, builders, and developers. By doing so, they stimulate market demand and assist stakeholders in adopting energy-saving measures to meet regulatory requirements and to achieve higher building performance standards.

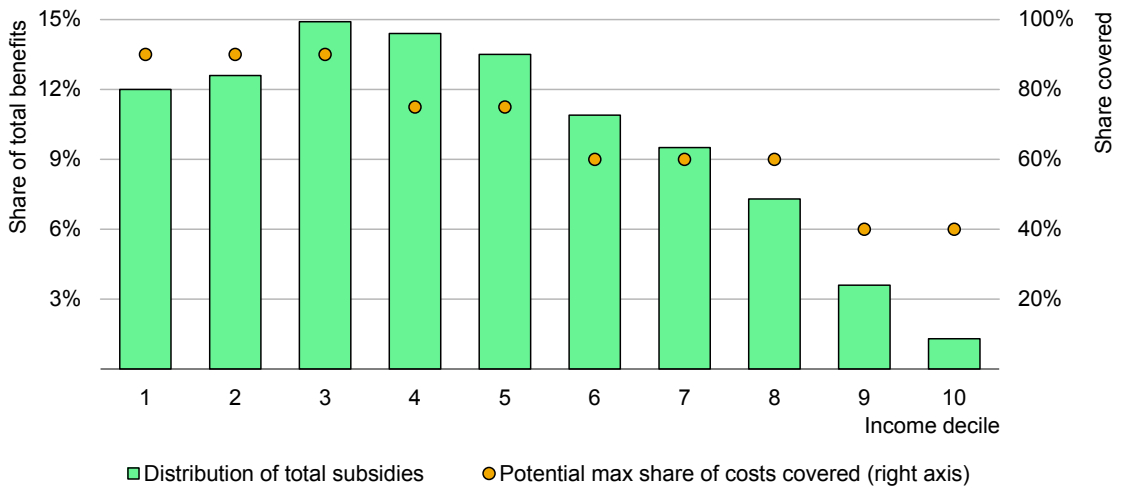
Typically, grants provide funding before retrofits are carried out and cover a portion of the expenses, such as those for installing insulation, upgrading heating and cooling systems, or adding solar PV. These grants often come with conditions to improve the overall energy performance of buildings (usually based on a prior technical evaluation of the proposed measures) and are sometimes connected to energy performance certificates. In Japan, for instance, the Ministry of the Environment's Energy Conservation Promotion Project for Existing Buildings was introduced to subsidise the renovation of building envelopes and the optimisation of home operations, covering up to one-third of eligible renovation costs. This policy covers various measures, such as replacing façade windows and skylights, adding external insulation, improving heating and cooling systems, and optimising building energy management systems.

Non-financial incentives have also been used as mechanisms to advance implementation of building energy efficiency. These include expedited administrative procedures and awards programmes. Administrative procedures for implementing upgrades – especially those concerning the permitting and review processes – can cause delays and generate unforeseen expenses. Accelerating these procedures by targeting high performing new buildings or retrofit projects can foster the implementation of energy efficiency measures. Awards can also increase the uptake of such measures by encouraging households to invest in efficiency improvements.

In a number of countries, equity considerations have also been included in the design of financial incentives for building energy efficiency, in order to ensure wider uptake and shared benefits across different socio-economic groups. In Greece, for example, the Save and Renovate for Young People programme provides financial support to youth to buy their own homes and carry out energy efficiency upgrades and home renovations. The programme is only targeted to people born between 1984 and 2005 and sets income thresholds. By specifically targeting young people, this measure addresses a major issue faced by Greek youth, who leave their parental home, on average, only after the age of 30, which is significantly later than the EU average. The programme makes housing options more affordable and helps tackle energy poverty by reducing energy consumption and utility bills.

In France, the MaPrimeRénov' programme partially covers the costs of energy efficiency upgrades for homes based on several criteria, including household income. The programme targets older houses and has been designed to support low and middle-income households. As part of this targeting effort, the share of renovation expenses covered by the programme is higher for the lowest-income households (around 90% of the total costs) than for the highest income groups (up to 40%). As a result, between 2020 and 2022, low-income deciles received about 70% of the grants, whereas higher-income deciles received less than 5%.

Distribution of allocations of MaPrimeRénov' grant and maximum share of retrofit costs covered in France, 2020-2022



Source: IEA analysis based on data from Ministère de la Transition Ecologique et de la Cohésion des Territoires (2023).

Regulations and incentives for energy-efficient mobility

In 2019, global transport accounted for nearly 23% of global energy-related CO_2 emissions. Passenger cars and vans accounted for over a quarter of global oil consumption and contributed approximately 10% of energy-related carbon dioxide emissions. Countries in different national contexts have introduced several regulatory approaches to help reduce the use of private vehicles and increase the uptake of more efficient and less polluting modes of transportation, including electric vehicles.

There are several regulatory mechanisms that have been used to decrease the use of private vehicles. These include congestion charging, which applies a fee to drive in congested areas, and Low-Emissions Zones (LEZs), which are urban areas where specific types of vehicles (typically privately owned) are required to achieve a certain emissions standard to circulate freely or without paying a fee. LEZs had been adopted by more than 500 European cities as of 2025 (Clean Cities, 2022). In 2003, for example, London introduced a Low-Emissions Zone in order to reduce dependency on cars in the city. (It followed this up with a 24-hour Ultra Low-Emissions Zone in 2019.) While reducing the congestion and emissions caused by private vehicles, the measure also helped improve the public transport system, which received revenues from the programme. Research findings have highlighted that LEZs significantly contribute to reducing the concentration of NO_2 and other air pollutants, particularly those applying stricter criteria, such as the Ultra Low-Emissions Zone in London.

Fuel economy standards are a regulatory tool which have been used to help foster the production of more efficient vehicles by defining the targets for fuel economy and greenhouse gas emissions that manufacturers must respect for producing new vehicles. Experience has shown that fuel economy standards can stimulate innovation as manufacturers implement efficient solutions and develop advanced technologies in order to respect the targets. Currently, more than 80% of new passenger vehicle sales worldwide are covered by fuel economy standards, which are applied in a number of large economies such as China and the European Union.

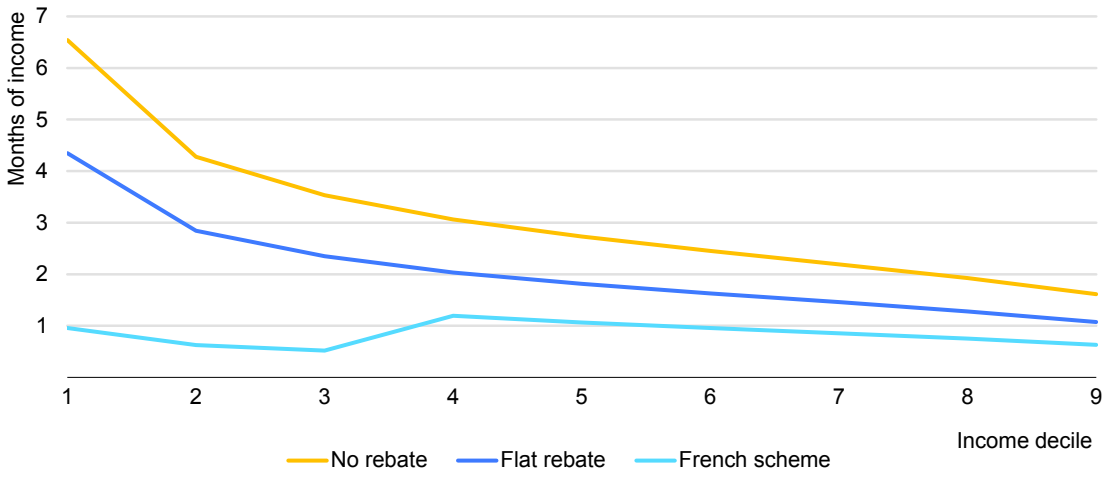
Electric vehicles have steadily become a mainstream product in a growing number of countries. The first quarter of 2024 saw electric car sales rise by around 25% relative to the first quarter of 2023. In the first half of 2025, electric cars accounted for approximately 25% of all light-duty vehicles sold across the world. The market share of this technology in China was about 48% in 2024 (SolarTech, 2025), though has also been rising in many emerging economies such as Viet Nam (35%), Thailand (22%) and Colombia (7.4%).

