



# Energy Efficiency Policy Toolkit 2024

From Versailles to Nairobi

International  
Energy Agency

The IEA examines the full spectrum of energy issues including oil, gas and coal supply and demand, renewable energy technologies, electricity markets, energy efficiency, access to energy, demand side management and much more. Through its work, the IEA advocates policies that will enhance the reliability, affordability and sustainability of energy in its 31 member countries, 13 association countries and beyond.

This publication and any map included herein are without prejudice to the status of or sovereignty over any territory, to the delimitation of international frontiers and boundaries and to the name of any territory, city or area.

Source: IEA.  
International Energy Agency  
Website: [www.iea.org](http://www.iea.org)

## **IEA Member countries:**

Australia  
Austria  
Belgium  
Canada  
Czechia  
Denmark  
Estonia  
Finland  
France  
Germany  
Greece  
Hungary  
Ireland  
Italy  
Japan  
Korea  
Lithuania  
Luxembourg  
Mexico  
Netherlands  
New Zealand  
Norway  
Poland  
Portugal

Slovak Republic  
Spain  
Sweden  
Switzerland  
Republic of Türkiye  
United Kingdom  
United States

The European Commission also participates in the work of the IEA

## **IEA association countries:**

Argentina  
Brazil  
China  
Egypt  
India  
Indonesia  
Kenya  
Morocco  
Senegal  
Singapore  
South Africa  
Thailand  
Ukraine

Energy efficiency is central to improving the lives of all people. It provides affordable and reliable energy access, bolsters the security of energy supply, accelerates clean energy transitions and supports economic growth and resilience. For these reasons, energy efficiency policies can deliver many benefits to people – lowering energy bills, improving health outcomes, and creating new jobs, while ensuring these benefits are shared by all. A strong, early focus on energy efficiency is essential to achieve net zero emissions by 2050.

To accelerate action on energy efficiency, the International Energy Agency (IEA) created this Policy Toolkit for governments on the occasion of the **9th Annual Global Conference on Energy Efficiency**. This Global Conference in Nairobi is co-hosted by the IEA Executive Director Fatih Birol and the Kenya's Minister of Energy and Petroleum Davis Chirchir. The Policy Toolkit will help governments contribute to the global target of doubling energy efficiency progress by 2030, as agreed in the [UAE Consensus](#) reached at COP28 in Dubai and the [Versailles Statement](#) from the IEA's 8th Annual Global Conference on Energy Efficiency in 2023.

The Toolkit builds on the IEA's Policy Packages, which were launched at the IEA's [7th Annual Global Conference on Energy Efficiency](#) in Sønderborg. These Policy Packages provide a practical approach to

accelerate energy efficiency by guiding governments in the design of effective policy measures. They highlight key policies which should be combined to create strong outcomes across three pillars: regulation, information and incentives. They were updated for the [Versailles Conference](#) in 2023.

The **2024 Policy Toolkit** focuses on how the doubling goal can be achieved with concrete tools or specific instruments found in the Policy Packages. **The “Doubling Policy Tools” are meant to help policymakers with the implementation of energy efficiency policies that can contribute to annual progress** while improving living standards, public budgets, energy security and employment, and while supporting just and inclusive energy transitions.

This document is created as an accessible overview on policy instruments and includes useful links to more detailed information. For the 9th Global Conference, the IEA has developed 12 initial “doubling tools” that address the efficiency of buildings, appliances, industry and vehicles. It will be updated as more tools are added throughout the year.

# 10 strategic principles

Based on the IEA's analysis of best practices and the work of the [Global Commission for Urgent Action on Energy Efficiency](#), the following strategic principles can help guide policy makers to enhance and expand their energy efficiency policies and programmes, and to accelerate energy efficiency gains through new and stronger policy.



1. Prioritise **cross-cutting energy efficiency action** for its economic, social and environmental benefits.



2. Act to **unlock efficiency's job** creation potential.



3. **Create greater demand** for energy efficiency solutions.



4. Focus on finance in the wider context of **scaling up action**.



5. Leverage **digital innovation** to enhance system-wide efficiency.

6. **Lead by example** in the public sector.



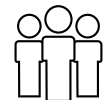
7. **Engage all** parts of society.



8. **Leverage behavioural insights** for more effective policy.



9. Strengthen **international collaboration**.



10. **Raise global energy efficiency** ambition.

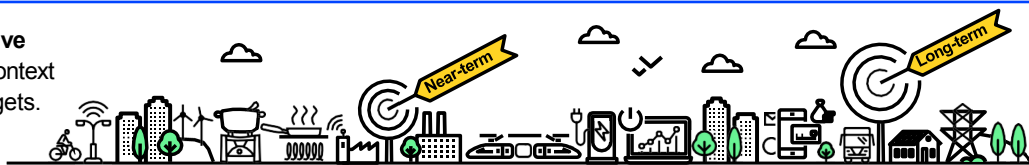


## Policy Packages for Energy Efficiency

In all sectors the greatest efficiency gains are achieved by a package of policies that combine three main types of mechanisms: **Regulation**, **information** and **incentives**. Careful design and implementation will deliver efficiency's full potential to enhance energy security, create jobs, increase living standards, cut energy bills and reduce emissions.

Targets

**Policies are more effective** when they are set in the context of clear strategies and targets.

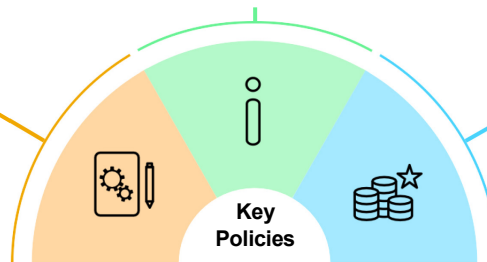


Essential elements

**Regulation** is essential to exclude the worst performing equipment and practices from the market, to drive average efficiency levels up, and to set rules for measurement of performance.

**Information** helps people make more efficient choices in what they buy and how they use energy.

**Incentives** make efficient options more attractive and speed up the upgrade and replacement of appliances, buildings and vehicles. They also encourage the use of new technologies and practices.



**Implementation** is as important as policy design.



Ensure that the **resources** are in place to put policies into action.



Address **vital elements** such as capacity building, enforcement, and monitoring.



It is important to continually assess **policies and programmes** so as to keep up to date with technology developments.

The Energy Efficiency Policy Packages contain instruments that cover different sectors and types of policies. While countries should work towards a framework that includes different instruments and covers multiple sectors, in the short term, it can be useful to prioritise. Some policies are quicker to implement or can have larger effects. This depends on national circumstances, such as the existing policy mix, the structure and size of the economy, available fiscal space and the country's institutions. The following questions aim to help policymakers identify first steps, given their specific situation:

1. **Which sectors contribute the most to national energy consumption?** Identifying the energy consumption of different sectors can help policymakers determine what to focus on. If the industrial sector is responsible for half of the country's energy demand, it can be useful to first spend effort on the Policy Package for industry. Strong data and reporting is essential to adequately analyse sectoral consumption.
2. **What are the national climate and energy policy goals?** Determining the targets and time horizons is important to identify potential policy instruments. For instance, countries expecting to expand their building stock can benefit from regulation and incentives for new buildings, while other countries might prioritise retrofits or other sectors. Policy targets in 2030 can require strengthening existing instruments, while new instruments can be considered for longer-term targets. It is also important to take existing national and international obligations and commitments into account.
3. **What are the existing energy efficiency policies?** Setting up new policy measures can take time. It can be more time-efficient to strengthen existing policies rather than developing and implementing new legislation or regulation.
4. **Which type of policy instruments should be the focus?** If a country already has a lot of incentives in a sector, additional incentives might not lead to as significant energy efficiency improvements as exploring other types of instruments such as regulation or information tools.
5. **What are the necessary resources and capacity?** The implementation of policy instruments might require skilled personnel, funding and time. Depending on these resources, countries can choose the best policy instruments for their context. Countries with limited fiscal space might consider regulatory or informational tools first, as incentives can sometimes be costly. Similarly, regulations require institutions to monitor and enforce them, which need to be in place before a regulation is implemented.
6. **Which policy measures can complement or strengthen the existing energy efficiency policy mix?** Many of the policy measures in the packages can reinforce each other. For example, a country with an existing labelling scheme might consider minimum energy performance standards, since a lot of the necessary infrastructure is already in place.

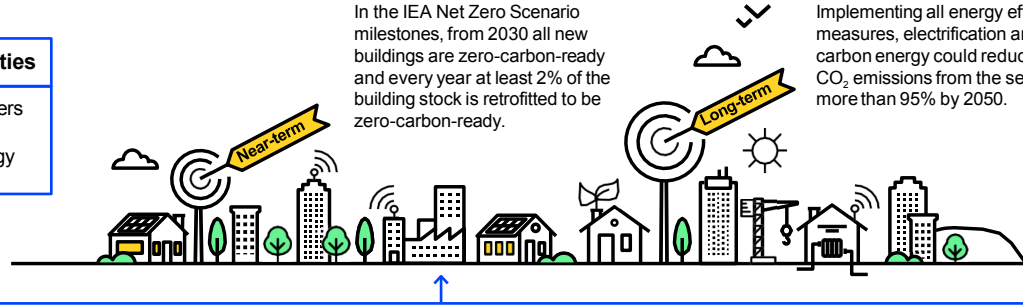
# Policy Package – Buildings Energy Efficiency

## Immediate opportunities

Replacing fossil fuel boilers with high efficiency heat pumps can reduce energy use by up to 75%.

In the IEA Net Zero Scenario milestones, from 2030 all new buildings are zero-carbon-ready and every year at least 2% of the building stock is retrofitted to be zero-carbon-ready.

Implementing all energy efficient measures, electrification and low-carbon energy could reduce total CO<sub>2</sub> emissions from the sector by more than 95% by 2050.



## REGULATION

- **Targets for energy efficiency** in buildings, including for renovation rates, fosters market growth and facilitates long-term investment decisions.
- **Building energy codes** for new and existing buildings are essential to accelerate the transition to zero-carbon-ready buildings. It is important that they are regularly updated to increase coverage and stringency.
- **Minimum energy efficiency requirements** for existing buildings help guarantee performance and accelerate the process of renovation through instruments such as the standardisation of processes.
- **Regulations** can ensure that buildings are equipped with smart interactive technologies and can become demand response ready.



## INFORMATION

- **Information on building performance** allows consumers to identify the most efficient options when buying or renovating buildings. Examples include energy performance certificates, disclosure programmes, one-stop shops for upgrades and renovation passports.
- **Smart interactive technologies** can show real-time energy performance, help adjust occupants' behaviour and optimise energy use based on signals from the grid.
- **Training and education programmes** for building sector workers are important to ensure a suitably skilled workforce.
- **Public awareness campaigns** designed to include behavioural insights encourage low-cost actions, such as thermostat adjustment and use of smart technologies.



## INCENTIVES

- **Financial incentives** such as green mortgages, energy performance-based preferential loans and tax rebates and grants can motivate consumers and developers to increase investment in energy efficient solutions.
- **Expedited administrative procedures**, including accelerated permitting, targeted at high performing new build or retrofit projects, encourage the implementation of energy efficient measures.
- **Award and recognition programmes** encourage the development of highly energy efficient buildings.

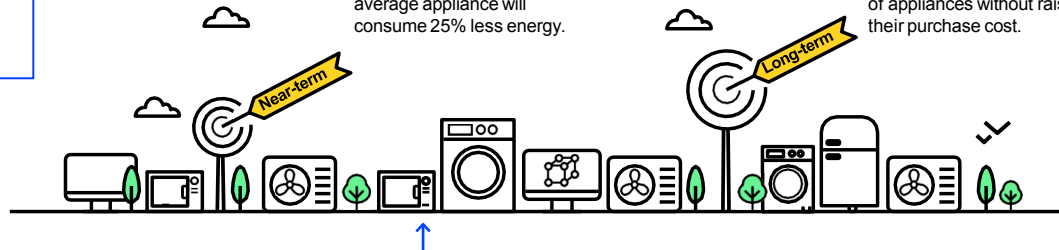
# Policy Package – Appliance Energy Efficiency

## Immediate opportunities

In most cases, it is possible to buy appliances that are twice as efficient as those typically purchased.

