Strategic Plan for

ADVANCING ENERGY EFFICIENCY ACROSS DEMAND SECTORS BY 2030

March, 2023

Knowledge Partners

GOVERNMENT OF INDIA
MINISTRY OF POWER

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BUREAU OF ENERGY EFFICIENCY
Government of India, Ministry of Power

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PREFACE

The “Strategic Plan for Advancing Energy Efficiency Across Demand Sectors by 2030” has been prepared by Bureau of Energy Efficiency as a critical input for the energy efficiency discussions of the Energy Transitions Working Group (ETWG) in G20 Presidency 2023.

The G20 is an intergovernmental forum of 19 major economies and the European Union (EU). It accounts for around 80% of the world’s GDP, 75% of global trade, 72% of total energy consumption, and 60% of the worldwide population, thus playing a central role in global decarbonization and sustainable development progress.

India took over the presidency of the G20 from Indonesia in December 2022. The Indian presidency will build upon the efforts and outcomes of previous presidencies, which have successfully advanced the cause of global cooperation in clean energy transition and have made it central to the agenda of sustainable economic development.

For decades, the countries constituting G20 have significantly emphasized accelerating energy efficiency uptake and achieved significant efficiency improvements in residential, services, transport, and industry. G20 Energy Transitions Communiqué consistently recognized energy efficiency as the first fuel for a clean energy transition to ensure access to clean and affordable energy for all.

The “Strategic Plan for Advancing Energy Efficiency Across Demand Sectors by 2030” presents recommendations that the G20 can consider for moving energy efficiency goals forward, in support of achieving Sustainable Development Goal 7 and decarbonization efforts required by the Paris Agreement. To steer the international perspective on energy efficiency as the cheapest, fastest, and cleanest fuel for the global energy transition, the plan is presented to the Energy Transition Working Group (ETWG) of G20.

Director General
Bureau of Energy Efficiency

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ACRONYMS

BAT	Best Available Technology
BEE	Bureau of Energy Efficiency
BLDC	Brushless Direct Current
CEM	Clean Energy Ministerial
DCS	District Cooling System
EJ	Exa Joule
EnMS	Energy Management Systems
EU	European Union
ETWG	Energy Transitions Working Group
ESCO	energy service companies
EEFTG	G20 Energy Efficiency Finance Task Group
EELP	G20 Energy Efficiency Leading Programme
GW	Giga Watt
Gt	Giga Tons
HVAC	Heating, Ventilation and Air Conditioning
ICCT	International Council on Clean Transportation
IEA	International Energy Agency
IPEEC	International Partnership for Energy Efficiency Cooperation
LiFE	Lifestyle for Environment
M&V	Monitoring & Verification
MEPS	Minimum Energy Performance Standards
MOP	Ministry of Power, Government of India
SDG	Sustainable Development Goals
SEER	Seasonal Energy Efficiency Ratio
TWh	Tera Watt hour
TERI	The Energy and Resources Institute

1. Introduction

Energy efficiency is the cornerstone of just and equitable sustainable energy transitions and a critical lever for the decarbonization of global economy. It is the 'first fuel' - and in most cases the 'cheapest fuel' - that every country possesses in abundance to provide optimized and affordable energy services to all, tackle inflationary energy prices and supply constraints, and underpin sustainable development objectives, including:

Delivering climate mitigation actions in line with SDG 13 and the Paris Agreement, as energy efficiency can cost-effectively contribute 40% of the emissions savings goal of the Paris Agreement.

Increasing the share of renewables in total final energy consumption in line with SDG 7.2, as renewable energy coupled with energy efficiency measures enable energy applications that could not have been otherwise technically or economically feasible.

Delivering universal electricity access in line with SDG 7.1 to the 733 million people currently lacking it by allowing the energy produced to serve more people, reducing peak load, and improving grid reliability.

Maximizing productive use of electricity, for example energy efficiency frees up resources that can improve access to clean cooking for the 2.4 billion people still relying on inefficient and polluting fuels and sustainable cooling for the 1.2 billion people at high risk, while allowing the creation of new businesses reliant on electricity that in turn boost economies and create jobs.

Accelerating progress towards multiple SDGs by creating jobs, improving productivity, lowering the energy burden for low-income households, delaying the construction of new energy plants, improving air quality to name a few examples.

Globally, countries are witnessing escalated concerns over energy security, strained energy markets, and the inflationary impact of higher energy prices. Most countries are facing the brunt of the energy crisis in the form of increasing food insecurity and squeezing household budgets, particularly where a relatively high percentage of income is spent on energy and food. Such challenges demand a calibrated response from the national governments to ensure energy security and focus on the energy transition to provide access to clean and affordable energy. One of the central forces to achieve affordable clean energy transitions will be to undertake energy efficiency interventions.

Energy efficiency has a high job creation potential. IEA analysis finds that clean energy now employs over 50% of the total energy workforce. In 2019, the energy sector employed over 65 million people, equivalent to around 2% of global employment. Employment in end use such as energy efficiency and vehicle manufacturing, accounts for about 24 million jobs. Clean energy now accounts for over 50% of employment in the energy sector – which is estimated to increase to 80% with a total of 90 million people in 2030. New jobs in clean energy industries reach 40 million by 2030, outweighing job losses in the fossil fuel-related industries. Around 10 million new jobs need to be added in energy efficiency, including end uses and vehicles (IEA, 2022). A paradigm shift in the energy workforce will require strategic foresight to train up the requisite workforce for deploying clean energy at scale as well as just transition policies that provide for employees negatively affected by these changes. Governments are also working with the private sector to localize production and address global supply chain weaknesses, both within fossil fuel and key clean energy segments, including the minerals critical to their manufacture.

The world has made immense progress in energy efficiency. IEA analysis shows that over the last two decades since 2000 energy intensity improvements of the global economy have resulted in energy consumption and CO2

emissions that are around 30% lower than would otherwise have been the case. Over these two decades, energy intensity progress almost doubled moving up from averaging around 1% per year from 2001-2010 to almost 2% from 2011-2020 – this also doubled the energy and CO2 savings. If a similar doubling is achieved in the next decade from 2020-2030 and the global rate of improvement moves from 2% to 4% per year, this would result in an extra 95 EJ and 5 Gt of CO2 savings, putting the world onto a net zero emissions pathway.

Despite this progress, the world is falling short of the Sustainable Development Goal (SDG) 7.3 target of doubling the rate of energy efficiency improvement by 2030, leaving vast opportunities untapped.

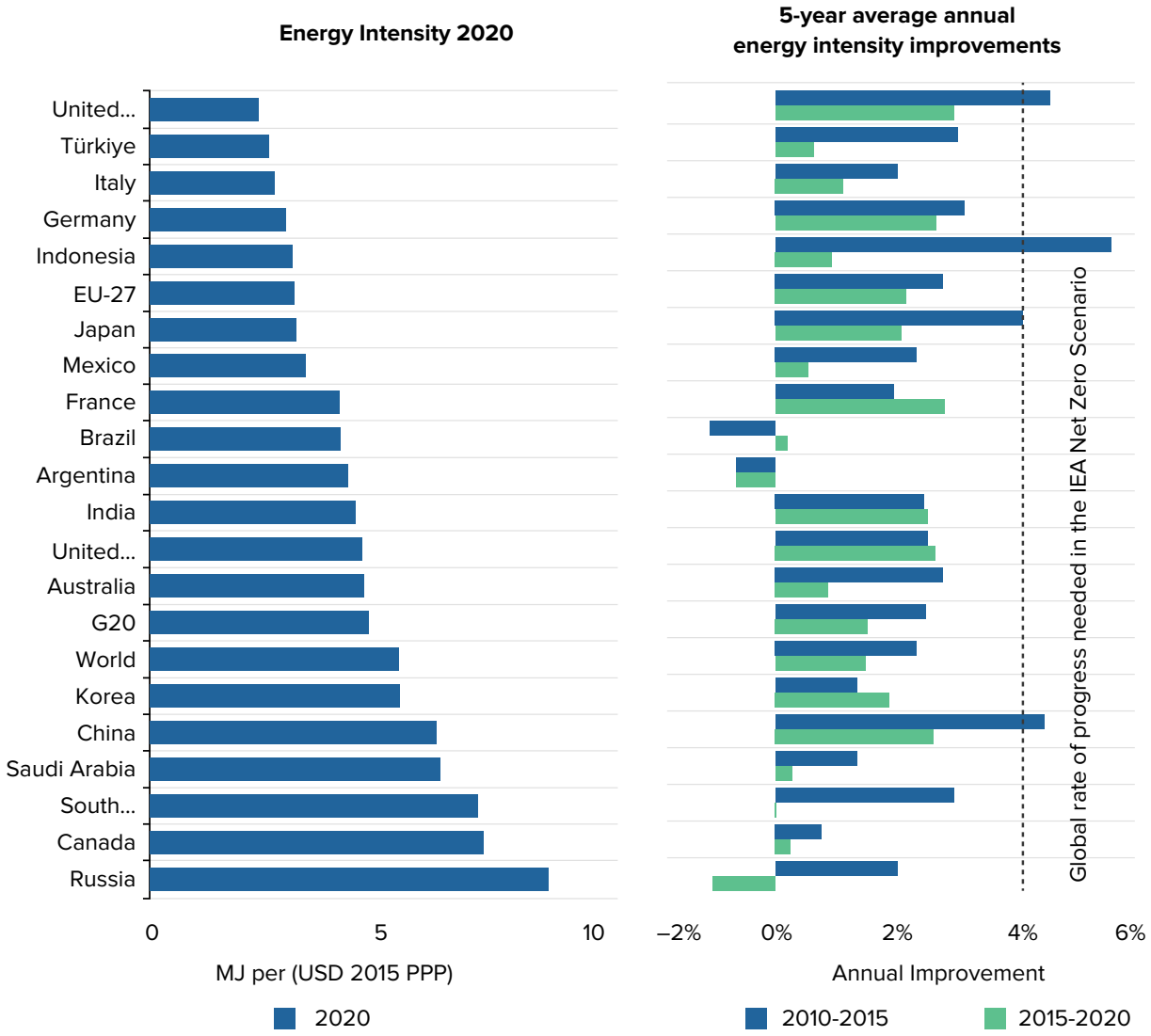

Figure 1: Primary energy intensity in G20 countries, 2020, and annual improvement 2010-2020

While energy efficiency improvement slowed globally from 2.2% over 2010-2015 to 1.4% over 2015-2020, global primary energy intensity improvement reached almost 2% in 2022. Based on recent trends, the target of SDG 7.3 to double the global rate of energy efficiency improvement by 2030 would have to be raised from 3.2% to 4% annually to put the world on track with ambitions to achieve Net-Zero by mid-century and global development and climate objectives. At a country level, the rate of progress has been extremely diverse, and dependent not only on energy efficiency ambitions but also on other factors such as economic structure and activity. To achieve global decarbonization goals, each country would need to step up energy efficiency action, in line with national progress and commitments. Fast-paced improvements will be required in all sectors by 2030 as highlighted in Figure 3. In all sectors, changes in behaviour are expected to contribute significantly to improving efficiency and reducing energy demand in the coming decades. This acceleration will also require new approaches to financing so that valuable public sector resources leverage a significant increase in private sector investment.

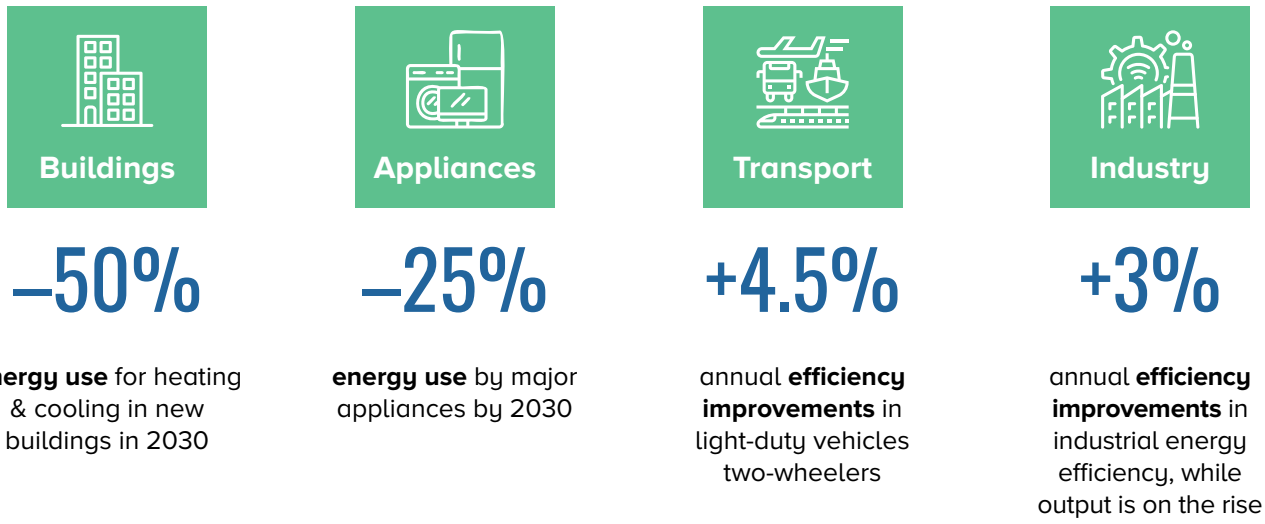

Figure 2: Energy efficiency improvements are necessary by 2030 to achieve global net zero by 2050 (IEA, NZE 2021 and EEMR 2022)

Among G20 countries, energy demand and supply trends have changed over time, but the energy mix remains dominated by fossil fuels. Analysis conducted by TERI indicated that for primary energy supply, there had been a shift from oil to natural gas use for most G20 countries in the last two decades. However, coal use has also significantly risen in some countries as the primary energy source. Concerning the demand side, the share of G20 nations in the world's total energy consumption decreased from 79% in 2000 to 77% in 2020. The percentage shares of energy consumption are significant for three sectors, namely, industry, transport, and buildings, while they are minimal for agriculture and allied sectors. Globally, the distribution of energy consumption has shifted: emerging economies already account for more than 60% of global final energy demand. This share will likely increase to 65% by 2030, whereas energy demand in advanced economies is expected to stay relatively steady. The more significant share of energy demand in emerging economies suggests that the most critical energy efficiency opportunities will increasingly be found in emerging economies like Brazil, China, India, Indonesia, Mexico, and South Africa (International Energy Agency, 2022). To enable a clean energy transition, while allowing for sustainable development in line with the Sustainable Development Goals, a massive upscaling of investment is needed, combined with comprehensive policy packages to enhance the deployment of cost-effective efficient technologies.

