



ACCELERATING SDG 7 ACHIEVEMENT

# POLICY BRIEF 04

DOUBLING THE GLOBAL RATE  
OF IMPROVEMENT IN ENERGY  
EFFICIENCY

7 AFFORDABLE AND  
CLEAN ENERGY





# **POLICY BRIEF #4**

## **DOUBLING THE GLOBAL RATE OF IMPROVEMENT IN ENERGY EFFICIENCY**

### **Developed by**

UN Environment, Copenhagen Centre on Energy Efficiency, International Energy Agency (IEA)

### **In collaboration with**

UNECE, UNESCWA, UNIDO, Federal University of Rio de Janeiro and FIA Foundation

## KEY MESSAGES

### Status of energy efficiency and progress towards achieving SDG 7 objectives

- Improving energy efficiency is critical to achieving all the Sustainable Development Goals. For example, reducing electricity waste (SDG 12) by appliances and equipment means that utility companies can offer electricity to more clients without having to build additional power plants. This helps to keep electricity affordable and reliable (SDGs 1, 7 and 8), which is essential for storing food and medicines (SDGs 2 and 3), running competitive businesses (SDGs 8 and 9), and keeping homes, schools and cities well-lit, comfortable and efficient (SDGs 3, 4 and 11). In turn, growth in air pollution and greenhouse gas emissions are mitigated (SDGs 13 and 15).
- Doubling the global rate of energy efficiency progress is a key enabler of the sustainable energy transition. Every unit of energy saved lowers the energy requirements for renewables expansion and universal access provision. The IEA's Sustainable Development Scenario, which achieves universal access to modern energy by 2030, significantly reduces the damage caused by both indoor and outdoor air pollution, and puts the global energy system on track to achieving the Paris Agreement. The scenario shows energy efficiency accounting for 44 per cent of the cumulative greenhouse gas emissions reductions by 2040 (IEA, 2017).
- About 90 per cent of the Nationally Determined Contributions submitted under the Paris Agreement mention energy efficiency (REN21, 2016). While many countries have put concerted energy efficiency programmes in place, the current rate of global energy efficiency progress falls far short of the annual rate of 2.7 per cent needed between now and 2030.

### Priority actions

- Well-designed, -implemented, and -enforced energy efficiency policies and action plans, including building codes for residential and commercial facilities with energy performance requirements for new construction and major renovations, minimum energy performance standards and labels for electric and electronic products and vehicles, and ambitious sectoral policy approaches, recognizing the multiple development benefits of energy efficiency.
- Combined action on energy efficiency and certain refrigerant gases Significant opportunities for action towards energy efficient cooling and environmentally sound air conditioning exist under the global policy mandate provided by the Kigali Amendment to the Montreal Protocol.
- Robust energy efficiency data collection systems, energy efficiency indicators and clearly defined metrics will help policymakers understand the current state and trajectory of energy use in their economies (including at the subnational level, and by different sectors and end uses), enabling them make informed policy decisions and investments.
- Improve progress in supply-side efficiency: Significant supply side energy efficiency gains are largely untapped in electricity generation, transmission and distribution.
- Maintain global attention and advocacy on energy efficiency as a priority development action area, energy sector reforms, including through capacity-building and empowerment of non-state actors and public stakeholders.
- Develop cost-reflective energy tariffs, and reform damaging fossil fuel subsidies both in energy consumption and energy supply.
- Mainstream energy efficiency procurement and facilitate private sector investment in energy efficiency through training and capacity-building at all education levels.
- Pursue integrated systems approaches on energy efficiency across sectors as a package together with renewables and energy access, acting at the city and country level.

