

GLOBAL COMMISSION
FOR URGENT ACTION
ON ENERGY EFFICIENCY

**RECOMMENDATIONS
OF THE GLOBAL
COMMISSION**

June 2020

FOREWORD

In the year since the Global Commission for Urgent Action on Energy Efficiency was launched in Dublin, our world has changed in so many different ways. The Covid-19 pandemic has resulted in a tragic loss of life and has led to a global economic crisis from which all our countries are working hard to bounce back.

At the launch of the Global Commission, global leaders emphasized the need for urgent investment in energy efficiency programmes and policies. Faced with the threat of climate change, we saw that there was an overwhelming case for action to lessen future harm and to make ambitious progress in areas like energy efficiency, innovation, and digitalisation.

At this critical time, the importance of energy efficiency has not faded. If anything, the case is stronger and more urgent than ever before. As detailed in our recommendations, ambitious energy efficiency action can be mobilised quickly to create jobs, stimulate local economic activity, and improve energy affordability, thus helping governments to accelerate achievement of our recovery goals.

We need transformative change. Therefore, we have developed this set of 10 recommendations that identify policies that can be implemented quickly to boost activity on energy efficiency globally. These recommendations focus on how to stimulate more action, more investment, and more jobs especially in the Covid-19 recovery.

The strength of these recommendations is that they are applicable in many different contexts and I hope policymakers in every country can take inspiration from them. I believe we can learn from each other and develop well-designed, comprehensive policy packages with ambitious targets, clear implementation strategies, and strong monitoring frameworks. From behavioural insights to deep energy system retrofits, the wide diversity of opportunities presented by energy efficiency represent a game-changing approach for all our countries.

Energy efficiency is at the core of Ireland's Climate Action Plan, which sets out how we intend to reduce our GHG emissions in the years ahead. In addition to helping Ireland create new jobs and ensure a strong recovery, these investments will give us cleaner air, warmer homes, better quality of life, and improved housing and health for the future.

Similarly, we are pleased to see energy efficiency at the heart of the European Union's Green Deal Recovery Package. We will work together in the spirit of ambitious international collaboration to ensure a successful, swift recovery across all our member states.

In my role as honorary chair of the Global Commission I have seen first-hand how this kind of inter-governmental collaboration can help us solve the many challenges we face as a global community – from Covid-19 to climate change and beyond. Ireland will play its part in this global discussion. I hope these recommendations will help policymakers around the world understand the vital role energy efficiency can play in our immediate economic recovery and help us develop better climate and energy strategies for the future.

H. E. MR. LEO VARADKAR

*Prime Minister
Ireland*

Honorary Chair of the Global Commission

RECOMMENDATIONS OF **THE GLOBAL COMMISSION**

TABLE OF CONTENTS

THE GLOBAL COMMISSION	4
RECOMMENDATIONS	6
EXEMPLAR POLICIES & CASE STUDIES	21

THE GLOBAL COMMISSION FOR URGENT ACTION ON ENERGY EFFICIENCY

Convened by the Executive Director of the IEA in response to the global slowdown of energy efficiency progress, the Global Commission for Urgent Action on Energy Efficiency was established in June 2019 at the IEA's Fourth Annual Global Conference on Energy Efficiency in Dublin, Ireland. The Commission has 23 members and is composed of national leaders, current and former ministers, top business executives and global thought leaders.

With analytical support from the IEA, Global Commission members have examined how progress on energy efficiency can be rapidly accelerated through new and stronger policy action by governments across the globe. It has developed this series of actionable recommendations to support governments in achieving more ambitious action on energy efficiency.

The Global Commission's work comes at a critical moment in clean energy transitions around the world. Despite energy efficiency's tremendous potential, the world is struggling to capture its full benefits. Global energy efficiency is not improving quickly enough to offset strong energy demand and CO₂ emissions growth. In light of these worrying trends, there is a growing recognition by governments and leaders across the globe that efficiency efforts need to be stepped up.

In 2020, the Covid-19 pandemic has transformed the energy landscape and the priorities of governments around the world. The Global Commission's work has been sharply focused on this new reality. Energy efficiency represents a key tool that governments can use to respond to the severe economic, environmental, and social development consequences of the crisis.

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THE GLOBAL COMMISSION FOR URGENT ACTION ON ENERGY EFFICIENCY

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Sierra Leone



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President
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PART I

RECOMMENDATIONS OF THE GLOBAL COMMISSION

RECOMMENDATIONS OF THE GLOBAL COMMISSION

1

PRIORITISE CROSS-CUTTING ENERGY EFFICIENCY ACTION FOR ITS ECONOMIC, SOCIAL AND ENVIRONMENTAL BENEFITS

A stronger, all-of-government policy focus will enhance social and economic development, energy security and resilience, decarbonisation, and rapid job creation and economic stimulus

2

ACT TO UNLOCK EFFICIENCY'S JOB CREATION POTENTIAL

Energy efficiency can quickly deliver job growth and can become a long-term, sustainable employment sector

3

CREATE GREATER DEMAND FOR ENERGY EFFICIENCY SOLUTIONS

Efficiency action will be most rapidly scaled up through a focus on increasing demand for efficient products and services and enabling greater levels of market activity

4

FOCUS ON FINANCE IN THE WIDER CONTEXT OF SCALING UP ACTION

Mobilising finance is an essential element of efficiency action, and policies to do so will be most effective if they are part of a wide, coherent approach to driving market scale

5

LEVERAGE DIGITAL INNOVATION TO ENHANCE SYSTEM-WIDE EFFICIENCY

Policy-makers can take advantage of digital innovation's potential to enable smart control, better energy management, and wider energy system optimisation

6

THE PUBLIC SECTOR SHOULD LEAD BY EXAMPLE

Governments should lead through investment in public sector efficiency and driving innovation and higher standards throughout its reach

7

ENGAGE ALL PARTS OF SOCIETY

Implementation of efficiency action can happen at all levels of society, with cities, businesses, and local communities all playing a particularly important role in its success

8

LEVERAGE BEHAVIOURAL INSIGHTS FOR MORE EFFECTIVE POLICY

People are at the centre of energy efficiency action, and insights from behavioural science can help design smarter policies

9

STRENGTHEN INTERNATIONAL COLLABORATION

International collaboration and exchange of best practice allow countries to learn from each other and to harmonise approaches and standards where appropriate

10

RAISE GLOBAL ENERGY EFFICIENCY AMBITION

Governments should be significantly more ambitious in both the short- and long-term when setting their efficiency targets, policies and actions

INTRODUCTION

The Global Commission believes that energy efficiency is centrally important to the achievement of social development, economic growth and resilience, and clean energy transitions. Many countries have been successful in implementing efficiency policies, resulting in a range of positive outcomes in terms of jobs, health, security, resilience and access. Strong, urgent action can greatly enhance these positive benefits.

Without the energy efficiency improvements that have been made since 2000, the world would be using 13% more energy today, and energy-related carbon emissions would be 14% higher. These efficiency improvements have reduced energy bills for homes and businesses, enhanced competitiveness and supported job creation. Efficiency progress is also enhancing energy security and access to affordable, reliable energy. Over half of the energy savings from efficiency improvements have come from the industry sector, about a third from buildings and appliances, and a tenth from transport.

However, IEA analysis shows there is still significant untapped potential of energy efficiency and has revealed a concerning slowdown of global efficiency progress in recent years. It is clear that ambition should be higher, and progress on energy efficiency globally needs to be faster. The new IEA World Energy Outlook (WEO) Sustainable Recovery Report highlights the many areas where policy could drive stronger progress on energy efficiency, generating both short- and long-term benefits. Millions of jobs could be created quickly, supporting economic recovery and prosperity, and setting the global energy system on a more efficient and sustainable path for the future.

The recommendations of the Global Commission present opportunities to all governments to consider how to enhance their existing set of energy efficiency policies and programmes, and how to quickly accelerate energy efficiency gains through new and stronger policy actions. There are a number of key cross-cutting themes:

Action to build scale quickly - A key requirement to achieving urgent action on energy efficiency is the ability to scale up solutions quickly. Achieving energy efficiency outcomes rapidly and at scale will support Covid-19 recovery efforts as well as longer-term economic, energy and environmental goals. The energy efficiency policy and market environment today is much different to those following the 2009 Global Financial Crisis – for example, today, many of the foundational elements for a rapid scaling of energy efficiency are in place, including best-in-class policy options, cost-effective technologies, robust supply chains, and sustainable business models.

Governance and Implementation - Energy efficiency presents some unique challenges in its delivery, which is why so much cost-effective potential remains untapped. Unlike other energy sectors, many of the technologies needed for transformation exist, are affordable, and offer very good returns on investment. Many of the barriers preventing uptake are issues of practicality. Key barriers typically take the form of regulatory hurdles, socio-behavioural norms, and misaligned financial incentives. This makes the project of accelerating energy efficiency one of implementation, i.e. practice rather than theory, therefore requiring a cross-cutting, action-oriented effort.

People and narratives - Energy efficiency is inextricably linked to the motivations and behaviour of individuals – people's decisions regarding investment in and use of energy consuming equipment, buildings and vehicles are influenced by awareness and attitudes, which in turn can be influenced by designing behaviour-informed policies and creating the right narratives to demonstrate the benefits of energy efficiency.

Learning from Global Best Practice - Policy experience in energy efficiency is rich and extensive, and policy makers have much to learn from each other in policy selection, design and implementation, adapting to local circumstances and preferences as appropriate. This learning from the world's best policy experiences lies at the heart of the recommendations of the Global Commission: drawing on knowledge from what has worked, and what has not, to build a set of policy options for governments to consider when they expand and strengthen their efficiency policy portfolio.

PRIORITISE CROSS-CUTTING ENERGY EFFICIENCY ACTION FOR ITS ECONOMIC, SOCIAL AND ENVIRONMENTAL BENEFITS

A stronger policy focus on energy efficiency will enhance social and economic development, energy security and resilience, and decarbonisation, as well as supporting immediate job creation and economic stimulus. Capturing these benefits requires a whole-of-government engagement, using narratives that highlight efficiency's positive benefits and build support for stronger action.

Efficiency cuts across all sectors and all government departments, from energy to environment, from finance to education, to health, buildings, industry and transport. A whole-of-government approach can ensure alignment of priorities and actions and, hence, greatly increases impact.

There are many good examples of whole-of-government approaches strengthening impacts. Energy efficient cooling, for example, is a cross-cutting issue of huge importance and is driven by all-of-government national action plans in both the People's Republic of China ([China](#)) and [India](#), among others. In [Japan](#), energy efficiency progress has been steered by an overarching framework, the Energy Conservation Act, which has been in place for 30 years and provides a comprehensive set of targets, regulations and incentives across all sectors, and is regularly updated. It provides clarity of structure and priority for both policy makers and industry.

There are lessons to be learned from other domains such as climate governance, where cross-government targets and strategies drive action. In the [United Kingdom](#) for example, a sequence of five-year targets is translated into carbon budgets and near-term action plans, and an independent body monitors progress.

Such approaches, signalling a prioritisation of energy efficiency, can stimulate short-term action in all relevant parts of government as well as supporting longer-term change in areas such as infrastructure and land-use planning. They also allow for alignment of wider policy sets such as fiscal policy, industrial policy and planning, and structural reform. This also helps place efficiency goals in the context of overarching imperatives such as job creation or emissions reduction, rather than as goals for their own sake.

The current climate provides an opportunity for an all-of-government alignment through the creation of stimulus plans, as recovery will be a cross-government priority with a sharp focus on impacts. By incorporating efficiency into recovery plans, governments can be sure to lock in efficiency thinking across government agencies now and into the future. The urgency of current imperatives can help ensure cross-government alignment and impetus. Based on learnings from the 2009 Global Financial Crisis, [Ireland](#) is driving a whole-of-government focus on building retrofit through a national Housing Retrofit Taskforce that brings together all relevant public bodies to collaborate on delivering the target of upgrading one third of the total housing stock by 2030.

Building such cross-government support relies on the benefits of energy efficiency being made clear through the right metrics and effective narratives. Politically, different narratives can be important in securing high-level support. In China, for example, alleviating urban air pollution has been a very important impetus for efficiency action, whereas, in India, job creation and energy security have been central to the discourse. In many countries, of course, greenhouse gas abatement has been the key driver.

Within any government, different narratives and benefits will resonate. Highlighting, through real data, energy efficiency's positive impacts on energy security, energy access and lower consumer bills, can build support within various branches of government. [Japan](#), for instance, spent USD 20 billion less on imported oil in 2018 thanks to efficiency improvements since 2000. Analysis in [Saudi Arabia](#) has highlighted the economic benefits, both to consumers and to the government, of more efficient air conditioners. [New Zealand's](#) Warmer Kiwi Homes Programme and its predecessor programmes have measured the significant savings to the national health system that home energy efficiency upgrades generate, and have shown them to be well in excess of the initial investment costs of the programmes. This has helped secure cross-governmental support.

ACT TO UNLOCK EFFICIENCY'S JOB CREATION POTENTIAL

Energy efficiency investment is a key strategy for immediate job creation and the Global Commission believes it can, and should, be a central element of stimulus programmes. Evidence shows well-designed stimulus programmes with efficiency considerations can rapidly support the existing workforce, create new jobs and boost economic activities in a range of key sectors. According to the forthcoming WEO Sustainable Recovery Report, energy efficiency actions can be utilised to quickly create millions of jobs, particularly in construction and manufacturing. Key opportunities include building retrofit and technology replacement programmes.