To keep the world on track to achieve decarbonization goals, countries would need to: double the current rate of improvement in energy intensity with evidence-based targets across all sectors, to increase the annual investments in end-use energy efficiency to more than three times current levels before 2030 (without accounting for investments in end-use electrification) globally, and to frontload energy efficiency measures during this critical decade.

2. The G20 Leading the Transformation

Energy efficiency is a long-term priority for G20 nations, as it ensures the efficient utilization of energy resources, strengthens energy security, and improves environmental outcomes. It also contributes a host of other social and economic benefits. Together, G20 nations consume more than 75% of global energy. Thus, they can lead the development and direction of energy efficiency programs, channel energy efficiency investments, and improve energy efficiency worldwide.

2.1 Overview of past G20 action on energy efficiency

For many years, the G20 has consistently recognized the importance of energy efficiency and encouraged initiatives to accelerate energy efficiency progress to respond to evolving global and national energy priorities.

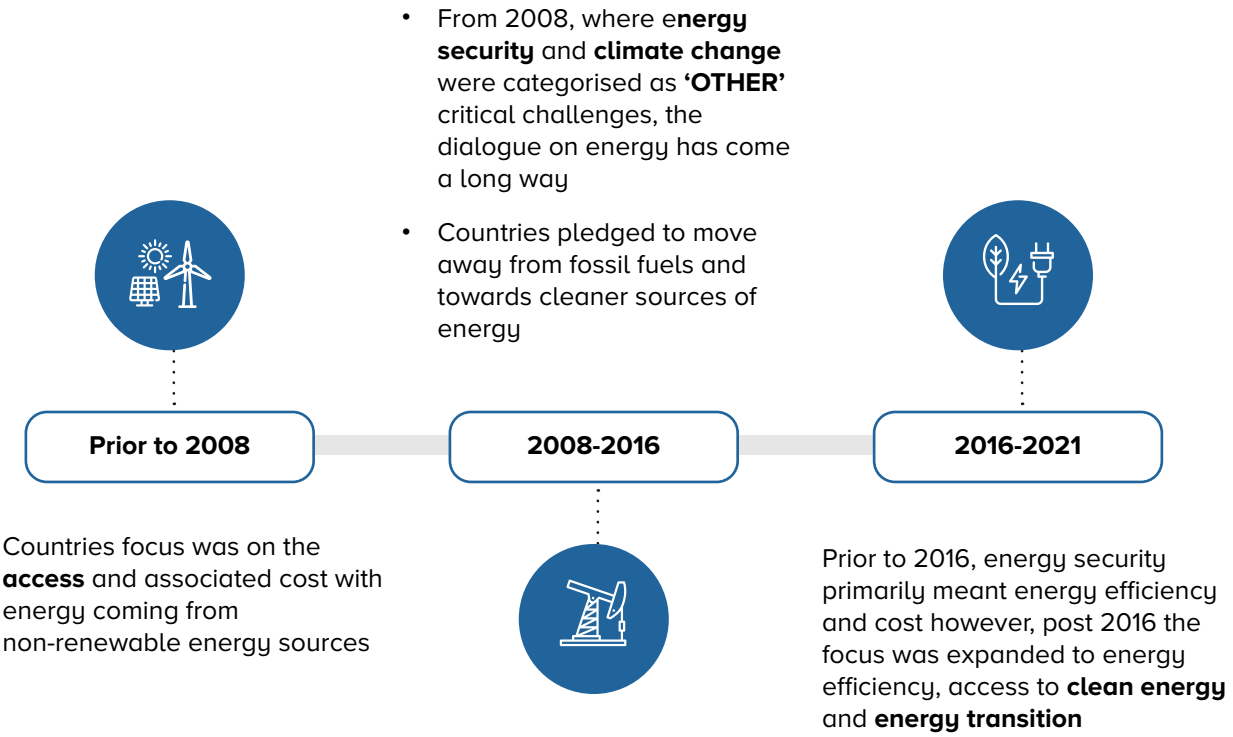

Figure 3: The evolution of G20 focus on energy efficiency

Since 2014, a series of notable initiatives have sought to drive coordinated action by the G20:

➔ In 2014, the G20 Energy Efficiency Action Plan (EEAP) was adopted as a practical plan to strengthen voluntary energy efficiency collaboration in a flexible way. It documents six priority areas of cooperation and knowledge sharing among G20 members through either existing or new energy efficiency work - namely vehicles, products, finance, buildings, industrial energy management, and electricity generation. Notable progress was achieved during the first year of implementation, resulting in engagement with 60 government agencies, numerous consultations with public and private entities, six substantive reports, and 28 best practice case studies[1]. The EEAP also launched the G20 Energy Efficiency Finance Task Group (EEFTG), which delivered the Voluntary Energy Efficiency Investment Principles in 2015. It rallied hundreds of banks, leading public financial institutions, insurance companies – and institutional investors representing over USD 4 trillion – to support the ambition of increasing energy efficiency investments.

1 See: http://g20.org.tr/wp-content/uploads/2015/11/Report-on-G20-Energy-Efficiency-Action-Plan-2015-Outcomes.pdf

➔ Building on this progress, the G20 Energy Efficiency Leading Programme (EELP) was adopted in 2016, during the presidency of China, providing the basis for the first comprehensive, flexible, and adequately-resourced long-term framework necessary for strengthened G20 voluntary collaboration on energy efficiency. It included the G20 Voluntary Pillars for energy efficiency cooperation and encouraged G20 members to pursue energy efficiency with national policies and measures that reflect the socio-economic diversity within the G20. It also covered ongoing activities under the EEAP on Vehicles, Networked Devices, Finance, Buildings, Industrial energy management, and Electricity Generation. In addition, it expanded the work to five new areas of collaboration: Super-efficient Equipment and Appliances Deployment initiative (SEAD), Best Available Technologies and Practices (TOP TENs), District Energy Systems (DES), Energy Efficiency Knowledge Sharing Framework, and Energy End-Use-Data and Energy Efficiency Metrics.

➔ The EELP also called for enhanced capital flows into energy efficiency investments. In 2017, as a culmination of three years of collaboration, the EEFTG launched the G20 Energy Efficiency Investment Toolkit. The Toolkit provided a new perspective on the challenge of scaling-up energy efficiency investments and gathered first-of-their-kind insights from policymakers, banks, investors, insurance companies, and public finance to maximize the ability of the financial system to factor in and incentivize energy efficiency measures. In the same year, the G20 Hamburg Climate and Energy Action Plan for Growth gave a mandate to explore how to create an Energy Efficiency Hub to strengthen the intergovernmental collaboration on energy efficiency.

➔ In 2019, the G20 Global Summit on Financing Energy Efficiency, Innovation, and Clean Technology was convened as a milestone for leading financial institutions and policymakers in the implementation of the 2017 G20 Energy Efficiency Investment Toolkit and practical review point for the progress made by the task group and its member economies. A G20 Energy Efficiency Finance and Investment 2019 stocktake report was launched with the following key conclusions:

- Better sustainable finance data is required across the financial system to accelerate financial institutions' "real world impact" towards the SDGs and Paris Agreement.
- Public financial institutions should lead the market as policy banks.
- Promoting best practices and sharing experiences across banking, investment, public banks, and policymaking is essential to advance this market.

Energy efficiency remained a priority in G20 Energy Ministers' Communiqués in the following years, while countries sought to respond to the global health crisis, energy market turmoil, and sustainable recovery priorities. In 2021, the Energy Efficiency Hub was launched, hosted by the International Energy Agency and comprising 16 members[2]. It was also recognized in the Joint G20 Energy-Climate Ministerial Communiqué. Also in 2021, the UK government, in partnership with the IEA and SEAD, led a call to action to double the efficiency of a group of key products used globally. The call to action that was announced at CoP 26 was signed by 14 countries including several G20 members.

➔ In 2022, the Bali Energy Compact - among its set of inclusive voluntary principles for G20 members and beyond to ensure smooth and effective transitions - called for boosting energy efficiency measures to realize its potential as the first fuel to drive cost-effectiveness across sectors. In addition, the Bali Energy Transitions Roadmap called for sectoral partnerships to increase the energy efficiency of the global economy, encouraging the G20 to identify priority measures to scale up actions by sector, and recognized the relevant work of IEA, SEforALL, CEM/MI and Mission Efficiency in this area.

2 Argentina, Australia, Brazil, Canada, China, Denmark, the European Commission, France, Germany, Japan, Korea, Luxembourg, Russia, Saudi Arabia, the United Kingdom and the United States.

2.2 The opportunity ahead

The Bali Energy Transitions Roadmap mandates ambitious, action-oriented, sector-specific, and collaborative G20 action on energy efficiency. Previous milestones equip the G20 with a track record in recognizing the centrality of energy efficiency and understanding the challenges in stepping up cooperation and investment. They also lay a sound basis of experiences and partnerships necessary to empower G20 countries to undertake more coordinated efforts. A renewed global momentum for energy efficiency, resulting from the urgent need for governments to address energy security and energy poverty issues while stepping up action to decarbonize their economies, calls for more ambitious, long-term, and concerted efforts.

Current efforts - both in the G20 and globally - are falling short of global energy and climate targets. The G20 has a historic opportunity to prioritize energy efficiency in the global climate and sustainable development agenda and encourage countries to elevate efficiency in policy and regulatory frameworks, in order to deliver a doubling of annual energy intensity improvements. There is a gap in the current institutional framework for energy efficiency cooperation, particularly in mobilizing cooperation and investments that are at global scale to meet energy and climate commitments, and in support of developing and emerging economies. The G20 is ideally positioned to catalyze collaboration for investment scale-up, North-South and South-South learning and diffusion of best practices to accelerate global progress. It can do so by leveraging the wealth of experience with energy efficiency policies and programs within the G20 and its broad ecosystem of partners, and by building on existing initiatives like Mission Efficiency, the Energy Efficiency Hub and the IEA Technology Collaboration Programmes.

Therefore this Strategic Plan continues building on past initiatives to address these challenges and to lead by example in the transformation to an energy-efficient world that is on track to achieve SDG 7 and global decarbonization goals. This study presents three strategic opportunities to drive progress, with a renewed emphasis on mobilizing energy efficiency finance and cooperation and a novel focus on the role of behavioural changes:

1. **Opportunity to ELEVATE energy efficiency in the global agenda** and promote behaviour and lifestyle changes for an energy-efficient life.

2. **Opportunity to SUPPORT energy efficiency, with a clear policy signal by the G20 to raise ambition to the degree needed to double the global annual rate of energy intensity improvement before 2030,** and support, through a coalition of G20 partners, exchange of best practices and delivery of the required sectoral solutions to G20 countries and the Global South.

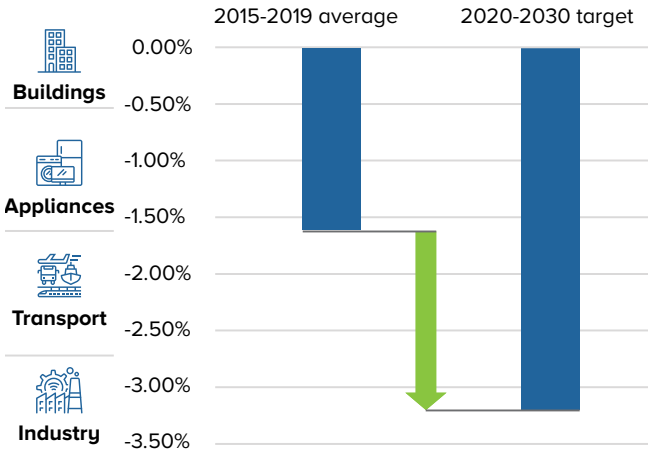

Figure 4: Global energy efficiency improvement rate and target, with critical sectors for G20 action

3. **Opportunity to INVEST in energy efficiency through a coordinated global marketplace to scale global annual investments in energy efficiency and electrification to over USD 1.5 trillion before 2030, of which atleast USD 840 million per year in energy efficiency.** Each country or organization needs help to deliver the scale of action. A Global energy efficiency marketplace for coordinated support could provide:

   - Technical assistance for market readiness activities
   - A suite of financing de-risking instruments
   - A commitment to deploy public spending to help catalyze three to four times as much private investment

G20 collaboration is critical to scale up annual energy efficiency investment gaps in energy demand sectors for achieving SDG 7.3 goals by 2030 and keep the world on track with the Paris Agreement:

Figure 5: Target average annual investments in 2026-2030 in energy efficiency by sector (IEA, EEMR 2022)

2.3 Plan for Advancing Energy Efficiency across Demand Sectors by 2030

Energy efficiency is centrally important to improving the lives of all people, providing reliable and affordable energy access, supporting economic growth and resilience, enhancing security of supply and accelerating clean energy transitions. Energy efficiency has therefore been a long-term priority for G20 countries and has been recognised consistently in the G20 Energy Transitions Communiqué as the first fuel for the energy transition to ensure access to clean and affordable energy for all. The 2022 Bali Energy Transitions Roadmap calls for ambitious, action-oriented, sector-specific and collaborative G20 action on energy efficiency. India plays a key role in global energy efficiency development, and its 2023 G20 Presidency offers a unique opportunity to draw on its rich experience in energy efficiency policies and strategies and chart the path for energy efficiency action by 2030, a period of utmost importance to put the world on a decarbonisation pathway. The G20 is uniquely positioned to prioritise energy efficiency in global policy agenda, leverage its full gamut of initiatives, toolkits and experience and strengthen partnerships for energy efficiency action and investment.

The value and importance of raising ambition on energy efficiency is widely recognised for its potential to support the goals of the Paris Agreement, and help all governments maximise the benefits of energy efficiency for their countries and citizens. The strategic plan for Energy Efficiency outlines measures that, if comprehensively designed and implemented, can meet the goals of SDG 7 and double annual energy intensity improvements by 2030, based on IEA analysis. The G20 offers a unique forum to exchange best practices and policies, drive energy efficiency progress through cooperation on data, policies and technologies and mobilise the necessary investment in energy efficiency across end-use sectors with a particular emphasis on supporting countries in the Global South.

