



POLICY BRIEF #4

DOUBLING THE GLOBAL RATE OF IMPROVEMENT IN ENERGY EFFICIENCY

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This document is a part of a series of Policy Briefs being developed to support SDG7 review at the UN High-Level Political Forum to be held in July 2018. The objective is to inform intergovernmental discussions by providing substantive inputs on SDG7 and its interlinkages with other SDGs prepared through inclusive multi-stakeholder consultation processes. The development of these Policy Briefs is coordinated under the auspices of the Ad Hoc Informal Multi-stakeholder Technical Group of Advisors on SDG7.

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WHY IS ENERGY EFFICIENCY IMPORTANT FOR SUSTAINABLE DEVELOPMENT?

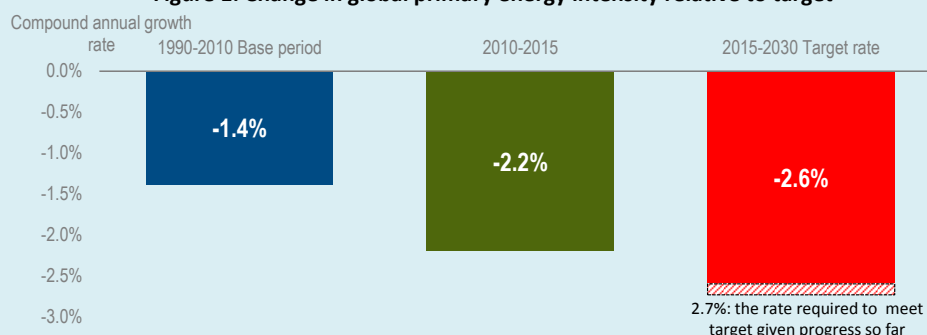
- **Improving energy efficiency is critical to achieving all Sustainable Development Goals.** For example, reducing electricity waste (SDG 12) by appliances and equipment means that utility companies can offer electricity to more clients without having to build additional power plants. This helps to 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, thereby easing the burden of attaining each. Efficiency is essential to making the rapid progress required. In 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, energy efficiency accounts for 44% of the cumulative greenhouse gas emissions reductions by 2040 (IEA, 2017).
- The Paris Agreement is the first multilateral agreement on climate change covering almost all of the world's emissions. **About 90% of the Determined Nationally Determined Contributions submitted mention energy efficiency** (UNFCCC, 2016).

KEY MESSAGES

Status of energy efficiency and progress towards achieving SDG7 objectives

- Global energy efficiency, as measured by the world's primary energy intensity, has improved at a faster rate (2% per year) since 2010 than in the previous two decades (1.4% per year). However, this rate of progress still falls far short of the annual rate of 2.7% now needed over the period to 2030 to put the world on a sustainable development pathway (Figure 1). The rate of energy efficiency improvement will not reach this level without a significant ramp up in global policy ambition.

Figure 1: Change in global primary energy intensity relative to target



Source: IEA Energy Balances database (2017)

Priority actions over the next four years

- **Well-designed, implemented, and enforced policies are essential to foster widespread and lasting improvements in energy efficiency.** Building codes for residential and commercial facilities should include energy performance requirements for new construction and major renovations. These should be complemented by minimum energy performance standards and labels for electric and electronic products and vehicles that reference international best practices and are regularly updated to address performance improvements and cost reductions in available technologies.
- **Ambitious cross-sectoral integrated policy approaches should be a priority.** China has made strong gains in its industry energy efficiency over the last 10 years via mandatory intensity through its Top 1 000 and Top 10 000 programmes. In Europe, progress has been aided by incentive schemes, often based on reductions in tax liabilities, in exchange for the achievement of energy intensity targets or the implementation of energy management systems. India has recently introduced sector targets too, with compliance allowed to be traded between companies.
- **Combined action on energy efficiency and certain refrigerant gases increases the benefits for the climate and ozone.** Significant opportunities for action exist under the global policy mandate provided by the Kigali Amendment to the Montreal Protocol.
- **Robust data and clearly defined metrics are essential for effective policy action.** They help policymakers understand the current state and trajectory of energy use in their economies, enabling them make informed policy decisions and investments. Different aggregation and disaggregation of energy efficiency data – at national, sub-national levels, by sector and sub-sectors, and by supply and end uses – allow focusing policy interventions where

needed and where they are most effective. The World Bank's Regulatory Indicators for Sustainable Energy report provides a means to benchmark progress across countries on national energy efficiency policies, among others

- **Demand side efficiency is improving but progress in supply side efficiency remains slow.** The key end use sectors in the economy usually addressed are buildings (residential and commercial), industrial facilities (manufacturing and processing), and transportation (ground, air and marine). At a lower tier, policy-makers target major end uses, such as lighting, heating, cooling and transport. 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.