## ENERGY EFFICIENCY AND THE SDGs

### Energy efficiency—more recognition and political will

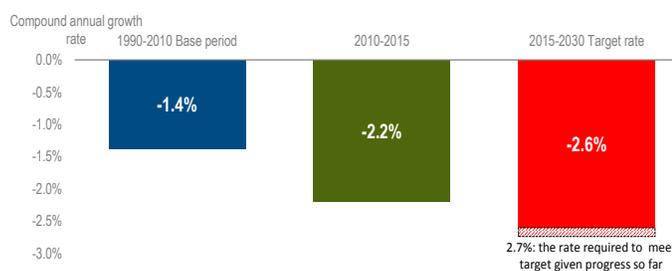
The importance of energy efficiency is increasingly recognized in countries’ low-emission and sustainable development strategies and policymaking. There is a surge in adoption of energy efficiency targets and policies, especially in developing countries. Out of the 189 countries that submitted INDCs, 147 countries mentioned renewable energy, and 167 countries mentioned energy efficiency (REN21, 2016). Among the NDCs submitted by developing and emerging economies, 79 included energy efficiency targets (REN21, 2017). About 31.5 per cent of global final energy use is now covered by mandatory policies, which are most effective in improving overall energy efficiency levels, up 17 percentage points since 2005 (IEA, 2017).

By the end of 2016, at least 137 countries had enacted some kind of energy efficiency policy, and at least 149 countries had enacted one or more energy efficiency targets. Of these countries, 48 enacted a new or revised policy in 2016, and 56 countries adopted a new target in 2015 or 2016 (REN21, 2017). Many countries are also taking substantive energy efficiency actions in their effort to reduce urban air pollution, thereby creating local jobs, as well as improving national energy security.

Another boost to global commitments towards energy efficiency improvement came in October 2016, after a historic amendment to the Montreal Protocol to phase down hydrofluorocarbons, climate-harming greenhouse gases mainly used in air conditioning and refrigeration. Philanthropic funds dedicated US\$ 53 million to help developing countries move faster towards energy efficient and climate-friendly cooling and air conditioning so as to double the climate benefits.

Figure 4.1

### Change in global primary energy intensity relative to target



Source: IEA Energy Balances database (2017)

### Progress towards achieving the SDG 7 energy efficiency target

Globally, the energy efficiency improvement rate has been accelerating towards the SDG target for energy efficiency, that is, to double the global rate of improvement in energy efficiency by 2030. Global energy intensity—measured as the amount

of primary energy demand needed to produce one unit of gross domestic product (GDP)—declined by 2.2 per cent on average from 2010 to 2015. While this progress is encouraging, more needs to be done to reach the overall SDG 7 target for energy efficiency improvement by 2030.

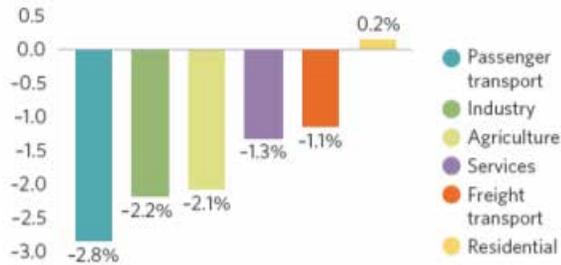
Energy intensity levels in different countries vary widely, depending on their economic structure and development, technology status, and energy mix. Some low-income countries and oil-exporting countries have high primary energy intensity due to their reliance on traditional biomass use and oil dependence, while some developed countries like Denmark, the UK and Japan, have lower primary energy intensity.

In the majority of developed countries, peak energy use occurred between 2005 and 2010. Total energy demand for OECD countries as a whole peaked in 2007. This means that despite these countries’ economy growth and income increase, their energy use is no longer increasing. While the majority of countries have declining primary energy intensity, some countries in Africa and South America are seeing an opposite trend. There are also major differences in the energy intensity changes among the big energy consuming countries and regions. For example, in 2016, energy intensity declined by 2.9 per cent in the United States and by 1.3 per cent in the European Union, while China’s primary energy intensity fell by 5.2 per cent, making it the country with the biggest energy efficiency improvement. Without China, the decrease in global intensity in 2016 would have been only 1.1 per cent (IEA, 2017).