This Strategic Plan focuses on opportunities to accelerate energy efficiency improvements along five pillars: in the buildings, industry and transport sectors, energy efficiency financing and behavioural changes. Strengthened international cooperation to elevate, support and invest in energy efficiency is understood as an overarching principle to promote faster progress in the G20 and in Global South countries.

This plan recognises that the greatest efficiency gains can be achieved through carefully designed and implemented policy packages, that combine regulation, information, and incentives, while placing people at the centre of the clean energy transition. People centred, inclusive and effective policy packages will deliver efficiency's full potential to enhance energy security, create jobs, improve living standards, lower energy bills and reduce emissions.

3. Pillar 1: The Buildings Sector

Buildings represent about 30% of the global final energy consumption. Energy efficiency measures in the buildings sector can deliver some of the greatest energy savings through to 2030 and beyond. As critical part of addressing energy performance of buildings, energy codes set minimum energy performance standards for new buildings and can also trigger requirements for major refurbishments or renovations of existing buildings. Building energy codes typically address operational energy use by focusing on envelope performance standards, including for walls, windows and roofs, as well as major end-use equipment. Energy-use applications include large and small appliances, lighting, IT, and equipment for thermal comfort, such as ceiling fans, air coolers, room air conditioners, central air conditioners, air-source heat pumps, boilers, furnaces, climate controls, geothermal heat pumps, heat/energy recovery ventilators, light commercial HVAC, and ventilating fans.

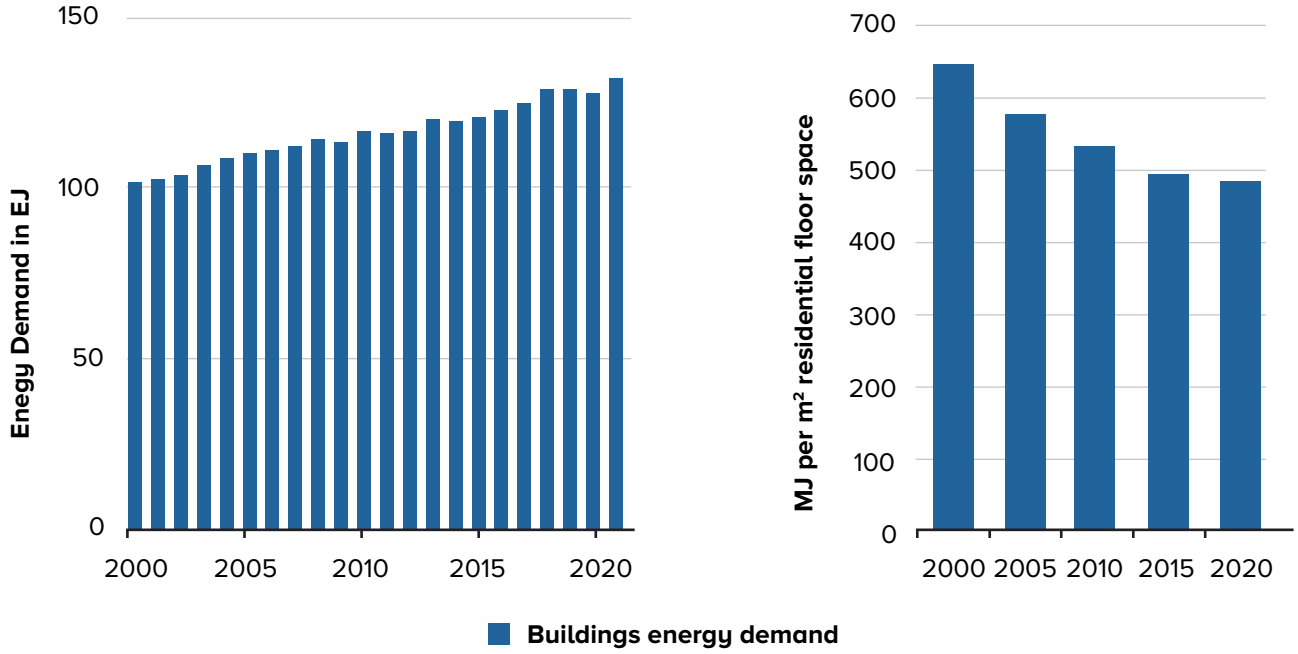

Figure 6: Global buildings final energy demand and energy efficiency indicator, 2000-2020 (IEA, EEMR 2022)

3.1 Policies

Policies and regulations for energy efficiency in the buildings sector across G20 economies have led to significant savings over the last 50 years. Building Energy Codes, minimum energy performance standards, benchmarking energy use and energy performance labelling are only some of the wide range of policy instruments that span regulatory measures or targets, information measures and financial incentives.

All countries can benefit from cooperation on best practice and knowledge exchange, and developing countries can be supported through technical assistance programs to fast-track the development or improvement of many of these successful policies. Increased investment from the public and private sectors will have to be directed across all countries to enhance implementation and compliance.

Cooling is the fastest growing end-use, responsible for 15% of the electricity used in buildings worldwide today – or 5% of total global electricity consumption (IEA). With the energy needed for cooling expected to overtake the energy required for heating by 2050, driven by rising cooling demand in G20 countries, the topic requires urgent attention. Cooling is necessary to provide thermal comfort in residential and commercial buildings and is a crucial indicator to gauge the quality of life in any country. And yet, the environmental impact of rising cooling

demand will lead to greater direct and indirect emissions from refrigerants and electricity, respectively. Passively cooled buildings coupled with efficient, low-carbon cooling technologies hold great promise to reduce energy consumption and emissions. Researchers, not-for-profit organizations, governments, and businesses are already working together to develop national cooling action plans, building energy codes, appliance standards, labelling programmes, bulk procurement schemes, innovative technologies, and clean financing options to speed up the transition toward sustainable cooling solutions.

3.2 Technologies

Energy efficient technologies are crucial in achieving the G20 energy and climate change policy goals in the buildings sector. Many energy efficient technologies not only consume less energy and reduce energy costs, but also bring multiple benefits including higher comfort, increased productivity, improvements to health and well-being. Competitive technologies and steep adoption curves driven by policy can bring about market transformation.

Most cooling and refrigeration appliances also contribute to the peak electricity demand in many countries, with the share of cooling exceeding 40% in the case of Indonesia and India, putting a further drain on the resources required to develop a reliable power system infrastructure. The Global Cooling Prize, initiated by the Government of India in 2018, awarded breakthrough cooling technology around the world to drive incubation, commercialization and adoption of more efficient and innovative cooling solutions. The 2018 IEA study "The Future of Cooling" estimates that there is a potential to increase the average global seasonal energy efficiency ratio (SEER), a metric to evaluate the energy efficiency of air conditioners expressed in (W/W) by roughly 1.5 times by 2030 compared to the baseline scenario. This would approximately result in annual energy savings of 1200 TWh in 2030.

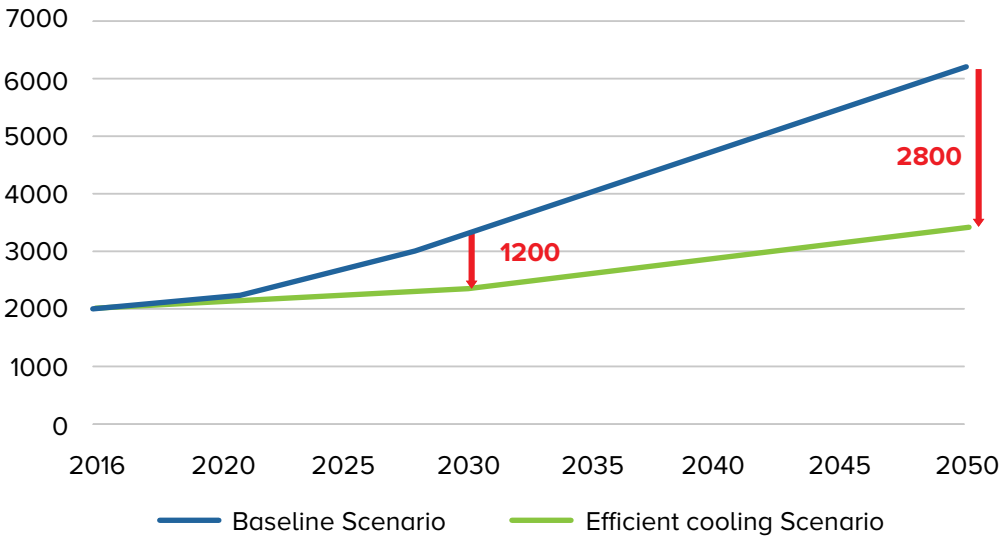

Figure 7: Energy efficiency savings potential in space cooling (The Future of Cooling)

3.3 Recommended actions

Strategic G20 action can ensure the sustainable manufacturing and global deployment of critical technologies and solutions that offer scalability, that can deliver large-scale energy demand savings and peak demand reductions, as well as emissions reductions, that should positively impact people's quality of life.

In order to achieve this outcome, the following actions are recommended:

- ➔ Development or strengthening of building energy codes to ensure that all buildings are built to optimal energy efficiency levels and that the overall building stock is 40% more efficient.
- ➔ Promotion of integrated approaches combining passive building design and affordable energy efficient technologies to accelerate access to thermal comfort for all.
- ➔ Implementation of appropriate Minimum Energy Performance Standards (MEPS) for all appliances that could deliver a 25% decrease in their overall total energy use by 2030. By 2030, all new lighting could be based on LED technology, and by 2035 most air conditioners sold could be best in class, decreasing energy demand by more than 25%.
- ➔ Policy action to achieve universal access to clean cooking by 2030.
- ➔ Implementing ambitious policies to decrease energy consumption for heating and cooling in new buildings by 50% and increase heat pump usage to represent 20% of heating demand in 2030 while prioritising access to the 1.2 billion people who do not have access to heating and cooling.

3.4 HIGH-IMPACT OPPORTUNITY: Rethinking Energy Codes for a Net-Zero Energy World (RENEW)

Building energy codes are acknowledged to be one of the most effective policy tools to improve the overall energy efficiency of the building sector. There are two key issues in improving building code implementation and evolution:

a) Ensuring compliance and implementation of increasingly more stringent codes at scale would require more trained government officials and professionals with the requisite understanding and knowledge to do this effectively. Apart from the use of building energy simulation during design development, there needs to be more use of technology both in the code-compliance check process and in verifying the performance of the building once it is built. This is pertinent to developing and developed countries alike, as compliance rates of less than 50% are estimated;

b) Moving from energy to carbon: Current building energy codes focus on operational energy. Future codes need to cover the entire life cycle of buildings and move from energy to carbon metrics. Currently, more knowledge, processes, and systems are needed to allow us to develop and comply with net zero carbon-neutral building codes (NZCNBC) for the future. The next generation of building codes will need to be adaptable as more information, processes, technologies and systems are developed to enable development and compliance with NZCNBC.

Actions that are grounded in first principles and will affect the complete value chain of the building design and construction industry, starting from metric-driven energy performance of the building envelope, end-use energy systems, onsite renewable energy systems, energy storage, and grid interactive features, will need to be incorporated into the next generation of energy building codes going beyond operational energy use to encompass embodied carbon. Specific examples include maximum allowable heat transfer across building envelopes (in W/m2) to maximum allowable energy intensity used to heat or cool buildings (in kWh or W/m2 or m2/refrigerant ton) to limiting the maximum end-use energy intensity for different building types (e.g., kWh/m2/year or joules/m2/year).

What: One possible solution is the development and adoption of outcome-based codes that can be enabled, with the help of technology and digital platforms and will significantly reduce the cost of compliance and implementation. Another advantage of this switch is that the line dividing new construction and existing buildings must disappear as outcome-based codes, and building performance standards converge. The goal is to introduce creativity during the building design process, eliminate short-cuts, sub-optimal, and increasingly ineffective manual ways of ensuring code compliance and replacing them with cost-effective measurement and verification technology to introduce radical transparency.

Why: This approach will help address a chronic shortage of trained professionals at the state/province and city level, as digital building energy code-checking platforms can help approve code-compliant building designs. These performance-based changes will introduce a much higher level of accountability amongst building designers, materials manufacturers, and end-use technology providers. They will help create an environment where policies will reward innovation and low-carbon technology advancements.

How: Current technology, such as IoT-enabled meters, sensors, and cloud-based energy management platforms, can validate building performance on a dynamic and real-time basis and enable grid interaction leading to reduced dependence on skilled and trained professionals and officials in the entire process leading to more effective achievement of policy goals while achieving cost reductions for governments.

4. Pillar 2: The Industrial Sector

Industrial efficiency is a crucial pillar of G20 countries' energy efficiency policy and is an integral part of several countries' flagship initiatives on energy efficiency. The industrial sector accounts for 38% of the G20 final energy consumption. While many industries are making energy efficiency improvements, prompted by a need to improve competitiveness and regulatory compliance, over the last decade, the rate of energy intensity improvement in industry has, on average, reduced from almost 2% per year in 2010-2015 to just under 1% in 2015-2020. More extensive and faster improvement in industry and enterprises will have to be tapped to meet the 2030 energy intensity improvement targets. However, numerous barriers and challenges would need to be addressed to achieve these targets.