Financial incentives for car buyers, such as discounts and rebates, have been used in several countries as a tool to lower the costs faced by consumers purchasing electric vehicles. In 2025, Italy launched a USD 700 million programme to support the purchase of electric cars by households and micro-enterprises (European Commission, 2025). The measure is aimed at increasing the adoption of electric cars in the country, which currently has one of the lowest uptakes of EVs in Europe. Similarly, China introduced generous purchase subsidies for New Energy Vehicles, resulting in a sharp growth in sales of electric cars across the country.

In several countries, financial incentive programmes have been designed with equity considerations to ensure wider uptake and increased adoption by lower-income households.

In France, for instance, a subsidy programme for purchasing electric cars was designed by making the subsidy amount income-dependent, with higher grants reserved for applicants below specified income thresholds.

Purchase cost premium for EVs in months of average household income in France after applying benefits/grants existing in selected countries



Note: The flat rebate and no-rebate cases are illustrative model assumptions used for comparison, assuming a uniform bonus amount across all income deciles and the complete absence of purchase support, respectively.
Source: IEA (2024) Strategies for Affordable and Fair Clean Energy Transitions.

In some emerging economies, where two- and three-wheelers are increasingly used, targeted subsidies have been used to foster the purchase of electric models. In India, for instance, the FAME (Faster Adoption and Manufacturing of Electric Vehicles) Scheme is providing financial incentives for purchasing electric two- and three-wheelers, which are significantly more attainable than cars for most of the population. In Malaysia, the Electric Motorcycle Usage Promotion Scheme has offered rebates for purchasing electric motorcycles for people earning less than around USD 30 000 per year, significantly increasing the uptake of electric motorbikes by middle and low-income households.

Several measures have been implemented in different national contexts to encourage modal shift and enhance transport efficiency. These include financial incentives that have increased public transport uptake by lowering the costs faced by users. Several cities have significantly lowered public transport prices or made public transport free. In 2023, for example, Bangkok introduced a flat fare covering its entire electric rail system. The policy resulted in a substantial rise in public transport use, which increased by almost 35% since implementation of the new fare. In 2025, Belgrade became the largest European city to offer free public transport to all users. This was accompanied by an ongoing effort to modernise the public transport system, with the aim that by 2027 all vehicles in the fleet will be no more than two years old. Germany introduced the Deutschlandticket, in 2023, proposing a monthly flat fare of EUR 58[6] to travel throughout the country

[6] Exchange rate: 1 Euro (EUR) = USD 1.16 (as of 3 June 2026).

using any means of public transport. Evidence from the programme shows that the introduction of this ticket has led to a significant reduction in the use of private vehicles while boosting the uptake of public transport (Hamel et al., 2025).

Immediate transport measures to shelter households and businesses from the 2026 oil shocks

In March 2026, amid skyrocketing energy prices in the context of the escalating conflict in the Middle East, the IEA released a set of measures that could be implemented quickly by governments, businesses and households to reduce the impact of the crisis on energy security and affordability (IEA, 2026b).

The immediate measures identified by the IEA, which mostly relate to consumption of road transport fuels, include:

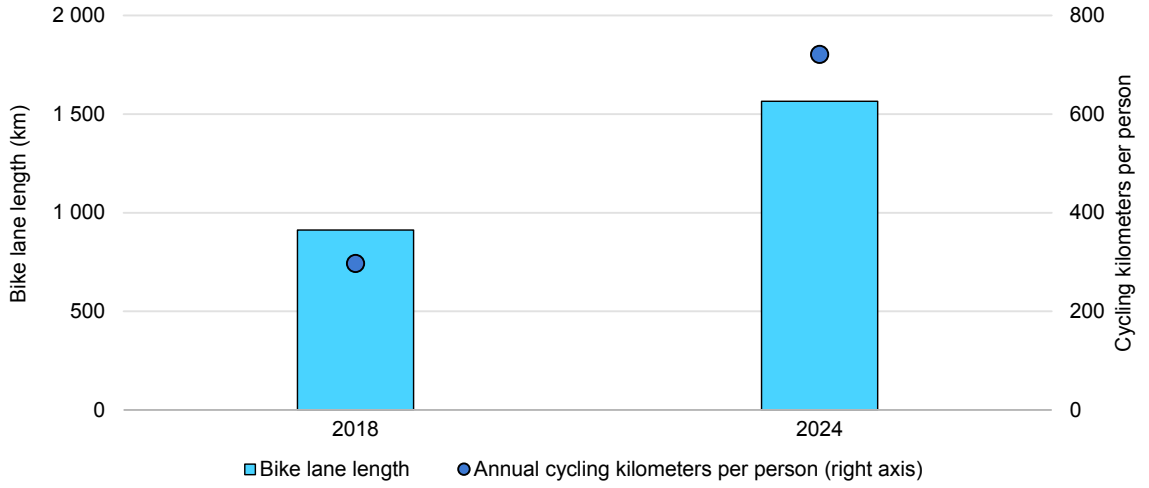
- **Work from home**, to reduce oil consumption from commuting by around 20% for individual drivers.
- **Lower speed limits on highways by at least 10 km/h**, to cut oil consumption from private cars and trucks.
- **Promote the use of public transport**, as modal shift can curb national oil use for cars by 1% to 3%.
- **Introduce alternating access to urban roads for private cars**, assigning driving days based on number plates to ease congestion, limit idling and reduce stop-and-go traffic, lowering national car oil use by 1% to 5%.
- **Expand car-sharing and promote efficient driving behaviour**, encouraging carpooling together with eco-driving habits to cut fuel demand from cars by roughly 5% to 8%.
- **Limit air travel when viable alternatives are available**, since reducing business-related flights substantially curbs jet-kerosene use, lowering demand by an estimated 7% to 15%.

Some countries have made considerable infrastructure investments to make their public transport systems more efficient and attractive for users. The 2022-2033 National Transport Plan in Norway, for example, has channelled investments to enhance the efficiency, safety and connectivity of the public transport network, with a focus on railway, road, air and maritime transport. The Plan aims to halve emissions from the transport sector by 2030, compared with 2005 levels, and to multiply the number of system users.

In many countries, a substantial share of car CO_2 emissions comes from relatively short trips. In the United Kingdom, for example, it is estimated that trips up to

16 km account for about 40% of car emissions (Brand, 2021). Several examples have demonstrated that investments in cycling infrastructure in cities can support modal shift, especially as a large proportion of city trips are relatively short. Paris, for instance, has heavily invested in transport infrastructure to incentivise cycling. It launched its most recent cycling plan (Plan Vélo: Acte 2) in 2021. This includes 180 km of new cycle lanes to be built by 2026, as well as greater integration and connectivity between the city centre and the surrounding metropolitan area. The initiative has also improved other aspects of the cycling ecosystem, for example by introducing more than 130 000 new parking places for bicycles and updating safety measures.