Among the major energy-consuming sectors, industry is the most important contributor to declining global energy intensity, with an annual reduction of 2.2 per cent in 2012–2014. The residential sector had a small increase in energy intensity (measured in energy consumption per capita) (See figure 4.2). In transport, the progress is encouraging, as widespread diffusion of fuel efficiency standards helped accelerate reductions in energy intensity (measured in energy consumption per passenger-km or ton-km), with passenger transport progressing at 2.8 per cent a year, compared with just 1.1 per cent a year for freight transport. The strongest improvements in the transport sector are seen in passenger buses (4.8 per cent a year since 2010) and sea freight (3.7 per cent) (World Bank and IEA, 2017). Buildings have a long use life, and their energy performance has a high impact on the overall energy efficiency level of service and residential sectors. Given the fact that 36 per cent of global final energy use is consumed in buildings, there is a strong need to improve the energy efficiency of buildings.

Figure 4.2:

**Relative improvement in final energy intensity by end-use sectors, 2012–2014** (Compound annual growth rate of final energy intensity, per cent)



Source: World Bank and IEA, Global Tracking Framework 2017 - Progress Toward Sustainable Energy

### Multiple benefits of energy efficiency

Energy efficiency interventions have multiple benefits that are often not taken into account when designing policies aimed at meeting one objective. At the whole economy level, cost-effective energy efficiency investments boost economic growth, by improving business productivity and increasing consumers' disposable income.

Some energy efficiency measures have impacts that cut across many areas. For example, efficient building refurbishment programmes can reduce fuel poverty, improve indoor air quality and tackle chronic health conditions, cut carbon emissions, reduce fuel imports, improve energy system reliability, regenerate neighbourhoods, increase asset values and, during the investment phase, provide local employment opportunities.

### Efficiency and smart systems

“Smart” energy solutions can help reap the benefits of energy efficiency faster and at larger scale. Use of information and communications technology (ICT) to improve energy management is growing across the value chain. From smart generation and distribution (grids), to smart building and home systems and smart mobility, technology options are commercializing and reaching wider markets, utilizing advanced mobile telecommunication and Wi-Fi applications.

### Behaviour and behavioural change

Despite the faster deployment of energy efficient technologies, human behaviour underpins the effectiveness of policies and measures. A smart home avoids wasting energy only if its owner utilizes the features controlling energy use. The mere fact the technologies (such as efficient appliances, thermostats or controls) are installed is not enough. For example, a homeowner who leaves the heating or cooling on when away from home does not achieve

any energy efficiency gains.

### Myths

“If energy efficiency really was so cheap, it would happen anyway.” Some energy efficiency progress does take place without government intervention. In the most energy intensive industries, more (although not all) available cost-effective efficiency options are taken up, but other sectors suffer from market failures related to lack of information, misaligned incentives, the bounded rationality of consumers, and energy prices that do not take into account the full societal costs of energy consumption, lead to a significant underinvestment in energy efficiency (Brown 2001; Gerarden et al., 2015).

“Energy efficiency is only for developed countries.” The cost of energy efficient technologies is decreasing at a fast rate, largely due to commercial deployment at scale. Multiple energy efficiency financing options are now available.

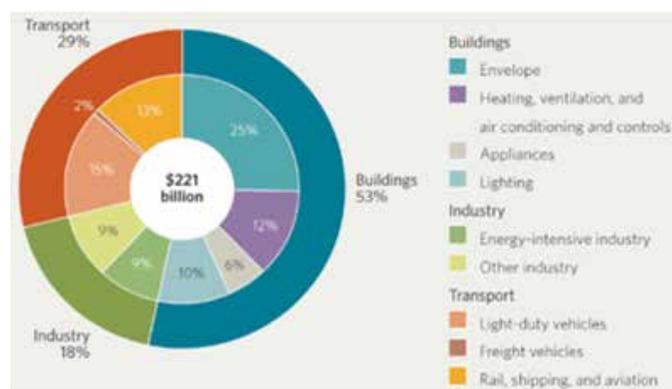
### Measures to fill the energy efficiency gap

Doubling the global rate of energy efficiency improvement by 2030 would require more and faster energy efficiency action by 2030, to catch up on the lag caused by the slow energy efficiency improvements since 2010. Despite 2012–2014 being slightly better than 2010–2012, rapid development in developing countries and emerging economies implies a need to act now to avoid lock-in of inefficient technologies.