In the IEA Net Zero Scenario milestone for 2030 the average appliance will consume 25% less energy.

Long-term appliance policies can halve the consumption of appliances without raising their purchase cost.



## REGULATION

- **Minimum Energy Performance Standards** exclude the least efficient products from the market. They should be in line with international best practices, while reflecting local circumstances; and be regularly updated. Regulations are essential for moving the market towards the best available technology in line with achieving net zero targets.
- **Regulation** can ensure that new appliances are demand response ready in order to offer flexibility to the end-user and the overall system, and reduce peak demand.
- **Regulating the import and performance of used appliances** can help avoid inefficient appliances entering the market.



## INFORMATION

- **Comparative labels** help consumers, to identify the most efficient appliances and encourage purchases based on lifetime costs. Ensuring labels are appropriately displayed is also key.
- **High Efficiency Performance Specifications** identify the best performing products and are often used as the basis for labels and incentives.
- **Education and capacity building** encourage industry and retailers to produce and supply more efficient products.
- **Consumer information campaigns** help people make informed decisions. These are most effective when based on behavioural insights and targeted strategies.



## INCENTIVES

- **Rebates, grants and other financial offers** motivate consumers to buy highly efficient appliances. These could come directly from governments or schemes such as energy efficiency obligations.
- **Finance or taxation measures** on sales and imports can encourage manufacturers to produce appliances that are more efficient.
- **Dynamic electricity pricing** helps incentivise flexible demand.
- **Product lists** help companies and households identify efficient products which are eligible for loans, tax reductions, or other financial incentives.
- **Awards** promote the most efficient appliances and equipment.



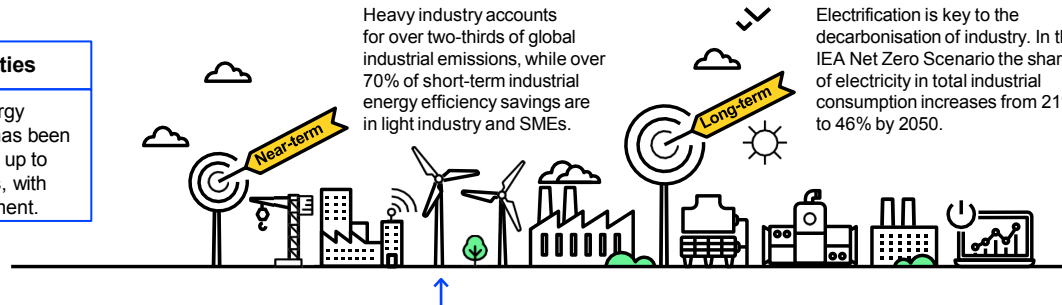
## Policy Package – Industry Energy Efficiency

### Immediate opportunities

Implementing better energy management practices has been shown to deliver savings up to 15% in the first 1-2 years, with little or no capital investment.

Heavy industry accounts for over two-thirds of global industrial emissions, while over 70% of short-term industrial energy efficiency savings are in light industry and SMEs.

Electrification is key to the decarbonisation of industry. In the IEA Net Zero Scenario the share of electricity in total industrial consumption increases from 21% to 46% by 2050.



### REGULATION

- **Minimum Energy Performance Standards** for key equipment, such as motors and pumps, can drive up overall industrial efficiency levels.
- **Regulation** extends beyond technology to target areas such as research and development, energy auditing, mandatory consumption reporting, energy management systems, and upskilling of the workforce. Incorporating life cycle impacts into regulation helps promote material efficient choices at the design stage.
- **Regulatory instruments** yield best results when rooted in a good understanding of local context and include ambitious, regularly updated, standards.
- **Regulations to ensure demand side response capabilities** help provide flexibility to the grid.



### INFORMATION

- **Benchmarking, indicators and other forms of detailed data** allow governments to track the progress of policies and allow industries to compare their energy performance with that of their peers.
- **Digital technologies** enable industries to track energy use in real time and help ensure flexible demand side response, resulting in energy optimisation and cost saving opportunities.
- **Sharing information on energy efficiency best practice** through targeted information and industry networking activities helps industries raise ambition and improve energy performance.



### INCENTIVES

- **Incentives** such as preferential finance, links to carbon trading, obligations and tax-based measures can motivate crucial energy efficient decisions at the process design and equipment selection stage, supporting industry's transition to near zero emission technologies.
- **Free or subsidised energy audits**, often targeted at SMEs and other sectors of strategic importance, can help rapidly increase energy efficiency.
- **Policies to foster Energy Service Companies** provide industry with access to significant external energy expertise and attractive structured financial packages.
- **Incentives for the reuse and recycling** of materials reduce the need for higher-emission primary materials production.

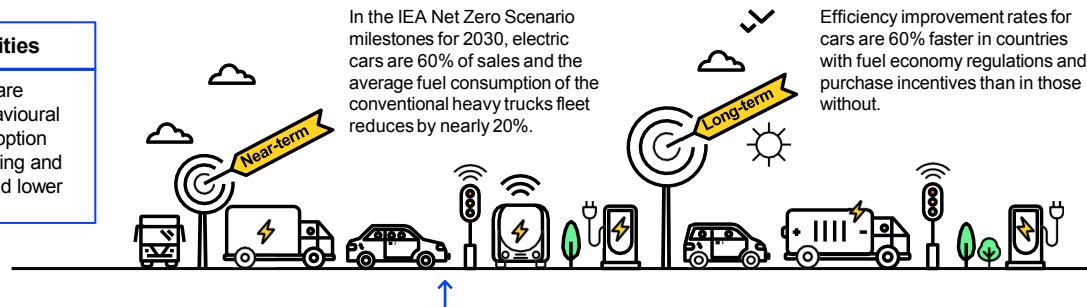
## Policy Package – Vehicle Energy Efficiency

### Immediate opportunities

Significant fuel savings are achievable through behavioural actions including the adoption of best practices for driving and vehicle maintenance, and lower speeds.

In the IEA Net Zero Scenario milestones for 2030, electric cars are 60% of sales and the average fuel consumption of the conventional heavy trucks fleet reduces by nearly 20%.

Efficiency improvement rates for cars are 60% faster in countries with fuel economy regulations and purchase incentives than in those without.



### REGULATION

- **Vehicle fuel economy standards** result in greatly reduced fuel use provided they are kept up to date, well monitored and properly enforced.
- **Regulating the import and export of used vehicles** can help improve fleet fuel economy and ensure road safety and air quality benefits.
- **Regulatory and market signals**, such as through stringent standards and target setting, help bring electric vehicles to the market, by providing an impetus to manufacturers to develop these technologies.
- **Regulation** can also help ensure the required infrastructure, such as standardised charging, is in place.



### INFORMATION

- **Information campaigns** on carsharing practices and more fuel-efficient driving help people take informed action relating to energy and cost savings. Campaigns are more effective when based on behavioural insights and targeted strategies.
- **Labels inform consumers**, identifying the most efficient vehicles allowing people to choose vehicles that cost less to run. Labels for new and used vehicles help ensure benefits for all vehicle purchasers.

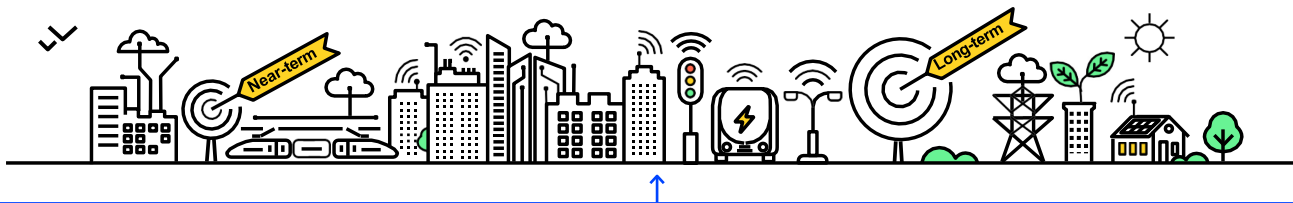


### INCENTIVES

- **Incentives** can make vehicle costs cheaper at point of purchase, such as through grants or lower registration fees. They can also reduce on-going costs, through for example free parking and exemptions from congestion tolls.
- **Government grants** for strategic charging infrastructure, such as charging stations in homes and workplaces or fast charging along expressways, encourage the adoption of electric vehicles reflecting that purchase decisions are influenced by the availability of infrastructure.
- **Such incentives** facilitate the early adoption of electric vehicles and can be phased out as uptake grows.
- **Vehicle taxation and duties**, can be structured to incentivise the purchase of more efficient vehicles.

## Policy Package – Energy Efficient Cities

**National policy makers play an important role in accelerating urban energy transitions.** Cities connect directly with communities and people to enhance implementation and better inform policy. National and city-level alignment in energy efficiency policy is a key dimension of clean energy transitions. Energy Efficient cities can use digital tools to make smarter, better-informed decisions and improve quality of life for all.



### REGULATION

- **National governments help create the environment** for cities to take action through setting an overall vision including plans and targets.
- **Local regulations and codes** incorporating solutions such as smart data and metering help unlock system-wide efficiencies.
- **Planning** should be integrated and cross sectoral, taking a long-term view.
- **International standards and benchmarks** are important in enabling seamless communication across technologies and applications, critical for efficient urban energy systems.
- **National action that facilitates business models** for clean urban energy services, such as Public Private Partnerships and ESCOs, unlock new sources of finance.



### INFORMATION

- **National initiatives can be used to build energy efficiency capacity in cities** through creating training opportunities and partnerships, informed by international best practices.
- **Digitalisation creates new sources of data** e.g. on-air quality, energy consumption and traffic. Analysis and communication of this data can improve the operation of urban energy systems.
- **Digital solutions for energy efficiency in cities**, require open, transparent access to data, with privacy protected. National governments can facilitate this by developing guidelines and mechanisms to enable data use and sharing across sectors and levels of government.
- **Sharing information on energy efficiency best practices** and proven cost-effective technologies can help cities better understand and implement efficiency opportunities to improve performance.



### INCENTIVES

- **Investing in city level action and enabling funding to flow** from the national to local level, through targeted funding models, can give the best returns on investment and accelerate inclusive clean energy transitions.
- **National governments can use their influence to leverage international programmes** aimed at cities, for example by creating innovation areas to attract digital and clean energy technology talent.
- **Seed funding and complementary finance from national governments**, can mobilise and help scale up private capital for investment in energy efficient cities.
- **Green procurement** for example through the incorporation of energy efficiency performance criteria into municipal tenders, mobilises the purchase power of public bodies, acting as a major driver for market deployment of efficient products.

## Policy Package – Clean Efficient Cooking

### Immediate opportunities

A successful strategy to achieve clean cooking goals needs to consider all available technologies and fuels.

For rural communities, replacing traditional stoves with improved solid fuel stoves is an important first step to better population health.

In the IEA Net Zero Scenario universal access to clean cooking is achieved by 2030. This can reduce GHG emissions by 870 Mt CO<sub>2</sub>-eq equivalent to double Brazil's total annual CO<sub>2</sub>-eq emissions from energy today.

Globally long-term policies prioritise electrical cooking appliances to reach climate goals. By 2050 reduced indoor air pollution due to clean cooking will result in 2.3 million fewer premature deaths per year.