Bike lane length and annual cycling kilometres per person in Paris, 2018-2024



Source: IEA (2025) Energy Efficiency 2025.

Energy efficiency in industrial textile production

The textile industry consumes about 4-5% of global energy and accounts for approximately 2% of global greenhouse gas emissions annually. It thus represents a significant opportunity for energy efficiency improvements. A substantial portion of the sector's emissions stems from fossil fuel-based thermal energy used for process heating, including steam production and thermal oil heating. For small and medium-sized enterprises in particular, energy efficiency can play an important role in lowering production costs and maintaining competitiveness in global markets. In India, for instance, assessments suggest that the textile industry could save between 5% and 10% of its energy use by introducing more efficient technologies (TERI, 2023).

Studies have found that energy management systems can also generate substantial improvements. By systematically monitoring energy consumption,

identifying inefficiencies and implementing targeted interventions, textile manufacturers can reduce operational costs whilst lowering their carbon footprint.

Existing research highlights that up to 60% of energy savings can be achieved in textile facilities through customisation or the replacement of machinery and working methods. In India, for instance, the Perform, Achieve and Trade (PAT) Scheme was introduced to advance energy efficiency in several energy-intensive industries, including textiles, by setting energy-saving goals for companies. Textile companies consuming more than 3 000 tonnes of oil or the equivalent are included under the scheme and subject to the regulation.

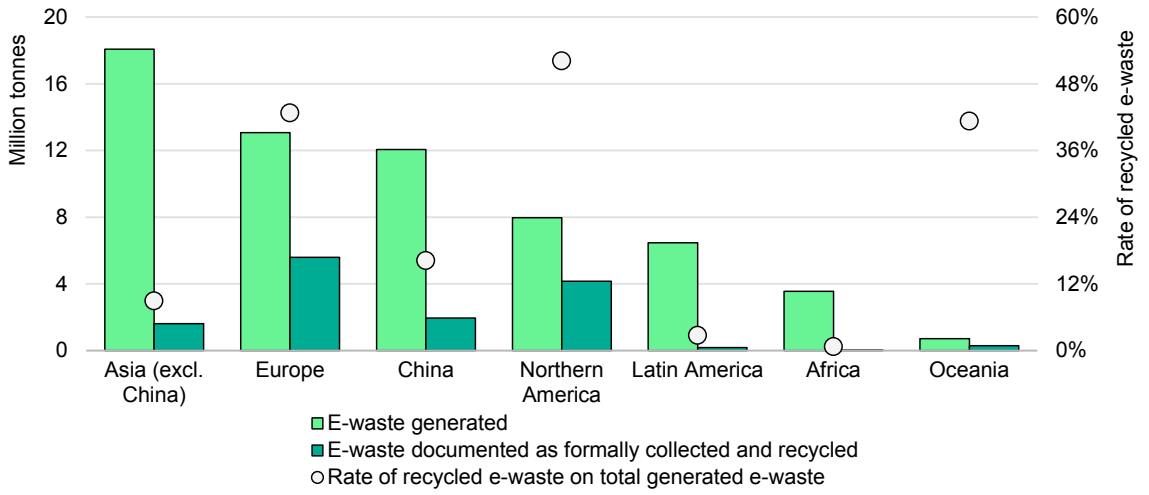
Innovative finance mechanisms have also been used to boost energy efficiency improvements in the energy-intensive textile industry. In China, for example, the China Banking Regulatory Commission and the National Development and Reform Commission issued the Energy Efficiency Credit Guidelines, which encourage commercial banks to increase their lending to energy-intensive industries, including textiles, with the aim of increasing companies' capacity to invest in energy efficiency measures.

Recycling of critical minerals from e-waste

The rapid proliferation of electronic devices has created a mounting electronic waste (e-waste) challenge – though also a significant opportunity to recover critical minerals. E-waste generation has grown much faster than collection and recycling efforts since 2010. Internationally, only around a quarter of e-waste generated in 2022 was documented as properly collected and recycled (IEA, 2024).

In 2022, metals found in discarded electronic devices were valued at around USD 90 billion, yet only about USD 28 billion was actually recovered, representing a significant missed opportunity for resource recovery. While collection and recycling systems are much more established for bulk metals such as aluminium and copper, recycling rates for critical minerals remain very low. Current data highlights that Asia, excluding China, is the continent generating the highest amount of e-waste, but has a recycling rate of less than 10%. In comparison, more than 50% of the e-waste generated in North America (Canada and the United States) is subsequently recycled.

E-waste generated and recycled by region, 2022



IEA. CC BY 4.0

Source: IEA analysis based on data from Global E-Waste Monitor (2024).

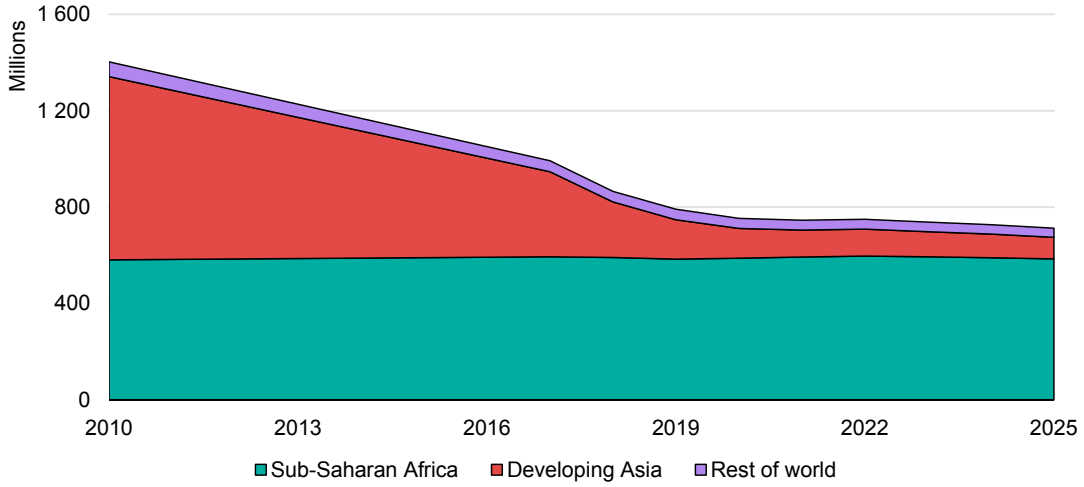
As of June 2023, 81 countries had introduced e-waste recycling legislation, representing an increase from 78 in 2019. Of these, 67 countries had established legal frameworks for e-waste management that included measures to promote extended producer responsibility, i.e. making producers responsible for what happens to their products when people are done using them (UNITAR, 2024). In 2025, for instance, the European Union published the Updated List of European Waste with battery-related waste codes, which is aimed at promoting the circular management of batteries and the recycling of raw materials.

The Specifications for the Comprehensive Utilisation of Waste EV Batteries, issued in 2024 by the Chinese Ministry of Industry and Information Technology, feature a regulatory framework to improve the recycling process for electric vehicle batteries, as well as more stringent rules for the recycling and management of critical minerals used in such batteries.

Global progress and remaining gaps in electricity access

About 750 million people today lack access to electricity. This number has decreased steadily since 2000, but the pace of the decline slowed after the Covid-19 pandemic. In 2024, the global population without electricity access declined by 11 million people, which is significantly lower than the annual average reduction of 65 million recorded between 2010 and 2019. Most of the progress achieved in the past twenty years has taken place in developing countries in Asia, Latin America and the Caribbean, which are now approaching universal access. Africa has become the primary focus of efforts to achieve universal access, since it now accounts for about 80% of the world's unelectrified population.