A range of actions can be taken to quickly create jobs as well as develop capacity and new, long-lasting employment opportunities in sectors that will only become more important in the future. Previous stimulus and energy efficiency programmes offer governments and policy makers valuable insights into programme design and implementation. (See [IEA's analysis of energy efficiency and economic stimulus](#)).

As demand grows for energy efficient products, services and infrastructure, it is essential to increase the supply of workers equipped with the advanced skills necessary to satisfy that demand. Governments can draw lessons from experiences like the National Australian Built Environment Rating System (NABERS) programme in [Australia](#). The government created the NABERS training and accreditation programme to develop the reliable, high-skilled workforce needed for this burgeoning industry. The commercial buildings ratings scheme was able to rely on a strong workforce of energy auditors to scale up the programme and ensure that high standards of quality were met.

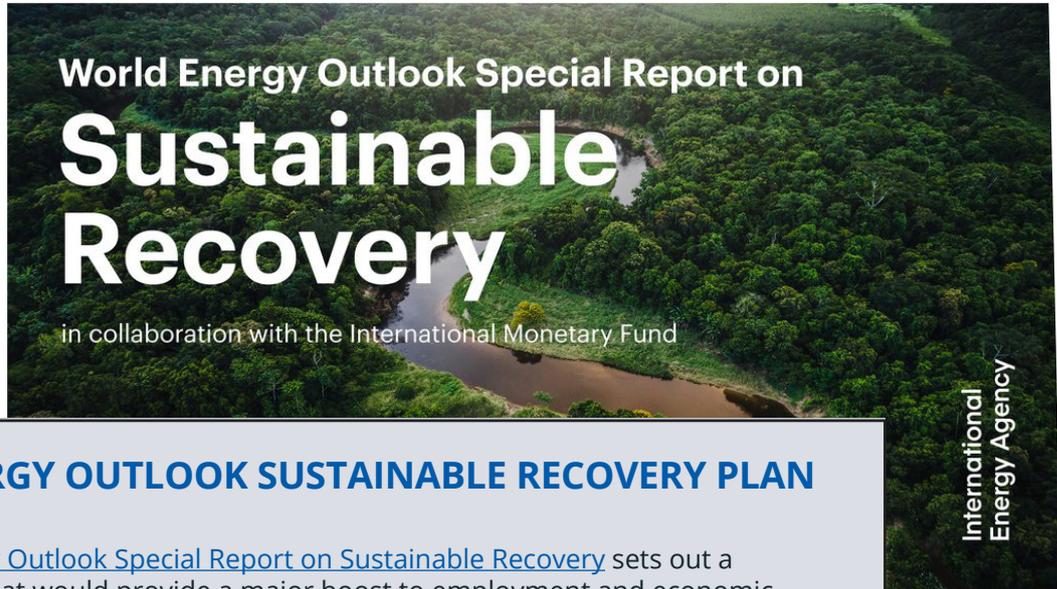
As efficiency technology becomes more complex and widespread, there will be a need for a more qualified workforce with new skills. Advances in building envelope technology will require construction workers to learn new techniques. The emergence of electric vehicles and digitalised smart grids will require a new workforce of advanced electricians and engineers. Deployment of smart technologies will enable new job creation in energy management and efficiency services. These will not just be short-term stimulus jobs that lose relevance

after the current crisis. On the contrary, jobs in energy efficiency will continue to grow in demand and relevance. Currently there are not enough people with the skills required for clean energy transitions. Having a properly trained workforce in place is also crucial for the correct specification, installation and maintenance of efficiency technologies.

For example, it is estimated that the [United Kingdom's](#) ambition for widespread deployment of heat pumps will create nearly 45 000 new jobs, but significant training will be required to build the necessary workforce. When [Spain](#) established a requirement for business energy audits in 2016, it also put in place programmes to develop a professional sector to carry them out. Similarly, the [Make in India](#) and [Made in China](#) programmes are aimed at developing high-quality manufacturing jobs with energy efficient products being one of the target sectors. These grow the sectors while at the same time making efficient appliances more affordable to purchase and run. Training and capacity programmes are aimed at developing high quality manufacturing jobs with energy efficient products being one of the target sectors. These grow the sectors while at the same time making efficient appliances more affordable to purchase and run.

Energy efficiency job training can also support a more balanced transition away from carbon-intensive energy systems. As part of the move away from carbon-intensive energy sources, certain types of jobs associated with them will decline, while other new areas open up. Training in new energy efficiency or renewable energy technologies, and in fields such as energy management, can help to protect employment by creating new jobs, particularly in communities with high numbers of displaced workers. A good example of this can be found in the Appalachian Region of the [United States](#), where numerous partnerships have been created between government, civil society, and the private sector to teach former coal workers new skills in energy audits, solar panel installation, energy efficiency, computer programming, and more.

ACT TO UNLOCK EFFICIENCY'S JOB CREATION POTENTIAL



WORLD ENERGY OUTLOOK SUSTAINABLE RECOVERY PLAN

The IEA's [World Energy Outlook Special Report on Sustainable Recovery](#) sets out a comprehensive plan that would provide a major boost to employment and economic growth while creating a more secure, cleaner and more resilient energy sector. Over the period of 2021-2023, the Sustainable Recovery Plan could boost annual economic growth by 1.1 percentage points on average, save or create approximately 9 million jobs, and reduce annual global energy-related greenhouse gas emissions by 4.5 billion tonnes.

The number of jobs created would be much higher than the number lost directly in the energy sector due to the crisis. Analysis shows that, of the 40 million jobs in the energy industry, around 3 million have been lost or are at risk due to the Covid-19 pandemic, with another 3 million jobs lost or at risk in related industries, such as transport, buildings, and industry. The Sustainable Recovery Plan shows that the largest portion of the millions of new jobs created would be in energy efficiency sectors, such as the renovation of buildings and grid upgrading. Energy efficient vehicles, industrial energy efficiency investments, and low-carbon transport infrastructure also represent significant contributions to job creation.

The Plan would also support energy security and access worldwide, bringing electricity access to nearly 270 million people, clean cooking solutions to approximately 420 million people and reducing air pollution emissions by 5% per year.

Global GDP would increase by 3.5% more than it would without the stimulus investment. On top of current spending, the Sustainable Recovery Plan indicates that around USD 1 trillion in additional spending each year would be needed, which represents around 0.7% of today's global GDP. 30% of this sum would be derived from direct public expenditure.

In total, almost 40% of the USD 1 trillion annual spending is for efficiency measures across the transport, industry and buildings sectors, resulting in the efficiency of around 20 million dwellings being drastically improved each year and nearly 350 million new, efficient appliances being sold, alongside other improvements being made to industrial processes. In addition, significant reductions in energy costs of 1-3.5% from energy efficiency and fuel switching measures would be realised.

CREATE GREATER DEMAND FOR ENERGY EFFICIENCY SOLUTIONS

A range of policies exists to drive demand for energy efficient products and services, yet market uptake is still far from where it needs to be. A focus on driving demand for efficiency technologies and services, and on removing barriers to their uptake, can greatly accelerate progress.

Policies such as standards and labels can increase demand for more efficient choices by informing consumers and by moving markets towards more efficient options. Transition to more efficient options can also be accelerated by incentives for consumers to replace old, inefficient products with new, more efficient models.

This is particularly important as our current economic circumstances will reduce investment by both businesses and households and so slow the changes in the capital stock. The quality and rate of turnover of the capital stock is a key determinant in driving efficiency. Technology replacement programmes (sometimes called 'cash for clunkers') can support jobs throughout the manufacturing, transport and retail supply chains, and drive demand for energy efficient products. Well-designed policies build market scale for new technologies in ways that bring prices down and make more efficient options more affordable.

For example, in 2017, [Colombia](#) implemented a programme aimed at replacing over 1 million inefficient refrigerators. This one small programme resulted in significantly lower energy bills for consumers, reduced the need for subsidies from low-income households, and created 12 000 jobs. Similar programmes have been introduced in other countries, such as [Mexico](#) (replacing inefficient televisions), and the [United States](#) (promoting a range of household appliance replacements). Appliance upgrade programmes can create around 9 to 12 jobs per million USD invested.

Many governments face the challenge of how to accelerate the demand for energy efficiency renovations of buildings. This issue is particularly urgent now, given that such activity can be a huge support to local jobs in the construction sector. Around 10% of the global workforce is involved in building, construction-related manufacturing and the economic activity created by the sector.

One potential approach to scaling up renovation rates, while at the same time delivering social, economic and environmental benefits at the community-level, is to adopt an area-based approach, whereby whole neighbourhoods undergo buildings renovations under one programme at one time. [Energiesprong](#) is an example of this approach, focused on creating a volume market for energy efficiency solutions and offering attractive and hassle-free installation and financing packages. Originating in the Netherlands, the approach is now being implemented in France, Germany and the United Kingdom, as well as in North America.

In addition, best-practice policies and programmes need to be designed to take advantage of - and overcome barriers faced during - specific renovation 'triggers', such as a change of use, of ownership or a reconfiguration of the building. For instance, several examples exist where governments require energy efficiency upgrades for rental properties at the time of re-leasing.

In advanced economies, where building stock growth is relatively small, renovation of a quarter of all buildings, using efficiency and clean energy measures, would reduce total CO₂ emissions from space heating by a third. In countries where building stock is expanding rapidly, up to 60% of buildings that will be in use in 2030 are not yet built, putting a focus on building codes and other policies for ensuring such buildings are as efficient as possible, right from when they are built. In economic stimulus terms, efficiency activities in buildings creates 11 to 35 local jobs per million USD invested. Benefits are greatest when efficiency ambition is high.

In the industrial sector, there are many examples of driving demand for energy efficiency solutions through a range of mandatory and voluntary policy measures. For example, targeted incentives, such as tax rebates and exemptions, have been shown to significantly accelerate adoption rates for certified energy management systems in a range of industrial sectors. Ongoing sustained demand for efficiency solutions can also be driven through large-scale, comprehensive programmes such as [India's](#) Perform, Achieve, and Trade programme for industry that put in place a mixture of incentives and imperatives for target setting, audits, efficiency upgrades and better energy management practices.

3

CREATE GREATER DEMAND FOR ENERGY EFFICIENCY SOLUTIONS

According to the WEO Sustainable Recovery Report, industry energy efficiency programmes can create around 10 jobs per million USD.

Demand for efficiency services and technologies may be affected by the current environment of low energy prices. This makes it all the more important that governments focus on the policies that will build demand, remove barriers to action and ensure incentive and policies are aligned. This includes carbon pricing and reform of fossil fuel subsidies. When placed well in a broader suite of policy measures, price reform can boost efficiency action, and government revenue can be more targeted towards efficiency programmes to the benefit of

all consumers, including businesses affected most by the economic crisis or vulnerable households. For example, [Saudi Arabia](#) increased energy prices with the aims of encouraging greater economic efficiency as well as energy efficiency. The increased revenue from higher prices was used to directly help individuals and families through monthly payments to a means tested Citizen's Account, thus avoiding negative reaction to the changes. Where appropriate, taxation can also be used to encourage behaviour change among individuals, households and businesses, and not just in the price of energy itself. For example, many governments apply vehicle purchase tax structures that encourage more efficient buying choices.

FOCUS ON FINANCE IN THE WIDER CONTEXT OF SCALING UP ACTION

Policies to get finance flowing can combine measures to increase demand with actions to remove barriers to investment and to enable appropriate finance and business models. This is critically important now as governments look at ways to channel public funds and leverage private capital at a time when private investment is likely to slow. Among the many initiatives and policies put in place to create flows of finance to efficiency actions, the most successful have avoided looking at finance in isolation, but rather treat it as part of the overall environment that centres on driving larger-scale activity.

In the short-term, governments should consider where to focus public funds, such as towards vulnerable communities, social housing, health care, education and other priority sectors. Direct public financing, such as through grants, is likely to be particularly important in many sectors in the short term, and can be designed both to maximise immediate activity and to leverage additional private investment. In the context of economic stimulus, funding is probably better applied to expanding pre-existing mechanisms rather than commencing new ones from scratch. This was the approach taken recently when the [European Investment Bank](#) provided a large loan to boost funding to the Dutch Government's revolving loan facility, the National Energy Savings Fund. In Japan, public funding for efficiency is secured through a 'special account' for investing in energy security measures, including efficiency, providing long-term stable funding as part of a wider set of measures for driving market scale for energy efficiency.

In the medium- to long-term, governments may prefer to shift away from the direct grants and loans by offering technical and commercial de-risking support to attract private sector capital. Credit guarantees or other such mechanisms to address current macro risks could help unlock private capital. A range of international initiatives such as the [United Nations Environment Programme Finance Initiative](#), the [Investor Confidence Project](#), and the [Energy Efficiency Financial Institutions Group](#) all work to support public programmes and facilitate private investment by measures such as enabling project aggregation and standardising the way energy efficiency projects are developed, documented

and measured. The [Efficient World Financing Forum](#) also brings some of the leading multilateral banks together with the IEA to work in a collective way to scale up financing for energy efficiency.