### REGULATION

- **Strong government regulation** of energy markets can help ensure clean energy supplies are available for consumers.
- **Minimum Energy Performance Standards** for clean cooking stoves and other cooking equipment remove the least efficient products from the market.
- **Targeted subsidies for the most vulnerable consumers** can help ensure equal access to clean cooking, such as efficient LPG or electric cooking.
- **Building codes and obligations on landlords** can ensure adequate ventilation and other health and safety requirements are met.



### INFORMATION

- **Consumer information campaigns** help people make more informed decisions. They are most effective when based on behavioural insights and targeted strategies.
- **Local information provision** through field offices in rural areas and advisory centres can improve the standing of programmes among the local population.
- **Demonstrations** highlighting traditional dishes successfully cooked using new technologies can help transform perceptions.
- **Labelling and certification** help consumers to identify the most energy-efficient clean cooking technologies. This can create a market for efficient technologies and provides motivation for manufacturers to improve the efficiency of their products.



### INCENTIVES

- **Measures such as rebates, grants and tax reductions** motivate consumers to choose efficient clean cooking appliances.
- **Appliance replacement programmes** encourage households to replace their old, inefficient cooking stoves with more efficient models including induction stoves.
- **Clean cooking initiatives** can be included in carbon credit and offset schemes.
- **Restructuring energy tariffs**, including those for electricity, to include provisions favouring clean cooking can incentivise consumers to switch from traditional biomass and other fossil fuels.

## Policy Package – Financing Energy Efficiency

### Immediate opportunities

Growth in energy efficiency investment is lower than it needs to be, but enacting the right policies delivers social and economic benefits promptly, such as doubling the number of energy efficiency related jobs by 2030.

Stronger policy action can facilitate a tripling of energy efficiency-related investment to almost USD 1.8 trillion per year by 2030 in the IEA Net Zero Scenario.

Reaching net zero emissions requires an unprecedented acceleration in action. The share of total energy investment related to energy efficiency will need to continue to increase from around 20% of the total today to about 50% in 2050.



### REGULATION

- **Long-term strategies, targets and planning** emphasise government commitments to sustained change, attracting private investment.
- **Energy market structures** can facilitate the participation of private actors, including energy service providers, supporting investment over time.
- **Strong policy and governance frameworks** including transparency regulations, Minimum Energy Performance Standards and ESG (Environmental, Social and Governance) requirements, can attract international investment and ensure the long-term flow of capital.
- **Utility regulation** can spur investment and enable innovative financing approaches e.g. where outlay is recouped through energy bills.



### INFORMATION

- **Training programmes and technical assistance** for financial institutions and project developers help improve understanding of business models, risks and opportunities.
- **Policies and digital tools** enhancing data availability and quality, including energy performance certificates, help to improve financiers' understanding, and to verify energy savings and payback periods.
- **Development of standardised contract templates and terms** help create trust, reduce transaction costs and simplify replication.
- **Dedicated information campaigns** raise awareness of preferential funding opportunities, and how to access them.



### INCENTIVES

- **Streamlined and digitised administrative processes** for energy efficiency projects, including permits, licences or subsidies and one-stop shops reduce barriers to investment.
- **Public funding** can support de-risking mechanisms, like guarantee funds or risk-sharing facilities, helping to attract private capital.
- **Coordination platforms** and matchmaking services between project developers and private investors can improve access to funding.
- **Policies promoting innovative mechanisms** such as bulk procurement, on-bill financing and leasing models can achieve scale and amplify actions.
- **Energy subsidy reform** helps phase out poorly targeted fossil fuel subsidies while boosting direct support for energy efficiency measures, including for vulnerable groups.

## Immediate opportunities

The expansion of heat pump manufacturing and installations has the potential to reduce CO<sub>2</sub> emissions, improve air quality, and generate employment.

## Policy Package – Heat Pumps for Buildings



### REGULATION

- Introduce stringent **Minimum Energy Performance Standards (MEPS)** to ensure that heating solutions including heat pumps adhere to high-efficiency requirements.
- Mandate that new heat pumps are equipped with **connected controls**, providing flexibility to end-users and the overall energy system, contributing to reducing peak demand.
- Establish **regulations, including building codes**, facilitating the integration of heat pumps. This includes adjustments related to thermal performance, and building permissions, as well as refining decision-making protocols in multi-owner buildings.
- Introduce **long-term policy support and regulatory certainty** with transparency on upcoming changes and providing opportunities for industry input.



### INFORMATION

- Harmonise **labels** to inform consumers about the energy efficiency of heating solutions.
- Promote **consumer information campaigns**, informed by behavioural insights, to empower individuals to make informed decisions.
- Create **one-stop-shop platforms** for supporting consumers in the uptake of heating equipment.
- Promote upskilling through accreditation for heat pump specialists and the integration of **heat pump content into educational curricula** at all levels.
- Provide **criteria to define clean heat** and improve heat pumps **market data collection** and data accessibility to inform policy decision-making.



### INCENTIVES

- Introduce **rebates, grants and other financial offers** to motivate consumers to buy highly efficient heat pumps.
- Introduce **finance or taxation benefits** to encourage manufacturers to scale up heat pump production.
- Establish **well-designed procurement processes** to increase the market share of heat pumps and drive innovation.
- **Adjust the price of electricity** to make the operating costs of heat pumps more favourable.
- Offer **dynamic electricity pricing** to help incentivise flexible demand and new business models.

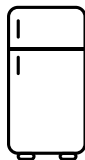
# Overview of the Doubling Policy Tools

The doubling policy tools are meant to help inform policymakers on possible energy efficiency policies they can use to contribute to the global doubling target. This policy toolkit contains 12 initial policy tools for four end-use sectors: buildings, appliances, industry, and vehicles. Each sector includes an overview of the regulation, information, and incentive policy tools, describing their relevance to the doubling target, basic implementation steps and best practices around the world, as well as useful links to more detailed information.

**Click on a tool to immediately skip to the page with the relevant information.**



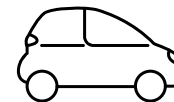
[Buildings](#)



[Appliances](#)



[Industry](#)



[Vehicles](#)



[Building Energy Codes](#)

[MEPS for Appliances](#)

[MEPS for Motors](#)

[Fuel Economy Standards](#)



[Energy Performance Certificates](#)

[Energy Labelling](#)

[Energy Efficiency Industry Networks](#)

[Vehicle Energy Labelling](#)



[Energy Retrofit Grants](#)

[Rebates and Loans](#)

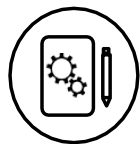
[Energy Efficiency Obligation Schemes](#)

[Grants for Passenger Electric Vehicles](#)



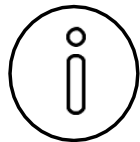
## RELEVANCE FOR DOUBLING

Buildings account for [about 30%](#) of final energy consumption globally and [more than half of electricity consumption](#). To stay on the pathway towards [net zero emissions](#) by 2050 and achieve a doubling of global annual energy intensity improvement between now and 2030, buildings need to rapidly become more efficient. An integrated policy approach combining regulation, information and incentives is the most effective way to achieve this goal. The following doubling tools can help governments to implement energy efficiency policy and contribute to the global doubling target.



### Doubling Tool: [Building Energy Codes](#)

- Building energy codes set requirements for the minimum energy performance of buildings.
- Mandatory [zero-carbon-ready building energy codes](#) need to be in place globally for [all new buildings by 2030 in the net zero pathway](#).
- Buildings built after a code is introduced can use [up to 50%](#) less energy.



### Doubling Tool: [Energy Performance Certificates](#)

- Energy performance certificates (EPCs) provide information and can increase awareness on the energy performance of a building.
- This helps consumers to make more informed decisions about retrofits, behaviour changes, and property investments.
- EPCs help governments design policies to improve the efficiency of buildings by providing data to identify areas needing intervention.



### Doubling Tool: [Retrofit Grants](#)

- Retrofit grants play a crucial role in enhancing building energy efficiency by lowering the upfront investment costs of clean technologies.
- Grants are an effective tool that have increased uptake of energy efficiency measures in many countries.
- They can promote the most efficient technologies or target a specific subset of the population that needs the support the most.





## WHAT THEY ARE

Building energy codes are a regulatory instrument in the [buildings policy package](#). They set minimum requirements for energy use in buildings. They may set requirements for the overall energy efficiency of an entire building (performance-based codes) or for individual building components such as insulation, lighting systems, or heating and cooling systems (prescriptive codes). They may include both types of requirements to provide flexibility to the market. Only buildings compliant with the energy code are allowed to be built.

To get buildings on track for a net zero emissions future, building energy codes should include not only energy efficiency requirements, but also requirements around on-site renewable energy production, embodied carbon, energy management and the [integration of smart appliances and equipment](#) to enable demand response. Building energy codes should be applied to both new buildings and existing buildings undergoing major renovations. They can also set deadlines for energy efficiency upgrades. They improve the efficiency of buildings and help industry prepare for, and adapt to, market changes. As of 2023, there were around 80 building energy codes in place across the world, with only 40% of new buildings constructed globally covered by requirements for energy efficiency.

## HOW TO IMPLEMENT

Specific steps to implement building energy codes vary by country and should be adapted to the regulatory context. The most common implementation steps include:

- 1. Assessment and planning:** Analyse the current state of energy use in buildings, identify opportunities for improvement in energy efficiency in different building types and climate conditions, and develop a strategic plan for implementing building energy codes.
- 2. Code development:** Establish a task force with stakeholders from government, industry, and academia to discuss the code design. Consider aligning with international standards (e.g. International Energy Conservation Code) or existing successful codes in other countries. Then the actual drafting of the building energy code can commence, including specific requirements for construction and operation. Specify the scope, including building types, geographic areas, and the time frame. Lastly, establish mechanisms for compliance with the building energy code, including penalties for non-compliance.
- 3. Public consultation:** Solicit input from industry professionals, builders, architects, and the general public to gather feedback on the proposed regulation.

4. **Approval and adoption:** Present the regulation to relevant authorities for approval and adopt the building energy code through legislative or regulatory means.
5. **Training and education:** Provide training programmes for architects, builders, contractors, code officials, enforcement personnel and other stakeholders. Raise awareness about the new building energy code and its requirements.
6. **Updates and revisions:** Regularly review and update the building energy code based on your monitoring efforts to incorporate technological advancements and industry best practices. Consider amendments based on lessons learned from implementation.
7. **Collaboration:** Foster collaboration between government agencies, industry experts and advocacy groups to support implementation.

## HOW TO MONITOR

Setting up a monitoring and evaluation (M&E) system may include some of the following common steps:

- Identify key performance indicators (KPIs) and set measurable objectives for building energy codes, such as compliance rates, energy savings and wider socio-economic impacts.
- Determine data sources and collection methods. Collect data on energy consumption, building characteristics, and other relevant parameters, taking into account a variety of design and renovation practices, as well as climatic conditions.
- Establish a baseline for energy consumption and building characteristics (preferably before the regulation is developed).
- Develop a reporting system. Regularly publish results on the KPIs and areas for improvement.
- Implement regular audits and inspections focusing on compliance with the building energy code.

## BEST PRACTICE EXAMPLES

- **Switzerland's** [Minergie 2023 standards](#) include a mix of requirements for maximising the use of solar energy, continuously improving energy efficiency, significantly reducing greenhouse gases, and ensuring the thermal comfort of occupants.
- In the **United States**, the [California 2022 Energy Code](#) includes mandatory requirements for electric-ready buildings, including space and pre-wiring requirements for more electric end uses.
- **Singapore's** [Code for Environmental Sustainability of Buildings](#), which made many previously [voluntary standards](#) mandatory, is based on energy performance criteria and a point-based system for environmental performance. It includes requirements for energy efficiency, renewable energy, and smart solutions. It is linked to a target that 80% of new buildings be [Super Low Energy](#) from 2030.
- **Nigeria's** [National Building Energy Efficiency Code](#) emphasises the role of [bioclimatic design strategies](#) for energy efficiency. These can enable significant energy savings ([up to 40%](#)) compared with business-as-usual buildings. Savings can reach 75% when combined with high-performing building envelopes and systems.