Population without electricity access, 2010-2025



Source: IEA (2025), Universal Access to Clean Cooking in Africa.

According to IEA tracking of national energy access strategies, around 60% of the global population lacking electricity now lives in countries that have introduced policies to improve energy access in the past two years, including fiscal incentives, targeted electrification programmes and comprehensive national strategies. In addition, several low-emissions initiatives have been used to advance energy access across sub-Saharan Africa while supporting broader socio-economic developments across the continent.

In Angola, for instance, the Portuguese group MCA recently inaugurated the largest off-grid solar-plus-storage system on the continent. The system is expected to provide electricity access to about 136 000 people in the country, bringing significant economic and health benefits.

The Nigeria Electrification Project, led by Nigeria's Rural Electrification Agency, is one of the most ambitious off-grid electrification initiatives in sub-Saharan Africa. The Project aims to drive socio-economic development by bringing electricity to more than 3.5 million people, including 705 000 households, 90 000 micro, small, and medium-size enterprises, and 15 federal universities, through off-grid solutions, such as solar hybrid mini-grids, solar home systems, and captive power plants.

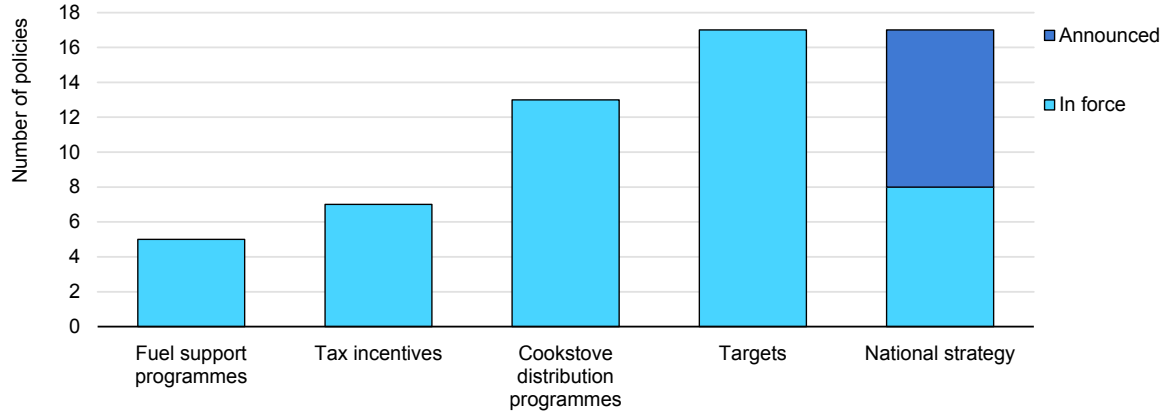
Access to clean cooking

More than 2 billion people still live without access to clean cooking technologies. Worldwide, the lack of access to clean cooking solutions is linked to approximately 3 million early deaths annually, disproportionately affecting women and children. According to the World Health Organization, respiratory and cardiovascular

diseases resulting from inhaling particulate matter produced by traditional cooking methods are the second most significant cause of premature death. Lack of access to clean cooking also generates about 1.2 gigatonnes of CO_2-equivalent emissions annually, an amount comparable to the total annual emissions of Germany. The issue is particularly acute in sub-Saharan Africa, where 80% of households still do not have access to clean cooking options.

In the last five years, sub-Saharan Africa has seen about 13 million people per year gain access to clean cooking solutions, marking a 20% increase over the average for the previous decade. This progress has been especially notable in West and East Africa. Since 2024, eight countries in sub-Saharan Africa have introduced national clean cooking strategies, and nine more have announced such strategies. For example, in 2024 the government of Tanzania launched the National Clean Cooking Strategy, a national plan to grant access to clean cooking for 80% of the population by 2034.

Number of countries with new clean cooking policies by type since 2024



Source: IEA (2025), Universal Access to Clean Cooking in Africa.

Countries have used a range of policy tools to address the challenge. This includes tax incentives to make clean cooking solutions more affordable for households. For example, in 2021 Kenya implemented the Finance Act, which included an import VAT exemption for clean cooking stoves. The measure also lowered the purchase price of several fuels, including denatured ethanol, biogas and sustainable fuel briquettes, promoting wider access to clean cooking solutions.

Where clean fuels are scarce and expensive, countries can also consider implementing programmes to support fuel affordability. The Electricity Regulatory Authority of Uganda recently implemented the Electricity Cooking Tariff to subsidise electric cooking for households.

Cookstove distribution programmes can also enhance access to clean cooking, particularly for rural communities. For example, since 2024, the Ministry of Energy of Ghana has distributed more than one million clean stoves.

International development investments have made a significant contribution to improving access to clean cooking across sub-Saharan Africa. At the IEA's 2024 Summit on Clean Cooking in Africa, 12 African countries put forward policy pledges, and public and private-sector actors together committed USD 2.2 billion, of which USD 470 million has been released so far.

Addressing energy affordability

Even when energy and low-emissions technologies are available, many low-income households across the world cannot afford to use them to meet their needs. The inability of some households to access adequate levels of essential energy services, such as heating, cooling, lighting and cooking, remains an important issue in both advanced and emerging economies. Recent IEA analysis estimates that around 20% of households in advanced economies spend more than 10% of their income on energy bills, the threshold commonly used to define energy poverty. However, some stakeholders have argued that energy poverty may impact an even greater proportion of households, and countries have begun to explore other dimensions of energy poverty, such as the need to make trade-offs with other essential services and the extent of household vulnerability.

Research highlights that, when all costs of delivering energy are considered (including operating expenses, the need to pay back previous investments and financing costs), a more electrified, renewables-rich and efficient energy system is cheaper to operate over time, leading to greater affordability for consumers. However, when considering the adoption of clean energy solutions, households are often discouraged by high upfront costs (Bansal et al., 2024).

Policymakers in different national contexts have designed clean energy programmes to ensure that all segments of society can benefit from their outcomes, such as lower energy bills, improved health and greater comfort. In Canada, for instance, the Oil to Heat Pump Affordability Programme was introduced in 2023 to assist households with low to moderate incomes transition from oil-based heating systems to more energy-efficient electric heat pumps. The initiative targeted oil heating because it is notably more expensive in Canada than natural gas or electricity and is associated with much higher emissions. The programme was designed to lower the upfront costs that often constitute a structural barrier for middle- and low-income households to access energy-efficient technologies, covering the full cost of the pump conversion for consumers with the lowest incomes. Evaluation of the programme demonstrates that it has led to a reduction in residential energy expenditure for households.

In Norway, Enova (a state-owned enterprise) and the Norwegian State Housing Bank (Husbanken) have provided differentiated subsidies (based on income and housing expenses) to reduce the costs of energy efficiency upgrades. In addition, Enova has supported the installation of solar panels for electricity generation, in order to reduce dependence on fossil fuels and promote adoption among lower-income households.

Other examples of renewable energy programmes designed to increase adoption among less affluent households include India's PM Surya Ghar Yojana programme. The Ministry of New and Renewable Energy launched this initiative in 2024 to subsidise the installation of rooftop solar panels for lower- and middle-income households. The programme has not only helped reduce electricity bills for participating households, but has created a new source of income by allowing these households to sell surplus electricity to energy distribution companies. In some countries, similar incentives also support small businesses. In Australia, for instance, the Small-scale Renewable Energy Scheme provides incentives to households and small businesses to adopt small-scale renewable energy systems, including rooftop solar and solar water heaters.