Governments can also consider supporting the expansion and reach of existing private sector financial instruments. Home energy upgrade loans tied to the properties or on-bill financing linked to utility bills are both common mechanisms. A new programme in [Ghana](#) provides a mechanism to buy energy efficient refrigerators and air conditioners via loans from local private financial institutions that are repaid through wage deductions.

Market-based instruments can also increase demand for energy efficiency services and stimulate finance flows. Utility obligation schemes, many of which are currently experiencing slow-downs in delivery, are looking at ways to re-deploy resources to keep programmes as active as possible (especially in hardest hit communities and businesses) and focusing on measures that can be implemented in the near-term. The unique relationship that utilities have with customers enable wide-scale reach to individual residences and businesses to encourage investments in energy efficiency upgrades and behaviour changes. Energy and carbon pricing also influences investment, and well-designed carbon pricing can drive investment in efficient technologies and services.

ESCO companies are taking advantage of near-empty facilities to undertake important diagnostic activities and necessary maintenance and repair, as well as promoting innovative 'as-a-service' options to address the upfront cost barrier to carrying out bigger building upgrades.

Governments at national and local levels can also identify opportunities to remove 'red tape' and facilitate more rapid action on energy efficiency project investment. For example, [Denmark](#) has allowed municipal governments to remove caps on renovation budgets. Other governments in Europe are looking to address the split-incentive barrier between landlords and tenants by allowing the cost of retrofits to be included in rental service charges.

LEVERAGE DIGITAL INNOVATION TO ENHANCE SYSTEM-WIDE EFFICIENCY

Many aspects of energy efficiency are being transformed by the new possibilities created by digital technologies. Digital technologies can reduce costs, overcome persistent barriers, create value, enable new business models, mobilise investment and boost the role of energy efficiency and demand response in energy systems. They also allow for a more modernised, rounded concept of energy efficiency that considers system optimisation, such as integrating variable renewable sources, rather than just looking at the end-use of energy.

The IEA has created the [Readiness for Digital Energy Efficiency](#) policy framework, a set of critical policy considerations for harnessing digital technologies for energy efficiency. The framework is designed to ensure that the benefits of digital energy efficiency are realised through policies that address a range of issues: from balancing data accessibility with data privacy to helping remove regulatory barriers to innovation. Consistent standards and measurement approaches are also important.

Digital technologies enable better control of energy use, for instance through smart building management systems that optimise the building's conditions efficiently, enhancing comfort while lowering costs while also allowing for wider systems thinking, particularly in electricity grids. Digital control can optimise grids to make use of variable renewables when they are available and lower demand when power is most expensive and most carbon-intensive. Digitalisation can enable energy efficiency and demand response to actively support electricity system resilience.

Detailed digital data lowers the cost of monitoring of energy assets. This can enhance business performance and allow new business models to emerge that monitor and optimise energy systems in homes and businesses, often remotely, using large volumes of data. Such business models often require policy interventions to enable them.

Digitally enabled data collection also plays a key role in optimising energy system planning. The Australian government, for example, has committed over AUD 20 million (USD 14.3 million) to develop the [National Energy Analytics Research](#) (NEAR) Programme. The programme uses digital technologies to collect granular data to link energy consumption data with the factors that drive demand, including: appliance and equipment usage; building characteristics; demographics and consumer behaviour. The programme also includes a broad research agenda, aiming to create new ways to link, analyse and use data.

Such innovative approaches often require a degree of redesign of electricity systems both in terms of technologies and business models. The development of both can be facilitated through setting up pilot projects or test-beds. There are many examples of creating testing or piloting environments to foster innovation, such as [Malaysia's](#) 'regulatory sandbox' to pilot peer-to-peer electricity trading, or [Korea's](#) Jeju Islands Smart Grid Test-Bed, experimenting with new pricing and trading mechanisms as part of the national smart grid roadmaps.

While digital technologies offer great potential for new energy efficiency gains, energy demand from data centres, networks and connected devices is becoming an important consideration. Efficiency gains have ensured that total demand in these sectors has been flat in recent years despite strong growth in activity. However, the installation of new hyper-scale data centres can represent huge electricity demand loads on local grids. Governments can take a proactive approach to address such challenges by encouraging energy efficiency through guidance, incentives and standards, as well as ensuring proper planning and close coordination among grid and data centre operators. Many data companies also support the generation of renewable energy to meet their demand ([see IEA Analysis](#)).

THE PUBLIC SECTOR SHOULD LEAD BY EXAMPLE

Governments should be trailblazers in all aspects of efficiency action and lead by example, positioning themselves as leaders in implementing best practice, using procurement to build scale for efficient technologies and fostering new business models for efficiency services. Investment in public sector efficiency improvements is a clear opportunity for maximising stimulus returns. These returns can be achieved through a variety of mechanisms.

Bulk procurement can help target technologies become more affordable and accessible by achieving scale and wide-scale transformation. This has been done successfully in [India](#), where more than 350 million LED lamps have been distributed. The economies of scale of the programme have helped reduce the price of a LED lamp by a factor of ten.

Governments can also lead on energy efficient investment through general procurement rules and specifications. The [European Union](#) and the [United Arab Emirates](#), among others, have implemented 'green' procurement directives, specifying energy and environmental standards for goods bought by government itself. Many countries have also specified high efficiency standards for buildings for them to qualify for being rented by government bodies.

In the most immediate sense, governments can direct stimulus funding to targeted building upgrades, new builds or deferred maintenance programmes. The public sector can issue tenders for new facilities, like social housing, to activate spending, create jobs and signal the importance of energy efficient infrastructure. Programmes like these lock in a stock of high quality residences with low energy costs for decades and make energy affordable for the most vulnerable sectors of society.

Similarly, there is an immediate opportunity to invest massively in efficiency upgrades in schools, hospitals and other public buildings. These types of public buildings and facilities are often difficult to address because of constant occupancy, in addition to limited budgets. Likewise, maintenance projects, like public transit repairs or electricity distribution system improvements, are often deferred much longer than they should be. These types of investments will ensure cost savings to government while improving public infrastructure. Many cities are taking advantage of the current low levels of urban transport to undertake upgrades to cycling and walking facilities, for example.

Governments can also set clear targets for energy efficiency improvements in their own buildings or commit to upgrading specific segments of public buildings. In the United States, for example, the [Federal Energy Management Program](#) sets energy requirements and goals for federal agencies, and facilitates compliance through training, guidance, and technical assistance. A recent bill laid out energy efficiency goals for agencies through 2030, aiming at 2.5% improvement per year. [Morocco's](#) Green Mosques Programme, launched in 2015 with a job-creation focus, has resulted in more than 100 mosques modernising their energy systems, and is being scaled up to invest in more than 1 000 mosques, and widened to other types of buildings. [New Zealand](#) has recently announced a State Sector Decarbonisation Programme that includes replacing coal boilers in schools and hospitals with low-emissions alternatives.

ENAGAGE ALL PARTS OF SOCIETY

Because energy efficiency requires a particular focus on implementation, it is important to engage relevant parts of society at the appropriate levels. Policies can be more successful if they recognise the relative strengths of different levels of government and empower them accordingly. By empowering cities and sub-national actors to innovate and develop their own ambitious efficiency initiatives, and by collaboration between national and local levels, governments can enable transformation from the bottom up.

The [Philippines's](#) Climate Change Act, for example, requires local governments to prepare and regularly update Local Climate Change Action Plans while also giving the national government the mandate to ensure the implementation of those plans through capacity building and financing. [China's](#) Thousands of Vehicles, Tens of Cities (TVTC) programme ensured strong alignment across national and local government to push the uptake of new energy vehicles. It included financial, infrastructure, manufacturing and research aspects.

Efficiency impacts are often determined by the implementation of policies and programmes at sub-national levels. For example, many countries set ambition at national level but the power to implement is at the state or city level. This informs buildings efficiency policy approaches in [India](#) and [Mexico](#), among others, where national government activity engages local government to develop the implementation actions required to meet the standards set at national level for efficiency codes in new buildings. In [Spain](#), financial support programmes for efficiency in buildings and transport are co-designed by the national and sub-national governments. In the [United States](#), a number of major cities use building performance standards to set out the efficiency ambition for buildings in the city, allowing developers to apply flexible and innovative approaches to deliver them. In [Japan](#), the city of Tokyo drives efficiency actions across large factories, buildings and heat suppliers through its urban cap-and-trade scheme with regularly updated emission reduction targets.

In the context of economic recovery, sub-national governments can be key actors in ensuring that programmes are fit-for-purpose and effectively

implemented, as well as often acting as the primary delivery agency. Also, in terms of delivery, municipal and local governments can often have greater insight into the needs of a particular region or community, and can have stronger delivery mechanisms in place. They are often responsible for local infrastructure, be it transport infrastructure, street lighting or social housing, and thus can be key drivers of efficiency action, particularly in the economic stimulus context. By creating policies that encourage close collaboration with sub-national governments, stimulus programmes and other energy efficiency policies can have a greater likelihood of local community support and uptake.

Beyond government itself, there are many successful examples of direct engagement with key stakeholder groups leading to better outcomes. Many countries have, for instance, involved industry in the design and delivery of their efficiency programmes, such as [Japan's](#) Top Runner programme or the [EU's](#) Ecodesign regulation, helping ensure targets are informed by good data and are both ambitious and well-implemented. [Denmark](#) has also successfully engaged industry through a set of 13 'climate partnerships' with all branches of Danish business that will be central components of the overall national plan to reduce greenhouse gas emissions by 70% by 2030.

Involving local communities or specific target groups can also enhance outcomes. Many governments prioritise vulnerable groups, supporting efficient energy access and tackling 'energy poverty' in their policies, [Spain](#), for example, set out a national strategy to combat energy poverty in 2019, committing to improving the living conditions of those in vulnerable households by ensuring their access to energy supply, while also incorporating a focus on both energy efficiency and renewable electricity. In many countries, efficiency obligation programmes set aside specific sub-targets for actions such as working with vulnerable households or communities. In [Ireland](#), a particular strand of the national home retrofit programme encourages local communities to come together to deliver community wide initiatives. It stimulates both wider participation and higher ambition in home energy efficiency activities, and also places emphasis on the creation of local jobs.

LEVERAGE BEHAVIOURAL INSIGHTS FOR MORE EFFECTIVE POLICY

Expected and actual behavioural responses to energy efficiency policy can often diverge. This is sometimes because policy design and implementation may resort to 'rules of thumb' about human behaviour, often based on standard economic theory rather than more subtle analysis of a given set of circumstances.

Learnings from behavioural sciences ('behavioural insights') can inform policy making by ensuring that energy policies are based on a sound understanding of the mechanisms guiding human behaviours. Behavioural insights are important for all policies designed to change individual, household and business behaviours that impact energy consumption and investment in energy efficiency: they can help identify behavioural barriers to policy effectiveness and help redesign policy actions accordingly.

The Covid-19 crisis has brought about significant changes in lifestyles and work practices, as employees in service sectors work from home and avoid business travel, thereby causing immediate implications for energy consumption. Beyond the immediate crisis and society's reflex reactions to it, longer-term changes in attitudes and beliefs may also affect people's consumption and mobility patterns, as well as perceptions of energy efficiency. Greater interest in climate change and air quality, as well as concerns raised over issues such as resilience, quality of life and job and energy security, all open up the possibility for new perceptions of the importance of energy efficiency.

Much has been learned in recent years about the science of human behaviour as applied in the field of energy efficiency. Energy efficiency policies that incorporate behavioural insights in their design and implementation have been proven to be more effective in achieving the desired outcome. For example, evidence from behavioural insights was used by the [European Commission](#) in the redesign of its appliance energy labels, changing the efficiency scale to one better understood by consumers.

In the [United States](#), utilities have tested different formats of home energy reports, giving people information on their energy use patterns and comparing household energy consumption with that of similar neighbours. Even simply highlighting the social popularity of desirable behaviours can increase their adoption and has resulted in 2% average annual savings across millions of households. [New Zealand's](#) Gen Less information campaign seeks to make a climate-positive lifestyle appealing and desirable through positive messages and articulates the role of energy use and energy efficiency in achieving that lifestyle.

Redesigning policies and products to make the energy efficient option the default simplifies choices for consumers. For example, the Government of [India](#), in consultation with the Bureau of Energy Efficiency (BEE), recently mandated that all room air conditioners should have a default set-point temperature of twenty-four degrees Celsius, rather than lower defaults more typically being set. This makes use of a well-known insight from behavioural sciences that few consumers change from the default settings of their appliances. Users are free to change the settings but the default settings are more efficient than before.

STRENGTHEN INTERNATIONAL COLLABORATION

The range of examples and learnings discussed here demonstrate clearly the value of international exchange and collaboration. International organisations can help countries to connect with each other for enhanced collaboration. The IEA convenes governments and stakeholders from around the world and facilitates sharing of best practice and data. Platforms such as the Clean Energy Ministerial and the IEA Technology Collaboration Programmes serve to enable collaboration and exchange at many levels. The Clean Energy Ministerial's [SEAD](#) initiative is now working with the UK Government, in its capacity as COP26 President, on the Product Efficiency Initiative to generate increased ambition for product energy efficiency, thereby reducing global greenhouse gas emissions whilst ensuring consumers have access to affordable and innovative technologies.