## WHAT THEY ARE

Energy Performance Certificates (EPCs) are an information instrument in the [buildings policy package](#). EPCs are usually documents that inform on the energy performance of a building and its energy demand, indicating how efficient – and often how environmentally-friendly – a building is. EPCs can differ, but some of the key elements may include:

- **Energy Efficiency Rating:** A scale of several energy classes, for example from A (most efficient) to G (least efficient), visually represented, often as a color-coded bar chart.
- **Current and Potential Ratings:** Display the building's current state and its potential efficiency rating after recommended improvements.
- **Property Details:** Basic information about the property, including size and evaluation date.
- **Recommendations:** Specific, cost-effective advice on improving the property's energy efficiency, such as the addition of insulation, heating system upgrades, and the use of renewable energy.
- **Estimated Energy Use:** Projection of energy consumption and costs based on standard usage patterns, identifying potential savings.
- **Carbon Emissions:** Information on the building's carbon dioxide emissions, emphasising its environmental impact.

## HOW TO IMPLEMENT

Implementing an EPC programme involves several steps to ensure it effectively encourages improvements in buildings. These may include:

1. **Legislative framework:** Set the scope, objectives and requirements, including which buildings need an EPC, under what circumstances (e.g., sale, rent, construction), and the validity period of certificates.
2. **Standards:** Develop a methodology to assess energy performance and calculate the efficiency rating. This should include guidelines on the evaluation process, data collection and calculation methods.
3. **Training and accreditation:** Set up a system to train and accredit assessors who carry out energy performance evaluations. Certified and competent assessors are crucial to the credibility of EPCs.
4. **Certification process:** Implement a process for issuing EPCs, including property inspections, data analysis, and the creation of the certificate with recommendations for efficiency improvements.
5. **Data collection and registry:** Establish a database to record and manage EPC information to facilitate the tracking of energy performance across the building stock and support policy analysis.
6. **Quality control and enforcement:** Put mechanisms in place to ensure the quality of EPCs, such as random checks or audits. Also, define penalties for non-compliance to enforce the requirements.
7. **Public engagement:** Launch initiatives to raise awareness among property owners, buyers, tenants and the general public about the importance of energy efficiency and the role of EPCs in promoting it.
8. **Updates and revisions:** Regularly review the effectiveness and update standards, trainings and methods to reflect technological advancements, changes in energy prices and other relevant factors.

## HOW TO MONITOR

Monitoring the effects of EPCs is crucial to evaluate their impact on improving building energy efficiency, influencing real estate markets, and contributing to environmental goals. To track these effects, a comprehensive approach to data collection and analysis is needed. This may include the following elements:

- Collect data on the distribution of energy efficiency ratings across the building stock to understand the current state of buildings.
- Require regular updates to EPCs and track changes in buildings' ratings, especially after renovations or efficiency improvements.
- Track the implementation of energy efficiency recommendations provided in EPCs (for example, through [building energy passports](#)), such as insulation upgrades, heating system replacements, or the installation of renewable energy sources.
- Monitor energy consumption data (for example, with smart meters) before and after the implementation of EPC recommendations to measure energy savings.
- Compare actual energy savings (and/or reductions in greenhouse gas emissions) with estimated building energy performance made in EPCs to assess the accuracy of assessments and the effectiveness of recommended measures.
- Collect data on why recommendations are not implemented, such as financial constraints, regulatory barriers, or lack of awareness.
- Collect data to analyse the impacts of EPC ratings on property values, sales prices and rental rates to see how efficiency influences real estate market dynamics.

## BEST PRACTICE EXAMPLES

- **Sweden's** [EPCs](#) use metered values and on-site visits, which enhance the quality of the certificates. This offers advantages, such as ensuring that they reflect the real energy efficiency of buildings, making the recommendations specific to each building. The EPC is also valid for a shorter time than is typical in other countries (five instead of ten years) which further encourages energy efficiency improvements in buildings.
- **South Africa's** [EPCs](#) offer a standardised approach to assess a building's energy performance and assign it to one of the five classes (A to G). It is mandatory for privately owned commercial buildings (>2000 m<sup>2</sup>) and publicly owned, rented and operated buildings (>1000 m<sup>2</sup>) to undergo the EPC assessment and disclose the results. Penalties for non-compliance include a fine of up to USD 260 000 and imprisonment of up to five years. EPCs help the government collect data and monitor energy use in buildings through a centralised repository.
- For **Portugal's** [EPCs](#), achieving high energy ratings can lead to tax benefits, exemptions and favourable financing terms. The EPC process begins with an assessment to establish a baseline for the energy performance of the building, and to guide renovations to achieve energy and cost savings. A final EPC after renovating serves as a compliance check, confirming improvements and updating energy performance indicators.



## WHAT THEY ARE

Retrofit grants are an incentive in the [buildings policy package](#). Grants can reduce upfront costs for energy efficiency technologies and make them more attractive and financially viable for consumers, builders and developers. This can help create a market pull, supporting stakeholders in implementing energy efficiency measures to comply with regulations to achieve higher levels of building energy performance.

Grants usually provide payment before the retrofit happens and cover part of the costs, such as adding insulation, upgrading heating or cooling systems, or installing solar PV. Grants may include requirements to improve the overall energy performance of the buildings (typically based on a theoretical assessment of the measures) and are sometimes linked to energy performance certification programmes. In addition to traditional grants, there are also market mechanisms that reward improved performance or [pay-for-performance](#) instruments.

## HOW TO IMPLEMENT

The process depends on the depth of the retrofit, eligible measures, grant size and country context. Common implementation steps are:

1. **Objectives:** Identify goals, such as reducing energy consumption and emissions, or supporting vulnerable households. They should be specific, measurable, achievable, relevant and time-bound.
2. **Target audience:** Determine the recipients of the grant, which can

include homeowners (or specific groups based on income, dwelling type, household size, etc.) and businesses. Tailor the programme to the specific needs of the target audience.

3. **Design:** Outline the eligibility criteria, application process and compliance process. Provide clear guidelines to ensure potential participants understand how to qualify and apply. Make the process simple, preferably accessible online or through physical forms, where owners can submit details about the building and the retrofit project.  
**Performance criteria:** Define criteria that projects must meet to qualify for the grant, including the types of retrofits eligible, the energy savings required, a method to determine these savings (e.g. theoretical or metered data) and any relevant certification standards.
4. **Budget:** Establish a clear budget for the grant, identify funding sources and secure the funds. This can involve government funds, private investments, or public-private partnerships.
5. **Administrative capacity:** Establish a team or designate an agency responsible for administering the program. This includes processing applications, disbursing incentives and monitoring compliance.
6. **Raising awareness:** Provide information about the programme to the target audience. Use websites, social media, press releases and community events to promote the programme and its benefits.
7. **Monitoring and evaluation:** Develop mechanisms to monitor the progress and evaluate its impact on energy efficiency. This involves tracking participation rates, energy savings and cost-effectiveness.

## HOW TO MONITOR

Monitoring and evaluation (M&E) of grant programmes for energy-efficient building retrofits are critical for assessing the effectiveness, impact, and efficiency of these initiatives. This process involves collecting, analysing and using data to track programme progress against its objectives and to inform future policy and programme design. Key steps include establishing clear metrics and indicators for success, such as energy savings, cost-effectiveness and participant satisfaction. Data is gathered through methods like metering, surveys and audits.

It is important that the process includes comparing pre- and post-retrofit energy use to quantify savings and determine if the programme met its goals. Measuring actual savings is important, as estimated savings risk being higher than reality if measures were not adequately implemented. This process helps identify best practices, areas for improvement, and supports data-driven decision-making to enhance the performance of energy efficiency programmes. It could also be beneficial (from the point of maximising energy savings) to provide larger grants to the achieved improvements in energy performance beyond what is required in the building regulations and/or link the grant to a [Pay-for-Performance \(P4P\) scheme](#).

## BEST PRACTICE EXAMPLES

- In **France**, the "[MaPrimeRénov](#)" policy is a grant designed to support energy efficiency improvements in residential buildings. The programme brings together all grants that are available from

different organisations to make the application process easier. The scheme is available to all homeowners, but the amount of the grant depends on the income of the applicant. The programme is linked to Energy Performance Certificates and requires a minimum improvement of two energy classes, and an energy audit before and after the work to confirm the improved energy performance.

- **Australia's** incentives for efficiency in buildings are often set at the sub-national level and aligned with the building energy certification schemes ([NABERS](#) and [NATHERS](#)). The [Energy Savings Scheme](#) in New South Wales (NSW) offers grants to upgrade equipment for buildings that expect to get a NABERS energy rating of at least 0.5 stars higher than that of the average building stock within the same building type, or at least 0.5 stars higher than the building's historical energy rating. Another [incentive](#) in NSW supports measures to reduce peak electricity demand and pressure on the electricity grid.
- **Singapore** has the [Green Mark Incentive Scheme for Existing Buildings 2.0](#) to enhance the energy performance of existing structures and accelerate the goal of greening 80% of the country's buildings by 2030. The scheme offers grants to assist building owners in achieving higher energy performance, reducing the initial costs associated with energy efficiency upgrades, and enhancing investment returns, especially for buildings that reach [Super Low Energy or Zero Energy](#) standards. Funding is determined by the outcome, e.g. the certification level attained, and the degree of carbon emissions reduced through the energy enhancement projects, within the limits for each level of energy performance.



## CONCLUSION

An effective policy package to improve the energy efficiency of buildings contains policy instruments on regulation, information and incentives. These work together to drive efficiency in buildings and contribute to the global target of doubling energy efficiency progress by 2030 and achieving net zero energy sector emissions by 2050.

Regulatory standards such as **building energy codes** are among [the most effective policies](#) to not only boost energy performance and reduce emissions, but also to improve occupants' health, comfort and productivity – while enhancing climate resilience and mitigating energy price fluctuations.

Information instruments such as **energy performance certificates** provide transparency about a building's energy use, allowing consumers to make better-informed decisions. They can also help deliver insights to governments on a country's building stock, which in turn can inform regulatory updates to the building energy code. Other information tools include campaigns to raise awareness and acceptance among stakeholders and one-stop-shops that facilitate easy access to grants and other incentives, alongside guidance and quality assurance.

Incentives such as **retrofit grants** can promote efficient technologies by lowering the upfront cost of the investment, making an energy efficiency upgrade more accessible and affordable. Grants can direct investments from stakeholders towards specific energy efficiency measures and motivate them to exceed minimum standards by reducing the upfront costs, adopt innovative technologies, and engage in best practices

**Other supportive measures** include mandatory energy and/or carbon disclosure programmes at the point of a building's sale and/or lease; other financial and non-financial incentives linked to building energy performance, utility-based rewards, procurement regulations; and training for architects, builders, building assessors and inspectors.

## MORE INFORMATION

This toolkit provides an overview of the most important elements of each policy instrument, but we encourage policymakers to explore additional resources available for more in-depth information.

- IEA [Overview on Buildings](#)
- IEA [Working Group on Building Energy Codes](#)
- PNNL [Toolkit on how to develop building energy code](#)
- UNEP [Handbook of Sustainable Building Policies](#)





## RELEVANCE FOR DOUBLING

Appliances represent 45% of electricity demand in buildings and are responsible for almost 3 gigatonnes (Gt) of CO<sub>2</sub> emissions. To stay on the pathway towards [net zero emissions](#) by 2050 and achieve a doubling of global annual energy intensity improvement between now and 2030, appliances need to be between 30% and 40% more efficient by 2030. An integrated policy approach combining regulation, information and incentives is the most effective way to achieve this goal. The following doubling tools can help governments to implement stronger energy efficiency policies and contribute to the global doubling target.