Some policy frameworks have recycled carbon tax revenues to provide additional finance to help low-income communities adopt low-emissions technologies. In California, for example, the Greenhouse Gas Reduction Fund, launched in 2012, is a cap-and-trade programme with a legal requirement that at least 35% of all funds must be dedicated to projects benefiting socio-economically deprived communities. As of November 2023, the fund has helped reduce CO_2 emissions in the state by more than 109 million tonnes while 76% of the revenue has been dedicated to projects such as affordable housing and low-emissions energy solutions targeted at low-income households.

Case studies (Part 3). Sector: Transforming systems

Principle 8

Support the advancement of clean building practices, embracing techniques and technologies that prioritise efficiency, sustainability and affordability for all.

China – General Code for Building Energy Efficiency and Renewable Energy Utilization (GB 55015-2021)

Policy rationale: The General Code for Building Energy Efficiency and Renewable Energy Utilization was designed to enhance energy performance in the country's building sector. It was developed by the Ministry of Housing and Urban-Rural Development, along with provincial and municipal authorities, developers, design institutes and energy efficiency service providers.

Actions taken:

- The Code introduces standards for building envelopes, heating, ventilation and air conditioning systems, lighting, and renewable energy integration. It does not prescribe the adoption of specific technologies or solutions but outlines the performance standards to meet.
- The Code establishes energy consumption targets for buildings to meet, whether through improved insulation, more efficient appliances, or renewable energy technology integration.
- The Code promotes the adoption of cutting-edge technologies such as high-performance insulation, passive design and energy management systems.

Outcomes:

- The energy consumption of new residential buildings has been reduced by about 30% compared to 2016 standards.
- The average energy-saving rate of residential buildings in severe cold and cold regions shall be 75%, and the average energy-saving rate of residential buildings in other climate regions shall be 65%.
- The average design energy consumption level of new public buildings has been reduced by 20% compared to the energy-saving design standards implemented in 2016, corresponding to an average energy-saving rate of 72%, rather than a general 20% improvement in energy efficiency.

- The use of renewable energy technologies, such as solar photovoltaics and ground-source heat pumps, has become widespread, in urban and rural areas.
- As a result of these measures, buildings constructed under the new code have reported average annual carbon emissions reductions exceeding 7 kg of CO_2 per square metre.

Indonesia - Green Building and Smart Building Regulations

Policy rationale: Indonesia's Ministry of Public Works and Housing issued the Green Building and Smart Building Regulations in 2021 to promote low-emissions, efficient and climate-resilient buildings and the adoption of smart technologies to improve building efficiency.

Actions taken:

- For both new and existing buildings, the regulations prescribe the incorporation of automation, energy management, cybersecurity and smart-system features, with mandatory, recommended and voluntary classifications based on building type.
- Government agencies created a national platform to gather and assess data at each building phase, from design to demolition.
- These regulations are mandatory for office, commercial and residential buildings, as well as for hospitals, educational and cultural facilities if the buildings exceed specific size thresholds (e.g. larger than 5 000 m² for residential).
- The requirements of the Smart Building regulation are mandatory for high-performance or high-cost green buildings, as well as buildings in dense urban areas with limited land.

Outcomes:

- Green and smart building principles have been adopted in the city of Nusantara, which is being developed as a showcase for sustainable and intelligent urban planning.
- To encourage wider implementation, a Green Building Roadmap has been created to guide the adoption of green building practices in both residential and non-residential sectors.
- The target of the regulations is to reduce energy consumption by 25% and water use by 10% by 2030.

Australia – Nationwide House Energy Rating Scheme

Policy rationale: The Australian Department of Climate Change, Energy, the Environment and Water administers the Nationwide House Energy Rating Scheme (NatHERS) on behalf of the states and territories. The scheme aims to improve the design, construction and energy efficiency of the country's new homes in order to reduce energy waste and demand.

Actions taken:

- The Scheme establishes energy efficiency requirements for both newly built and renovated homes.
- NatHERS created a unified framework to evaluate the energy performance of new residential properties.
- Homeowners and builders can select from a range of accredited software tools to simulate energy use and receive official ratings, which help demonstrate compliance with national regulations.
- Certified assessors conduct evaluations, issuing certificates and uploading the results to the CSIRO Australian Housing Data portal.

Outcomes:

- More than 90% of new residential designs in recent years have been assessed using NatHERS. The government is planning to expand NatHERS to existing homes.
- After the introduction of NatHERS, households save on average USD 264 per year.

Principle 9

Enhance accessibility to low-emissions mobility in both urban and rural areas. By promoting sustainable transportation options affordable for all, we aim to create inclusive and environmentally friendly mobility solutions for all members of our community.

London – Low-Emissions Zone

Policy rationale: Introduced in 2003 by the Greater London Authority, with operational management by Transport for London, the Low-Emissions Zone is designed to reduce traffic in central London, diminish air pollution and increase uptake of public transport. The final goal is for London to become a zero-carbon city by 2030.

Actions taken:

- Implementation of a congestion charge in central London since 2003, with zone boundaries, operating hours and fee amounts updated over time.
- Introduction of a daily fee for vehicles entering the congestion zone in 2022, applicable during specific hours on weekdays, weekends and most holidays.
- Establishment of an extensive camera network to monitor vehicles entering the zone, automatically checking license plates against payment records and issuing fines to those who do not pay within three days.
- Allocation of revenues from the congestion charge to operational expenses and improvements in London's public transport system, with the aim of reducing car use and making public transit more appealing.
- Provision of discounts or exemptions for certain groups, including people with disabilities, local residents, emergency services, taxis, electric and alternative fuel vehicles, motorcycles, mopeds, and bicycles.
- Introduction of additional road pricing schemes, such as the Low-Emissions Zone for heavy vehicles and the Ultra Low-Emissions Zone for a wider range of vehicles, with stricter emission standards and expanded coverage to further cut pollution and improve air quality.

Outcomes:

- Traffic composition shifted after the congestion charge, with space previously occupied by cars quickly taken up by taxis and service vehicles, which are largely exempt from the fee.
- Vehicle mileage for cars and taxis has declined by roughly 6% (or 1.6 billion kilometres) in London since 2000.
- Compliance with emission standards improved significantly. Nearly 94% of vehicles in the Ultra Low-Emissions Zone now meet required standards, and the compliance rate for heavy vehicles in the Low-Emissions Zone rose from 48% in 2017 to 96% in 2022.
- Diesel car usage within the Ultra Low-Emissions Zone dropped sharply, with 44 000 fewer diesel cars on the roads each day (a reduction of 20%), leading to cleaner air and notable health benefits for residents.
- Overall traffic flows have seen a modest reduction of about 2%, but without these measures, congestion and pollution likely would be much worse.

China – Purchase Subsidies for New Energy Vehicles

Policy rationale: The policy was introduced by the central government piloted in 2010, and officially implemented nationwide in 2013 until its phase-out in 2022. The objective of the subsidies has been to accelerate the development and adoption of clean, energy-efficient transport by offering financial incentives for electric vehicles, plug-in hybrid electric vehicles, and hydrogen cell electric vehicles.

Actions taken:

- The policy provided incentives directed to consumers, manufacturers and local governments to reduce the cost of electric vehicles.
- Subsidies were adjusted based on performance improvements, ensuring alignment with market developments.
- The policy implemented several enabling measures, including investments in charging infrastructure.
- Subsidies were progressively reduced from 2016 to 2022, until phase-out.

Outcomes:

- The subsidies introduced led to a substantial increase in sales of domestically produced electric vehicles.
- Long-term advantages include the growth of scalable and clean technologies. Market expansion saw electric vehicles sales surge from around 17 600 units in 2013 to over 330 000 units by 2015.
- Charging infrastructure experienced rapid development, with more than 1 million charging piles installed nationwide by 2020.