Global platforms of commitment, such as the Three Percent Club, also serve an important role in highlighting the efficiency opportunity and encouraging international collaboration. The Global Alliance of Buildings and Construction has also been a strong driver of action and exchange. Among the largest economies, the G20 has been an important forum for energy efficiency collaboration in a number of areas. For example, in 2019, as part of its G20 presidency and as laid out in the Karuizawa Action Plan, Japan embarked on a global collaboration initiative to develop energy efficiency benchmarks for heavy industry as a means of supporting policy making.

The Energy Efficiency Hub, created at the end of 2019, already counts many of the world's major economies among its members and is developing collaboration activities to align with the work of the IEA and other international organisations. It represents a major opportunity to enhance global collaboration on energy efficiency.

Global engagement can also bring benefits through harmonised approaches, enhanced opportunities for trade and reduced transaction costs. Such approaches have proven very successful for the [Multilateral Fund for the Implementation of the Montreal Protocol](#), which brings both governments and industries together towards a common goal and, now through the Kigali Amendment

to the Montreal Protocol, fostering a strong and collaborative approach that covers both energy efficiency and refrigerant gases.

International cooperation can also be used to promote the progressive harmonisation of efficiency standards. Standards harmonisation can support industry transitions by reducing variance between national requirements and enabling greater efficiency at scale. The Australian and New Zealand governments jointly administer the [Trans-Tasman Equipment Energy Efficiency](#) programme, which delivers a single integrated package on energy efficiency standards and energy labelling for equipment and appliances, and has secured large energy savings benefits for both markets. This approach of developing common standards across countries is also used in the European Union and North America. Activity on regional harmonisation is also underway in [ASEAN, Sub-Saharan Africa and Central America](#). Standards bodies and governments should consider further opportunities to align performance standards and testing methodologies.

Finally, many efficiency challenges are common to all parts of the world, as are available technologies, the menu of policy options and the most important policy principles. At the same time, local circumstances vary and these recommendations are not meant to be prescriptive or universally applicable. Governments should make their own policy choices but it is important to look at others' experiences to leverage the world's best policy practices.

The IEA holds a wealth of data that can help decision-makers to shape and structure policies and should continue to be at the centre of global efforts to support energy efficiency. Global experience has created a community of experts whose knowledge can be of great value as governments seek to strengthen their efficiency policies on the basis of best practice experiences elsewhere. This Global Commission demonstrates the value of bringing together such expertise that can be availed of to help governments design and implement best practice policies. The IEA should ensure that such expertise remains available to governments and facilitate exchange among policy makers and experts.

RAISE GLOBAL ENERGY EFFICIENCY AMBITION

The Commission is strongly of the view that significant potential exists to enhance global energy efficiency and collective ambition should therefore increase. Realising this ambition will entail action over a number of years that blends short- and longer-term perspectives.

At this critical moment, governments have a sharp focus on economic stimulus and delivering tangible, widely-felt social and economic benefits. This can include a range of energy efficiency programmes such as home retrofits that improve quality of life or action to reduce fuel poverty and enhance energy access, as seen in the IEA's Sustainable Recovery Plan. Governments can act as leaders by investing in efficient infrastructure, leveraging public procurement mechanisms to encourage manufacturing of efficient products, and incentivising actions and investments that help bring energy efficiency to scale.

Stimulus programmes will create significant activity in building and technology deployment, from new schools and homes to new cars and white goods. The Global Commission stresses the importance of avoiding the lock-in of long-term negative impacts with these investments. Especially with regard to infrastructure, the investments governments make now will remain a part of our infrastructure for decades to come. In order to reach the rapidly approaching goals of 2030 and 2050, the global community cannot afford investments in infrastructure that are not aligned with making progress toward those goals.

A parallel longer-term focus can encourage 'next wave' efficient infrastructure projects, like public transit system investments, street-lighting programmes, or the creation of digitalised smart-grids. Whole-of-government action, quantitative data-driven targets, and comprehensive timelines for achieving near- and long-term goals are proven strategies for ensuring more effective roll-out of stimulus and efficiency programmes. Long-term thinking is important to ensure decisions regarding infrastructure and planning are aligned to efficiency imperatives. Efficiency policy will also benefit from clear overall targets against which progress is regularly reported.

Beyond the immediate stimulus focus, the Global Commission considers that the appropriate average global level of ambition over time is at least a 3% annual gain in overall primary energy intensity. Such a level of ambition is fully achievable using available, cost-effective technologies, and would see the energy efficiency of the global economy double in the next two decades. This is not to suggest a binding target for individual governments but rather to inform a global understanding of the necessary – and achievable – scale of ambition overall. This level of ambition is already enshrined in the UN Sustainable Development Goal 7: Ensure access to affordable, reliable, sustainable and modern energy for all.

Decisive, ambitious, transformative action on energy efficiency will improve the resilience and efficiency of our energy systems, improve access to clean, affordable energy services, and improve our economies to create jobs and enhanced quality of life. Never before has such action been more urgent.

PART II

POLICY CASE STUDIES

GLOBAL EXPERIENCE ON ENERGY EFFICIENCY

ACHIEVEMENTS SINCE 2000

Global energy efficiency improvements have delivered significant benefits for the climate, national budgets, and for energy consumers. Without energy efficiency improvements since 2000, the world would have used 13% more energy in 2018, and energy-related carbon emissions would have been 14% higher.

There has been a significant increase in energy-consuming activity since 2000 (more and larger homes, people driving more, and more industrial output) as the world has become wealthier and expectations rise. This would have led to a substantial rise in energy consumption and related emissions. Energy efficiency has managed to counteract almost half of the expected energy increase.

Technical efficiency gains from 2000 to 2018 avoided cumulative emissions of over 32.2 billion tonnes of additional CO₂ emissions, larger than the cumulative energy-related emissions of India over the same period. Without these efficiency improvements, global emissions would have been 14% higher in 2018.

Since 2000, efficiency improvements reduced oil imports in the world's major economies by over 165 million tonnes of oil-equivalent (mtoe), similar to the combined annual primary oil demand of Germany, Australia and Belgium. These efficiency improvements have also enhanced energy security. Japan, for instance, spent USD 20 billion less on imported oil in 2018 thanks to efficiency improvements since 2000.

Over half of the energy savings from efficiency improvements have come from the industrial sector, followed by buildings and appliances (32%) and transport (11%). In the industry sector, nearly one-third of the global efficiency savings have been achieved in China. China's Top 10 000 programme and India's Perform, Achieve and Trade programme are among the industry policies with the largest global impacts. In the buildings and appliances sector, significant energy efficiency improvements

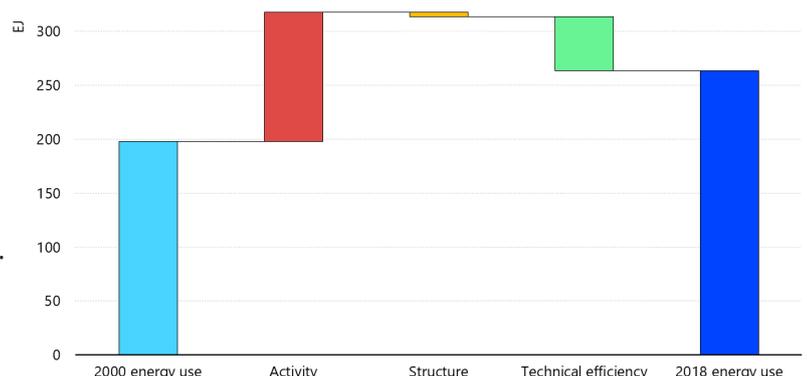
have been achieved, but have been more than offset by continued increases in building stock and appliance ownership. Energy use in buildings and appliances has grown by over 20% in the past two decades. The most effective policies in the buildings and appliances sector have included those that established minimum energy performance standards, such as national and regional building codes, Japan's Top Runner programme, and Europe's Ecodesign policy. Since its inception, the EU Ecodesign directive has achieved energy savings impacts equivalent to 9% of current energy consumption and 7% of CO₂ emissions. The directive also created close to one million new jobs.

Within the transport sector, the largest energy efficiency gains have been achieved as a result of the introduction and strengthening of mandatory fuel economy standards for passenger vehicles. Globally, these policies are responsible for over 50% of the total energy efficiency improvement in transport since 2000. Due to increased levels of activity, passenger transport energy use has increased by 40% since 2000. However, efficiency standards for cars are saving more than one million barrels of oil per day.

FUTURE POTENTIAL

Energy efficiency will deliver more than one-third of the total greenhouse gas emission reductions within the IEA's Sustainable Development Scenario (SDS) up to 2050. Energy efficiency plays an even more important role in the short-term, representing approximately half of the abatement in the SDS to 2030.

Decomposition of Final Energy Use in the World's Major Economies, 2000-18



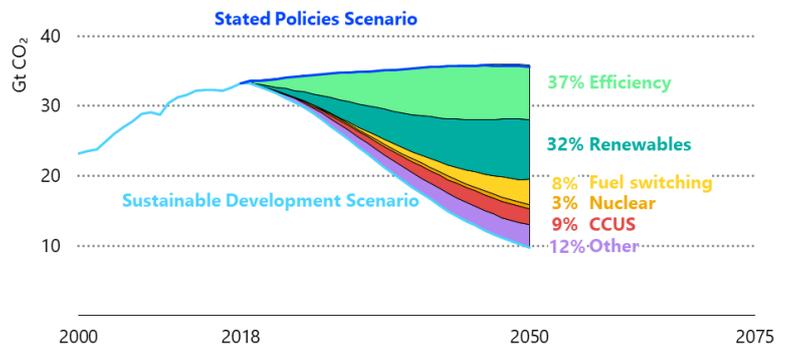
GLOBAL EXPERIENCE ON ENERGY EFFICIENCY

If the world were to implement the cost-effective energy efficiency opportunities available today, energy demand could be reduced by 15% in 2040. At the same time, households globally could save USD 200 billion in avoided expenditure on fuels such as electricity and gas, and USD 365 billion in avoided expenditure on transport fuels. The transport sector (38%) accounts for the largest share of future energy savings, followed by buildings and appliances (33%) and industry (29%).

Despite an expected doubling in activity levels, best practice energy efficiency policies could keep transport energy demand flat between now and 2040. Two-thirds of the energy savings potential could come from road transport, both passenger and freight, with the remainder from aviation and shipping.

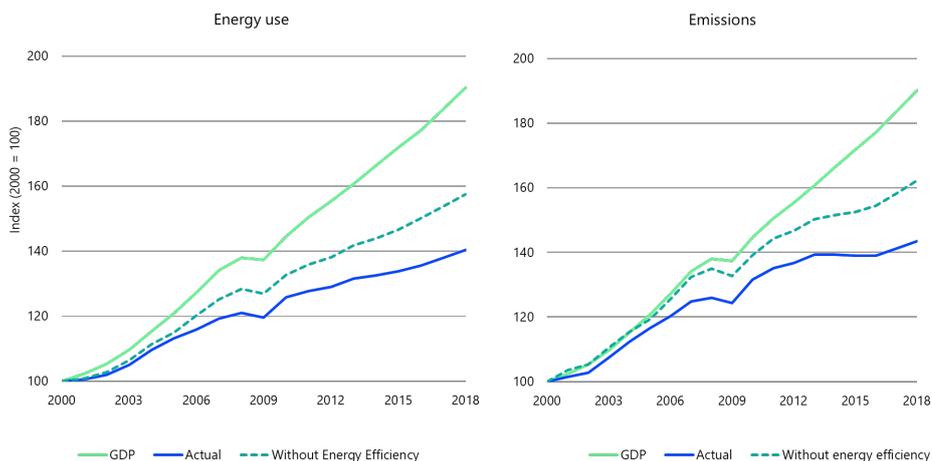
The vast majority of the energy savings potential within the industry sector could come from light industry. Such less energy-intensive sectors, such as food, beverage and textile manufacturing, represent 70% of the potential energy savings for industry in 2040, and could improve efficiency by over 40%, compared with a 16% gain between 2000 and today. The most significant opportunity comes from more efficient motor systems, which consume over 70% of electricity used in industry. Energy efficiency in iron and steel manufacturing could improve by 25%, compared with a 5% gain since 2000, particularly through greater use of metals recycling.

Energy-Related CO₂ Emissions and CO₂ Emissions Reductions by Measure in IEA's Sustainable Development Scenario



Finally, even with 60% growth in total building floor area, best practice energy efficiency policies could keep total energy use in buildings and appliances flat between now and 2040, and buildings could be nearly 40% more efficient than they are today. Applying best practice policies between now and 2040 would lead to 43% improvement in space and water heating energy efficiency, and a doubling of the average air conditioner efficiency. These efficiency gains will require significant investment, much higher than the rates of investment in efficiency seen in recent years. These investments pay for themselves several times over from the energy savings they produce – at a ratio of 2:1 for transport, 3:1 for buildings and transport and 7:1 for industry. Furthermore, investment in energy efficiency will generate additional jobs and expand the global economy. Every USD 1 million invested in energy efficiency will generate 10-25 jobs.