### Doubling Tool: Minimum Energy Performance Standards

- MEPS set requirements on the efficiency of appliances and help to eliminate the worst performing equipment from the market.
- In countries where standards and labelling programmes have been implemented, appliances are now typically consuming [30% less energy](#) than they would have otherwise.



### Doubling Tool: Energy labelling

- The labelling of appliances is fundamental for tracking the energy efficiency trends of appliances in the market and informing consumers about their energy performance when purchasing a new device or equipment.
- Additionally, setting new and more stringent labelling schemes can pull markets towards more efficient equipment.



### Doubling Tool: Loans and rebates for efficient appliances

- Rebates provide a discount on the purchasing price of an appliance, lowering the upfront cost of investing in an efficient appliance, while loans help consumers overcome credit barriers to financing. This helps consumers to be able to afford more efficient devices.
- They increase the average efficiency of products sold in the market and accelerate the replacement of old inefficient models.





## WHAT THEY ARE

Minimum energy performance standards (MEPS) are a regulatory instrument in the [appliance policy package](#). They set a minimum efficiency threshold for appliances or other energy-consuming equipment to overcome barriers to improved efficiency, such as potentially higher purchase prices or product availability, and provide a level playing field in competitive markets. Equipment that does not comply with these minimum requirements is not allowed to be sold on the market.

Depending on the lifetime of a product and possible policies to incentivise early replacement, such as financial rewards, the stock turnover induced by MEPS happens over a longer or shorter time period. MEPS effectively limit the products on the market to new equipment that is more energy efficient. Less efficient equipment will leave the stock gradually as it is replaced. MEPS are among the longest standing energy efficiency policy instruments and often very cost-effective in improving the energy efficiency of products on the market. As of 2023, over [115 countries](#) representing almost 98% of world electricity consumption have MEPS in place for at least some appliances.

## HOW TO IMPLEMENT

The implementation of MEPS requires technical expertise to set up a [Quality Infrastructure System](#) adjusted to local requirements. This contains a regulatory framework (standards and technical regulations),

institutions (standardisation, accreditation and certification bodies, as well as market surveillance and enforcement) and a dedicated infrastructure such as local or regional laboratories. The implementation usually follows this process:

1. **Technical assessment:** Using energy demand analysis and market data, identify target products based on the potential impact of energy efficiency regulation. Priorities are assigned based on energy consumption and savings potential.
2. **Development of technical standards:** Develop standards which define and specify the testing procedures and conditions to determine the efficiency of a product. These can be based on international standards (such as ISO or IEC standards) to facilitate trade and simplify the implementation process.
3. **Technical regulation:** Issue technical regulation that defines minimum energy efficiency performance thresholds and legislative acts that prohibit manufacturers and importers to put equipment on the market that does not comply with the regulation. These acts define the scope, the obligations, the implementation timeline, the conformity assessment procedures and other relevant requirements.
4. **Implementation period:** Identify the date the regulation will come into force. To give market actors more time to adapt, policymakers can implement the regulation at first with a less stringent threshold and increase stringency at specified dates.

**5. Compliance and enforcement:** Set up compliance and enforcement frameworks to ensure that products comply with the requirements, based on [three pillars](#):

- Conformity assessment procedures define the process for suppliers to ensure their product complies with the regulation. They can include product testing, performance declaration and product registration.
- Market surveillance by the responsible authorities to monitor registered products, verify declarations and screen the market for non-registered products.
- Enforcement by the authorities, including issuing of penalties for non-compliance and to deter further non-compliance.

**6. Continuous updates:** Once the system is functioning and the number of non-compliant products is under control, continue to expand the scope and stringency of the standards with regular updates to keep up with market and technology developments.

## HOW TO MONITOR

To update the policy and to ensure compliance and enforcement, the programmes should be periodically evaluated, ideally by independent researchers. [Evaluation](#) should be transparent. Objectives, indicators and methods for data collection and analysis should be clear in advance. Analysis should include indicators on target achievement (e.g. all new devices sold have at least the regulated minimum energy performance), impacts (e.g. the energy consumption of the given equipment is reduced by x% per year; household energy savings; reduced additional cost to consumers), and process (e.g. number of

faulty energy performance certificates; number of complaints by manufacturers; cost of market surveillance). The impact evaluation should carefully define a baseline of equipment that would have been sold without the regulation and compare it with the volume of equipment actually sold. Manufacturers may need to annually report their sales by efficiency level.

## BEST PRACTICE EXAMPLES

- **The European Union's** energy efficiency regulation for appliances, the [Ecodesign Directive](#), covers 31 product groups. It is being revised to form the [Ecodesign for Sustainable Products Regulation](#) that includes additional provisions for environmental sustainability and circularity. For each new product category or revision, extensive preparatory studies are done to evaluate the market, the energy savings potential and the international policy landscape.
- **The People's Republic of China** (hereafter “China”) [regulates the energy efficiency performance](#) of many product groups. The 2020 revision of regulation for room air conditioners has led to a rapid market transformation. By the end of 2021, the sales share of grade 1 – a level in line with what is needed in the [IEA's scenario for reaching net zero emissions by 2050](#) – had risen from 19% to 56%.
- **Japan's** [Top Runner programme](#) is an alternative form of MEPS for appliances. It requires manufacturers of an appliance to reach a minimum average energy performance across its annual product sales of the same type. This system is similar to the design of most fuel economy standards for cars, which mandate fleet averages per manufacturer. Failing to reach this average incurs a fine.



## WHAT THEY ARE

Labelling programmes are an information instrument in the [appliance policy package](#). They provide information for consumers to promote purchasing decisions towards a more energy-efficient product or appliance.

Generally, two types of labels can be distinguished. Comparative labels, which are often mandatory, have a classification scale to enable consumers to compare the energy performance of different products and are generally found on all products of the same type. Endorsement labels, which are voluntary, are found only on best-in-class models or those exceeding a certain efficiency level. These two types of labels can also complement each other.

There are different designs of labels, but it is essential to ensure that the label is understandable to the target consumer and therefore that it reflects relevant local norms. Energy efficiency labels, particularly mandatory ones, are also an important tool to collect data for market analysis, providing information for the implementation of other programmes, such as minimum energy performance standards or purchase incentives. Today, 107 countries have a labelling scheme for appliances in place.

## HOW TO IMPLEMENT

The implementation of labels requires a [Quality Infrastructure System](#) adjusted to local requirements. This contains a regulatory framework (standards and technical regulations for the labelling scheme), institutions (standardisation, accreditation and certification bodies, inspectors) and dedicated infrastructure such as local or regional laboratories. The implementation usually follows this process:

- 1. Technical assessment:** Using energy demand analysis and market data, identify target products based on the potential impact of a labelling scheme. Assign priorities based on energy consumption and savings potential.
- 2. Technical standards:** Develop standards which define and specify the testing procedures and conditions to determine the efficiency of a product. These can be based on recognised international standards (such as ISO or IEC standards) to facilitate the trades and simplifies the implementation process. It can be useful to consult behavioural experts to ensure the policy has its intended effects.
- 3. Technical regulations and legislative acts:** Issue regulations which mandate the labelling of specific products. They define the scope, the obligations, the implementation timeline, the conformity assessment procedures and other relevant requirements.
- 4. Implementation period:** Identify the date the regulation will come into force. To give market actors more time to adapt, policymakers can set an implementation period.

**5. Compliance and enforcement:** Set up frameworks to ensure that products comply with the requirements, based on [three pillars](#):

- Conformity assessment procedures define the steps for manufacturers and importers to ensure their product complies with the regulation. They can include product testing, performance declaration and product registration.
- Market surveillance by the authorities to monitor products, verify declarations and screen the market for non-registered products. For labelling schemes, this includes verifying that products are labelled accordingly and checking the information provided in the labels is consistent with testing reports.
- Enforcement by the authorities, including issuing of penalties for non-compliance and to deter further non-compliance.

**6. Continuous updates:** Once the system functions and the labels are recognised by the public, add appliances/products to increase the coverage. Follow the priorities in the technical assessments. For products with a label, rescale to avoid the concentration of products in the top classes, aligned with the revision of MEPS.

## HOW TO MONITOR

To update the policy and to ensure compliance, the programme should be periodically evaluated in an independent and [transparent](#) way. Objectives, indicators and methods for data collection and analysis should be clear in advance. Analysis should include indicators on target achievement (e.g. new devices have at least the regulated minimum energy performance), impacts (e.g. the energy consumption is reduced

by x% per year; household energy savings), and process (e.g. number of faulty energy performance certificates; number of complaints by manufacturers; cost of market surveillance). The evaluation should define a baseline of equipment that would have been sold without the regulation and compare it with the equipment sold. Manufacturers may need to report annually their sales by efficiency level.

## BEST PRACTICE EXAMPLES

- **The European Union** has a category-based labelling programme that started in [1992](#) and was last updated in [2017](#). Currently, [16 product groups](#) have a mandatory energy efficiency labelling requirement, which should classify products on a homogenous A to G scale as labels are rescaled.
- **Mexico** has implemented a range-based comparative labelling scheme, which is currently [mandatory for 13 appliances or associated products](#), using a label that indicates the savings percentage versus the MEPS baseline. In this case, a new label sets a new minimum performance level.
- **Australia** and **New Zealand** have jointly implemented the [Equipment Energy Efficiency Programme](#) to deliver an integrated approach to energy efficiency standards and labelling. The [labelling](#) consists of a 6-star classification and includes appliances such as air conditioners, clothes washers, dryers, dishwashers, monitors, televisions, refrigerators, and pool pumps. The programme has recently incorporated the [Zone Energy Rating Label](#) to address difference in cooling and heating uses by climate zones.



## WHAT THEY ARE

Loans and rebates are incentives in the [appliance policy package](#). These incentives lower the upfront investment costs of appliances and are used to persuade consumers to buy more efficient products and motivates suppliers to produce them. Incentives also drive innovation and the adoption of new technology and practices.

Rebates and loans are regularly combined in one policy instrument to reduce upfront costs and offer financial support. These incentives encourage consumers and manufacturers to invest in and develop energy-efficient appliances. Rebates reduce upfront costs, but they can be expensive and require careful design. Low-cost loans provide funding upfront and are available for highly efficient or best-in-class models. In many cases, the eligibility criteria include scrapping an old but functioning appliance..

## HOW TO IMPLEMENT

The implementation of a loan or rebate requires a coordinated approach between several stakeholders, often involving several steps in the design phase. The implementation usually follows this process:

1. **Technical assessment and definition:** It is necessary to select the technology to be incentivised, based in energy efficiency levels in the market and possible new energy efficiency regulation being

implemented for a specific appliance. It is important to define the scrapping process for the inefficient appliance when required in the eligibility for the loan.

2. **Financial mechanism:** The fund and investment must be allocated, and the main actors involved in the repayment mechanism (potentially through the electricity bill) and the governance of the programme must be identified, generally involving the ministry of energy, the ministry of economy, an energy utility, and a national development bank, as well as manufacturers associations, marketers and retail stores. Loans are designed establishing fixed rates and payments.
3. **Final consumers:** Retail stores could play a key role in guiding customers and determining their eligibility, while delivering new efficient appliances and selling those that meet low-energy consumption requirements. They can also take care of collecting the old, less efficient appliances and transporting them to scrapping centres.

## HOW TO MONITOR

Evaluation is an important process to understand what effects the rebate/loan had, for whom and why. Evaluation also allows the design of a rebate-loan scheme to be adapted based on consumer needs. Rebate and loan schemes should be periodically evaluated, optimally by independent researchers.

It is important to consider assessing whether the correct products are incentivised, as well as to determine the suitability of compulsory versus voluntary measures, ensure that MEPS and labels are appropriately calibrated with the rebate/loan, and embed policy within broader frameworks or climate change commitments.