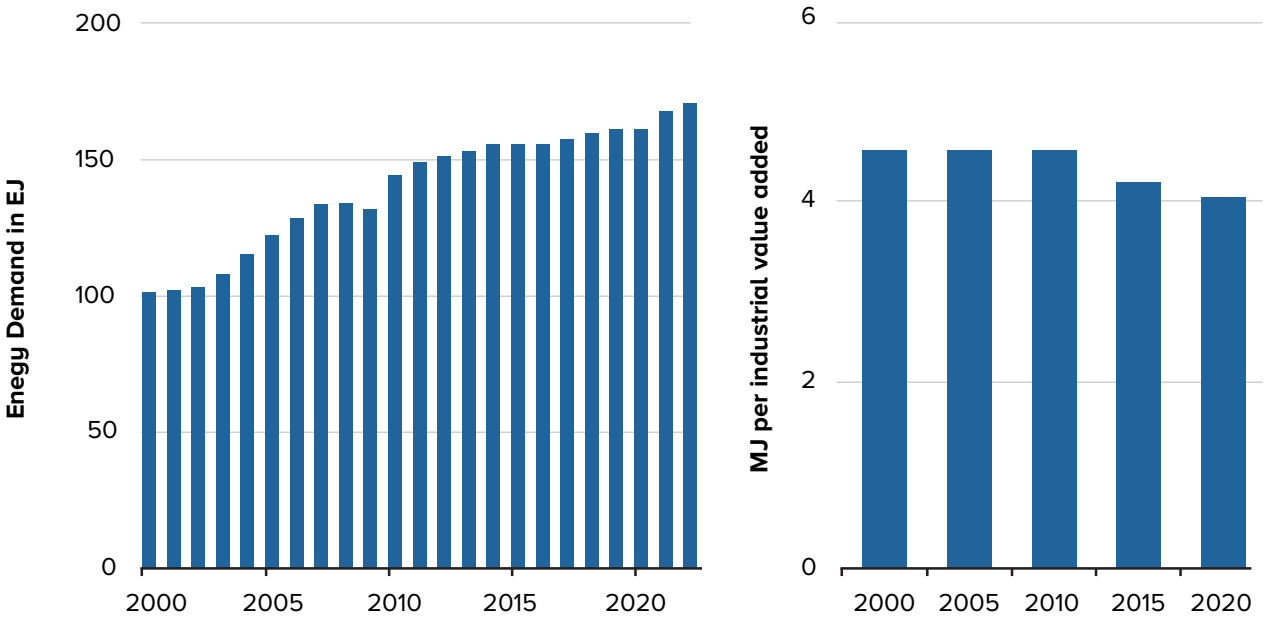

Figure 8: Global industrial final energy demand and energy intensity, 2000-2022 (IEA, EEMR 2022)

4.1 Policies

Policies and regulations for energy efficiency in the industries sector have delivered significant positive impact. Mandatory and voluntary policies including regulatory measures and targets, information measures and financial incentives, have played important roles in decreasing the energy and emissions intensity of industries in G20 economies. Cooperation on best practices and technical assistance programs can continue to help emerging and developing economies in their efforts to implement and enhance many of these successful policies. More public sector investments are needed across all countries to enhance implementation and compliance and to leverage the private sector investments that will be essential to achieve the doubling goal.

Significant opportunities remain in large energy-intensive industries and other enterprises active in product manufacturing and services, particularly in SMEs, for which energy is a considerable cost. Overall, promoting energy efficiency in SMEs can lead to significant cost savings, improved environmental sustainability, and increased competitiveness in global markets. Energy use in industry can be disaggregated by industry sectors (such as Iron & Steel, Cement, etc.) and end-use. The typical energy end uses in industry include, but are not necessarily limited to, process heating, process cooling, drying, motors and drives, electrochemical processes, and process-specific technologies.

The IEA estimates that of all the industrial energy efficiency improvements to be made to achieve climate goals, 70% are in non-intensive sectors. SMEs make up a significant component of industry and GDP in the developing countries in G20. There are more than 100 million SMEs in G20 nations, and they account for up to 30-50% of all businesses, contributing significantly to total employment and wealth generation. Many would benefit from being more efficient. As a result, there is significant potential for introducing energy efficiency technologies to improve operations for SMEs. Interestingly, IEA analysis shows that access to the untapped potential for industrial energy efficiency does not depend upon unexpected technological breakthroughs but rather on removing already-identified barriers to implementing energy efficiency measures that are economically viable.

Energy management systems (EnMS) provide a process of continuous energy management and performance improvement, allowing organizations to systematically track, analyze, and optimize their energy use. These systems are proving to be very effective in achieving industrial energy efficiency goals and have the added benefit of improving company productivity. Several studies indicate that 20-30% energy saving can be achieved by altering the management aspects before embarking on technological investments. Despite the proven benefits of EnMS, widespread adoption remains a challenge.

SMEs perceive the most popular standard on EnMS, i.e., ISO 50001, as expensive and onerous. The new and simplified standard, ISO 50005, launched in 2021, is designed to overcome this problem and is aimed at small- and medium-sized business sectors. G20 countries can use this standard to promote EnMS as a viable means of reducing energy consumption and accelerating the uptake of systems approaches. Some governments have already dedicated significant resources to encourage the uptake of EnMS by creating supporting policies, which are in some case mandatory, and offer tools, incentives and technical assistance. The incentives can be targeted specifically to encourage adoption of EnMs by SMEs.

4.2 Technologies

Energy efficient technologies have a high importance in achieving the G20 energy and climate change policy goals in the industrial sector. Processes in industry are very diverse in nature. They range from cross-cutting technologies like efficient electric motors or heat pumps for process heat in low- and medium temperature processes to highly specialised technologies in hard to abate sectors like electric arc furnaces in the steel industry. Many energy efficient technologies not only consume less energy and reduce energy costs with short payback times, but also bring multiple benefits including increased productivity, improved worker safety and cooler working environments benefitting employee productivity and well-being. Competitive technologies and steep adoption curves driven by effective policy can accelerate the decarbonisation of industry.

4.3 Recommended actions

Strategic G20 action can ensure the sustainable manufacturing and global deployment of cost-effective and efficient critical technologies and solutions that offer scalability, and that can deliver annual energy efficiency improvements of 3% across the industries sector.

In order to achieve this outcome, the following actions are recommended:

- ➔ Development of policies and motor replacement programmes that ensure that until 2030 all new electric motors sold are IE class 3 or above, and that use variable speed drives.
- ➔ Implementation of policies supporting or mandating energy or emissions audits and reporting in industry using coordinated methods for consistency, accuracy and reliability. Support of energy management systems.
- ➔ Support of high efficiency industrial equipment like heat pumps and other electrification technologies for low and medium temperature process heat as well as LEDs.

- ➔ Implementation of policies supporting production process optimisations including leakage control, regular maintenance schedules, correct sizing of compressor load and optimisation temperature in process heat flows.
- ➔ Implementation of policies for heavy industry that can drive higher energy and material efficiency and increase the use of low-carbon alternatives.

4.4 HIGH-IMPACT OPPORTUNITY: Scaling-up Motor Efficiency for Small and Medium Enterprises (SME^2)

Electric motors and motor-driven systems use about 70% of the electricity used by industry. In 2022, 57 countries had minimum energy performance standards (MEPS) for industrial electric motors, covering about 50% of the global electricity consumption of industrial motors, up from 20% ten years ago (Energy Efficiency 2022, IEA). These MEPS are predominantly based on International Efficiency (IE) standards that define five distinct performance levels, ranging from IE1 (least efficient) to IE5 (highest efficient) motors.

Many developed economies like the EU, USA, Canada, Japan, and others switched to higher efficiency motors (IE3) as MEPS, whereas developing economies like India, Indonesia, Argentina, and others are still following lower standards (IE2) as MEPS for motors (ABB, 2022). Different countries tend to have different scopes in terms of size and types of motor covered leading to increased cost of compliance for manufacturers which are passed on to purchasers. Stringent MEPS for energy-efficient motors and programs such as Top Runner in Japan can play a significant role but are only effectively deployed in only a few countries. There are significant efficiency improvements between IE2 and IE5. The technology is mature but at higher first cost, even though life-cycle costs tend to be significantly lower with typical paybacks of a few months to a few years depending upon the application. Even so the first cost barrier is a problem when driving turnover of stock and financing schemes would be needs to drive the market transformation at the desired pace and scale;

What: In the medium term till 2030, G20 countries could consider direct policy action with goals such as to make 9 out of 10 new motors sold IE class 3 and above by 2030. Develop a dedicated financing window targeting replacement of older and inefficient motors with IE3 or higher motors for the SME sector.

Why: These actions will likely reduce the total electricity use in the industrial sector across all G20 countries by 10% by 2030. Japan's market share of high-efficiency motors increased from 5% in 1995 to over 70% in 2015, according to a report by the International Energy Agency (IEA). Using high-efficiency motors has contributed to a significant reduction in energy consumption in the manufacturing sector in Japan, which decreased by around 20% between 2000 and 2012. [Source: Status of electric motor regulations July 2022, IEA]

How: Countries would need to introduce more ambitious MEPS for motors while providing sufficient lead time for the industry to upgrade their production processes. This is particularly important for SME motor manufacturers as they get integrated into the green supply chain of larger and more efficient motor manufacturing companies. Governments could collaborate on improving wide-spread access to manufacturing technologies for IE3 or higher motors and building capacity in SMEs for upgrading their facilities and workforce skills to produce IE3 or higher motors over a phased time frame.

5. Pillar 3: The Transport Sector

The G20 nations collectively account for two-thirds of the world's population and are responsible for over 80% of transport related global energy demand and v more than 90% of new sales of light and heavy-duty vehicles (Miller et al., 2017). While electrification is gaining pace, the transport sector is still heavily reliant on fossil fuels, with oil products providing around 91% of its final energy use. Road transport makes up around 75% of energy demand and emissions in the transport sector. Despite improvements in energy consumption intensity over the past years due to fuel economy standards, improvements in engine technology and stronger uptake of electric vehicles, better road infrastructure, and improved fuel quality, there are still significant challenges.

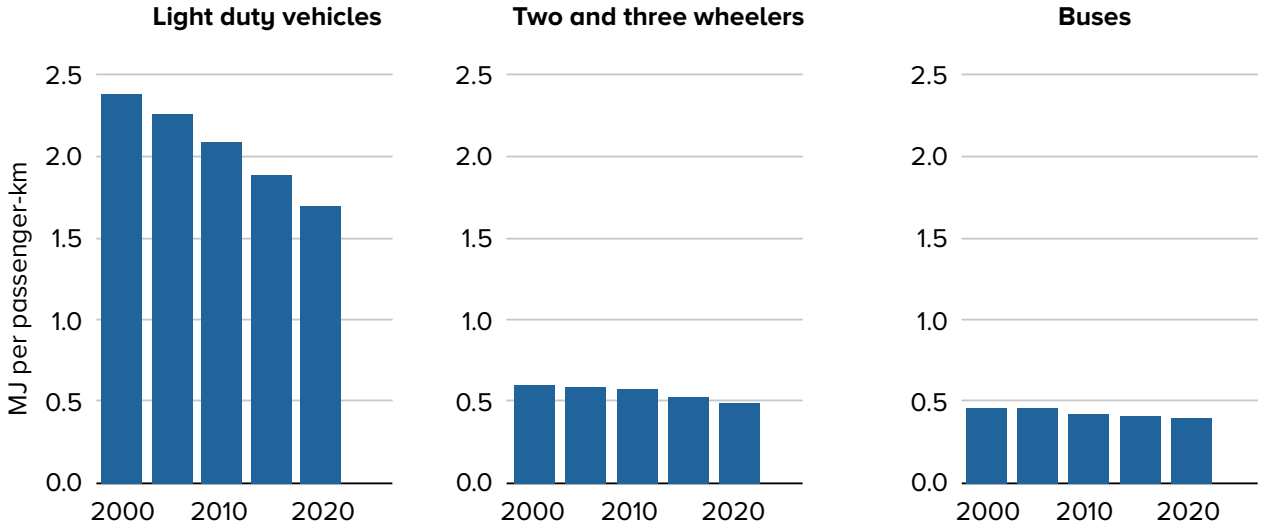

Figure 9: Global road transport efficiency indicators, 2000-2020 (IEA, EEMR 2022)

5.1 Policies

Policies and regulations to enhance energy efficiency in the transport sector have led to average annual improvements in specific fuel consumption of 1.7% for cars and light trucks, and close to 1% for two-and three-wheelers and buses between 2000 and 2020. Fuel economy standards and labels have helped transforming the vehicle fleets towards models with lower fuel consumption and incentive policies for electric vehicles have led to an extraordinary growth in uptake of electric mobility in many economies with one in eight cars sold world-wide being electric. Policy instruments that span regulatory measures, financial incentives, information measures or wider defined targets. Developing countries can benefit from cooperation on best practices and technical assistance programs to move ahead more quickly in their policy development or improvement processes. Public investments can further increase technology uptake.

Fuel Quality and Vehicle Fuel Economy standards have been highly successful policy instruments to improve transport efficiency. The Energy Efficiency Action Plan adopted by G20 covered six focus areas, including motor vehicles. The G20 Energy Efficiency Leading Programme also established a multilateral definition of "world-class" clean vehicle and fuel standards for the first time. Several G20 nations have policies and roadmaps to improve vehicle efficiency.

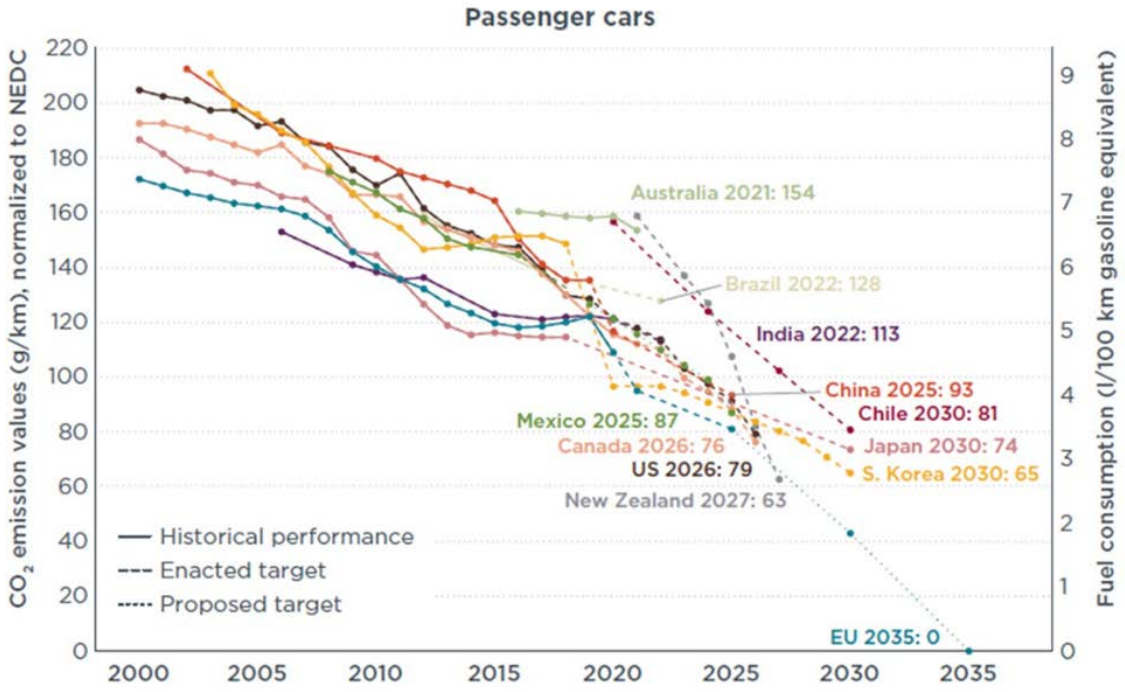

Figure 10: Historical energy efficiency improvement in passenger cars and future targets (ICCT)

5.2 Technologies

Energy efficient and low emissions vehicles are crucial in achieving the G20 energy and climate change policy goals in the transport sector. They not only consume less energy and therefore cost, but also bring multiple benefits including higher comfort or lower noise. A policy framework favouring the competitiveness of more energy efficient technologies can help strong adoption rates and a transformation towards more clean transportation.