Priority actions towards 2030

Higher level transversal measures needed include:

- Develop cost-reflective energy tariffs and reform damaging fossil fuel subsidies both in energy consumption and energy supply.
- Implement solid data collection systems and produce energy efficiency indicators, following best practice at international standards.
- Develop energy efficiency policies and action plans at national and local level and care for its full enforcement and monitoring.
- Mainstream energy efficiency procurement and facilitate private sector investment in energy efficiency through training and capacity building at all education levels.
- Further prioritise supply side efficiency alongside demand side efficiency.
- Recognise and value the multiple development benefits of energy efficiency.
- Involve non-state actors at a wider scale and empower them to lead on energy efficiency action.
- Pursue integrated systems approaches on energy efficiency across sectors as a package together with renewables and energy access, acting at city and country levels.

ENERGY EFFICIENCY AND THE SDGs

Energy efficiency - more recognition and political will

The importance of energy efficiency is increasingly recognised in countries' low-emission and sustainable development strategies and policy making. 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. Among the NDCs submitted by developing and emerging economies, 79 included energy efficiency targets. 31.5% of the global final energy use is now covered by mandatory policies, which are most effective in improving overall energy efficiency level, up 17 percentage points since 2005.

By end-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. Many countries are also taking substantive energy efficiency actions in their effort to reduce urban air pollution, creating local jobs, as well as improving national energy security.

Another boost to global commitments towards energy efficiency improvement came in October 2016, after an historic amendment to the Montreal Protocol to phase down hydrofluorocarbons, a climate-harming greenhouse gas that is mainly used in air conditioning and refrigeration. Philanthropic funds dedicated \$53 million to helping developing countries transit faster towards energy efficient and climate-friendly

cooling and air conditioning, so as to double the climate benefits.

Progress towards achieving the SDG7 energy efficiency target

Globally, the energy efficiency improvement rate is accelerating toward the SDG target for energy efficiency - doubling the rate of energy efficiency improvement by 2030. Global energy intensity – measured as the amount of primary energy demand needed to produce one unit of gross domestic product (GDP) – fell by 1.8% in 2016. Since 2010, intensity has declined at an average rate of 2.1% per year. The global community has made some progress in achieving the SDG7 energy efficiency improvement target of 2.6% annual decrease (double the baseline level of 1.3 per cent per year from 2000 to 2012). The progress is encouraging, but more needs to be done to reach the SDG7 target for energy efficiency improvement.

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, UK and Japan, have lower primary energy intensity.

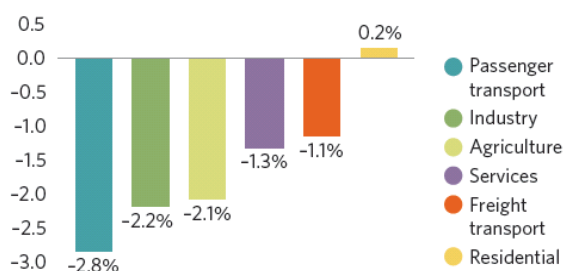
In the majority of developed countries, peak energy use occurred between 2005 and 2010. Total energy demand for OECD countries as a whole peaked in 2007. This means that despite these countries' economy growth and income increase, their energy use is no longer increasing. While the majority of countries have declining primary energy intensity, some

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countries in Africa and South America are seeing an opposite trend. There are also major differences in the energy intensity change among the big energy consuming countries and regions. For example, in 2016, energy intensity declined by 2.9% in the United States and by 1.3% in the European Union, while China's primary energy intensity fell by 5.2%, making it the country with the biggest energy efficiency improvement. Without China, the fall in global intensity in 2016 would have been only 1.1%.