[Evaluation](#) should be transparent. Objectives, indicators and methods for data collection and analysis should be clear in advance. Analysis should include indicators on target achievement (e.g. the number of consumers benefitting from the rebate/loan), impacts (e.g. the energy consumption of the given equipment is reduced by x% per year, household energy savings, upfront and lifecycle cost savings to the consumer), and process (e.g. satisfaction with the application process).

The impact evaluation should carefully define a baseline of equipment, that would have been sold without the incentive and compare with the actually sold ones. Moreover, rebates must also address challenges such as the potential that certain groups benefit more than others. Certain participants might have also bought the same efficient product without the incentive. Emphasis should be placed on the replacement of outdated yet functioning appliances while directing benefits to specific demographics, such as low-income households.

## BEST PRACTICE EXAMPLES

- **Mexico's** [Appliance Replacement Programme \(PSEE\)](#) is an example of a mix of rebate and loan incentives. Consumers received a rebate of 10% of the upfront cost and a four-year credit, with fixed rate and payments, to purchase new energy-efficient refrigerators and air conditioners (ACs), replacing appliances that were inefficient and at least 10 years old. The loan was repaid monthly through the electricity bill from their power utility. The PSEE Programme replaced 1.9 million refrigerators and air conditioners in three years.
- In **Ghana** and **Senegal**, the [EcoFridges initiative](#) presented innovative models to facilitate the purchase of high-efficiency equipment. In Ghana, an on-wage financing system was implemented, providing 0% interest loans to private sector employees, with the employer as guarantor. In Senegal, the loan takes the form of on-bill financing, in which the purchase is then paid back monthly through the electric utility bills.
- **Singapore's** [Climate Friendly Household Programme](#) offers USD 110 for the purchase of high-efficiency refrigerators and USD 20 for the purchase of LED lights. The enhanced programme will commence on 15 April 2024, where all eligible households will receive USD 220 worth of Climate Vouchers to purchase 10 types of qualified household products.



## CONCLUSION

An effective policy package to improve the energy efficiency of appliances contains policy instruments on regulation, information and incentives. Together, these help drive the change from inefficient to efficient appliances, contributing to the global target of doubling energy efficiency progress by 2030 and reaching net zero energy sector emissions by 2050.

Regulations such as **minimum energy performance standards (MEPS)** ensure that the least efficient equipment is not sold on the market. MEPS also encourage suppliers to increase the efficiency of the appliances they produce, accelerating the improvement of efficiency on the market.

Information instruments such as **energy labelling of appliances** are important tool to collect data for market analysis, providing an informational foundation for the implementation of other programmes, such as minimum energy performance standards or purchase incentives. They also provide valuable information for consumers when they are making purchase decisions, and for retailers when they are selecting products to offer in their stores.

Incentives such as **rebate and loan programmes** lower the upfront costs of investing in appliances and can persuade consumers to buy

more efficient products, while motivating technology suppliers to innovate and produce high efficiency alternatives. By offering incentives, policy makers can accelerate the transition for appliances to meet MEPS requirements.

## MORE INFORMATION

This toolkit provides an overview of the most important elements of each policy instrument, but we encourage policymakers to explore additional resources available for more in-depth information.

- U4E - [Energy labelling guidance for lighting and appliances](#)
- IEA [Appliance Energy Efficiency Policy](#) online training
- IEA [TCEP for Appliances and Equipment](#)
- IEA [Energy Efficiency 2023](#)
- United4Efficiency [Model Regulation Guidelines](#)
- CLASP [World's Best MEPS](#)



## RELEVANCE FOR DOUBLING

Industry accounts for [37%](#) of final energy consumption globally. To stay on the pathway towards [net zero emissions](#) by 2050 and achieve a doubling of global annual energy intensity improvement between now and 2030, industry needs to decouple production of output from energy demand and increase the share of electricity in the sector's energy consumption from [23%](#) in 2022 to [30%](#) in 2030. An integrated policy approach combining regulation, information and incentives is the most effective way to achieve this goal. The following doubling tools can help governments implement energy efficiency policies and contribute to the global doubling target.



### Doubling Tool: Minimum Energy Performance Standards for Industrial Electric Motors

- Electric motor-driven systems currently account for over [50% of global electricity consumption](#).
- MEPS set requirements on the energy performance of motors and drive the worst performing motors out the market. Given the long lifetime of motors, early implementation of MEPS is necessary to drive change in the market and contribute to the global doubling goal.



### Doubling Tool: Industrial Energy Efficiency Networks

- Industry networks increase awareness on energy efficiency by promoting the exchange of knowledge between companies and experts.
- They can accelerate action on energy management and audits through peer-to-peer learning and can increase transparency on energy use in industry. Being a member of an Industrial Energy Efficiency Network has been proven to result in increased energy savings.



### Doubling Tool: Energy Efficiency Obligation schemes

- Energy Efficiency Obligation Schemes reduce energy consumption through the increased uptake of energy efficiency measures. Obligated parties often achieve savings of more than 100% of the target within the first 10 years of the scheme.
- The schemes can be adapted to target specific sectors, technologies or population groups, such as vulnerable households.



## WHAT THEY ARE

Minimum Energy Performance Standards (MEPS) for industrial electric motors are a regulatory instrument in the [industry policy package](#). They set requirements for a minimum level of energy efficiency that electric motors must meet to be sold in a particular jurisdiction.

MEPS typically specify minimum efficiency levels for electric motors based on their size, type and application. Motors meeting or exceeding the specified efficiency levels are considered compliant, and non-compliant models are not allowed to be sold on the market. Efficiency is usually measured as a ratio of the motor's output power (mechanical power delivered to the load) to its input power (electrical power consumed).

MEPS for electric motors are often based on international standards for efficiency classes, such as [IEC](#), [NEMA](#), and [GB](#). MEPS can help countries to meet their energy efficiency and carbon dioxide emissions targets. These standards not only foster an overall enhancement in motor efficiency but also facilitate [comparability of efficiency levels](#) among manufacturers for motor users.

MEPS for industrial electric motors have been implemented in [62 countries](#), encompassing over half of the global industrial motor fleet as of 2022.

## HOW TO IMPLEMENT

The successful implementation of MEPS for industrial electric motors relies on a multi-faceted approach encompassing leadership, technical enhancements, effective communication, compliance monitoring, and supportive enforcement mechanisms.

This often involves several steps:

- 1. Stakeholder engagement:** Before establishing MEPS, proactively engage stakeholders through workshops involving motor suppliers, users and authorities to ensure the MEPS are relevant to the specific market context. These workshops serve as platforms for gathering input and support for subsequent actions. It can be useful to consult behavioural experts in the design phase to ensure the policy has its intended effects.
- 2. Technical aspects:** Develop and refine motor test methods and testing capacity, ensuring accurate measurement and assessment of energy performance. These technical enhancements are essential to underpin the efficacy of MEPS regulations.
- 3. Development and publication:** Draft the legislation and present it to authorities for approval. Adopt the MEPS through legislative or regulatory means.

4. **Raising awareness:** Develop effective communication strategies which ensure widespread awareness and understanding of the new standards. Create a comprehensive communication campaign targeting both market stakeholders and end-users. This campaign is useful to not only prepare the market for the required changes but also to educate users and buyers on the efficiency gains from MEPS-compliant motors.

## HOW TO MONITOR

Monitoring the compliance of motors with MEPS is essential to assess the effectiveness of the policy. Standardised testing procedures based on the MEPS parameters (i.e. power factor, temperature, and energy consumption) can increase compliance.

Monitoring those parameters is essential to evaluate the impact of energy performance. Technical assistance programmes and labelling initiatives can also increase the effectiveness of a monitoring and evaluation system, providing support to stakeholders to comply with the regulation.

From a market perspective, the availability, delivery and price of motors can be barriers to rapid market turnover. These factors should also be taken into account during the evaluation phase. The government can also assess the investment capacity of stakeholders to help determine whether potential subsidies are also needed to enable the phaseout of inefficient motors.

## BEST PRACTICE EXAMPLES

- The **European Union**, after a period of voluntary agreements, first introduced [MEPS](#) in 2009. These standards were updated [in 2019](#) and amended [in 2021](#) to include a broader range of motors. Non-EU countries in Europe have also adopted these standards in their own legislation.
- In 1995, **Canada's** [Energy Efficiency Act](#) provided the framework for setting efficiency standards for energy-consuming products, including electric motors. The government worked with industry stakeholders to establish and refine MEPS that would drive the adoption of more efficient motor technologies. In 2019, the energy efficiency regulations were updated. Canada also published a Motor Selection Tool, helping consumers to choose more efficient motors.
- The **United States** introduced MEPS for certain types of motors in 1987 in the [National Appliance Energy Conservation Act](#), driving innovation in motor design and manufacturing. With the expansion of the coverage, the United States took the lead (along with Canada around the same time) in implementing MEPS at the IE2 level in 1997 and upgraded to the IE3 level in 2010.
- **Australia** implemented [MEPS](#) for electric motors to align with international standards and promote energy efficiency in the industrial sector. Each motor must meet a specified efficiency at 75 or 100% rated load. Compliance with MEPS is mandatory for [motors sold](#) or imported into the Australian market.

## WHAT THEY ARE

Industrial Energy Efficiency Networks (EENs) are an information instrument in the [industry policy package](#). EENs differ in structure, but they generally consist of a group of energy managers from different industrial sites that meets regularly to share knowledge and experience on improving energy efficiency in the industrial sector.

EENs can operate solely to share information between peers, or they can include elements such as energy reporting and the setting of energy saving targets. These networks act to guide industries in becoming more efficient, in line with government policies, and to improve government insight into industry for more effective policy development.

There are over 1 000 Industrial Energy Efficiency Networks worldwide, and this number is growing as governments seek to expand their policies and industries seek to reduce costs, energy use and emissions.

To establish an EEN, the government must form a network structure to identify and to remove the different barriers to increase industrial energy efficiency. This involves a programme to design, co-ordinate and manage the network.

Maintaining government control over the network, which can be managed either internally or through an external body, ensures

alignment of goals between government policy and the network participants and ensures that government has access to the network for feedback on policy and to gather data and information on industrial energy consumption.

## HOW TO IMPLEMENT

An EEN may take several forms, but successful EENs report the following components:

- Industry expert(s) facilitate the exchange.
- Membership is built around energy consumption size/profile.
- Members make a concrete commitment to improving energy efficiency and emissions reductions, often supported by their registration to an energy management standard or process.
- Special working groups or focus areas are created to share experiences and challenges on energy efficient design, specific technologies, process improvements and utilities.
- Tools and standardised guidelines are provided to lower implementation and transaction costs and to ensure a high quality of energy savings.
- Knowledge sharing opportunities and/or training are offered for network members and for the staff in the participating companies.

## HOW TO MONITOR

Ongoing monitoring, targeting and evaluation are essential elements to the operation of an Industrial EEN, both at the individual member level and at the overall network governance level. Therefore, a defined methodology, in line with the policy objectives, must be determined when the EEN is established. It should be reviewed and updated regularly.

Within the EEN, the members must agree to:

- An initial energy review/audit for each site taking part in the EEN
- The setting of short term (one year) and longer energy efficiency targets (five to 10 years)
- Annual reporting, monitoring and benchmarking
- Annual energy efficiency target review.

Typically, information and data gathered in the process of monitoring and evaluation is then collated and analysed by the network operator and compiled into a published annual report.

## BEST PRACTICE EXAMPLES

- In 2014, **Germany's** [Energy Efficiency and Climate Protection Networks Initiative](#) was introduced as a voluntary measure. To date, over 250 EENs have registered under this programme, with more than 2 000 participating industries. The networks report exceeding their savings targets by over 10%. After three to four years, participating companies improved their energy efficiency

significantly more than the industry average, reduced their greenhouse gas emissions and increased their energy productivity twice as fast as the industry average.