Technological Advancements for Improving Efficiency and Reducing Emissions in IC Engine Vehicles. A combination of factors, such as the engine type, transmission system, fuel quality, consumption, weight, and aerodynamics, determines the efficiency of a vehicle. These factors have a significant impact on both the fuel efficiency and overall performance of the car. In the coming years, several technological advancements have the potential to significantly improve the efficiency of IC engine vehicles and reduce emissions by up to 50%.

Engine technologies

- ➔ Hybrid and Electric Engines
- ➔ Advanced Combustion Engines
- ➔ Improved Fuel Injection Systems
- ➔ Advanced lubricants

Lightweight materials

- ➔ Lightweight Materials: Aluminium and carbon fibre
- ➔ Advanced tyre technology

Transmission system

- ➔ Advanced transmission systems, such as continuously variable transmission (CVT) and Automated Manual Transmission

Alternate Fuels

- ➔ Alternative Fuels: Biofuels, natural gas, and hydrogen

Figure 11: Technological advancement options in vehicles to improve the fuel economy

In addition to the above technology advancements, the Internet of Things (IoT) in transportation will improve efficiency and safety and reduce emissions by enabling real-time monitoring, control, and optimization of transportation systems, vehicles, and infrastructure. For example, IoT can optimize traffic flow, reduce congestion, and improve the energy efficiency of transportation systems by reducing the need for vehicles to idle or travel unnecessarily. Connected and autonomous vehicles can also improve energy efficiency by reducing the need for human intervention and enabling more efficient driving patterns.

5.3 Recommended actions

Strategic G20 action can ensure the sustainable manufacturing and global deployment of critical technologies and solutions that offer scalability, that and that can deliver large-scale energy demand savings and emissions reductions and well as peak demand reductions and that positively impact people's quality of life.

In order to achieve this outcome, the following actions are recommended:

- ➔ Development or strengthening of fuel efficiency standards to improve the overall efficiency of the G20 fleet of cars and two and three-wheelers by 4.5% annually, as well as heavy trucks by 3% annually by 2030.
- ➔ Implementation of policies and incentives to ensure that electric vehicles reach more than half of new sales in passenger cars by 2030.
- ➔ To incentivise a modal shift away from individual transport, policies can support the development of public transport systems that are convenient, cost-efficient, and sustainable.

6. Pillar 4: Investments and Financing of Energy Efficiency

Promoting energy efficiency investment and financing has been one of the key priority areas of G20. The G20 Energy Efficiency Investment Toolkit released in 2017 provided a collaborative architecture for countries to exchange best practices in scaling up energy efficiency investment. Despite positive policy reforms and government initiatives, financing remains a significant constraint to energy efficiency. Globally, increasing the annual improvement rate in energy intensity by 2030 to 4% will necessitate to about triple the annual energy efficiency investment, from an average of USD 300 billion/year in the last 7 years to an average of USD 840 billion in the second half of the decade 2026 to 2030. About 60% of investments will be required in buildings, 30% in transport, and 10% in industry (Figure 13). Additional investments in electrification and end-uses will bring the required efficiency-related investment to USD 1.6 trillion per year up to 2030.

Figure 12: Target average annual investments in 2026-2030 in energy efficiency by sector (IEA, EEMR 2022)

Rapidly upscaling investment in energy efficiency and clean technologies also depends on enhancing access to low-cost financing, particularly in emerging and developing economies. The cost of capital provides a critical benchmark to assess the risk and return preferences of investors and the pricing of money in the wider economy, and can act as a lever for financial flows to influence prices and choices in the real energy economy. IEA analysis shows that the economy-wide cost of capital remains quite different between groups of economies and can be up to seven times higher in nominal terms in emerging and developing economies compared with the United States and Europe. Country-related risks and underdeveloped local financial systems account for much of this difference, which can be even greater in riskier markets and segments. The IEA Cost of Capital Observatory tracks the cost of capital in emerging and developing economies.

6.1 Catalytic use of public finance

Financial instruments can be organized into four groups: grants, debt, equity, and hybrid (i.e., debt and equity and other) schemes. Using debt and equity or combinations of these instruments has helped minimize and share the risks of energy efficiency-related actions among the private and public sector. Most G20 countries are currently promoting public and private finance to improve energy efficiency in industrial, commercial, and public and residential buildings. Historically, public finance has triggered private sector co-investment to the tune of three times. However, some sectors and technologies described in this section represent a more significant financing challenge.

Furthermore, MSMEs are over-reliant on debt, which may only sometimes be considered the most suitable form of financing for new and high-growth SMEs. Alternative financing tools, such as equity finance, corporate bond

issuance, and others, should be utilized more by MSMEs. Notably, alternative finance is needed by companies seeking to transform their activities, such as changing ownership or expanding into new markets.

Indicative Supply Chain for Energy Efficiency Finance Showing Components and Flow

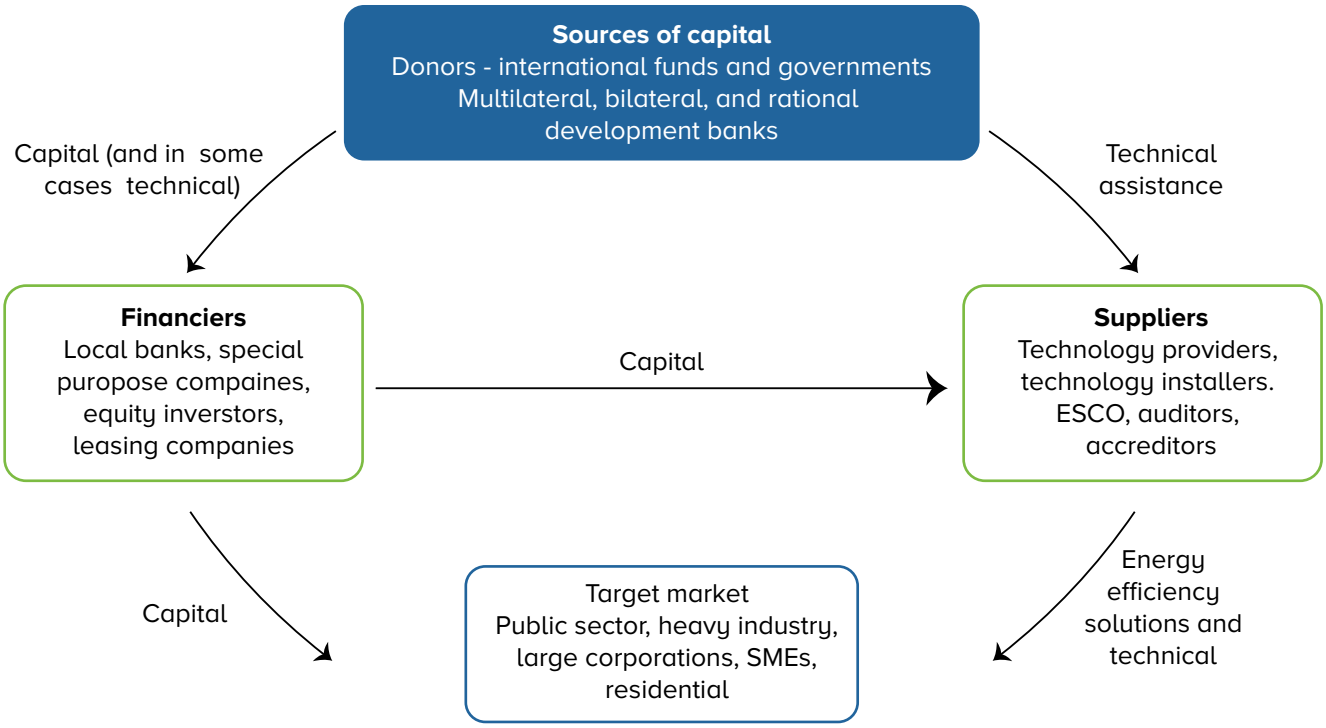

Figure 13: Indicative supply chain for energy efficiency finance (ADB)

While public funding is essential to catalyze investments and support policy implementation, most of the investment must come from the private sector and energy providers. The graphic shows the supply chain of energy efficiency financing and public finance's indispensable role in commercializing private sector finance.

It is essential to ensure that public funding complements and leverages private investments and does not crowd them out. Also, providing financing mechanisms alone is insufficient, as they need to be embedded in holistic policy frameworks and approaches that enable access to finance and attract investment by driving demand in bulk for energy efficiency projects or purchases.

Challenging areas remain for private investments. For example, in building energy efficiency, 'split incentives for investment' misalign motivations between building developers and owners, tenants, and landlords, whereby the entity that invests in the energy efficiency improvement is often not the same organization that benefits from that investment. Overcoming this split incentive is crucial for channeling finance to improve buildings' energy efficiency.

Strategic use of public finance is needed to enhance investment in currently underfunded areas and clean energy technology supply chains, and to catalyse private investments that would otherwise not occur.

6.2 De-risking instruments to make energy efficiency investment scalable and profitable

Energy efficiency investments are often hampered by the uncertainty associated with risks regarding the assets installed, the revenues resulting from the project, and the energy savings generated. All these risks need to be addressed and better understood in scaling-up energy efficiency investments. The transfer of risks to insurance

companies can lower the cost of carrying this risk and – by improving the project's risk profile – reduce the cost of capital. Energy savings insurance of this nature can enable business models for SMEs with limited balance sheets and abilities to write guarantees, even though the quality of their project work may be high (G20 Energy Efficiency Investment Toolkit, 2017). Industries, particularly SMEs, face issues with access to adequate and timely financing on competitive terms, particularly for longer-tenor loans. The investment horizon of many SMEs is short to medium-term (3–4 years), which is sufficient to recover the investment of several low to medium-cost EE investments. However, there are challenges including:

- ➔ Lack of capacity for preparation of bankable EE investment projects amongst SMEs
- ➔ Lack of risk assessment capacities of EE investments within banks
- ➔ Insufficient creditworthiness/ bankability of many SME clients
- ➔ Lack of collateral/guarantees within SMEs

Thus, the banks and insurance companies will have to be more forward-looking, and innovative, and develop instruments to meet the financing requirements of the SMEs while minimizing the associated risks. G20 nations can work together to design energy savings insurance schemes and capital allocation that public and private financial institutions and insurance companies can leverage.

6.3 Financial technology developments and digital tools for SME financing

By bringing about new digital tools for SME financing and approaches to credit risk assessment, digitalization creates new opportunities and new challenges for SME financing. New opportunities for data collection have led to new developments in data analytics for financial services. One of the applications of these methods is credit scoring, i.e., the statistical analysis of creditworthiness to reduce the risk of a payment default. The growth of so called fintech instruments has resulted in increased access to and convenience of financial services, whether for households or SMEs. Fintech has also contributed to decreasing transaction costs for lenders wishing to reach out to underserved segments of the SME population, such as firms in rural and remote areas, micro-enterprises, and informal ventures, all of which are more common in emerging markets. Digitalizing financial services has also facilitated cross-border investments, although this needs to be completed in the face of regulatory discrepancies.

6.4 Recommended actions

A coordinated enabling framework for energy efficiency investment, under G20 leadership, could scale up annual investment in energy efficiency and electrification to about USD 1.5 trillion until 2030.

In order to mobilize these investments, the following actions are recommended:

- ➔ Development of policy frameworks and programmes to enable innovative financing and business models to help lower transaction costs and the cost of capital (e.g. aggregating large numbers of small investments), mitigate risk (perceptions), and overcome persistent access barriers.
- ➔ Deployment of de-risking instruments, financing models for SMEs and counter-guarantee support for energy service companies (ESCOs)
- ➔ Strategic deployment of public finance to enhance investment in currently underfunded areas, and to de-risk and leverage 3 to 4 times in private sector investment.
- ➔ Develop policies and instruments to enhance data and information availability, enhance skills and provide technical assistance for project preparation and market readiness activities

6.5 HIGH IMPACT OPPORTUNITY: Financing for Aggregating Services and Technologies (FAST)

Project aggregation and bundling of smaller investments is particularly important to finance energy efficiency improvements. Energy Service Companies (ESCOs) offer specialist solutions to identify, finance and implement energy-efficient equipment and systems at their customers, and are often used in the SME sector, reducing energy consumption and carbon emissions. Under an energy performance contract, the ESCO provides the initial capital for energy-efficient equipment, and the client or SME repays the cost by using the savings generated. Despite growing attention towards energy efficiency and the escalation of energy expenses, several hindrances prevent the successful execution of ESCO projects. Notably, these are not technology or performance related. These barriers include client credit risk, inadequate demand, mistrust in the ESCO industry, and regulatory constraints.