Malaysia – Electric Motorcycle Usage Promotion Scheme

Policy rationale: The Electric Motorcycle Usage Promotion Scheme (MARiiCas), operated under the purview of the Ministry of Investment, Trade and Industry since 2023, aims to increase the affordability of electric motorcycles for middle- and low-income households in Malaysia by providing targeted rebates that apply to the initial price of these vehicles.

Actions taken:

- MARiiCas provides a rebate of about USD 600 for two-wheelers purchased from several providers to households with an annual income of USD 29 000 or less.

- The Scheme targets motorcycles specifically, as these are the main means of transport used by low-income households in the country.

Outcomes:

- In 2023, most applications to the subsidy were submitted by Malaysians earning between USD 5 000 and USD 20 000, demonstrating that uptake from low-income households was particularly high.
- The 18-30 age group, which was expected to strongly participate, submitted less than 20% of the total applications, mainly due to financial constraints.
- Adoption has been concentrated in urban areas, where infrastructure for electric vehicles is more developed.

India – Corporate Average Fuel Efficiency

Policy rationale: The Government of India first introduced Corporate Average Fuel Efficiency (CAFE) norms in 2017 under the Energy Conservation Act. Rather than regulating individual car models, this policy sets a limit on the average carbon dioxide emissions of a manufacturer's entire vehicle fleet. The objective is to force automakers to improve overall fuel efficiency, which in turn lowers carbon emissions, reduces dangerous air pollution, and cuts India's reliance on expensive crude oil imports.

Actions taken:

- The government implemented Stage I of the fuel efficiency norms from the 2017-2018 fiscal year, followed by stricter Stage II norms starting in 2022-2023.
- These regulations apply across all passenger vehicles, regardless of what powers them, including petrol, diesel, liquefied petroleum gas, compressed natural gas, hybrids, and fully electric vehicles.
- The Bureau of Energy Efficiency is actively designing the next generation of these standards to keep pushing the automotive industry toward cleaner technologies.

Outcomes:

- The initiative achieved substantial greenhouse gas emissions reductions and energy savings.
- By reducing the amount of fuel burned by passenger vehicles, the policy generated an estimated USD 0.92 billion in monetary savings.
- The government is planning more stringent standards for future stages of the scheme, which will further accelerate the transition to electric mobility.

Germany - Deutschlandticket

Policy rationale: The German Federal Ministry of Transport and Digital Infrastructure introduced the Deutschlandticket to increase public transport uptake. For a monthly flat fare of EUR 58, ticket holders may travel throughout the country using any means of public transport.

Actions taken:

- The digital ticket can be used across the country for local and regional buses, trams, metros, S-Bahn trains and regional trains, though is not valid for most long-distance services.
- Several cities, such as Stuttgart and Tubingen, introduced additional subsidies to further lower the price of the Deutschlandticket.

Outcomes:

- The ticket is currently used by more than 14 million people in Germany.
- Surveys show that 12-16% of journeys have shifted from car to rail, often for longer distances (average 30 km).
- Studies estimate that the Deutschlandticket has resulted in annual emissions reductions of between 4.2 and 6.5 million tonnes of CO_2.
- The ticket enjoys broad public support and is considered the most popular transport policy measure in Germany.
- Purchases of the ticket depend strongly on its cost, and research suggests that higher prices are likely to result in lower uptake.

Norway – 2022-2033 National Transport Plan

Policy rationale: The Norwegian Ministry of Transport introduced the 2022-2033 National Transport Plan in 2022 to foster an efficient and low-emissions transport system that supports both urban and rural communities through large-scale investments in the public transport sector.

Actions taken:

- The Plan implements investments to foster the development and maintenance of transport infrastructure across all modes (road, rail, maritime and air).

- The government is allocating around USD 36 billion of investments in the national highway network over 12 years, with significant funds for operation, maintenance and tunnel safety upgrades.
- The Plan allocates about USD 3 billion over 12 years to support the development of a competitive, efficient, safe and climate-friendly maritime transport, with efficient ports and transport corridors.
- The Plan actively promotes technological advancements in the public transport sector, for instance through the adoption of all-electric aircraft, hybrid electric aircraft or aircraft where hydrogen is burned directly in the engine.

Outcomes:

- The Plan is expected to halve greenhouse gas emissions from the transport sector by 2030 compared to 2005 levels.
- Through large investments in the public transport sector, the Plan is expected to increase public transport uptake and decrease the use of cars.

Principle 10

Support a universal transition to affordable, reliable, efficient and sustainable low-emissions energy technologies by investing or encouraging targeted measures and campaigns that promote fairness.

Norway – Husbanken/Enova Buildings Energy Efficiency Subsidies

Policy rationale: The Norwegian government earmarked over USD 80 million to increase energy efficiency in homes in 2025 under a subsidy programme that covers private households and municipally owned social housing. The programme is coordinated by Enova, a state-owned enterprise under the Ministry of Climate and Environment, and Husbanken, a Housing Bank dedicated to support households with “difficult housing situations” and those who cannot secure housing on the market.

Actions taken:

- Municipally owned housing association can apply for up to 30% of project costs, up to USD 1 million per project.
- Around USD 30 million in grants is available through Husbanken, with USD 20 million for municipal rental housing and USD 10 million for care homes and nursing homes.

- Municipalities are encouraged to integrate the grants into their social housing strategies, using their own eligibility criteria.
- Private homeowners must submit their subsidy applications before starting any renovation work. Additionally, the programme has expanded its list of eligible upgrades to include air-to-water heat pumps and roof or attic insulation.
- Provision of subsidies for private homes by Enova of up to 25-35% of approved invoice costs for a range of energy efficiency measures, including installation of energy-efficient doors and windows, wall insulation and solar panels.
- Availability for subsidies of up to 30% on energy efficiency measures for municipal and state-owned housing and buildings.

Outcomes:

- In the first half of 2025, Enova provided financial support for over 11 000 energy efficiency measures in Norwegian households.
- Earmarking a significant share of funding for public rental housing and care facilities reduces the risk that subsidies mostly benefit higher-income owner-occupiers.

European Union – Social Climate Fund

Policy rationale: The European Union will introduce its new Emissions Trading System (ETS2) in 2027, placing a price on carbon emissions from buildings, road transport and small industries. While the ETS2 will help reduce emissions, it will probably increase energy and fuel prices. The Social Climate Fund aims to mitigate the effect of such price rises on those who could be impacted the most, such as vulnerable people and small businesses. The fund will be operational in 2026, a year before the ETS2 enters into force. It will provide over USD 100 billion between 2026 and 2032, financed through the ETS2 and contributions from countries within the European Union.

Actions taken:

- Availability of over USD 100 billion for very small businesses (small family-run businesses and micro-enterprises) and vulnerable people, including those who struggle to heat their homes or cannot afford the transport they need.
- Requirement for member states to submit a Social Climate Plan in order to receive funds; such a plan must set out proposed measures to support those most affected by the green transition.

- Availability of investment finance for energy-efficient homes, including for the renovation of businesses to improve energy efficiency and install renewable energy technologies.
- Provision of financing to improve the availability of clean transport, including electric buses.
- Availability of temporary income support for the most vulnerable.

Outcomes:

- The Social Climate Fund aims to mitigate any energy or fuel price increase linked to the implementation of ETS2 on small businesses and vulnerable people.
- By encouraging cleaner energy use linked to ETS2, it can help the European Union reach its goal to achieve climate neutrality by 2050 – while ensuring that the transition is fair and does not leave the most vulnerable behind.

Canada – Oil to Heat Pump Affordability Programme

Policy rationale: Canada's Oil to Heat Pump Affordability Programme, launched in 2022, aims to address barriers to heat pump installation, such as high upfront costs and access to capital, by offering targeted advanced grants for medium- to lower-income households.