- **Ireland's** [Large Industry Energy Network](#) was established in 1995 and now has 205 members, representing 18% of Ireland's total energy supply. In 2020, members reported implementation of 238 energy projects, reduced their energy intensity by 7% and reduced their CO<sub>2</sub> emissions by approximately 142 000 tonnes. In general, the more engaged companies also report improved energy savings, and they often are the ones leading the pack in terms of innovation.
- **China** worked closely with Germany on the [Sino-German Energy Efficiency and Climate Network](#) (EEN) under the umbrella of the Sino-German partnership, through the National Development and Reform Commission (NDRC) of China and the German Federal Ministry for Economic Affairs and Energy (BMWK). The networks support the acceleration of energy efficiency in the Taicang industrial development zone. Participating companies are expecting to achieve a 10% to 15% reduction in CO<sub>2</sub> emissions and gain knowledge about energy efficiency solutions.
- **Brazil's** [Energy Efficiency Learning Networks](#) set common goals to improve energy performance in a collaborative structured environment. Building upon the energy efficiency networks model from Germany, with the support from the German Development Cooperation (GIZ), Brazil established two pilot networks: one in public buildings and the other one in energy intensive industries.

## WHAT THEY ARE

Energy Efficiency Obligation schemes (EEOs) are a regulatory instrument, often combined with an incentive element, in the [industry policy package](#). An EEO scheme is a mechanism that requires “Obligated Parties” to meet energy or emissions savings targets within their customer portfolio. Obligated Parties may be energy utilities, retail energy sales companies, energy distributors, transport fuel distributors and/or transport fuel retailers.

EEOs are [market-based instruments](#) that do not prescribe the measures to be deployed by Obligated Parties to achieve their set targets (within certain limits). Within some EEO schemes, “white certificates” (also called “energy savings certificates”) are documents certifying that a certain reduction of energy or emissions consumption has been attained. White certificates are generally tradable between over- and under-performers and combined with an obligation to achieve a certain target of energy or emissions savings.

They are in use in 31 countries, with the number of schemes growing steadily over the past 20 years.

## HOW TO IMPLEMENT

The main components of an EEO scheme include an adequate legal framework, scheme administration (institutional structures and capacity,

operational methodologies) and obligated party delivery models (delivery mechanisms, funding/financing products, methodologies, organisational strategies). EEO structures vary widely from one jurisdiction to another and can be adapted to local circumstances.

The most effective EEOs are simple, have sufficient administrative capacity to effectively manage the scheme, set obligations at appropriate levels, and provide the legal/regulatory flexibility for the scheme to evolve over time. The costs are borne by the utility, which also bears the risk from operations and potentially missed targets. This can make EEOs a low-risk and low-cost tool for governments.

EEOs also incentivise utilities or industries to discover the lower cost route to energy efficiency and can incentivise them to bring energy efficiency to specific sectors or subsectors, such as SMEs or vulnerable households. It can be useful to consult behavioural experts in the design phase to ensure the policy has its intended effects.

EEOs are adaptable tools in terms of scope, fuel, and target setting – however, it is important to know what the objective is (e.g. reducing emissions, lowering energy consumption, minimising peak demand, etc.) to target the scheme appropriately.

EEOs require a strong framework. Not prescribing which actions must be undertaken to meet the energy savings targets could risk Obligated Parties choosing to implement only the cheapest and easiest projects, such as lighting, and avoid more complex projects with a longer time horizon such as retrofits. However, to avoid this, policymakers can design the EEO scheme to ring-fence or target projects requiring a specified proportion of energy savings to be achieved from certain types of energy savings/or sectors.

## HOW TO MONITOR

One of the most important elements for a successful EEO is having a robust monitoring and verification framework in place. Policymakers will need to be able to evaluate whether the energy saving measures were actually undertaken as reported.

Calculations of energy savings are often done through estimations based on a pre-agreed formula rather than on measured data as it is simpler and cheaper to administrate. Monitoring and evaluation methods are specific to the EEO framework in question and need to be designed as an integrated part of the policy for each measure.

## BEST PRACTICE EXAMPLES

- In the **Australian** province of New South Wales, there has been an [Energy Savings Scheme](#) since 2009 which seeks to deliver the lowest cost primary energy savings. This scheme has been regularly reviewed and updated to set more ambitious targets. As of 2022, there is also a EEO [Peak Demand Reduction Scheme](#) which is more targeted and seeks to deliver the lowest cost electricity savings in a specified summer peak demand period (between 2:30 p.m. and 8:30 p.m.).
- **France's** [White Certificate Scheme and Obligation](#) has been running since 2006 and has been [updated](#) several times since then to include more sectors and revise targets. Today, it is a robust and comprehensive system. Energy suppliers must meet targets for energy savings through their residential and tertiary customers.
- In **India's** [Perform, Achieve, Trade scheme](#), each company has a target to meet through efficiency measures or purchasing energy savings certificates. This scheme has been built on a strong framework and has expanded its customer base while adding new sectors.



## CONCLUSION

An effective policy package to improve the energy efficiency of industry contains policy instruments on regulation, improving information and incentives. Together, these work to drive the change from inefficient to efficient industries – contributing to the global targets of doubling energy efficiency progress by 2030 and achieving net zero energy sector emissions by 2050.

Regulations such as **minimum energy performance standards for motors** increase the efficiency of industrial processes by requiring new motors to use less energy per unit of output. This also drives the innovation of more efficient technologies. The alignment of international standards can contribute to the strengthening and enforcement of regulation for industrial efficiency and accelerate global progress.

Information instruments such as **industry energy efficiency networks** can accelerate energy efficiency progress by facilitating knowledge exchange and the sharing of best practices. They can also work in conjunction with other government policies to boost uptake. For example, these networks can support the dissemination of information on incentives and available funding to industry, and they can provide a platform for direct communication on regulations applicable to the industrial sector.

Governments should consult local and national industry representatives and associations and profit from the insights of local industrial experts to determine the most effective information instrument for their country.

Incentives such as **an energy efficiency obligation scheme with a “white certificate” system** can be strong tools for leveraging private stakeholders to advance energy efficiency priorities. Incentives can also encourage private companies to invest in the most efficient technologies and allow for policies to be better targeted to help specific groups, such as vulnerable households, with energy efficiency improvements.

## MORE INFORMATION

This toolkit provides an overview of the most important elements of each policy instrument, but we encourage policymakers to explore additional resources available for more in-depth information.

- IEA [Energy Efficiency 2023](#)
- IEA [Industry Overview](#)
- IEA [Industry Technology Collaboration Programme](#)
- Regulatory Assistance Project [Costs and Benefits of Energy Efficiency Obligation Schemes](#)



## RELEVANCE FOR DOUBLING

Private cars and vans were responsible for more than [25% of global oil use](#) and around [10% of energy-related CO<sub>2</sub> emissions](#) in 2022. To stay on the pathway towards [net zero emissions](#) by 2050 and achieve a doubling of global annual energy intensity improvement between now and 2030, cars need to become [5% more efficient each year](#). An integrated policy approach combining regulation, information and incentives is the most effective way to achieve this goal. The following doubling tools can help governments to implement energy efficiency policy and contribute to the global doubling target.



### Doubling Tool: Fuel Economy Standards

- Fuel economy standards play a key role in reducing oil requirements and CO<sub>2</sub> emissions by setting limits to vehicle fuel consumption.
- In the European Union, stricter CO<sub>2</sub> emission targets have resulted in the average CO<sub>2</sub> emissions from all new passenger cars in the EU falling [by 27% between 2019 and 2022](#). Similarly, standards in the United States resulted in [USD 5 trillion of savings](#) on fuel costs.



### Doubling Tool: Vehicle Labelling

- Labels enable consumers to compare vehicle makes and models and can help consumers understand the financial impacts over the lifetime of the vehicle in countries where fuel economy is incentivised. Labels strengthen both regulation and incentives and give information on energy performance, including opportunities for information provision on real world use.



### Doubling Tool: Electric Passenger Vehicle Subsidies

- Purchase subsidies can help accelerate the uptake of EVs by contributing to their reaching price parity with ICE models. Well-designed grants increase the share of EVs, contributing to efficiency goals as EVs are generally much more efficient than conventional cars. Purchase subsidies can be designed for affordability, helping to ensure benefits reach lower incomes groups.



## WHAT THEY ARE

Fuel economy standards are a regulatory instrument in the [vehicle policy package](#). They regulate the efficiency of new vehicles by, in simplest terms, defining annual corporate average standards, or targets, for fuel economy (miles per gallon or kilometre/litre) or greenhouse gas (GHG/CO<sub>2</sub>) emissions (in grammes per mile/kilometre). There are different designs, but in general they define a standard for every auto manufacturer, for every year that the regulation applies. In some countries, flexibility mechanisms are offered, such as credits for manufacturers that over comply which can be used in future years or traded with manufacturers that underachieve.

Fuel economy standards have increasingly included provisions to facilitate the uptake of EVs (including battery electric and plug-in hybrid) and fuel-cell vehicles. Fuel economy standards help facilitate the development of advanced technologies and can greatly reduce fuel use, enhance energy security, and reduce emissions. Standards help increase regulatory certainty for manufacturers and can be most appropriate in [countries with large markets](#) and vehicle manufacturing facilities.

Currently, fuel economy or GHG/ CO<sub>2</sub> emission standards for new cars exist in over 40 countries, covering more than [80% of new passenger vehicle sales](#) worldwide.

## HOW TO IMPLEMENT

[Implementation](#) typically involves the following key elements:

1. **Identification of the government agency and legislative requirements** for setting and implementing the standards.
2. **Agreement on the design of the standard**, including the metric – fuel economy or CO<sub>2</sub>/ GHG emissions; how and whether vehicle attributes such as weight are considered in setting the standard, its stringency and target years. For trucks, **a market assessment** is key to understand the contribution from different truck categories.
3. **Consensus on test procedures and associated protocols** to inform standard setting and monitoring and evaluation.
4. **Agreement on flexibility mechanisms**, such as allowing manufacturers to bank and trade credits and the approach to facilitate adoption of electric and other alternative vehicle as well as whether niche or small-scale manufacturers are exempted.
5. **Setting of penalties for non-compliance.**

For cars, standards can be set as a single value or as a function of vehicle attribute such as footprint or mass. The stringency of the standards can depend on the policy context, wider considerations (e.g. technology costs) and dynamics with key stakeholders. Engagement with stakeholders (especially auto manufacturers) is key throughout the design process. It can be useful to consult consumer groups as well.

It is important to highlight that fuel economy standards present opportunities for both consumers, in terms of fuel cost savings and for manufacturers, in terms of enhancing their competitiveness.

Regulations should, however, allow for the standards to become increasingly stringent over time, with manufacturers needing a two-to-three-year lead-time to prepare for shorter-term targets.

## HOW TO MONITOR

A monitoring, evaluation and review process will need to be put into place when standards are implemented, allowing for them to become more stringent over time. Relevant test procedures should be used to verify, monitor and evaluate the implementation of the standards, with monitoring requirements depending on the standard approach. A key part of this will be establishing data-sharing protocols and identifying the legal requirements and entities with responsibility for ensuring compliance. Standards also need to be reviewed and revised on a regular basis to ensure their effectiveness and consistency with ongoing policy developments.

## BEST PRACTICE EXAMPLES

- **The United States'** CAFE standards have had a significant impact on the pace and direction of technology development in the automotive sector and have been strengthened over time. CAFE standards must be set based on in-depth analysis of [technical feasibility](#) and cost, as well as the energy and environmental

impacts, with public input playing an integral role. Compliance flexibility is substantial, offering manufacturers the opportunity to build up credits and use for offsetting and trading. The adoption of electric vehicles has been incentivised in the short term through zero emission counting and multipliers.