Some of the policies being used to promote energy efficiency include: minimum (mandatory) energy performance standards and labelling schemes; competitive tenders and procurement; fiscal policies; building codes; regulation and pricing; research schemes towards innovation; and advocacy and awareness campaigns. Energy efficiency policies are being implemented in an increasing number of developing countries and emerging economies.

Relatively low energy prices can pose a risk to the continued improvement of energy efficiency, lowering the economic attractiveness of saving energy and investing in energy efficiency.

Figure 4.3  
Global incremental investment in energy efficiency by sector and subsector (2015)



Source: IEA, Energy Efficiency Market Report 2016

## Policy implications and recommendations

### Energy efficiency in energy access

Energy efficiency has an important role to play in delivering universal access to electricity and clean cooking. More efficient appliances enable constrained electricity grids to provide power for more energy services, and can significantly improve the affordability of off-grid renewable systems.

Compared to a bundle of appliances (four light bulbs, television, fan and refrigerator) with a standard level of efficiency, highly efficient appliances, used with off-grid solar, would save households an average of US\$ 150 per year. The additional costs associated with efficient products can be paid via mobile phone as part of a general energy service package (IEA, 2017a).

More generally, there is a role for government in supporting a market transformation towards more efficient products through the use of minimum energy performance standards on new and imported goods, and raising awareness through labelling programmes and other information policies.

### Energy efficiency in renewable energy deployment

Energy efficiency and renewable energy targets are inextricably linked, with progress in either area making it easier to meet both targets.

Faster progress on renewables reduces the world’s primary energy intensity. Faster progress on efficiency means that less renewable energy deployment is needed to improve the share of renewable energy in total final energy consumption. Given the relative cost-effectiveness of energy efficiency interventions, making progress on efficiency is particularly important in reducing the overall costs of sustainable energy development.

In this context, there is a key role for government in considering energy efficiency policies in connection with renewable and wider energy systems policies. In many cases, a ramp up in energy efficiency ambition would be the most cost-effective strategy to pursue first.

Recent examples where energy efficiency and renewable energy are integrated in policymaking include the EU Nearly Zero Energy Building Directive (2012), the Mexican Sustainable Housing Programme (2016) and the Indian Energy Conservation Building Code (2017).

### Barriers, drivers and enablers

Governments play a crucial role in creating enabling environments for energy efficiency deployment. This section lists key top-down measures that can help overcome the main hindrances to full energy efficiency development.

Energy pricing reforms through the adoption of market-oriented principles, progressive pricing, and the removal of fossil fuel subsidies are some of the strongest tools to align market signals with environmental goals.

Global fossil fuel subsidies were on the order of US\$ 5.3 trillion in 2015, or 6.5 per cent of global GDP, according to the IMF (Cody et al., 2015). Fossil fuel subsidies are 3.5 times larger than the financing required to meet the SDGs for basic social protection, universal health and education.

Energy efficiency at scale requires aggregation of many small energy savings, which taken individually usually translate into small-size investments and proportionately high associated transaction costs, discouraging financial institutions to consider such investments. Governments can lead by example by mainstreaming energy efficient public procurement and address the lack of awareness among investors about energy efficiency projects and technologies, high-perceived end-user credit risks, low collateral asset value, high upfront costs and short payback period requirements.

Governments must ensure that sufficient human and financial resources are allocated to all units within ministries, national and regional administrations responsible for the development and enforcement of energy efficiency regulations, secondary legislation and programmes.

Among the most internationally successful implementation policies on energy efficiency is the adoption of minimum performance standards for energy-using products and buildings, together with information to consumers through labelling schemes and building codes that require energy efficiency standards. The potential savings for global regulations on energy efficient products if current minimum energy performance requirements had been harmonized globally would be on the order of 8,950 TWh, equivalent to closing 165 coal-fired power plants, or taking 132 million cars off the road (European Commission, 2015).