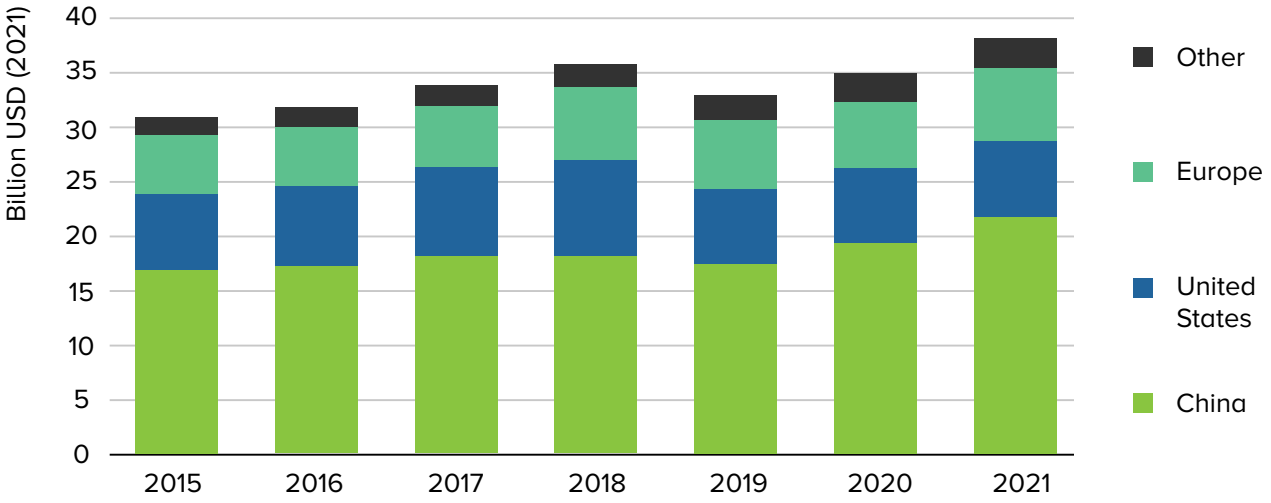

Figure 14: Investment in ESCO projects, worldwide, 2015-2021 (IEA, EEMR 2022)

A large portion (51% as per MOP) of carbon intensity reduction commitments under the Paris Agreement need to come from efficiency improvements. Energy efficiency measures have to be the focus of early and strong policy action, delivering immediate emissions reductions and making the energy efficiency and emissions reduction targets more achievable and cost-effective. The global ESCO market has steadily increased and reached USD 38 billion (Figure above). Given the significant benefits of the ESCO model, G20 countries could aim to supporting the ESCO industry by mobilizing $100 billion by 2030 to scale up energy efficiency investment.

The upfront investment is a significant deterring factor, discouraging many consumers from taking energy efficiency measures. This is often combined with further challenges including lack of knowledge about the long-term financial benefits of energy efficiency and access to affordable financing. Heating and cooling end-uses consume about 50% of the total energy consumed in buildings globally. Significant opportunities exist to make the HVAC systems more energy-efficient through technological interventions and affordable financing.

Use a combination of innovative business models (cooling and heating as a service, involving electrical utilities to offer heating and cooling as part of the servitization model), mature and available technology (e.g., district cooling and heating systems, radiant heating and cooling technologies, heat pump, BLDC powered fans, etc.) that has the potential to significantly reduce the energy use and cost without compromising on service quality, and concessional and blended financing to enable access to capital for ESCOs and service providers.

What: Committing to creating a revolving fund for dedicated energy efficiency financing for ESCOs through knowledge transfer across G20 countries and making specific budgetary line-item provisions for energy efficiency to enable lower energy intensity goals in building and industrial sectors. A provision to front-load energy efficiency financing investments will help overcome the perceived risks of non-payment down the road.

Why: Enable concessional and blended financing and counter guarantees, which have worked in attracting and scaling private capital for renewable business, to deploy $100 billion investments towards scaling the energy services sector. This can lead to the creation of several thousand green jobs across G20 economies. This needs to be combined with a paradigm shift to train the requisite energy workforce for deploying clean energy at scale, as well as just transition policies that take into consideration employees negatively affected by these changes.

How: Take concrete steps to create an independent and credible 3rd party measurement and verification platform or entity that facilitates faster repayments to the ESCOs and also put in place simplified settlement mechanisms settling any disagreements through independent, objective, and technically sound best practice-based methods to build trust amongst critical stakeholders.

7. Pillar 5: Behaviour and Lifestyle Changes

Lifestyle changes are increasingly cited among the options that could help meet climate mitigation targets. According to the IPCC, having the right policies, infrastructure, and technology in place to enable changes to lifestyles and behaviour could result in a 40-70% reduction in GHG emissions by 2050 (IPCC, 2022). It has been estimated that the average global lifestyle carbon footprint compatible with the 1.5°C aspirational target of the Paris Agreement should not exceed 2.5 tCO2e per person per year by 2030, and it should fall below 0.7 tCO2e by 2050. In 2020, the global average lifestyle carbon footprint was 4.6 tCO2e, almost twice the target for 2030 (Hot or Cool Institute, 2021).

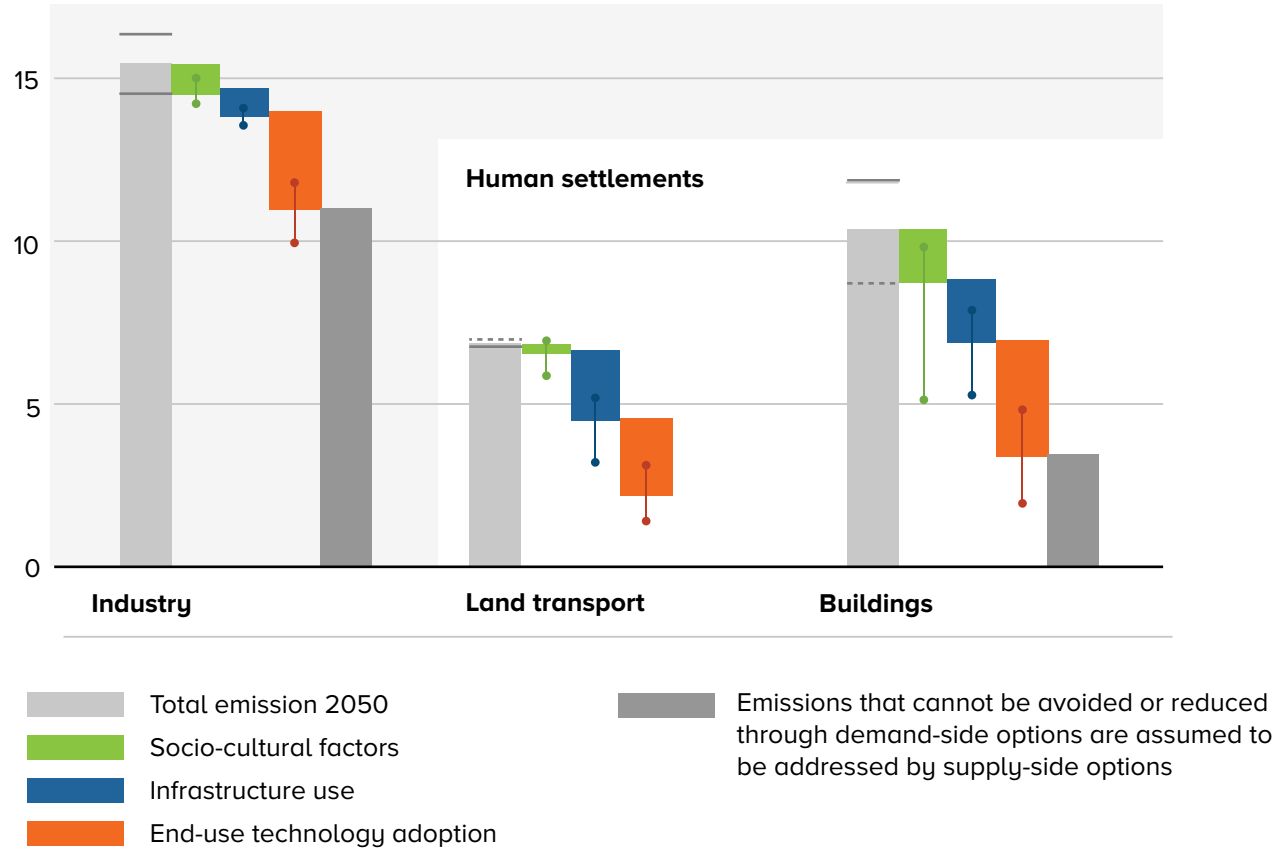

Figure 15: Demand-side mitigation actions by 2040 in industry, land transport, and buildings (Source: IPCCC, 2022)

The World Energy Outlook 2022 report outlines that achieving net zero emissions by 2050 will require a combination of end-use efficiency gains, electrification, and behaviour change (IEA, 2022). In addition, the IEA's Global Energy and Climate Model for the Net Zero Emissions by 2050 Scenario suggests that behavioural change and sustainable practices can reduce approximately 14 EJ in the transport sector, 7 EJ in the building sector, and about 2 EJ in the industries by 2030.

In India, the estimate for energy savings from behavioural interventions (primarily through programs such as home energy reports) is estimated to be between 3.4 TWh to 10.2 TWh per year by 2030, which is equivalent to taking a city half the size of Kolkata off the grid altogether for a year (AEEE, 2019). In Ireland, behavioural interventions (in the form of adjustments to indoor temperature settings) have been estimated to result in a reduction in energy use of 2.4 TWh per year in residential buildings and 6.5 TWh overall, with commercial and public buildings included (SEAI, Unlocking the energy efficiency opportunity, 2015). This would reduce the country's total energy consumption by 5% (SEAI, Changing energy behaviour - what works, 2019).

7.1 Enabling behavioural change in the buildings and transport sectors

There is substantial evidence that a focus is required on establishing enhanced demand-side strategies that could help individuals make prudent decisions and sustainable choices (Lehner et al., 2016). Therefore, behavioural insights are increasingly used in designing, implementing, and evaluating policy instruments. Individuals' choices and behaviour are crucial in leveraging different policy tools for fostering sustainable and efficient energy consumption in the residential and commercial sectors. An integrated policy-making process coupled with behavioural insights requires analysing biases affecting how individuals perceive, process, understand, or ignore information. Decisions relating to energy use, including thermostat settings, adoption of star-labelled appliances, or participation in demand-response programs, are all driven by human behaviour. The actions and attitudes of individuals play a fundamental role in cumulative energy consumption. Policies that support change in consumer habits and encourage investments need to be based on an understanding of possible barriers and an assessment of the triggers and incentives. Barriers can be financial such as higher first costs. However, they are often behavioural, e.g., inconvenience related to turning engines on and off at traffic lights. Policymakers can boost the effectiveness of energy efficiency interventions by expanding the policy design to include appropriate behavioural levers.

Enabling behavioural change is dependent on several parameters. When considering the building sector it is essential to understand that the uptake of the interventions would largely depend on the investments required to make the interventions. A cross-sectoral (Transport and buildings) behavioural intervention graph has been created to map the degree of relative impact and associated relative cost of a few relevant operational-user-behaviours and purchase-user-behaviours that governments could use to guide their future behavioural policy measures and actions. The placement of each behavioural intervention has been determined by the degree of relative impact and relative cost in terms of short-term and long-term gains.

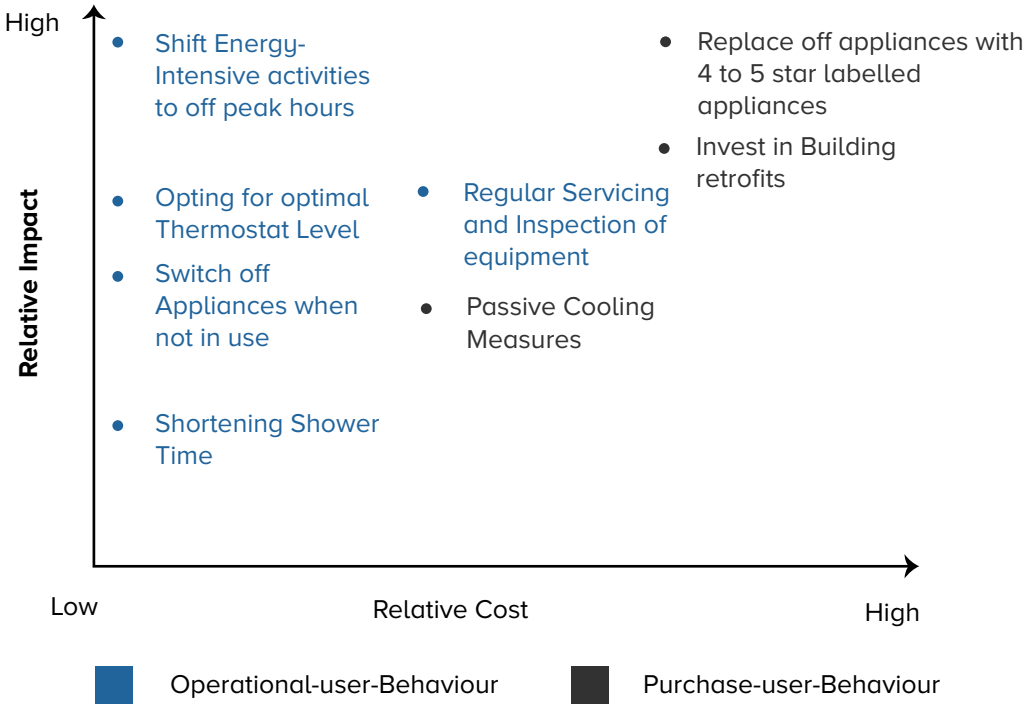

Figure 16: Behavioural energy options for the Buildings sector (AEEE)