- **Japan's** fuel economy standards in many countries follow tank-to-wheel efficiencies that do not consider the production of the fuel. However, with electric vehicle uptake on the rise, production efficiencies increase in importance as they can vary widely, especially depending on the share of fossil fuel inputs in electricity generation. For this reason, in its fuel economy standard for 2030, [Japan is employing a well-to-wheel approach](#) which allows for comparing the primary energy needed for moving the vehicle across different fuels.
- **Chile** released its first Energy Efficiency Law in 2021, and corresponding [fuel economy standards](#) have been set for light duty vehicles, with standards for medium and heavy-duty vehicles to be set in 2024 and 2026. Manufacturers have two years to comply. Key complementary policies include the National Electromobility Strategy, which sets out ambitious EV standards.

## WHAT THEY ARE

Energy labelling for vehicles is an information instrument in the [vehicle policy package](#). Labels inform consumers, helping them to identify the most efficient vehicles. They can cover new and used vehicles, facilitating benefits for all vehicle purchasers.

Labels can use different formats including on the vehicles in car showrooms and online. Increasingly, electric vehicles feature labels with metrics that also include the driving range of the vehicle. National comparison sites can also help potential buyers identify the most fuel-efficient vehicles by category, enabling consumers to compare makes and models and identify the best-performing vehicles.

In addition to information on fuel economy, labels can also include information on CO<sub>2</sub> and air pollutant emissions, as well as on fuel cost savings – with the latter allowing people to choose vehicles that cost less to run. Over 35 countries across the world have vehicle efficiency labels in place today.

## HOW TO IMPLEMENT

[Implementation](#) often covers four key steps:

1. **A regulatory framework** which empowers the relevant government bodies and agencies to introduce and enforce the programme.

2. **Programme design**, including decisions on which vehicles will feature the label – for example, whether the label will cover second-hand vehicles as well as new ones, and how and when electric vehicles might be captured. Data collection is a key aspect of the design, including on the real-world fuel economy of the vehicles. It can be useful to consult behavioural experts in the design phase to ensure the policy has its intended effects.
3. **Design of the label**, including decisions on information to be incorporated and the label's positioning and placement. Key metrics include fuel economy savings and associated financial benefits. In the label design, it is important to not overcomplicate the message. Other opportunities for additional information, including online, can be provided.
4. **Awareness raising** to ensure that consumers are informed about the label through outreach programmes. Reflecting the importance of the internet in purchase decisions, user-friendly websites which provide additional information are an essential component of outreach. For labels displayed in car showrooms, training on the use of the label – especially for [showroom or sales](#) staff – is necessary.

## HOW TO MONITOR

A robust monitoring and evaluation framework is important to maintain consumer engagement with and trust in the label. In terms of monitoring, it is important to have the mechanisms in place to ensure credibility in the fuel economy value and associated protocols for monitoring this. This can involve the real-world testing of vehicles to ensure the label corresponds with the experience of the consumer, as well as showroom visits or advertisement inspections to verify whether the label is correctly displayed and contains the necessary information.

To evaluate the effectiveness of the labelling programme on energy efficiency improvement, it is crucial to measure consumer behaviour and expectations through regular market research and surveys to track awareness of fuel economy and identify motivations in purchasing decisions. This information can inform potential adaptations to labels to include additional or revised information. Accurate monitoring and evaluation will help capture the outcomes of the policy and help improve the effectiveness of vehicle labelling programmes.

## BEST PRACTICE EXAMPLES

- The **United States'** [car label](#) includes information on costs (annual savings compared to an average car in the same category) and information on real world performance and air pollutant emissions. The label is supported by more detailed information via a QR code and website links. Labels for hybrid and electric vehicles follow the

same format for comparability but include different information where appropriate.

- **New Zealand** has [vehicle labelling](#) for new and used cars, which uses a star-based system. When the clean car discount scheme was in operation, information on the financial benefits were included on the label. User-friendly information is available on websites, with the seller only having to enter the vehicle plate number or equivalent to access it.
- In **Korea**, an [energy efficiency rating system](#) will be applied to all electric vehicles (EVs) sold from 1 April 2024. The electric vehicle (EV) grade label must be attached to the exterior and interior of the vehicle. The introduction of the rating system is expected to make it easier for consumers to compare EV efficiency and, as a result, help ensure that the most efficient EVs are attractive.
- **Chile** was the first Latin American country to implement a label, in 2013. The [label](#) includes information on CO<sub>2</sub> emissions and fuel economy in different vehicle driving circumstances. It is complemented by an online [vehicle consumption](#) website to assist consumers further. The label was the start of the development of Chile's vehicle efficiency policy framework, with incentives introduced in 2014 and fuel economy standards for light duty vehicles in 2022.

## WHAT THEY ARE

Subsidies for passenger EVs are an incentive in the [vehicle policy package](#). They play a key role in accelerating electric car sales, particularly for early adopters, and are in place in many markets. They can accelerate EV adoption by reducing the price gap between EVs and vehicles with internal combustion engines (ICEs). Subsidies usually take the form of discounts or rebates. They can also be implemented as tax reductions through income tax credits.

**Discounts and rebates** are the most commonly used incentives to lower the purchase price of EVs. They can be fixed direct discounts that are deducted from the cost of the vehicle at the point of sale, or rebates/refunds that are assigned once the vehicle has been purchased.

Subsidies have been implemented in most major EV markets, with different levels of incentives and requirements on eligibility, increasing the EV adoption. Additionally, different subsidy levels can help consumers opt for more efficient or affordable models among the EVs.

## HOW TO IMPLEMENT

The main components of EV grants are the design, allocation of funds, and compliance requirements. The structure of the grant should be adapted to local market conditions, considering the price gap versus incumbent technologies, the average market prices and the target group.

Implementation often follows several steps:

1. **Market analysis:** To identify the models offered, their fuel efficiency, their model cost and the main price differences between EVs and ICEs.
2. **Setting target groups:** Based on the market analysis and characteristics of the local market, target groups can be defined. This can include assigning benefits to private or company cars, different types of vehicles, and used or new models. In some regions capturing different vehicle modes, including two and three-wheelers, can contribute to increasing affordability and access to clean energy technologies. It can be useful to consult behavioural experts in the design phase to ensure the policy has its intended effects.
3. **Definition of the scheme:** Benefits should be set to achieve price parity or to reduce the price gap between available EVs and their ICE counterparts. Funds should be assigned based on sales targets. A price cap for eligible models should be set to limit the benefit to only affordable models and provide price signals to manufacturers. Different subsidy levels can be used, based on factors such as income, vehicle type or battery capacity. Programme designs should give certainty to both manufacturers and customers by setting a fixed period accompanied by specific targets that trigger adjustments.

4. **Adjustment period:** Once the scheme is implemented, it should be revised and updated as the market evolves. This includes adapting the benefit to market conditions, reducing the price cap and including new target groups.

When selecting the subsidy to be implemented, direct discounts or rebates are usually preferable, as they have an immediate impact on the price of the vehicle, making it easy for the buyer to factor them into their decision-making. In contrast, income tax credits are received at the end of the fiscal year and only for those liable to pay, disproportionately benefitting higher-income households. This must be considered during the design stage and be paired with eligibility criteria to avoid leaving anyone behind. Tax exemptions can complement selected subsidies in countries with high VAT or import duties, while the exemption of registration fees can also contribute to the reduction the overall costs.

## HOW TO MONITOR

Incentive programmes should be constantly monitored and evaluated based on specific targets and desired outcomes. The success of the programme should be based on the achievement of the sales targets initially set. Failure to reach the targets should trigger an evaluation of the programme and an adaptation of the incentives. As the targets are achieved, subsidies need to be progressively adjusted and eventually phased out. Based on available funding, these incentives can be redirected to specific groups in order to increase access to these technologies and reach other segments of the market.

## BEST PRACTICE EXAMPLES

- **China** implemented purchase [subsidies for new energy vehicles \(NEVs\)](#) starting in 2013, helping the country grow electric car sales to nearly 60% of the global total. These subsidies had range requirements for eligibility, with the minimum threshold initially set at 80 kilometres (km) and gradually increased, reaching 300 km in 2020. Higher subsidies were given to models exceeding a superior range level. The benefits lasted until 2022, when they were finally phased out after being adjusted in several stages.
- **The Netherlands** implemented a [five-year Subsidy for Electric Passenger Cars for Private Individuals](#) (SEPP) in 2020 for the purchase of cars priced between EUR 12 000 and EUR 45 000. The initial subsidy for new cars amounted to EUR 4 000 and was progressively reduced to EUR 2 950 ahead of its ultimate phase-out after 2025. Additionally, used cars can receive a EUR 2 000 discount. This is complemented by other tax exemptions.
- **India's FAME II programme** promotes electrification of all modes of transport, with a focus on two- and three-wheelers, subsidising up to 40% of their upfront cost in the form of a purchase rebate. The benefits are structured in such a way that the most affordable vehicles receive more of the allocated funding. Following the implementation of the programme, over 50% of new registrations for three-wheelers in India are electric today.

## CONCLUSION

An effective policy package to improve the energy efficiency of vehicles contains policy instruments on regulation, information and incentives. Together, these work together to drive the change from less efficient to more efficient vehicles. This contributes to the global target to double energy efficiency progress by 2030 and achieving net zero energy sector emissions by 2050.

Regulations such as **fuel economy standards** help influence market supply by encouraging manufacturers to put more efficient vehicles on the market. Countries with regulations and/or efficiency-based purchase incentives in place improve efficiency [on average 60% faster](#) than countries without such policies.

Information instruments such as **vehicle labels** help inform consumers of a vehicle's fuel economy and include cost savings for choosing a more efficient vehicle. Labels can illustrate the benefits of choosing more efficient vehicles, while also increasing transparency about real-world fuel use. Another information instrument is to promote fuel-efficient driving through training programmes. This can offer energy efficiency benefits, including fuel consumption savings of [on average 5%](#) in trucks.

Incentives such as **electric vehicles subsidies** can have positive effects in pulling the market towards more efficient and less polluting vehicles. Government support for EV purchases can be transitional and evolve with the development of the technology and markets. As the technology matures and EV prices become more competitive with their conventional counterparts, subsidies should be adapted and redirected in order to increase access to vehicles and improve their affordability, targeting groups where adoption is slower. Leasing can help increase access for low-income households through monthly payment schemes.

Financial incentives can be combined with disincentives for high-emitting vehicles by adding emission-based taxes or fees. These are known as “Feebates” or “Bonus-Malus” programmes, and they can have the advantage of being revenue neutral, with the money collected from fees available to accelerate the promotion of low-emission vehicles

## MORE INFORMATION

This toolkit provides an overview of the most important elements of each policy instrument, but we encourage policymakers to explore additional resources available for more in-depth information.

- IEA [Global EV Outlook 2024](#)
- IEA [Policies to promote electric vehicle deployment](#)
- IEA [Global EV Policy Explorer](#)
- ICCT [Principles for effective electric vehicle incentive design](#)

## International Energy Agency (IEA)

This work reflects the views of the IEA Secretariat but does not necessarily reflect those of the IEA's individual Member countries or of any particular funder or collaborator. The work does not constitute professional advice on any specific issue or situation. The IEA makes no representation or warranty, express or implied, in respect of the work's contents (including its completeness or accuracy) and shall not be responsible for any use of, or reliance on, the work.



Subject to the IEA's [Notice for CC-licensed Content](#), this work is licenced under a [Creative Commons Attribution 4.0 International Licence](#).

This document and any map included herein are without prejudice to the status of or sovereignty over any territory, to the delimitation of international frontiers and boundaries and to the name of any territory, city or area.

Unless otherwise indicated, all material presented in figures and tables is derived from IEA data and analysis.

IEA Publications  
International Energy Agency  
Website: [www.iea.org](http://www.iea.org)  
Contact information: [www.iea.org/contact](http://www.iea.org/contact)

Typeset in France by IEA - May 2024  
Cover design: IEA