Actions taken:

- Provisions of upfront grants of over USD 7 000 each to cover the purchase and installation of electric heat pumps for households previously using oil-powered heating systems.
- Increased funding of over USD 10 000 per project in some jurisdictions using additional provincial/territorial funding, with a special focus on remote households and Indigenous nations and Peoples.
- Direct installation services in some regions for eligible households.

Outcomes:

- As of November 2025, over USD 220 million issued.
- Over 24 500 new heat pumps installed, with an average grant of over USD 8 000.
- Over 69 000 metric tonnes of greenhouse gases reduced, equivalent to taking over 21 000 cars off the road.

- Average savings of around USD 1 000 a year on energy costs and average annual greenhouse gas reductions of 2.78 tonnes per participating household.
- Use of one-stop-shop approach in some provincial/territorial programmes, helping simplify the process and increase accessibility.

France - MaPrimeRénov

Policy rationale: MaPrimeRénov is a subsidy programme developed by the French National Housing Agency to partially cover the costs of energy efficiency upgrades for residential buildings. It is based on several criteria, including household income, with the goal of making renovation operations more affordable.

Actions taken:

- Initially focused on low-income households, the scheme has been revised to cover four income categories, with higher subsidies for those with lower incomes.
- Based on the allocation criteria, applicants in the lowest-income bracket can receive up to 90% of renovation costs, while those in the highest deciles are limited to less than 40%.
- The grant was made available to all properties built at least 15 years ago.
- In 2024, two sub-schemes were launched, one for standard upgrades (MaPrimeRénov' Efficacité) and one for deep renovations with professional guidance (MaPrimeRénov' Performance), the latter targeting the least energy-efficient buildings.

Outcomes:

- Since 2020, the programme has supported 2.44 million home renovations.
- In 2024, over 340 000 homes were renovated, with EUR 3.3 billion[7] in aid awarded and EUR 6.9 billion in works generated.
- 73% of beneficiaries have been low- or very-low-income households. For deep renovations, 61% of beneficiaries were very-low-income households, with limited participation from higher-income owner-occupiers.
- 89% of beneficiaries declared they were satisfied with the programme.

[7] Exchange rate: 1 Euro (EUR) = USD 1.16 (as of 3 June 2026).

India – PM Surya Ghar: Muft Bijli Yojana

Policy rationale: The Indian government launched PM Surya Ghar: Muft Bijli Yojana in 2024 to provide solar power to 10 million households by 2027. The policy, which is targeted at poor and middle-income households, aims to reduce electricity expenditure while increasing the share of solar rooftop capacity and empowering residential households to generate their own electricity.

Actions taken:

- Households apply for the subsidy though a national portal, which serves as a one-stop-shop, including by providing relevant information on system sizes and selection of suitable vendors for installation.
- Subsidies provided under the scheme prioritise low- and middle-income households and are based on average monthly electricity consumption and the corresponding required rooftop solar capacity.
- Provision of subsidies up to 60% of the cost for smaller solar systems (up to 2 kilowatts) and 40% of the additional costs for slightly larger systems (between 2 and 3 kilowatts).
- Availability of financing options through 12 public-sector banks to cover remaining costs with a subsidised interest rate.
- Investment in comprehensive training for approximately 1 million Solar PV Technicians.
- Outreach and application support through the national portal and local bodies to increase participation among lower-income and rural households.

Outcomes:

- As of March 2025, 310 000 loan applications had been received, with 158 000 approved and 128 000 disbursed, including strong uptake among lower-income and middle-income households.
- As of December 2025, over 2 million households had installed systems under the scheme, generating 7 gigawatts of clean power.
- The scheme is expected to cut 720 million tonnes of CO_2 over the next 25 years.
- It is estimated that the scheme will create around 1.7 million direct jobs in solar systems manufacturing, logistics, supply chain, sales, installation, operation and maintenance, and other services.

Peru – Social Inclusion Energy Fund

Policy rationale: The Peruvian Ministry of Energy and Mines created the Social Inclusion Energy Fund in 2012 to increase accessibility of clean energy for the most vulnerable groups, including those facing energy poverty, with a goal to provide over 1.7 million households in the country with lower-cost energy.

Actions taken:

- The programmes financed by this fund subsidise LPG prices and electricity tariffs for low-income households, promote car conversions to LPG or natural gas, and install solar PVs in isolated homes not connected to the grid.
- The Fund is financed from surcharges on large electricity consumers, such as mining and other energy-intensive industries, natural gas transporters and fossil fuel importers.
- Implementation is facilitated by a website and the use of text messaging and other "fast communication" methods to facilitate contact with eligible groups.

Outcomes:

- Since 2012, more than 115 million vouchers have been redeemed nationwide.
- Since 2012, the fund has benefited more than 5 million households across the country.
- In 2025, the fund financed 60 000 new natural gas connections and 16 000 vehicle conversions to compressed natural gas.
- Use of digital vouchers and cellular banking enables real-time transactions, eliminating delays and reducing administrative costs.

Principle 11

Implement actions to promote sustainable lifestyle and fairness in other areas related to the energy transition such as food production and consumption methods, textile production and consumption habits, recycling methods, clean cooking etc.

Tanzania – National Clean Cooking Strategy (2024-2034)

Policy rationale: The Government of the United Republic of Tanzania developed the National Clean Cooking Strategy in collaboration with a number of stakeholders. The strategy aims to ensure access to clean cooking solutions for 80% of Tanzanians by 2034.

Actions taken:

- The policy is supported by annual conferences, designated desk officers and a monitoring committee employing indicators and audits.
- The strategy requires all institutions serving more than 100 meals per day to switch away from firewood and charcoal to clean cooking solutions, such as LPG, electricity, natural gas, biogas or other approved clean fuels, with enforcement starting from January 2024.
- The strategy employs market and financing tools such as a National Clean Cooking Fund, tax and fee reductions, subsidies and low-interest loans, and pay-as-you-go models.
- The Strategy has expanded fuel supply and infrastructure through the promotion of municipal-waste conversion to biogas/briquettes/bioethanol, feedstock farms, LPG terminal and storage upgrades, natural-gas distribution to nine regions, and electricity access to all villages and hamlets by 2028.

Outcomes:

- The initiative has promoted domestic manufacturing and standards by installing regional prototypes, scaling improved cookstoves and briquettes, starting local electric-stove production, increasing cylinder and accessory output, and establishing testing labs and quality rules.
- The government has enabled private-sector investment via designated gas-distribution zones, inclusion in regional investment guides, lower advertising-permit costs, innovation awards and a national data platform.

India – Pradhan Mantri Ujjwala Yojana Scheme

Policy rationale: In 2016, the Indian government launched the Pradhan Mantri Ujjwala Yojana (PMUY) scheme to enable affordable access to clean cooking fuel. PMUY provides subsidised LPG connections and refills to rural and socio-economically vulnerable households that are otherwise reliant on traditional biomass fuels. By lowering upfront and recurring cost barriers, particularly for women

beneficiaries, the scheme addresses household air pollution, improves health outcomes, and reduces environmental degradation.

Actions taken:

- PMUY achieved its initial target of 80 million LPG connections by 2019.
- To extend coverage to the remaining eligible households, PMUY-Ujjwala 2.0 was launched in August 2021 with a target of 10 million additional LPG connections that was successfully met by January 2022.
- Building on this progress, an additional 6 million connections were provided under PMYU-Ujjwala 2.0, raising the total to 16 million connections by December 2022.
- The Government later approved 7.5 million more connections for the period FY 2023-2024 to FY 2025-2026, a target that was fully accomplished ahead of schedule by July 2024.