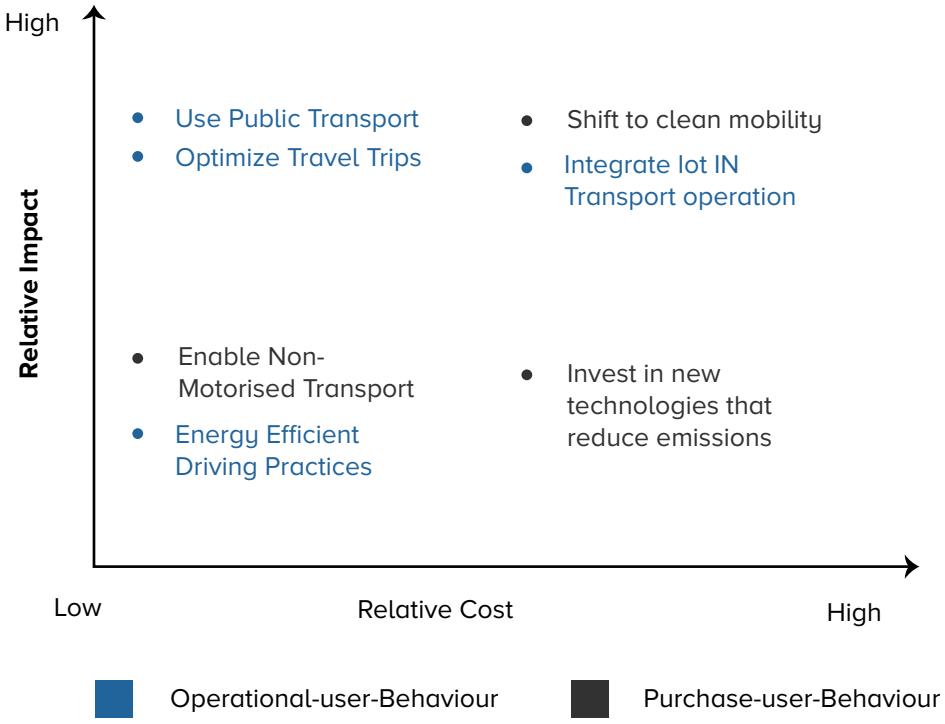

Figure 17: Behavioural energy options for the Transport sector (AEEE)

7.2 G20 leading the way for responsible consumption

The newly launched LiFE movement by the Indian Prime minister is a testament to India's envisioned reformed community lifestyles. The recent IEA report on 'Life Lessons from India: The benefits of advancing the Lifestyle for Environment (LiFE) initiative through the G20[1]" has estimated 2 billion tonnes of CO2 emissions reduction by 2030, given that countries globally imbibe the LiFE mindset and shift policy focus to behavioural interventions. The G20 can be essential in internationalizing Lifestyle for Environment (LiFE) since G20 nations account for around 80% of the world GDP, 75% of global trade, 72% of total energy consumption, and 60% of the worldwide population (IEA, 2023). The LiFE campaign in India embodies the vision of promoting an environmentally conscious lifestyle for mitigating climate change. The drive can be the starting point for creating an international community of 'Pro-planet people' that not only fosters the idea of developing an individual-centric nudge mechanism but could also be the platform for creating an international collaboration center on information sharing among the G20 group.

Partnerships among the G20 group could facilitate cooperative studies to capture best practices and case studies on successful behavioural interventions. For instance, the success and learnings from HERs in the US have enabled the launch of similar pilot programs across other nations such as Japan and India. Similarly, countries such UK, Australia, and Ireland have mandated the inclusion of in-home displays in their smart meter implementation. Hence, learnings across nations can help inform the design of replicable behaviour change policies and programmes across G20 members, thereby embodying the ethos of 'World is One Family' upon which India has assumed the presidency for the G20 summit for 2023.

As a result of G20 strategic leadership, behavioural energy efficiency and lifestyle changes can be promoted across sectors and communities, nudging people-led actions as a driver of change.

7.3 Recommended actions

Strategic G20 action can induce behaviour and lifestyle changes and foster citizen engagement.

In order to achieve this outcome, the following actions are recommended:

- ➔ The implementation of policies, combined with the right incentives and enabling infrastructure for incentivising behaviour change and sustainable consumption choices outlined in the Indian Lifestyle for Environment (LiFE) initiative can, replicated globally, decrease global annual CO2 emissions by more than 2 billion tonnes by 2030.
- ➔ Introduction of targeted information campaigns to induce people to behave in a more energy efficient way, without comprising on comfort or convenience. This includes sustainable purchase choices, efficient appliance usage behaviours (e.g. eco programmes) and transport modal shift towards public transport, walking and cycling.
- ➔ Regularly targeting information policy on product maintenance in all end-uses to ensure the efficient operation of equipment, an increased lifetime and more user satisfaction.
- ➔ Implementation of policies that make energy consuming equipment more economical during off-peak hours to reduce the need for electricity production capacity, increase grid stability and reduce infrastructure cost.
- ➔ Introduction or updating of policies to favour digitalisation to accelerate energy efficiency. Smart technologies can improve smooth operation of many end-use sectors. Smart home systems can intelligently shift demand from peak periods to off peak periods to reduce peak demand improving grid stability. Smart space heating and cooling, the largest source of residential electricity demand, can efficiently operate and decrease power for a limited amount of time to decrease consumption peaks. Smart chargers can connect electric vehicles to the power grid to charge their batteries when demand is low to reduce the cost for consumers, and digitally enabled traffic guidance can even out traffic flows to decrease transit times, and lead to more even driving speeds and reduced engine idling.

7.4 HIGH-IMPACT OPPORTUNITY: Comfort for an Affordable and Resilient Economy (CARE)

Access to heating and cooling cannot be taken for granted. Billions of people, mostly in developing countries, do not experience thermal comfort for extended periods. Even if people have access to heating and cooling, the affordability and sustainability of energy use may also be a challenge for many households, particularly in developing countries. Global warming, extreme weather events, and spikes in fuel costs pose a clear and present danger to living comfortably and productively. The International Energy Agency (IEA) estimates that the global energy used for building heating and cooling was approximately 69 EJ in 2021, making up about 52% of buildings energy use.

This is a two-part problem:

a) **Providing heating and cooling solutions in an energy-efficient and cost-effective manner:** For people who are fortunate to have access to a controlled environment, the amount of carbon that we consume to heat and cool our buildings has to be reduced - both in absolute and in per-capita terms to reduce carbon emissions and costs.

b) **Enabling access to heating and cooling:** How to provide thermal comfort to billions of people and protect them from extreme weather events, heat waves, and prolonged exposure to temperatures that may start to compromise life functions requires urgent attention.

What: Providing thermal comfort for all at an affordable price is a global imperative and is a just and equitable energy transition issue. A combination of policy, technological, financial, behavioural, and knowledge transfer-based interventions will be needed to tackle this growing problem with the urgency and importance it deserves. Building energy codes to limit heat transfer across building envelopes, and standards to drive HVAC efficiency will lead to the most efficient building materials and HVAC systems to be specified and deployed in buildings. In addition, adopting adaptive thermal comfort standards across G20 countries would allow temperature set points to be set closer to the acclimatized temperature preferred by local citizens, which can lead to significant energy and cost savings without compromising on thermal comfort.

Why: By encouraging the adoption of and providing monetary incentives to purchase super-efficient fans, room and split air-conditioners and heat pumps, packaged air-conditioners and chillers, hundreds of GW can be saved by G20 countries. By using adaptive thermal comfort principles and dressing appropriately, tens of TWh can be saved. In most G20 nations, cooling consumption significantly contributes to peak demand that can be shaved or shifted in buildings with tight envelopes and advanced HVAC controls.

How: A dedicated credit facility to enable thermal comfort for all while diversifying the manufacturing supply chain of critical components such as compressors, heat exchangers, high-efficiency motors, etc., would result in giga tons of CO2 reductions, enhanced thermal comfort, and the creation of significant green jobs.

8. Cooperation to Accelerate Energy Efficiency Progress

This Strategic Plan recognises that the greatest efficiency gains can be achieved through carefully designed and implemented policy packages, that combine regulation, information and incentives, while placing people at the centre of the clean energy transition. People centred, inclusive and effective policy packages will deliver efficiency's full potential to enhance energy security, create jobs, improve living standards, lower energy bills and reduce emissions. The G20 offers a unique forum to exchange best practices and policies, drive energy efficiency progress through cooperation on data, policies and technologies and mobilise the necessary investment in energy efficiency across end-use sectors with a particular emphasis on supporting countries in the Global South.

Ensuring greater collaboration and coordination among the G20 members to ELEVATE, SUPPORT, and INVEST in energy efficiency drive faster progress in the G20 and in countries of the Global South. Advancing energy efficiency across demand sectors by 2030 would require further building upon bilateral and multilateral cooperation already underway, adding countries or expanding groups or stakeholders, as necessary, with the aim of exchanging best practice information on:

Investment scale-up

Exchange of policy and technology best practices

Energy consumption data collection and analysis methodologies

Capacity-building, technical assistance and matchmaking of national energy efficiency priorities with available global support

8.1 HIGH-IMPACT OPPORTUNITY: Secure the Power of Energy Efficiency Data (SPEED)

Like oil (and now renewable energy), every country needs data to power development. Governments need to collect, analyse, and use data to strategize for clean energy development. Additionally, standard data reporting is required for a transparent and accountable transition, as mandated to meet our international reporting commitments.

There is a vast gulf among G20 countries in capacity, knowledge, institutions, and budgets allocated toward data infrastructure. International synthesis reports rarely have adequate comprehensive data from developing and emerging market economies. The problem is further accentuated when we look into end-use energy consumption data for the buildings, industrial, and transportation sectors.

A G20 task force, "G20 Energy Access Action Plan: Energy Efficiency and Data Analysis Task Force," was established in 2016 under the German G20 presidency. The IEA and ADEME provided technical and analytical support to the task force, helping to develop policies and recommendations for G20 countries to improve energy access, efficiency, and data collection.

What: Building on these international efforts, we recommend establishing a focused Energy Consumptions Data Task Force to assess the availability and quality of energy consumption data in G20 countries and create standards for quality and transparency. This task force will provide the necessary knowledge, technical assistance, and suggestive institutional frameworks to develop a solid data-driven ecosystem toward a sustainable future. The framework also needs to address the concerns of data privacy and security.

Why: A robust energy data ecosystem will help formulate and refine the next-generation energy efficiency policies, develop market mechanisms, and attract financing and investments in this segment.

How: Organizations such as the International Energy Agency, Energy Information Administration and programs such as EnergyStar, Residential, and Commercial Building Energy Consumption Survey, Mure and Odyssey in Europe, and Nabers in Australia can play a significant role in the knowledge transfer and in helping countries take full advantage of energy consumption data and digital platforms and technologies to fast track their decarbonization journey.

9. Way Forward

The G20 Strategic Plan for Advancing Energy Efficiency Across Demand Sectors by 2030 lays out the energy efficiency action priorities for this decade. G20 will be critical in shaping the global energy transition and ensuring the successful implementation of international climate change agreements. Efficiency improvements, together with wind and solar power are the largest lever to meet the world's commitments towards net zero emissions. Leaders at COP 27 highlighted the need for countries to make good their commitments to development finance for governments to act on reducing climate change impact. In 2021, G20 Energy Ministers reaffirmed the commitment made by developed countries to jointly mobilize USD 100 billion per year to address the needs of developing countries for meaningful mitigation actions. G20 is committed to activities that accelerate the gains from energy efficiency and advance resilience in the energy sector and critical end-use sectors. Meaningful participation of the G20 nations is pivotal in shaping international action on energy efficiency and can help achieve the desired rate of annual energy intensity improvement and deliver on climate commitments.

G20 countries have a large basket of notable legislation, regulations, and policies to advance energy efficiency in the key sectors comprising the buildings, industry, and transport sectors. Strengthening collaboration between governments to transfer key learnings across G20 countries and the different sectors identified should be of utmost importance. Additional investment needs to be mobilised quickly, including by unlocking investments through innovative financing instruments and catalyzing private investment in energy efficiency, which will support the achievement of the SDGs. Finally, G20 would benefit from embedding behavioural changes and responsible energy consumption for countries to share best practices and success stories for citizens to become agents of change.

Annex 1: Case Studies

The Buildings Sector

G20 members have implemented a range of energy efficiency policies, ranging from regulation and information measures to incentive schemes, to deliver substantial energy savings and GHG emissions reductions. The following are some notable examples:

- **All G20 members** have minimum energy performance standards and labels for air conditioners in place.
- **Australia** has a comprehensive policy package in place for building efficiency, comprising the building code, energy performance requirements and rating schemes as well as related incentive schemes.
- The Energy Company Obligation (ECO) scheme in the **United Kingdom** obliges energy suppliers to promote energy efficiency measures to vulnerable households.
- The **German Federal Funding Scheme for Efficient Buildings (BEG)** provides subsidised loans for the deep refurbishment or new construction of residential and non-residential buildings, as well as for individual measures.
- The C**anada Greener Homes initiative** provides grants for eligible home retrofits including the installation of heat pumps.

More detailed case studies follow on selected measures:

Name of policy/ program/scheme	UJALA (Unnat Jyoti by Affordable LEDs for All)
Country	India
Sector	Buildings
Duration	2015 to present
Summary	UJALA is the world's largest zero-subsidy LED bulb programme for domestic consumers. The UJALA scheme works on a "demand aggregation price cash model". In 2015, the Indian Super ESCO EESL invited manufacturers to submit open bids for a large-scale tender for LED lamps, covered the upfront costs and sought partnerships with state governments and electricity production and distribution utilities to establish a value chain for the public distribution of these lamps under the scheme. This large-scale demand aggregation used economies of scale to significantly lower retail prices of LED. Two payment options were offered to consumers for the purchase of LED bulbs: a) upfront payment of the whole cost, and b) based on a "pay-as-you-wish/on-bill financing" programme where customers would pay USD 0.15 (Rs.10) per bulb and would cover the remaining balance through a monthly charge on their electricity bill of the same amount (IBEF, 2023).
Outcomes & Impact	Under UJALA, India's Energy Efficiency Services Limited (EESL) distributed over 367 million LED bulbs as of March 2022 (PIB, March 2022). UJALA lowered the retail cost of LED bulbs from US$ 3.82–4.45 per bulb by about 77% to US$ 0.89–1.02 per bulb, and helped citizens achieve a 15% reduction in average household electricity bills while providing better lighting to their homes (Ujala Yojana, IBEF). The scheme has provided everyone with affordable energy and significant energy savings, with figures of 47,784 million units of electricity per annum, peak demand reduction of 9,566 MW, and 38.70 million tonnes of CO2 emission reduction annually (PIB, March 2022). The scheme has increased the domestic manufacturing of LED bulbs from 100,000 per month to 40 million per month by the start of 2022 (PIB, January 2022).