Major Economy Final Energy Use and Energy-Related CO₂ Emissions With and Without Efficiency Improvements, 2000-18



EXEMPLAR POLICIES OF RECENT YEARS

ECODESIGN FRAMEWORK DIRECTIVE IN THE EUROPEAN UNION

In the European Union (EU), Minimum Energy Performance Standards (MEPS) have been introduced in an EU-wide manner since 2005 as part of the Ecodesign framework directive, which currently covers over 24 technologies, from residential equipment, such as refrigerators and heating equipment, through to non-residential equipment, such as motors. These efficiency requirements are periodically updated according to technology developments and have expanded to address the aspect of resource efficiency in product design, central to the EU's circular economy strategy. The Ecodesign framework directive is estimated to be delivering nearly 20% of EU energy savings, over 300 million tonnes fewer GHG emissions, and net savings of EUR 63 billion on consumer expenditure.

[Link for details](#)

ENERGY STAR PROGRAM IN THE UNITED STATES

The United States established the Energy Star labelling program in 1992. Starting with computers, the scope of the labelling program has grown to cover more than 70 product categories, helping individuals and businesses identify more energy efficiency appliances, equipment and buildings. As of 2015, Energy Star has helped American consumers, businesses, and industries save over USD 430 billion on their energy bills while reducing carbon emissions by 2.7 billion tonnes.

[Link for details](#)

TOP RUNNER PROGRAM IN JAPAN

Japan introduced the Top Runner Program in 1998. The programme sets mandatory energy efficiency standards on a range of products, from passenger cars to refrigerators. Performance standards are dynamic, so that every few years the most efficient devices are set as the new standard to be met. The products that meet the standards obtain the official 'Top Runner' label, which is widely recognised by consumers to denote that a product performs best in its class in terms of energy efficiency. As of 2020, 32 products are covered in the Top

Runner program, with efficiency levels improving substantially. For example, the efficiency of air conditioners improved by 31% over the past two decades.

[Link for details](#)

JAPAN'S FUEL ECONOMY STANDARDS

Japan sets and periodically updates fuel economy standards on cars, vans and trucks under its Top Runner Program. The efficiency requirements are based on the most fuel-efficient vehicles on the market, and manufacturers and importers of these vehicles are required to meet these vehicle efficiency standards on a corporate average basis. The fuel efficiency of passenger vehicles has improved by 96% over the past two decades. Japan has announced new fuel economy standards on light duty vehicles, aiming at improving fuel efficiency by 32% by 2030, compared with 2016 levels. The scope has been expanded to cover the efficiency of electric vehicles and plug-in hybrids, and new standards take into account the energy consumption of the fuel production (gasoline and electricity), the so-called 'well to wheel' approach.

[Link for details](#)

EUROPE'S CO₂ EMISSION PERFORMANCE STANDARDS ON VEHICLES

European Union sets Europe-wide efficiency standards on light duty vehicles (cars and vans). Manufacturers and importers of vehicles are required to meet the efficiency standards, which have been periodically reviewed and strengthened. In 2019, the EU announced new CO₂ emission targets for the years 2025 and 2030, aiming at driving the European automobile market to cleaner vehicles such as zero and low emission vehicles. Standards for trucks have now also been introduced.

[Link for details](#)

NATIONAL ROADMAPS FOR BUILDING RENOVATION IN THE EUROPEAN UNION

The Energy Performance of Buildings Directive of the European Union requires all EU member countries to establish a long-term strategy to support the

EXEMPLAR POLICIES OF RECENT YEARS

renovation of their national building stock by 2050. These long-term renovation roadmaps set milestones for 2030, 2040 and 2050 with a set of policy measures and robust measurement to track progress. They are an important input to the 'renovation wave' initiative announced as part of the European Green Deal.

[Link for details](#)

TOP 10 000 PROGRAMME ON INDUSTRIAL ENERGY EFFICIENCY IN CHINA

Starting as the Top 1 000 Programme in 2006, the Top 10 000 Programme, sets mandatory energy intensity improvement targets for the largest energy-consuming enterprises within China. Targets have been set at the national level and then passed down local levels for action by individual companies. The programme, one of the largest in the world in terms of impact, is linked to strong policies to support the development of energy service companies.

[Link for details](#)

THE NATIONAL AUSTRALIAN BUILT ENVIRONMENT RATING SYSTEM (NABERS) IN AUSTRALIA

Australia launched a voluntary performance-based rating system of existing buildings in 2005. The NABERS measures overall environmental performance of buildings during operation, including energy efficiency, water usage, waste management and indoor environment quality. A self-assessment tool is available for estimates, with certified NABERS ratings completed by accredited, independent assessors. The certified rating can then be displayed and publicised.

[Link for details](#)

ENERGY CONSERVATION BUILDING CODE INDIA

India developed its building energy code for commercial buildings in 2017 (ECBC 2017). The current code is progressive and ambitious encompassing dynamic initiatives including efficiency requirements for most systems, bi-climatic design, commissioning of HVAC systems, mandatory renewable energy requirements for specific building types and special efficiency requirements for public buildings. It is estimated

that full adoption of the code in commercial buildings in India would lead to a 50% reduction in energy use by 2030. A residential version of the code has now also been developed.

[Link for details](#)

STANDARDS AND LABELLING PROGRAMME IN INDIA

India's standards and labelling programme is a successful example of enabling the energy efficiency market for appliances. The main aim of this scheme is to provide consumers with informed choices about different appliances available on the market regarding energy and related cost savings. As of now the MEPS and labelling scheme applies to 10 appliance categories on a mandatory basis and 13 on a voluntary basis. The scheme is estimated to have delivered to energy savings of 121 billion kWh from 2011 to 2018.

[Link for details](#)

VEHICLE CO₂ BONUS AND PENALTY SYSTEM IN FRANCE

Since 2008, France has incentivised the purchase of vehicles that emit less CO₂. On purchase, a bonus is paid to people acquiring vehicles that emit less than a certain threshold in terms of CO₂/km. Conversely, a purchase tax malus applies to less efficient vehicles in the range of EUR 50 to 12 500 depending on the degree of CO₂ emissions. The emissions thresholds are reviewed periodically to push the market towards lower-emitting cars.

[Link for details](#)

PERFORM, ACHIEVE AND TRADE SCHEME IN INDIA

The PAT scheme is a regulatory instrument to reduce specific energy consumption in energy intensive industries in India. The scheme sets mandatory energy intensity improvement targets for designated consumers (DCs) in energy-intensive sectors. The scheme incentivises over-achievement by allowing the trading of energy saving certificates. The first cycle of the PAT Scheme (2012-2015) managed to reduce the energy consumption of more than 400 DCs by 5.3%, above the initial target of 4.1%.

EXEMPLAR POLICIES OF RECENT YEARS

EFFICIENCY STANDARDS ON INDUSTRIAL ELECTRIC MOTORS

The coverage of mandatory energy standards across electric motors has been growing steadily across the world in recent years. More than a quarter of all energy consumed by motors is within a defined standard, although the standard applied varies. Most standards draw on an internationally agreed scale running from IE1 to IE4, the most efficient. A number of countries introduce standards at a specific level and then raise it over time. For instance, the United States and Canada implemented MEPS at the IE2 level in 1997, and have since strengthened the standard to IE3 level. Japan and Saudi Arabia are among other countries with standards at IE3 level.

THE TRANS-TASMAN EQUIPMENT ENERGY EFFICIENCY (E3) PROGRAMME

The Australian (federal and state) and New Zealand governments partner under the E3 programme to set regulations for MEPS and the Energy Rating Label to help end users of energy using appliances make informed choices at the point of sale. The programme covers a range of products ranging from televisions to clothes washers to refrigerators, and has delivered massive energy and costs savings to homes and businesses.

[Link for details](#)
[Link for details](#)

VOLUNTARY AGREEMENTS FOR US BROADBAND DEVICES

A 2015 voluntary agreement signed by internet service providers established voluntary efficiency standards for nearly 90% of internet modems, routers, and other broadband devices. To ensure the standards outlined in the voluntary agreement do not act as a 'ceiling' on innovation, the agreement also outlines how service providers and vendors can add innovative new features for energy efficiency confidentially for a limited period of time, to avoid compromising their competitiveness. The average idle mode energy usage of these products, relative to average broadband speed, has decreased by 66% since the agreement was ratified.

[Link for details](#)

PRIORITISE CROSS-CUTTING ENERGY EFFICIENCY ACTION FOR ITS ECONOMIC, SOCIAL AND ENVIRONMENTAL BENEFITS

CLIMATE CHANGE ACT IN THE UNITED KINGDOM

The United Kingdom enacted the Climate Change Act with cross-party support in 2008. The Act is the world's first legally binding national commitment to cut greenhouse gas emissions by at least 80% by 2050 (from 1990 levels). This comprehensive policy framework with long-term statutory targets and objectives put climate change on the agenda across political parties and government departments. Its 2050 target of at least 80% reduction of emissions on 1990 levels sets long-term direction of the whole economy and its sequence of 5 year carbon budgets translate into near-term actions. The Committee on Climate Change plays an important role as an independent advisory body, tracking and reporting the progress.

[Link for details](#)

JAPAN'S WHOLE GOVERNMENT APPROACH TO ENERGY EFFICIENCY

In Japan, the Energy Conservation Law has been driving policy actions across the government. It was first enacted in 1979 to enhance energy security and energy supply resilience. The law has been upgraded and improved several times over the years to accommodate changing socio-economic circumstance and to ensure a comprehensive set of policies and measures, including long-term targets, regulations and incentives. This overarching policy framework now covers all economic activities in Japan, ranging from residential and commercial sectors, to the manufacturing sector, to transport and power generation.

[Link for details](#)

HOUSING RETROFIT TASKFORCE IN IRELAND

Ireland launched the [Built Environment and Climate Action Plan](#) in 2019. The Plan set out a series of actions on public and private buildings to achieve a substantial reduction in greenhouse gas emissions by 2030 and to enter the right trajectory towards net-zero carbon emissions by year 2050. A central measure of the Plan is building retrofits. A high-level Housing Retrofit Taskforce is tasked to

ensure close collaboration across the government for designing and implementing a national retrofit plan, aiming to upgrade 500 000 homes (one-third of the housing stock) and install 400 000 heat pumps by 2030.

[Link for details](#)

THE HIGH EFFICIENCY AIR CONDITIONING PROGRAMME IN SAUDI ARABIA

Saudi Arabia has the highest share of air conditioning (AC) in household electricity consumption in the world, as the use of AC equipment has become prevalent to maintain thermal comfort. As part of government's approach to address the rising electricity consumption and peak demand during summer months, Saudi Arabia launched the High Efficiency AC programme in 2019. The programme offers 900 Saudi Riyals (250 USD) per unit to consumers for up to 6 split air conditioning units that are energy efficient. This programme is expected to save 33 TWh/year and 24 million tons of CO₂ by facilitating the replacement of inefficient window units and split systems currently in place.

[Link for details](#)

NATIONAL ENERGY EFFICIENCY ACTION PLAN IN GEORGIA

Georgia developed a National Energy Efficiency Action Plan (NEEAP) in 2019 in compliance with the EU Energy Efficiency Directive. The NEEAP prioritises energy efficiency across the government, and sets long-term efficiency targets for the country towards 2030: a 13% reduction in total primary energy supply, and a 14% reduction by 2030 compared with the BAU level. The NEEAP creates a basis for the implementation of efficiency measures across all sectors, and several important pieces of legislation are currently discussed, including building efficiency and eco-design of appliances.

[Link for details](#)

PRIORITISE CROSS-CUTTING ENERGY EFFICIENCY ACTION FOR ITS ECONOMIC, SOCIAL AND ENVIRONMENTAL BENEFITS

UNITED STATES CROSS-AGENCY PRIORITY (CAP) GOALS INITIATIVE

The United States established the Cross-Agency Priority (CAP) Goals to support collaborative, cross-agency projects, such as Data, Accountability, and Transparency and Results-Oriented Accountability for Grants. The CAP tool created a new governance and administrative infrastructure within the US government, resulting in a series of cross-agency initiatives within the Office of Management and Budget and has been adopted in the President's Management Agenda particularly in areas where implementation requires collaboration among multiple agencies.

[Link for details](#)

NATIONAL GREEN COOLING ACTION PLAN IN CHINA

In June 2019, seven Chinese ministries, including the National Development and Reform Commission (NDRC), jointly issued the national Green Cooling Action Plan (GCAP), a joint initiative with the Government of France that aims to support the improvement of energy efficiency standards for cooling equipment. The GCAP sets forth targets for cooling-product energy efficiency improvement by 2022 and 2030. China anticipates to increase cooling energy efficiency in large public buildings by 30%, overall cooling energy efficiency by more than 25%, and the market share of 'green efficient' cooling products by more than 40%. Taken together, achieving these targets would achieve annual electricity savings of approximately 400 billion TWh by 2030. As the country's first ever national action plan on cooling, it was well received by the international community and K-CEP awarded China the 'Progress on a National Cooling Plan' Award to recognise the speed and comprehensiveness of China's GCAP publication.

[Link for details](#)

COOLING ACTION PLAN IN INDIA

Launched in 2019, India's Cooling Action Plan (ICAP) sets out a long term vision to address increasing cooling demands across sectors and define a clear list of policy actions to curb the future trend. This initiative is cross-sectoral, ranging from residential and commercial buildings to cold-chain, refrigeration, transport and the industrial sector. The ICAP looks at a 2027-28 time horizon and highlights cooling as a priority area, aiming at reducing cooling and refrigerant demands across sectors. Training and certification of 100 000 technicians is integral to the ICAP.