Detailed, reliable, timely data collection on energy use in all economic sectors has proven to be critical to the deployment of strategies and policies by governments and facilitation of private investment in energy efficiency, particularly by energy service companies. Moreover, the introduction of energy management systems and follow-up monitoring and evaluation efforts help to raise the transparency of actions and build confidence in energy efficiency as an investment proposition.

To deliver energy efficiency at scale, there is a need to increase capacity-building and the number of qualified workers on energy efficiency. Tertiary education, as well as technical vocational education and training, need to capacitate energy efficiency “white-collar” and “blue-collar” professionals by “greening” existing skills and providing new skills. From national and local government officials to professional practitioners, education associated with the energy transition should receive special attention on the way to the 2030 Global Agenda targets. Training and capacity-building provide an employment pathway towards greener industry, with enhanced engendered training opportunities.

Peer-to-peer exchanges and South-South Cooperation represent knowledge sharing, training and capacity-building options for countries and their experts.

#### **Multi-stakeholder action and international cooperation**

Energy efficiency action is of interest to various stakeholder groups. It is happening under several overarching multilateral frameworks: the 2030 Development Agenda and its goal on energy, the climate agenda with the 2015 Paris Agreement, CO<sub>2</sub> limits for new fleet by the navigation and aviation sectors, and in 2017 the Kigali Agreement on refrigerants.

The Sustainable Energy for All initiative was instrumental in raising the political relevance of energy efficiency as an integral part of SDG 7, and the Global Tracking Framework reports have been maintaining the focus on progress towards the global 2030 energy efficiency target.

Countries have been individually and collectively adopting and enhancing their energy efficiency ambitions through strategies and plans. The ASEAN, G20 and the Clean Energy Ministerial have made energy efficiency a high policy priority.

Partnerships with the private sector aim at enabling faster market transformation for energy efficient products and services. Consumer groups have played important roles in awareness raising efforts, and a significant portion of the target beneficiaries are urban dwellers. Bringing groups together around a shared vision, with complementary action, is necessary to ensure the collective impacts required.

Partnerships and action by subnational and non-state actors

Action by subnational and non-state actors, including regional and local governments and businesses, is key to enhancing future progress on climate and sustainable energy.

The 2017 UN Environment Emissions Gap Report assessment suggests that the aggregated additional impact of the various non-state initiatives is of the order of a few Gt CO<sub>2</sub> eq in 2030, over and above current NDCs (UN Environment, 2017). This is potentially a significant contribution to closing the gap. Enhanced monitoring and reporting of non-state actions and resulting emissions reductions will be essential to making pledged actions transparent and credible.

The Marrakech Partnership for Global Climate Action was launched by the High-Level Champions at the COP22 in 2016 and is designed to structure and enhance coherence of the activities of the various coalitions, initiatives and organizations with a view to mobilizing climate action up to 2020 by parties and non-party stakeholders.

The first Yearbook of the Marrakech Partnership informs parties about what has been achieved during the year by non-party stakeholders, and spotlights how pre-2020 ambition can be accelerated. The Yearbook highlights three key emerging trends:

- Climate action in the context of the Marrakech Partnership is growing and getting more diverse; more non-party stakeholders, subnational governments, businesses and civil society organizations are making commitments and taking action. Many of those actions, in addition to mitigation, relate to increasing resilience.
- Climate action is spreading to the South and has scaled up in the lowest-income countries, facilitated by links with the SDGs and the Sendai Framework for Disaster Risk Reduction.
- Climate action is delivering: initiatives are moving forward from being just commitments on paper and are delivering a variety of outputs and creating the conditions needed to fully meet commitments.

Worldwide, energy efficiency action has to be maintained, scaled up and accelerated for the SDG 7 target on energy efficiency to be attained by 2030, and to deliver throughout the timeframe on a range of multiple benefits across the other SDGs.

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