China – Guidelines for Energy Efficiency Credit

Policy rationale: The China Banking Regulatory Commission and the National Development and Reform Commission issued the Energy Efficiency Credit Guidelines in 2015. Their aim is to scale up financing for energy efficiency projects in alignment with national energy-saving and low-emissions development strategies.

Actions taken:

- Banking financial institutions have expanded credit support for energy efficiency projects across key sectors, including industry, buildings and transport.
- The policy has prioritised financing for projects that promote industrial restructuring, technological upgrades, and adoption of advanced energy-saving technologies and equipment.
- Contract energy management models enable energy service companies (ESCOs) to access credit for implementing energy-saving projects with guaranteed performance.
- The programme has strengthened risk control and due diligence requirements for banks, including the use of technical and economic feasibility assessments, compliance checks and post-loan monitoring.
- The Guidelines have fostered financial innovation, such as green bonds, asset securitisation and new credit guarantee mechanisms to diversify and scale up financing channels for energy efficiency projects.

Outcomes:

- Credits under the scheme significantly increased both the quantity and quality of corporate low-carbon and green innovation, as evidenced by a rise in substantive green patents and inventions.
- The policy has intensified financing competition, attracting green investors, and enhancing climate-risk awareness, with effects especially strong in tech-intensive firms.
- Positive impacts are most pronounced in areas with robust financial oversight and social responsibility, helping to focus executive attention on environmental goals and reduce agency costs.

China – Standards for the Comprehensive Utilisation of Waste Power Batteries of New Energy Vehicles

Policy rationale: This industry standard, developed and released by the Ministry of Industry and Information Technology in 2024, aims to create a more supportive environment for the comprehensive utilisation of used EV batteries, with an emphasis on enhancing repurposing and recycling practices.

Actions taken:

- The specifications introduced more stringent requirements for repurposing and recycling processes, with refined definitions and updated standards for enterprise positioning and project location.
- The policy has ensured enhanced traceability and data management, including mandatory data uploads to the National EV Monitoring and Management Platform and new coding and labelling requirements for repurposed products.
- The rules have specified new safety and infrastructure measures, such as dedicated storage areas with advanced safety features, energy-saving assessments, and consumption monitoring systems.
- The specifications have strengthened technical capabilities for repurposing enterprises, including automated reassembly, quality testing, stricter source verification, and minimum annual volume requirements.
- The policy has established specific equipment and operational standards for recycling enterprises, with detailed recovery rate targets for critical minerals and expanded capability to process lithium-ion batteries used by electric bicycles.

- The policy has introduced product quality, warranty and certification requirements for repurposed and recycled products, alongside compliance with workplace safety and occupational health standards.

Outcomes:

- Pilot programmes have achieved high recovery rates for critical minerals, including 99.6% for nickel, cobalt and manganese, and 96.5% for lithium, demonstrating advanced recycling capabilities.
- Market transparency has improved through the enforcement of a white-listing process, with substandard or inactive firms delisted to maintain industry standards.
- Comprehensive traceability systems integrated with the National New Energy Vehicle Power Battery Traceability Information Platform ensure full-link traceability of power battery production, use, retirement and recycling.
- Regulatory bans in protected zones have discouraged informal and shadow recycling activities, supporting safer and more environmentally responsible practices.

European Union – Updated List of European Waste with Battery-related Waste Codes

Policy rationale: The European Union published the updated list of codes in March 2025 with the aim of improving battery lifecycles, especially recycling practices. The new codes cover manufacturing, used batteries from consumers, and intermediate fractions from recycling, ensuring proper handling and enhancing battery recycling efforts within the European Union.

Actions taken:

- The European Commission introduced new and updated waste codes for battery-related waste, reflecting advances in battery chemistries (notably for lithium-, nickel-, and sodium-based batteries) and evolving manufacturing and recycling processes.
- The codes classify intermediate fractions from battery waste treatment (such as “black masses”) as hazardous waste, based on current scientific and regulatory criteria.

- Alkaline batteries have been reclassified as hazardous waste, replacing the previous non-hazardous designation, in line with updated technical and scientific assessments.
- The updated list introduces a specific hazardous waste code for lithium-based batteries in municipal waste, addressing their unique transport and treatment risks.
- Terminology and definitions for battery-related waste are aligned with the latest EU Batteries Regulation, supporting improved sorting, reporting and traceability.
- The application of the new and modified waste codes will be phased in following a transition period to allow operators and authorities time to adapt facilities, permits and operational processes for compliance.

Outcomes:

- Although the policy is too recent to have official data on outcomes, it is expected to improve control over hazardous materials and waste shipments and enhance synergies with broader EU recycling and sustainability strategies.

India – National Critical Minerals Mission

Policy rationale: The Ministry of Mines launched the National Critical Mineral Mission (NCMM) in 2025. The NCMM is India's strategic initiative to secure and strengthen the supply chain of critical minerals essential for clean energy technologies, high-tech industries, national security and economic growth. It aims to reduce dependence on imports, enhance domestic production and processing, and ensure the long-term, sustainable availability of minerals. The NCMM adopts a comprehensive value-chain approach, spanning the exploration, mining, beneficiation, processing, recycling and stockpiling of critical minerals. By prioritising secondary sources, such as end-of-life batteries, e-waste, industrial scrap and mine tailings, the NCMM advances a circular economy approach for critical minerals essential to EVs, renewable energy, electronics and defence.

Actions taken:

- The NCMM was approved in January 2025 with an approved multi-year outlay of USD 1.81 billion through 2030-2031 and additional expected investment by PSUs and partners.
- The Union Cabinet approved a USD 166.2 million incentive scheme under the NCMM to boost India's recycling capacity for critical minerals from secondary sources such as e-waste, lithium-ion battery scrap, and end-of-life vehicle parts.

- NCMM has enabled policy and institutional support for technology development, infrastructure creation, and private-sector participation in recycling ecosystems.
- The programme links recycling efforts with domestic manufacturing, EV, and energy-transition programmes to ensure demand pull.

Key impacts and lessons learned from evidence and practice – Part 3

Drawing on the available evidence and the international case studies presented in this chapter, there are a number of lessons that co-leads and partners of the CEM Campaign on Sustainable Lifestyles, Fairness and Access to Clean Energy Technologies may wish to consider in their efforts to transform energy systems in structural ways that support low-emissions practices, enhance fairness, and create lasting resilience. These include:

- Allocating financial and technical support can help expand affordable access to electricity and clean cooking options, contributing to more reliable basic energy services for vulnerable and off-grid communities.
- Maintaining ambitious building energy codes and minimum performance requirements can serve as a key mechanism to increase efficiency in the built environment.
- Using a range of information tools, such as energy performance certificates, disclosure programmes, renovation passports and one-stop-shops, can help reduce information barriers in purchasing and renovation decisions.
- Offering financial and non-financial incentives to boost building efficiency, and tailoring support to different income and housing circumstances, can make upgrades more accessible and affordable.
- Supporting the expansion of active mobility options and affordable public transport networks can encourage alternatives to private car use and help ensure all groups can benefit.
- Introducing purchase incentives, such as targeted subsidies, and investing in enabling infrastructure, such as charging stations for electric vehicles, can make low-emissions private vehicles more accessible across diverse socio-economic groups.
- Using a range of regulatory policies on mobility, such as Low-Emissions Zones and fuel economy standards, can help reduce emissions and encourage clean transport uptake.
- Promoting policies and regulations that facilitate the collection and recycling of critical minerals from e-waste can help ease supply pressures for clean energy technologies.

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