[Link for details](#)

ENERGY EFFICIENCY FIRST ANALYSIS IN NEW ZEALAND

New Zealand's Energy Efficiency and Conservation Authority has investigated the role energy efficiency can play in supporting the government's ambitious target of 100% renewable electricity by 2035. The analysis found that accelerated uptake of existing energy efficient technologies like LED lamps, space and water heaters, and electric motors could provide the system with 4 000 GWh of extra capacity, before any new renewable generation would be required. Much of this technology represents negative-cost emissions abatement.

[Link for details](#)

LAMPU TENAGA SURYA HEMAT ENERGI (LTSHE) PROGRAMME IN INDONESIA

Indonesia launched the Lampu Tenaga Surya Hemat Energi (LTSHE) Programme in 2017 as part of its pre-electrification programme in areas of low energy access. Each household was given four LED lamps together with a 20 Watt-peak solar photovoltaic (PV) module and a lithium battery that can last for 60 hours. Incandescent lamps of equivalent light output would need around 25 watts, requiring six to eight more solar PV modules of the same watt-peak power, and the same battery would have only been able to operate the lights for around seven hours. The five provinces targeted – Riau, Maluku, West Papua, Papua, and West Nusa Tenggara – have significantly lower energy access than in Java. The

PRIORITISE CROSS-CUTTING ENERGY EFFICIENCY ACTION FOR ITS ECONOMIC, SOCIAL AND ENVIRONMENTAL BENEFITS

programme has reached about 80 000 homes in these five provinces with spending of nearly USD 25 million; the programme was expanded to 15 provinces and expected to reach more than 175 000 homes by 2018. The programme shows how energy efficiency can be integrated with renewable energy to facilitate access.

[Link for details](#)

WARMER KIWI HOMES PROGRAMME IN NEW ZEALAND

Since 2009, a series of energy efficiency programmes in New Zealand have combined government and third party funding (and, in some phases, homeowner contributions) to provide insulation retrofits, and sometimes heating, in older houses. In addition to energy savings benefits, the programmes have led to improved health outcomes, and measurable savings to the national health system. The current programme, Warmer Kiwi Homes, (launched in 2018) provides subsidised insulation and heating retrofits for low income homeowners. The programme includes measurement to demonstrate links between energy and health benefits, and also has potential for expansion to boost economic activity. A 2011 cost-benefit analysis of a previous iteration of the insulation grants programme found that it delivered health benefits well over NZD 1 billion (USD 610 million).

[Link for details](#)

GEN LESS CAMPAIGN IN NEW ZEALAND

In September 2019, New Zealand's Energy Efficiency and Conservation Authority launched an information campaign called Gen Less to help overcome awareness barriers and to get New Zealanders mobilised to reduce their energy-related emissions. The campaign sets out to make a climate-friendly lifestyle appealing and desirable now, and to articulate the role of energy use and energy efficiency in achieving that lifestyle.

[Link for details](#)

NATIONAL PAINTING COMPETITION AND ENERGY CONSERVATION DAY IN INDIA

India launched the National Awareness Campaign in order to raise awareness of energy conservation across the society. Painting competition at schools and states is central to this awareness raising measure, engaging and mobilising children, families and general public and explaining them about a range of benefits of energy efficiency. National Energy Conservation Day was another feature of the Campaign where the winner of the painting competition is celebrated, and states and industries with demonstrated reductions in their energy use are awarded in the presence of eminent dignitaries.

[Link for details](#)

ACT TO UNLOCK EFFICIENCY'S JOB CREATION POTENTIAL

NABERS TRAINING IN AUSTRALIA

Australia's voluntary performance-based rating system of existing buildings, NABERS, integrated a range of training programmes to build the advanced skills needed to implement buildings ratings. Accredited assessors carry out physical assessments of buildings, and the collected data and assessments feed into audits and a certification process carried out by the NABERS technical team. Training programmes provide a skilled workforce that ensures the quality of building assessments and audits. The commercial buildings ratings scheme was able to rely on a strong workforce of NABERS auditors to scale up the programme and ensure high standards of quality were met.

[Link for details](#)

TRAINING AND CAPACITY BUILDING FOR HEAT PUMP INSTALLATIONS IN THE UNITED KINGDOM

The United Kingdom's carbon emissions targets require widespread installation of heat pumps across the country, and currently more than 43% of the country's HVAC professionals say they have no experience with the technology. According to a recent study, there will be a yearly increasing demand for heat pump installers through at least the mid-2030s, creating nearly 45 000 new installation careers.

[Link for details](#)

TRAINING PROGRAMMES FOR FORMER COAL WORKERS IN THE UNITED STATES

Policy and market changes can lead to displacement of workers from certain sectors, as is seen for example in coal mining in some regions. So-called 'just transition' actions can foster new training and employment opportunities. Across the Appalachia Region of the United States, numerous partnerships have been created between government, civil society, and the private sector to teach former coal workers new skills in energy audits, PV installation, energy efficiency and computer programming.

[Link for details](#)

WEATHERIZATION ASSISTANCE PROGRAM (WAP) IN THE UNITED STATES

The Weatherization Assistance Programme (WAP) in the United States focuses on low-income households, helping to increase energy efficiency of homes while ensuring health and safety. In the context of the 2009 Global Financial Crisis, USD 2 billion in stimulus funding was invested by the US Department of Energy, while another USD 715 million was leveraged from other funding sources. More than 340 000 homes were weatherised during the stimulus period, supporting 28 000 jobs and returning more than USD 1 billion in energy savings benefits over the life of the energy efficiency measures.

[Link for details](#)

CREATE GREATER DEMAND FOR ENERGY EFFICIENCY SOLUTIONS

THE 'RETURN AND SAVE' CAMPAIGN IN COLOMBIA

In 2017, Colombia implemented a technology replacement programme aimed at replacing over 1 million inefficient refrigerators. This programme offered a significant reduction in VAT for a new refrigerator and included a dimension to recycle the old refrigerators in an environmentally responsible manner. The new refrigerators used 25% less energy than the old units, resulting in significantly lower energy bills for consumers and reduced need for subsidies for low-income households while creating 12 000 jobs.

[Link for details](#)

THE OPEN DIGITAL TELEVISION PROGRAMME (TDT) IN MEXICO

In 2015, Mexico implemented the Open Digital Television Programme (TDT) to give away new LED televisions to low income households in exchange for old models. Existing less efficient analogue cathode ray tube televisions were in place in many households. These televisions needed a new digital set-top box to continue to work with the new digital signal, which would have added a new source of energy demand in millions of homes. The new models were on average 60% more efficient than the older models. The programme was part of a government initiative to shift to television networks to digital, and resulted in replacement of more than 10 million televisions in low-income households in the country. It also supported domestic production of LED televisions.

[Link for details](#)

STATE ENERGY EFFICIENT APPLIANCE REBATE PROGRAM (SEEARP) IN THE UNITED STATES

In the wake of the 2009 global financial crisis, the United States launched a technology replacement programme commonly referred to as 'Cash for Appliances' as a part of the 2009 Recovery Act. The programme promoted investment in energy-efficient

appliances, and state governments rolled out their own programmes to provide subsidies for the purchase of efficient residential appliances. Consumers could claim a rebate when they purchased the appliances that met specific energy efficiency requirements related to Energy Star. The programmes increased appliance sales by up to 10 percent during the rebate period, and the market share of efficient appliances increased 1 to 2 percent.

[Link for details](#)

ENERGY EFFICIENCY (PRIVATE RENTED PROPERTY) REGULATIONS IN ENGLAND AND WALES

New Minimum Energy Efficiency Standards in England and Wales came into force in 2018, requiring all rental properties to have a minimum Energy Performance Certificate (EPC) rating of E on the A to G performance scale. The regulations came into force for new lets and renewals of tenancies in April 2018 and will apply to all existing tenancies from April 2020. It will be unlawful to rent a property below the minimum E rating, unless there is an applicable exemption. Similar legislation exists in Scotland, where the requirements will be ratcheted up such that all private homes should reach a C EPC rating by 2030.

[Link for details](#)

DECREE ON ENERGY PERFORMANCE OF OFFICE BUILDINGS IN THE NETHERLANDS

A November 2018 decree in the Netherlands, requires all office buildings, with some exemptions, to have an energy performance label of C or higher from January 2023. This minimum requirement will rise to A class energy performance from January 2030. In 2019, around 15 000 office buildings did not conform to this C standards. In addition, since 2019, Dutch Government operations have led the way, only using offices which are newly built or energy neutral.

[Link for details](#)

CREATE GREATER DEMAND FOR ENERGY EFFICIENCY SOLUTIONS

ELECTRIC VEHICLE POLICIES IN NORWAY

Norway leads the transformation of vehicle markets with a 39% share of electric car sales, the highest level in the world. Experience in Consumer demand for these energy efficient vehicles are driven by a long-term stable policy framework with a range of tax incentives, such as registration fee and VAT. There are also strong national policies for vehicle chargers in the public space as well as for home charging.

[Link for details](#)

RENOVATION WAVE AND ENERGIESPRONG

The European Union aims to create scale in building renovation, and its 'renovation wave' initiative looks to driver larger scale upgrading of both public and private buildings. A pioneering approach that emerged in Europe known as Energiesprong is beginning to address barriers and create greater demand for retrofits through a complete efficiency intervention featuring pre-fabricated facades, rooftop solar and new heating installations, all taking place over the course of a week. It creates a volume market for energy efficiency solutions, and offers attractive and hassle-free installation and financing packages. Originating in the Netherlands, the approach is now being implemented in France, Germany and the United Kingdom, as well as in North America.

[Link for details](#)

ENERGY MANAGEMENT SYSTEMS (EMS) AND ISO 50001 IN GERMANY

Energy management systems analyse and control a company's energy consumption and identify opportunities for efficiency gains. In Germany, around 9 000 companies and public sector entities are using an EMS certified under the international standard ISO 50001. Government's policy actions and incentives have been key to facilitating the use of certified EMS, with the Federal Government providing funding for the installation of sensors and software programmes and for training and capacity building.

[Link for details](#)

REBATE FOR TOP ENERGY EFFICIENT APPLIANCES IN SOUTH KOREA

Korea's Rebate for Top Energy Efficient Appliances programme provides a reimbursement of up to 10% to consumers for purchasing government-certified energy efficient appliances. In 2020, the government is expanding the programme as part of the stimulus package from the Covid-19 pandemic. The range of appliances eligible for reimbursements has been expanded from 7 to 10.

[Link for details](#)

FOCUS ON FINANCE IN THE WIDER CONTEXT OF SCALED UP ACTION

UNNATI JYOTI BY AFFORDABLE LED LAMPS FOR ALL (UJALA) PROGRAMME IN INDIA

India has been successfully driving the transformation of lighting market, having replaced more than 350 million lamps with LED lamps through a large bulk procurement approach. Lamps are bought as large scale by a nationally-owned body, Energy Efficiency Services Limited, and then sold on to consumers. Positive economic, social and environmental benefits of lighting efficiency are communicated in different languages and innovative promotional materials, such as National UJALA Dashboard. The UJALA scheme has already created more than 35 000 jobs and reduced annual CO₂ emission by 3 million tonnes.

[Link for details](#)

INVESTOR CONFIDENCE PROJECT (ICP) IN THE UNITED STATES AND EUROPE

The Investor Confidence Project aims to support public programmes and facilitate private investment by enabling project aggregation and standardising the way energy efficiency projects are developed, documented and measured. Offered in Europe and North America, it provides a range of standardised technical requirements, a system for independently verified project compliance, and a network of connected providers.

[Link for details](#)

THE UNITED NATIONS ENVIRONMENT PROGRAMME FINANCE INITIATIVE (UNEP FI)

The United Nations Environment Programme (UNEP) partners with the global financial sector, including banks, insurers and investors, to mobilise private sector finance for sustainable development through its finance initiative (UNEP FI). Founded in 1992 in the context of the Earth Summit in Rio, the UNEP FI engages with these key financial partners to promote energy efficiency in their investment decisions and facilitate information exchange through its [Energy Efficiency Finance Platform](#).

[Link for details](#)

THE ENERGY EFFICIENCY FINANCIAL INSTITUTIONS GROUP IN EUROPE

Established in 2013 by the European Commission and the United Nations Environment Programme, the Energy Efficiency Financial Institutions Group (EEFIG) is a platform for an open dialogue among public and private financial institutions, industry representatives and sector experts to discuss the barriers to the long-term financing for energy efficiency and identify policy actions to address them. To scale up efficiency investments, organisations work together to change investment practices to consider efficiency aspects and inform financial institutions, investors and project promoters of the benefits of energy efficiency investments.

[Link for details](#)

EFFICIENT WORLD FINANCING FORUM

The Efficient World Financing Forum brings together leaders of development banks from all world regions, along with the IEA, to share diverse experiences in the implementation, delivery models and financing mechanisms for energy efficiency, with the ultimate goal of helping to inform approaches to encourage investment in energy efficiency at scale. The Forum was established in 2018 in response to IEA analysis showing that to achieve all cost-effective energy efficiency potential globally, average annual energy efficiency investment must double to 2025 and then double again to 2040. Participants in the Forum include the Asian Development Bank, African Development Bank, Development Bank of Latin America, European Bank for Reconstruction and Development, European Investment Bank, Green Climate Fund, Inter-American Development Bank, Islamic Development Bank, KfW, and the World Bank.