Among the major energy-consuming sectors, industry is the most important contributor to a declining global energy intensity, with an annual reduction of 2.2% in 2012–14, but the residential sector had a small increase in energy intensity (measured in energy consumption per capita) (See figure below). 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% a year, compared with just 1.1% a year for freight transport. The strongest improvements in the transport sector are seen in passenger buses (4.8% a year since 2010) and sea freight (3.7%). 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% of global final energy use is consumed in buildings, there is a strong need to improve the energy efficiency of buildings.

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



Source: Global Tracking Framework Report (2017)

Multiple benefits of EE

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. Using ICT to improve energy management is growing across the value chain. From smart generation and distribution (grids), to smart building and home systems to 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 behavior underpins how effective policies and measures are. A smart home only avoids wasting energy 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 leaving the heating or cooling on when away from home does not result in 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) cost-effective efficiency options are taken up, but in other sectors, 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.

"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 EE 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 improvement since 2010. Despite 2012-2014 being slightly better than 2010-2012, the rapid development in developing countries and emerging economies implies a need to act now to avoid lock-in of inefficient technologies.

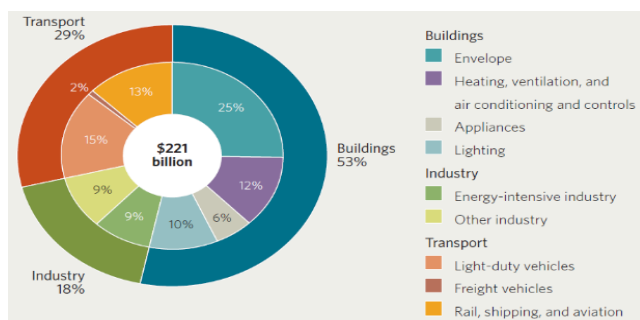
Various policies through minimum (mandatory) energy performance standards and labelling schemes, competitive tenders, fiscal policies, building codes, competitive procurement, regulation and prices, research schemes towards innovation, or advocacy and awareness, are some of the

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instruments used by countries. Energy efficiency policies are being implemented in an increasing number of developing countries and emerging economies.

Recently, the 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.

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



Source: IEA (2016)

POLICY IMPLICATIONS AND RECOMMENDATIONS

EE 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 lightbulbs, television, fan and refrigerator) with a standard level of efficiency, highly efficient appliances, delivered alongside off-grid solar, would save households an average of USD 150 per year, with the additional costs associated with efficient products are 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.

EE 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 policy alongside renewable and wider energy systems policy with, in many cases, a ramp up in efficiency ambition being the most cost-effective strategy to pursue first.

Recent examples where energy efficiency and renewable energy are integrated in policy making 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 in the order of US\$5.3 trillion in 2015, or 6.5 percent of global GDP, according to IMF (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 up-front 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 most internationally successful implementation policies on energy efficiency are the adoption of minimum performance standards for energy using products and buildings, associated with information to the consumer 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 harmonised globally would be in the order of 8,950 TWh, equivalent to closing 165 coal-fired power

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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, namely by Energy Service Companies. Moreover, the introduction of energy management systems and follow-up monitoring and evaluation efforts help to raise 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 respectively, by 'greening' existing skills and providing new skills. From Government officials at national and local level to professional practitioners, education associated with the energy transition should be subject of specific 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 between 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, CO2 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 what resulted into the SDG7. The Global Tracking Framework reports have been maintaining the focus on progress and areas of foci on the path to attain the global 2030 energy efficiency target.

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

Partnerships with the private sector aim at enabling faster market transformation for energy efficient products and services. Consumers groups have played important roles in awareness raising efforts. And a significant portion of the target beneficiaries are urban dwellers. Bringing all those groups together round 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 ambition 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 CO₂ eq in 2030, over and above current NDCs. This is potentially a significant contribution to closing the gap. Enhanced monitoring and reporting of non-state actions and the 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 COP 22 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, are making commitments and taking action, and in addition to mitigation, many of those actions relate to increasing resilience.
- Climate action is spreading to the South and has scaled up in the lowest income countries, facilitated by the link with SDGs and the Sendai Framework for Disaster Risk Reduction.
- Climate action is delivering: initiatives are moving from being commitments on paper, to actions, and are delivering a variety of outputs and creating the conditions to fully meet their commitments.