Name of policy/ program/scheme	ENERGY STAR buildings certification
Country	USA
Sector	Buildings
Duration	1993 - present
Summary	In the USA, the Environmental Protection Agency's ENERGY STAR program certifies buildings that are verified to perform better than 75% of similar buildings nationwide. Voluntary certification is given on an annual basis, so high performance needs to be maintained over time, and it is verified by a licensed third-party.
Outcomes & Impact	To date, over 2.4 million ENERGY STAR certified single-family, multifamily, and manufactured new homes and apartments have been built, including more than 8.5% of all U.S. homes built in 2021. Approximately 3,000 builders, developers, and manufactured housing plants - including the twenty largest home builders - are ENERGY STAR partners, and over 25% of the commercial floor square in the country is managed using EPA's ENERGY STAR Portfolio Manager tool to measure and track energy use, water use, and/or waste and materials.

The Industrial Sector

Industry is a sector with large energy savings potentials and an array of possible measures that have not yet been exhaustively targeted. For example, industrial energy management programmes and reporting schemes are present in most G20 countries with varying degrees of impact while only half the G20 members have market-based instruments for energy efficiency in industry in place. The following are some notable examples:

- ➔ **The Indian Perform, Achieve and Trade (PAT) scheme** is a regulatory instrument to reduce specific energy consumption in energy-intensive industries, combined with a market-based mechanism to improve cost-effectiveness through the certification of the achieved energy savings and trading of excess savings.
- ➔ **The Italian White Certificate Scheme,** launched in 2005, is an Energy Efficiency Obligation (EEO) scheme obliging electricity and gas distributors with more than 50,000 clients to reach increasing annual energy efficiency targets.
- ➔ **South Africa's 12L Energy Efficiency Incentive** provides an incentive rate of 95 cents per kWh of tax deduction for energy efficiency measures.

More detailed case studies follow on selected measures:

Name of policy/ program/scheme	The Top-10000 Energy-Consuming Enterprises Programme
Country	China
Sector	Industry
Duration	2006 to present
Summary	The Top-10000 Programme started in 2011. It was built on the successful foundation of the Top-1000 Programme, which operated between 2006 and 2010. The programme required enterprises to establish an energy conservation organization, formulate energy efficiency goals, establish an energy utilization reporting system, conduct energy audits, conduct training, formulate an energy conservation plan, adopt energy conservation incentives, and invest in energy efficiency improvement options.

Name of policy/ program/scheme	The Top-10000 Energy-Consuming Enterprises Programme
Outcomes & Impact	The Top-1000 program reported savings of 150 million tonnes of coal equivalent (Mtce) against the target of 100 Mtce from participating companies. The Top-10000 Programme covered two-thirds of China's total energy consumption with an energy saving target of 250 Mtce by 2015 or 37% of the total savings target. The total number of enterprises covered by this program reached around 17,000.

Name of policy/ program/scheme	Energy Management Systems in SMEs
Country	Mexico
Sector	SMEs
Duration	2015-2017
Summary and Impact	In Mexico, CONUEE's programme promoted energy efficiency and energy management systems in SME through dissemination of information on technologies and best practices. The programme provided training to SMEs' personnel on energy management systems and energy efficiency, and helped companies identify opportunities for improvement - including no-cost ones - through technical support for internal energy audits.
Outcomes & Impact	Thanks to the programme, participating enterprises achieved reductions of 57.7 GWh and of 14,820 t of CO2, and monetary savings equivalent to over $ 5 million pesos. Companies also documented improvements in product quality and increased productivity.

Name of policy/ program/scheme	Energy-Efficient Electric Motors in SMEs
Country	Türkiye
Sector	Industry, SMEs
Duration	2021 to present
Summary	In 2021, Turkey has introduced minimum energy performance standards for electric motors at IE3 level, in parallel with the EU regulation. The country is also expected to transition to IE4 levels in 2023 for motors in the 75-200 kW range. The policy effort was supported by the program Promoting Energy-Efficient Motors in SMEs, implemented by the Ministry of Industry and Technology (MoIT) with financial support from the Global Environment Facility (GEF) and in cooperation with UNDP.
Outcomes & Impact	The program has supported the replacement of 363 motors - with rated power output between 4 kW and 200 kW ranging from IE3 to IE4 efficiency - in 48 SMEs, achieving about 1.5 GWh/year energy savings and a reduction in greenhouse gases of 685 tonnes of CO2-equivalent.

The Transport Sector

The transport sector is rapidly changing worldwide. A move towards more fuel-efficient vehicles and fuel switching to electric vehicles and those using biofuels fuels can be observed everywhere but at very differing rates. G20 countries have developed an array of policies to support the clean energy transition in transport. The following are some notable examples:

- **All G20 members** have put in place vehicle emission standards, and many are also employing fuel economy standards for road vehicles. Investments in public transport infrastructure are being ramped up and most countries are incentivising the purchase of electric vehicles.

- Purchase incentives for electric vehicles are in place in many G20 countries, including **Australia, Canada, China, India, Japan, Korea, South Africa, the United Kingdom, the United States and all EU member states.**

- **Indonesia** has adjusted their motor taxation rate to 0% for electric vehicles and to between 2 and 12% for hybrid vehicles, while fossil-fuel powered cars are taxed at 15 to 40%.

- **Many G20 countries** have high-speed rail lines, contributing to shifting short- and medium-distance trips from aviation to rail, and to achieving energy savings and GHG emissions reductions. The EU, for instance, plans to double high-speed rail use by 2030 and triple current levels by 2050. Night rail services connecting EU countries are being expanded as well, as they can raise throughput on networks and reduce per-passenger cost of railway operations.

More detailed case studies follow on selected measures:

Name of policy/ program/scheme	Fuel Economy Standards for light duty vehicles and complementary measures
Country / Region	EU and France
Sector	Transport
Duration	2009 to present
Summary Impact	Mandatory corporate average fuel economy standards have helped reduce fuel consumption in light-duty vehicles in the European Union. Since 2009, manufacturers have been mandated to meet target CO2 emissions levels for all new vehicles sold by 2021, set at 95 gCO2/km - the most ambitious fuel economy target globally. In 2010-2015, average fuel economy improved by an average 3.2% annually, from 6.6. to 5.6 Lge/100km. However, progress slowed in the following years, including as a result of a steady increase in vehicle size. New emission standards for light-duty vehicles were introduced in 2019, mandating 15% reduction from 2025 onwards and 37.5% reduction from 2030 onwards, compared to the 2021 levels. Some EU Member States have also complemented the EU-mandated fuel economy standards with other instruments, to ensure that the light-duty vehicles sold in their territories are among the most fuel-efficient globally. For instance, a feebate scheme in France has helped further decrease CO2 emissions, by imposing a fee on the purchase of vehicles with rated specific CO2 emissions above a specified threshold, and a subsidy for the purchase of vehicles with CO2 emissions below a determined level. France has also introduced a tax that adds EUR 10 (USD 11.70) for every kilogramme over the 1,800 kg limit to the retail price, to dis-incentivise purchases of heavy SUVs and large car.

Name of policy/ program/scheme	Electrification of the urban bus fleet in Shenzhen
Country / Region	China
Sector	Transport
Duration	2009 to 2017
Summary	Shenzhen faced rapid population growth with significant pressures on air quality and congestion. Under the national electric vehicle demonstration programme, Shenzhen began adopting electric buses in 2009 and fully electrified its fleet by 2017 with no increase in customer fares. The three major bus operators received city and central government subsidies for the buses, which brought them into price parity with diesel buses (IEA, 2021). The Shenzhen Energy Conservation and New Energy Vehicle Demonstration and Promotion Leading Group (SNEVLG) was set up by the city to align with national and provincial policies and to coordinate relevant municipal departments. The government mandate to shift to clean energy buses, combined with national and local government subsidies and the municipal government's efforts to ensure land availability for new charging stations supported the rapid bus fleet electrification. The private bus manufacturer provided warranties for the lifetime of the buses, maintenance support as well as training for operator staff. The Shenzhen Bus Group (SZGB) also worked closely with other private companies and NGOs to put in place a bus operation management system, safety management system and repair and charging management system as part of its Intelligent Transportation Centre. The SZBG introduced a financial leasing model, where a leasing company purchased and owns the vehicles and leases them to SZBG for a period of eight years with a lifecycle warranty for key parts offered by bus manufacturers. Thereafter, ownership of the buses is transferred to SZBG. The charging facilities including charging stations and transformers are owned by the depot owners (either SZBG or a charging service provider), while the power supply lines are owned by the government (World Bank, 2021).
Outcomes & Impact	The city of Shenzhen has the world's largest fully electric bus and taxi fleets. In 2017, Shenzhen became the first city globally with a fully electrified urban bus fleet of 16,359 e-buses. At the end of 2019, 99% of the taxi fleet or 21,485 e-taxis were electrified (World Bank, 2021). Shenzhen's e-bus fleet now consumers about 73% less energy than in 2016, resulting in a total reduction of over 1 million tons of CO2 per year, and considerable reductions in CO, NOx, PM2.5 and PM10 (IEA, 2021).

Behaviour and Financing Initiatives

Enhancing energy efficiency is of utmost importance to the entire energy system across sectors and user groups. In addition to sectoral policies G20, Governments have also developed more systems-based approaches. The following are some notable examples:

➔ Driven by the 2022 power supply crisis, **Korea** launched a large-scale energy efficiency promotional campaign in collaboration with private sector companies and civic society groups, combined with an energy saving incentive programme for households: the 333 programme to save 3% electricity with 3 actions over 3 months, and a cashback programme which recorded 14% energy savings per household.

- In 2005, **Japan** launched its annual "Cool Biz" campaign, which suggests a standard office ACs setting to 28C, while encouraging a more relaxed and temperature-appropriate summer dresscode.
- Since 1990, the State Council of **China** has been holding an annual National Energy Conservation Awareness Week. It includes activities from 14 government departments with dedicated slogans and communication campaigns.
- The **Brazilian** Energy Efficiency Programme (PEE) mandates electricity distribution companies to invest 0.5% of their net operating revenues in energy efficiency measures across all sectors.

More detailed case studies follow on selected measures:

Name of policy/ program/scheme	Top Runner Programme
Sector	Buildings, Transport, Industry
Duration	1998 to present
Country	Japan
Summary	The Top Runner Programme, established in 1998, is an initiative of the Ministry of Economy, Trade, and Industry (METI) aimed at promoting the development and widespread use of advanced technologies and products that are highly energy-efficient. This program is now considered one of the pillars of Japan's climate policy. The Program began with nine products in 1998 and reached 32 products as of April 2019.
Outcomes & Impact	As per METI, the program has saved a total of approximately 9.5 million TOE (tonnes of oil equivalent) of primary energy, which is equivalent to approximately 30% of Japan's annual primary energy consumption in 2015. In terms of cost-benefit, the Japan Institute of Energy Economics (JIEE) conducted an evaluation of the program in 2016 and found that the benefits of the program, including energy savings, CO2 emission reductions, and economic benefits, were estimated to be approximately 11.5 trillion JPY (about 100 billion USD) from fiscal year 2000 to fiscal year 2020.

Name of policy/ program/scheme	Energy Savings Insurance
Country	Mexico, Argentina, Brazil, and other Latin American countries
Sector	Multi-sector
Duration	2016 to present
Summary	Mexico and Colombia have pioneered an Energy Savings Insurance (ESI) model. The ESI model incentivizes investments in energy efficiency projects through mitigation instruments including an energy savings insurance, standardized contracts, an independent verification and validation process, and concessional finance. The model is being implemented in Argentina, El Salvador, Chile, Brazil, Nicaragua, Paraguay, and Peru.
Outcomes & Impact	To date, the model has led to investments of over USD 18 million and the roll out of over 80 projects in the region, ranging from solar photovoltaics, cooling, solar thermal, air conditioning, and other energy-efficient technologies. In Mexico, the program was administered by FIRA and focused on SMEs in the agro-industry sector. Until February 2021, it has successfully attracted USD 3 million investment in energy-saving measures in 12 energy efficiency projects. In Colombia, enterprises in the healthcare and hospitality sector reduced their energy consumption by up to 70%.

Name of policy/ program/scheme	Cuidemos los recursos. Cuidemos nuestro país. Let's take care of our resources. Let's take care of our country
Country	Argentina
Sector	Cross-sectoral individual behaviour change measures
Duration	June 2022 until present
Summary	In view of Argentina's new tariff segmentation plan, which aims to phase out some existing subsidies, and the energy crisis which resulted in energy price hikes, the country launched its public campaign called " Cuidemos los recursos. Cuidemos nuestro país" [Let's take care of resources. Let's take care of our country] calling on citizens to take practical measures to reduce energy use. The campaign involves the use of videos and images to make energy savings easier for people. A website provides practical tips for more energy efficient behaviour at home, in offices and in transport, as well as information on energy labels and practical tools (household gas and electricity consumption calculators, calculator for gas consumption per appliance). The campaign was launched by the Ministry of Economy and was picked up by the Ministries of Agriculture, Transport, Finance, Industry and others on social media, demonstrating how a cross-ministerial collaboration can strengthen the messages and reach broader audience.

Name of policy/ program/scheme	AC@24 Campaign
Country	India
Sector	Buildings
Duration	2019 to present
Summary	The Bureau of Energy Efficiency, the statutory body under the Ministry of Power, Government of India for creating awareness and disseminating information on energy and conservation, has been undertaking concerted efforts since 2019 to promote optimum AC setpoint temperature settings among Indian users through its AC@24 campaign. This followed a two-pronged approach: 1. Default settings: In 2020, BEE notified new energy performance standards for ACs under which all brands and types of star-labelled ACs that are manufactured, commercially purchased, or sold in India have to have a default setting of 24°C (PIB, 2020). The user still has the flexibility to change or adjust the setpoint temperature as they wish. BEE has also issued a voluntary advisory to commercial establishments in India, including airports, hotels, shopping malls, and offices, to run ACs at the recommended temperature setting of 24°C. 2. Digital campaign to raise awareness and promote the optimum AC setpoint temperature settings based on elements of monetary and environmental motives.
Expected outcomes	BEE estimates that the adoption of the recommended AC setpoint temperature settings by 50% of consumers would result in savings of 10 billion units of electricity, equivalent to a reduction of 8.2 million tonnes of carbon dioxide (CO2) emissions per year (BEE, n.d.).

Small acts can drive reforms. What appears minor can actually be vital and fundamental. Generating 20,000 MW of power attracts a lot of attention. That is important. At the same time, 20,000 MW of power can be saved through a people's movement for energy efficiency. The second is more difficult but is as important as the first. Small indeed, is beautiful.

– Narendra Modi

G20

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