[Link for details](#)

FOCUS ON FINANCE IN THE WIDER CONTEXT OF SCALED UP ACTION

THE GREEN ON-WAGE (GO) FINANCIAL MECHANISM OF THE ECOFRIDGES PROGRAMME IN GHANA

Ghana has introduced a new mechanism for consumers to finance energy efficient and climate-friendly refrigerators and air conditioners. The programme facilitates the purchase of these appliances to be repaid overtime through salary reductions, in partnership with local private financial institutions and local suppliers. Emphasis is on local partners and supply chains, and on affordability for consumers.

[Link for details](#)

PROPERTY ASSESSED CLEAN ENERGY SCHEME IN THE UNITED STATES

Property assessed clean energy (PACE) provides building owners with upfront capital to finance energy efficiency investments in their buildings, and the funds are repaid through charges attached to their property tax bills. Emerged in the United States in 2014, over USD 6.6 billion has been invested through PACE securitisation, with the majority, USD 5.6 billion, going into residential projects, while USD 1 billion has been invested in commercial projects.

[Link for details](#)

EUROPACE FINANCING SCHEME IN EUROPE

EuroPACE is the European adaptation of the PACE scheme in the US, an on-tax financing mechanism that funds the renovation of in existing homes and offices. PACE financing covers up to 100% of renovation costs, and investors lend money for deep retrofits up-front and then get repaid regularly through an additional charge added to the property over a term of up to 20 years.

[Link for details](#)

NATIONAL ENERGY SAVINGS FUND IN THE NETHERLANDS

Since 2014, the Netherlands has provided a revolving loan facility, the National Energy Savings Fund, to fund private homeowners to finance a range of energy savings measures including insulation, efficient heating and solar PVs. The fund

has provided 24 000 low-interest loans of up to EUR 25 000 per housing unit, to private homeowners, and almost 200 loans to housing associations. By the end of 2019, the fund's loan portfolio had grown to EUR 395 million, with a further EUR 280 million of applications in the pipeline. In March 2020, the European Investment Bank provided a loan of EUR 150 million to the Netherlands' national fund, taking total funding available to EUR 1 billion.

[Link for details](#)

ENERGY UTILITY OBLIGATION PROGRAMMES

Energy utility obligations are a widely applied market based instrument that require retail suppliers or distributors of energy to achieve energy savings through their own actions or by contracting with third parties. The schemes encourage flexibility and innovation is identifying lower cost opportunities to deliver the savings. The costs are generally passed through to energy consumers, and in some cases, compliance with obligations can be traded in the form of 'white certificates'. Energy utility obligations are in place in 24 US States, 14 European countries, four Australian States and Territories, Brazil, Canada, China, Korea, South Africa and Uruguay.

[See IEA's analysis](#)

GREEN INVESTMENT BANK IN THE UK

Since 2012, the UK Green Investment Bank (GIB) has financed more than GBP 12 billion (USD 14.8 billion) UK green infrastructure projects, including the replacement of streetlights and the installation of energy management systems.

[Link for details](#)

CLEAN ENERGY FINANCE CORPORATION IN AUSTRALIA

Australia's Clean Energy Finance Corporation (CEFC) facilitates financial flow into a range of clean energy projects. The CEFC works with private-sector banks to roll out energy efficiency asset finance programmes through which they provide low-interest loans of up to AUD 5 million for energy efficiency projects.

[Link for details](#)

FOCUS ON FINANCE IN THE WIDER CONTEXT OF SCALED UP ACTION

KFW'S BUILDINGS FINANCE & INCENTIVE PROGRAMME IN GERMANY

KfW is a large socially-oriented investment bank that, among other activities, supports investment in energy efficiency projects in Germany. Its residential retrofit programmes offer a combination of performance-based grants and low-interest loans for retrofit projects, such as thermal insulation, renewable of windows and installation of heating/ventilation systems.

[Link for details](#)

ENERGY PRICE REFORMS IN SAUDI ARABIA

Saudi Arabia launched a series of energy price reforms in 2015, in the context of changing oil prices and goals to diversify the economy. These reforms worked to increase energy prices to consumers, the effects of which the government mitigated through a range of measures, such as the Citizen's Account scheme (cash transfer) and setting differentiated prices according to the level of consumption. The first phase of the reform led to almost 3 million tonnes of avoided CO₂ emissions, and the second phase more than 4 million tonnes.

[Link for details](#)

TECHNOLOGY DEMONSTRATION PROJECTS IN NEW ZEALAND

The Energy Efficiency and Conservation Authority (EECA) administers a fund for Technology Demonstration projects in New Zealand. The funding contributes to the cost of demonstrating proven technology or an innovative process improvement opportunity that has yet to be widely adopted. The project may focus on improving energy efficiency or reduce carbon emissions. EECA pays up to 40% of project costs, generally limited to NZD 100 000. For projects that result in energy and carbon savings through process heat technology or processes, funding can be up to NZD 250 000.

[Link for details](#)

LEVERAGE DIGITAL INNOVATION TO ENHANCE SYSTEMS-WIDE EFFICIENCY

INTERNATIONAL SMART GRIDS ACTION NETWORK

The IEA also has a number of Technology Collaboration Partnerships active in the area of digitalisation and energy that can provide insights and guidance towards future-proofing policies. For instance, the International Smart Grids Action Network (ISGAN), which brings together 23 countries and the European Union, is developing approaches to help manage electricity demand and support the integration of renewable energy, improve operational efficiency, and promote the use and uptake of energy efficient technologies.

[Link for details](#)

EUROPEAN ENERGY PERFORMANCE OF BUILDINGS DIRECTIVE (EPBD) AND A SMART READINESS INDICATOR (SRI)

The 2018 revision of the EPBD established a [smart readiness indicator](#) (SRI) for buildings, aiming to rate the capabilities of a building to adapt its operations to the needs of both the occupant and the grid in order to improve energy efficiency through the deployment of smart technologies. The SRI also aims at raising awareness among building owners and occupants of the benefits behind building automation and monitoring of energy consumption.

[Link for details](#)

BROOKLYN/QUEENS DEMAND MANAGEMENT (BQDM) PROGRAMME IN THE UNITED STATES

The Brooklyn/Queens Demand Management (BQDM) Programme demonstrates that customer load management can defer investments in grid networks. The USD 200 million programme launched by ConEdison in 2014, relies on a combination of utility-sided solutions and energy efficiency combined with demand management measures, such as LED retrofitting and smart thermostats, as well as on distributed energy resources and energy storage. By the end of Q4 2019, of the 58.7 MW total peak reduction, almost 27 MW came from energy efficiency measures alone. The programme successfully managed to produce sufficient savings (the original target was 52 MW) to delay the construction of an additional substation and was extended to 2021.

[Link for details](#)

EXEED PROGRAMME IN IRELAND

EXEED is a programme for incentivising, rewarding and facilitating energy efficiency in businesses in Ireland. It provides a framework for energy efficient design management for both new investments and upgrades to existing assets. The process puts energy management firmly on the design agenda, integrating the energy management discipline at the earliest stages of project or process design.

[Link for details](#)

SOLENT ACHIEVING VALUE THROUGH EFFICIENCY (SAVE) PROJECT IN THE UNITED KINGDOM

The demand-led peak reduction approach to defer grid upgrades was also used in the UK SAVE (Solent Achieving Value through Efficiency) project. It was shown that the adoption of LED lightbulbs can bring households annual savings of 90 kWh that when scaled up to the overall UK level could result in a peak load reduction of 1.3 GW. The local distribution utility, Scottish and Southern Electricity Networks, has expanded the use of these types of programmes into its everyday network operations, through a concept referred to as Social Constraint Managed Zones (SCMZ). SCMZs represent geographical regions where network requirements can be met by 'smart' solutions, ranging from battery storage to energy efficiency in customers' homes.

[Link for details](#)

MALAYSIA P2P ENERGY TRADING

Malaysia has launched a pilot project to test a peer-to-peer (P2P) electricity trading system. This 8 month pilot project uses a regulatory sandbox approach, enabling prosumers and consumers to trade excess electricity from solar PVs indirectly through grid operators. As a core strategy to bridge between electricity grids and demand-side energy management, P2P energy trading creates opportunities to scale up the integration of renewable energy and reduce peak demand and transmission congestion.

[Link for details](#)

LEVERAGE DIGITAL INNOVATION TO ENHANCE SYSTEMS-WIDE EFFICIENCY

SMART GRID INITIATIVE AND DEMONSTRATION PROJECTS IN KOREA

In 2010, Korea launched a National Smart Grid Roadmap - the country's first comprehensive policy framework to promote smart grids up to 2030. The roadmap included key investment and demonstration project plans such as the Jeju Island Smart Grid demonstration project. Subsequently, the Smart Grid Construction and Utilization Promotion Act was enacted in 2011. The act provides a legal ground for promoting smart grids in Korea and obliged the Ministry of trade, industry and energy (MOTIE) to formulate the Intelligent Grid Basic Plan every five years. The 1st Basic Plan was launched in 2012 with the 2nd released in 2018.

The success of Jeju Island project can be attributed to concrete institutional setup and comprehensive coordination across various stakeholders. To meet targets of engaging 30% of citizens in a real-time power market by 2030, the project has been used to conduct extensive research into end-user energy consumption habits and to better understand how to build user acceptance of technologies and new services. For instance, the project introduced a novel communication system between the utility and customers with automatic energy management functionalities to enhance energy efficiency, a new pricing scheme and consumer power trading.

Government investment of USD 56 million leveraged an additional USD 184 million of private sector investment. If scaled up as planned, smart grids in South Korea are expected to eliminate 230 million tonnes of GHG emissions, create 50 000 jobs annually and generate USD 64 billion worth of national demand for new technologies. Progress is ongoing. In 2018, Korea achieved 4.3 GW capacity of demand response. Further investments are planned to create new services including new business models based on big data.

[Link for details](#)

IEA'S READINESS FOR DIGITAL ENERGY EFFICIENCY POLICY FRAMEWORK

Policy could accelerate the adoption of digital technologies for energy efficiency. The IEA's Readiness for Digital Energy Efficiency Policy Framework offers insights into what policy considerations are important to exploiting the potential of digitalisation for efficiency. The framework is designed to ensure the benefits of digital energy efficiency are realised through policies that address a range of issues – from balancing data accessibility with data privacy, to helping remove regulatory barriers to innovation.

[See IEA's analysis](#)



THE PUBLIC SECTOR SHOULD LEAD BY EXAMPLE

GREEN PUBLIC PROCUREMENT IN THE EUROPEAN UNION AND UNITED ARAB EMIRATES

Public authorities are major consumers of energy, and have large purchasing power that can drive the market towards energy efficient products and services throughout supply chains. In Europe, the European Commission and several European countries developed common guidance that specify energy and environmental criteria for governmental procurement processes. Similarly, the UAE Ministry of Climate Change and Environment leads green procurement initiative in collaboration with relevant agencies to reduce the climate impact of governmental purchasing.

[Link for details on Europe](#)
[Link for details on UAE](#)

PROCUREMENT OF ELECTRIC FERRIES IN NORWAY

Norway set targets in 2018 to reduce emissions from cruise ships and ferries. The Norwegian fjords are popular tourist destinations, and there were concerns about the impact of increasing traffic on air pollution and health in local communities. By 2026, only ships with zero emission will be allowed, and Norwegian government incentivises investment in electric-powered ferries through a range of fiscal incentives.

[Link for details](#)

THE NATIONAL ENERGY EFFICIENCY FUND (NEEF) IN SPAIN

Spain established a dedicated fund for energy efficiency in 2014 to support technical assistance, training and information, and other measures. The funding comes a range of companies participating in national obligations, including gas and electricity retail/trading companies, petroleum products wholesale operators and wholesale operators of liquefied petroleum gas. From 2014 to 2019, the total fund amount was over EUR 1.1 billion. The fund covers all sectors and finances grants or loans-based programmes and measures of action including by municipalities and SMEs.

[Link for details](#)

GREEN MOSQUES AND BUILDINGS PROGRAMME IN MOROCCO

Morocco launched the Green Mosques Programme in 2015 with an aim to promote energy efficiency and the use of renewable energy in a range of religious and public buildings. The programme builds on collaboration across ministries and with the German agency for international cooperation. The project resulted in 260 new jobs and helped more than 100 mosques modernise their energy systems. The programme will be scaled up to invest in more than 1 000 mosques as well as the postal services, student dormitories and ministerial buildings.

[Link for details](#)

THE FEDERAL ENERGY MANAGEMENT PROGRAMME (FEMP) IN THE UNITED STATES

The United States sets energy and water reduction requirements and goals for federal agencies and facilitate their compliance through training, guidance and technical assistance under the [Federal Energy Management Program](#) (FEMP). It has been successful in driving efficiency action in public buildings, often involving energy service companies. A [recent bipartisan bill](#) would formally authorise the FEMP and put in place energy efficiency goals for agencies through 2030, aiming at 2.5% improvement per year.