Worldwide, energy efficiency action has to be maintained, scale up and accelerated for the SDG7 target on energy efficiency to be attained by 2030 and deliver throughout the timeframe on a range of multiple benefits across most of the SDGs.

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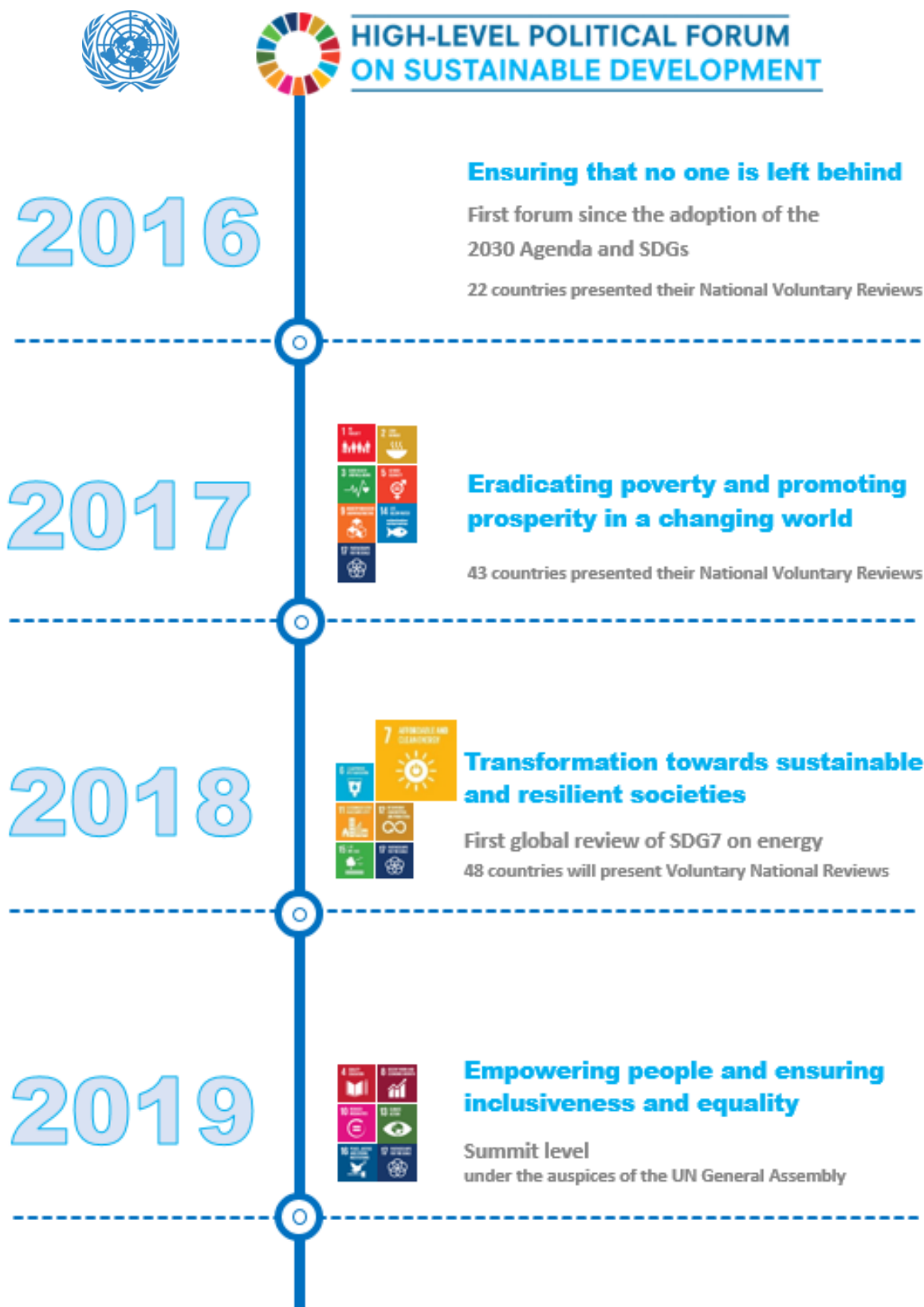
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