[Link for details](#)

AUSTRALIA NATION BUILDING AND JOBS PLAN

Australia established a AUD 42 billion Nation Building and Jobs Plan in 2009, and the plan included a AUD 5.2 billion package for the construction and renovation of social housing with a focus on energy efficiency. The Social Housing Initiative generated an estimated AUD 1.1 billion in average annual value over its 4-year duration and created 14 000 jobs across Australia.

[Link for details](#)

THE PUBLIC SECTOR SHOULD LEAD BY EXAMPLE

EUROPEAN ENERGY PROGRAMME FOR RECOVERY (EEPR)

The European Energy Efficiency Fund (EEEF) was established in 2011 under the European Energy Programme for Recovery (EEPR) to remedy the effect of the 2009 financial crisis. EEEF provided funding of EUR 121 million to 11 separate projects, which leveraged additional investments of EUR 224 million. As of 2016, EEEF investments have realised CO₂ reductions of 250 000 tonnes.

[Link for details](#)

STATE SECTOR DECARBONISATION PROGRAMME IN NEW ZEALAND

In December 2019, the New Zealand Government announced NZD 200 million in capital funding to help reduce the public sector's emissions. This funding supports projects including low emissions heating and cooling, energy efficient lighting, and low emissions vehicles. Approximately NZD 10 million in funding has already been allocated to replace coal boilers in schools and hospitals with low-emission alternatives, with further announcements to come.

BUENOS AIRES LED PROGRAMME IN ARGENTINA

In 2013, Buenos Aires launched a project to replace the city's street lighting with LED lamps. The upgrade was completed in 2019, with 160 000 new lights installed, along with digital sensors. The project has reduced CO₂ emissions by more than 50 000 tonnes/year, cut the city's lighting bill by more than half, reduced maintenance costs by 30%, and improved safety throughout the city.

[Link for details](#)

[Link for details](#)

ENGAGE ALL PARTS OF SOCIETY

BUILDING PERFORMANCE STANDARDS (BPS) IN US CITIES

In the United States, a number of major cities are addressing carbon emissions generated by buildings through building performance standards (BPS), requiring direct action by building owners to meet city-mandated performance improvement targets such as reductions in energy consumption, emissions, natural gas and water use. BPS policies define high-performance buildings through a set of targets and long-term goals while providing flexibility to building owners in the choice of technologies and strategies to make improvements. BPS are supported by a range of incentives and technical assistance programmes. Cities track progress through detailed data collection, working closely with a range of key partners including the private sector and utilities.

[Link for details](#)

TVTC PROGRAMME IN CHINA

To address the energy security and urban air-pollution concerns in the transport sector, China initiated the Thousands of Vehicles, Tens of Cities (TVTC) programme in 2009 to accelerate the commercialisation of 'new energy vehicles' (NEV), which include hybrid electric vehicles, battery electric vehicles, and fuel cell vehicles. In the past 10 years, the national government, local governments, academic research organisations, and private companies have invested more than USD 1.79 billion to carry out NEV research and development, pilots and demonstrations, and commercialisation activities. The TVTC programme focused on public fleet demonstrations in 25 cities, with subsidies available from national and local governments.

[Link for details](#)

URBAN CAP-AND-TRADE SCHEME IN TOKYO

The City of Tokyo launched a cap-and-trade programme in April 2010. It is Japan's first mandatory emission trading scheme, under which over 1 100 office and commercial buildings and large factories that consume large quantities of fossil fuels are required to achieve individual carbon emission reduction targets that are strengthened periodically. To comply, facilities can choose

to reduce their emissions onsite or to reduce emissions by purchasing offset credits, including excess emission reductions credits, small and midsize facility credits, renewable energy credits, and outside of Tokyo credits. CO₂ emissions were reduced by 27% in 2017 compared to the base-year emissions (2009), and the introduction of energy efficiency equipment, such as lighting, fans and air conditioning equipment, have been key to this decrease in emissions in the building sector despite continuous growth in floor space.

[Link for details](#)

BUILDINGS EFFICIENCY POLICY APPROACHES IN INDIA

Under the Energy Conservation (EC) Act 2001, all the State Governments and UT Administrations have established a State Designated Agency (SDA) to coordinate, regulate and enforce the provisions of this Act within the State. Additional responsibilities have either been assigned to one of the existing departments of the State Government, or a dedicated stand-alone SDA has been set up for energy efficiency. For example, most of the responsibility has been assigned to the State's Renewable Energy Development Agency, the Electrical Inspectorate, the Distribution Company, or the Power Department, with only 6% of states setting up a stand-alone SDA. India's Bureau of Energy Efficiency provides support to SDAs to build and strengthen their institutional, technical and financial capacities for undertaking energy efficiency activities at the State level. Financial assistance is available to the SDAs to help fund their coordination, regulatory and enforcement activities, as well as contributions to the State Energy Conservation Fund.

[Link for details](#)

CLIMATE PARTNERSHIPS IN DENMARK

Denmark launched the Government's 13 'climate partnerships' in November 2019. Representing all branches of Danish business, these 13 business sectors were asked to present their sectoral plans for green transitions towards 2050, which will be central to achieving Denmark's target of reducing its greenhouse gas emissions by 70% by 2030.

[Link for details](#)

ENGAGE ALL PARTS OF SOCIETY

NATIONAL STRATEGY TO COMBAT ENERGY POVERTY IN SPAIN

Spain set a national strategy to combat energy poverty in 2019, committing to improving living conditions of and supply of affordable energy to vulnerable households and businesses. Consumption of on-site generated electricity is central to this national strategy as it allows for a transition towards a more decentralised, affordable energy system where local stakeholders and prosumers respond to supply and demand of energy. Spain passed a royal decree in 2019 that removed administrative and technical barriers for the integration of renewables into local grid systems. This legislation concretises a 'community' approach, allowing a group of self-consumers, whether individuals or companies, to share energy supplied from the same generation plant.

[Link for details](#)

SUSTAINABLE ENERGY COMMUNITIES IN IRELAND

Ireland takes a partnership approach to engage different energy users in developing Sustainable Energy Communities (SEC), such as homeowners, sports clubs, community centres, local businesses and churches. This approach is gaining support across the country, and over 300 communities are now involved. The SEC approach builds on engagement of all relevant actors in local communities, collectively aiming at common goals. Some areas are most interested in local economic development, including jobs, while others are focussed more on improving health and well-being through building renovations and the integration of renewable energy technologies.

[Link for details](#)

COOPERATION BETWEEN NATIONAL AND SUBNATIONAL ACTORS IN MEXICO

In the states of Campeche and Yucatan, Mexico, a combination of political will, support from local, national and international actors, the private sector and academia are driving towards the adoption of building codes and standards in public buildings. Campeche has committed to reduce energy intensity to 1.9 GWh per billion MXN, while Yucatan has committed for all new buildings in their jurisdiction

to operate at net zero carbon from 2030 and for all buildings to meet this goal by 2050. A number of organisations, including the IEA, have been working to share international experiences and best practices including organising technical workshops bringing together local experts from various state agencies and other actors across the building sector, academia and civil society.

[Link for details](#)

CLIMATE CHANGE ACT IN THE PHILIPPINES

The Philippines's Climate Change Act passed in 2009, and requires local governments to prepare and regularly update Local Climate Change Action Plans while also giving the national government the mandate to ensure the implementation of those plans through capacity building and financing. As part of this law, the Department of the Interior and Local Government created a capacity-building programme for local officials giving them the tools they needed to undertake their climate action planning.

[Link for details](#)

INCLUSIVE NATIONAL URBAN PLAN IN CHILE

In 2012, the Presidential Advisory Commission on National Urban Development Policy developed a national urban policy (NUP) with explicit goals to improve quality of life, decentralise decision making, foster institutional coordination, provide a reference for policy reform, and create greater certainty for investors. To coordinate the NUP, an inclusive advisory committee consisting of 28 people including current and former ministers, members of parliament, civil society, labour unions, academia, and professional experts was created. The council achieves its goals by proposing changes to sectoral policies that affect urban development, proposing reforms to national legislation, and creating regional working groups to help adapt the NUP to local contexts.

[Link for details](#)

LEVERAGE BEHAVIOURAL INSIGHTS FOR MORE EFFECTIVE POLICY

LEVERAGING BEHAVIOURAL INSIGHTS TO UPDATE EU ENERGY EFFICIENCY LABELS

In 2015, the European Commission conducted a cross-country study aimed at testing several behaviourally-informed label designs. The study comprised experiments carried out both online and in physical stores in 9 EU countries. Insights gained from the study led to the revision of the energy efficiency labels: shifting from the existing A+++ to G to a new alphabetic scale ranging from A to G. The new scale was found to be better understood by consumers. This exemplifies how simplification and presentation of information building upon behavioural insights can act as a lever for behavioural change using a range of policy mechanisms, including information provision, awareness campaigns, and mandatory certification schemes.

[Link for details](#)

SMART DEFAULT OPTIONS IN AIR CONDITIONERS IN INDIA

In India, the Central Government, in consultation with the Bureau of Energy Efficiency (BEE), recently mandated that all room air conditioners manufactured, commercially purchased or sold in India shall have a default cooling set-point temperature of twenty-four degrees Celsius. This policy is aligned with a well-known insight from behavioural sciences: because of inertia, very few consumers tweak the default settings of their air conditioners. Setting the default options of appliances to the most energy-efficient option increases energy savings with minimal inconvenience to energy users, who can still adjust their appliance settings according to their preferences.

[Link for details](#)

SOCIAL BENCHMARKING IN HOME ENERGY REPORTS IN THE UNITED STATES

In the United States, utility companies have tested different formats of home energy reports, comparing household energy consumption with that of similar neighbours. Comparing household energy use to that of a more energy-saving neighbour can reduce total energy usage: highlighting the social popularity of desirable behaviours can increase their adoption. Studies have shown that these home energy report evaluations have saved about 2% of energy consumption across twelve utilities in the United States.

[Link for details](#)

STRENGTHEN INTERNATIONAL COLLABORATION

THE MONTREAL PROTOCOL

The Montreal Protocol was an agreement adopted in 1987 to phase out the use of the ozone-depleting substances like chlorofluorocarbons (CFCs), which are commonly found in refrigeration, foam extrusion, fire extinguishing, and other common industrial products and processes. Though industrialised countries were responsible for 86 percent of CFC usage, the transition away from ozone depleting substance (ODS) technologies still represented a substantial cost to emerging economies. In 1990, the Multilateral Fund for the Implementation of the Montreal Protocol was established to support this transition process. The Fund was the first financial mechanism to be born from an international treaty, and represents the belief that, though all countries have a common responsibility to reduce environmental damage, that responsibility is differentially distributed. In this way, the majority users of ODS technologies support the transition to non-ODS technologies internationally and help to offset the likelihood that the use of cheaper ODS technologies will simply be shifted to emerging economies, rather than reduced outright.

[Link for details](#)

THE PACIFIC APPLIANCES LABELS AND STANDARDS (PALS)

Pacific Island Countries (PICs) established a regional programme known as the 'Pacific Appliances Labels and Standards' or 'PALS' in 2012. The PALS has supported ten PICs since 2012 for designing and implementing Minimum Energy Performance Standards and Labelling (MEPSL) for their highest energy-consuming appliances. An important element of the programme is regional collaboration, working closely with the South Pacific Community, and aligning the efficiency standards with neighbouring countries, such as Australia and New Zealand.

[Link for details](#)

THE SUPER-EFFICIENT EQUIPMENT AND APPLIANCE DEPLOYMENT INITIATIVE (SEAD)

The Super-efficient Equipment and Appliance Deployment Initiative (SEAD) has been one of the flagship Clean Energy Ministerial (CEM) energy efficiency initiatives. With 19 participating member countries as well as partners, SEAD has established a vibrant international community of practice helping elevate the discussion on equipment and appliance energy efficiency policies to the highest levels globally. Employing current best practices in economies that are participating in SEAD can, by 2030, reduce annual electricity demand by 2 000 TWh, annual fuel energy demand by 30 million tonnes of oil equivalent, and carbon dioxide emissions by 11 billion metric tonnes over the next two decades. SEAD has been instrumental in the development of the Indian standards and labelling programme and has enabled the transfer of SEAD member government experiences and best practices to countries including Kenya, Mexico the Philippines, Brunei, and Chile. Since September 2019, the IEA has taken over the coordination of SEAD and, together with members, is developing a portfolio of activities and resources to ensure sustained and scaled-up relevance and value of the initiative.

[Link for details](#)

GLOBAL COMMISSION FOR URGENT ACTION ON ENERGY EFFICIENCY

RECOMMENDATIONS OF THE GLOBAL COMMISSION

These recommendations are made by the Global Commission for Urgent Action on Energy Efficiency, an independent group of global leaders and thinkers brought together to consider how faster progress can be made on energy efficiency through stronger policy action. The recommendations do not necessarily reflect the views or policy of the IEA Secretariat and/or of the individual IEA member countries. The IEA makes no representation or warranty, express or implied, in respect of the publication's contents (including its completeness or accuracy) and shall not be responsible for any use of, or reliance on, the publication. Unless otherwise indicated, all material presented in figures and tables is derived from IEA data and analysis.

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