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Appliance Efficiency in NDCs

Tracking Changes in Nationally Determined Contributions to the Paris Climate Agreement

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1. Background & Introduction

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Nationally determined contributions (NDCs) are the bedrock of the Paris Agreement, serving as the unique climate action plans of its signatories. NDCs enable countries to plan and implement climate mitigation and adaptation actions at the national level that contribute to a collective sustainable, low-carbon, and climate-resilient future.

Article 4 of the Paris Agreement requires countries to submit NDCs every five years beginning in 2020, with the aim to raise ambition with each iteration.[i,ii] Since 2020, several governments have revised their NDCs, and many others will soon begin developing more ambitious commitments for release in 2025.

Another key component of the Paris Agreement is the Global Stocktake (GST), which assesses the collective progress towards three important goals:

1. Limiting global temperature rise to well below 2 degrees Celsius C (°C) [3.6 degrees Fahrenheit (°F)] and ideally 1.5°C (2.7 °F);
2. Building resilience to climate impacts;
3. Securing financial support at the level needed to tackle the climate crisis. [iii]

The GST, which will occur every five years beginning in 2023, is a key deliverable of the 28th Conference of the Parties (COP28) to the United Nations Framework Convention on Climate Change (UNFCCC).[iv] In the leadup to the conference, the UNFCCC published a Synthesis Report that summarizes the findings to the first GST. It found that, collectively, countries are not on track to limit warming to 1.5 °C and that more ambitious targets and actions are needed at the national level.[v] At COP28, country delegates will discuss the GST's technical findings; identify opportunities and challenges for making progress; assess measures and best practices for climate action and international cooperation; and issue a final decision that will formalize the collective commitments in response to its findings. These actions will likely inform the next round of NDC revisions.

In 2022, CLASP published "Integrating Appliance Efficiency into Nationally Determined Contributions," a report that investigated the extent to which appliance energy efficiency was included in NDCs. The report assessed all NDCs[1] submitted before January 1, 2022. The analysis found that 41% of the parties to the Paris Agreement mentioned appliances and equipment in their NDCs. To measure progress in advance of COP28 and the GST, CLASP has revisited its

[1] If a country's first NDC was not available, CLASP reviewed their intended nationally determined contribution (INDC).

analysis and updated key statistics and recommendations for governments.

Appliance energy efficiency represents a major, but often overlooked, mitigation solution. CLASP estimates that the appliance sector[2] makes up 35% of global energy demand and 39% of energy-related CO2 emissions.[vi] The policies and solutions needed to improve appliance energy efficiency are proven and cost effective,[vii,viii] but rarely prioritized in international climate dialogues or highlighted in NDCs. This report shines a new light on the prevalence of appliance energy efficiency in NDCs and highlights and opportunity for governments to raise the ambition their climate commitments through appliance efficiency policies.[3]

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[2] Throughout this paper, we define the appliances sector to include all commercial and residential appliances and equipment, including lighting, as well as industrial electric motor systems.

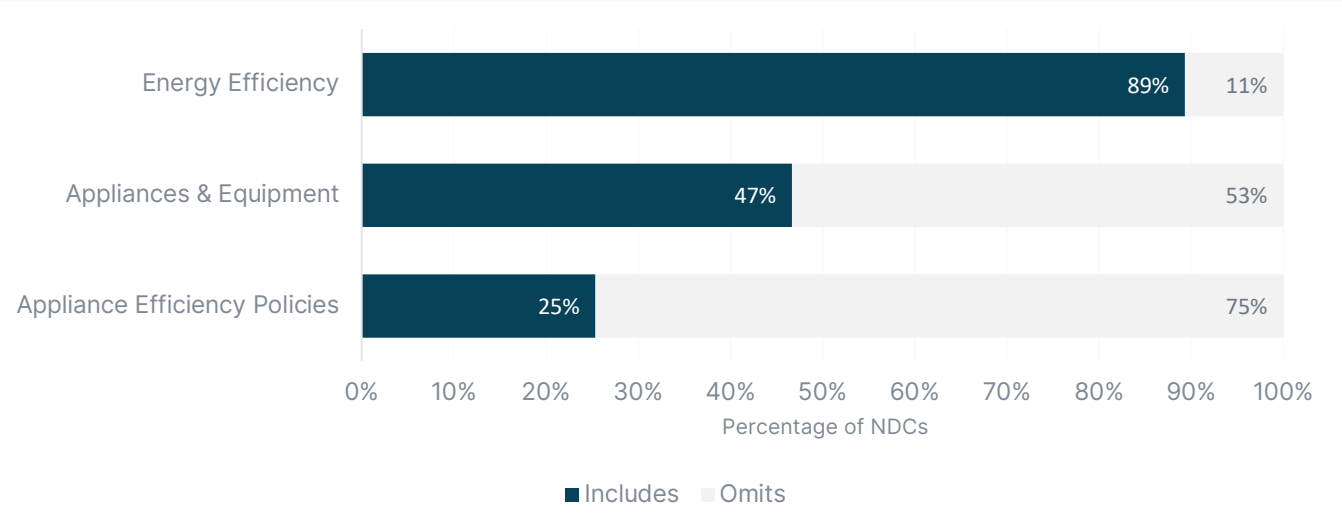
[3] Throughout this paper, we refer to appliance efficiency policies as minimum energy performance standards (MEPS) and labeling requirements.

2. Appliances & Equipment in NDCs

2. Appliances & Equipment in NDCs

A growing number of governments are including appliances and equipment in their NDCs, but more can be done. While most countries (89%) identify energy efficiency as a critical mechanism for reducing emissions in their NDCs, very few call out appliance energy efficiency specifically (Figure 1).[4] Currently, 47% of countries mention appliances and equipment in their NDCs, up from 41% in 2021.[ix] Thirteen new countries—Bolivia, the Central African Republic, the Democratic Republic of the Congo, Equatorial Guinea, Gabon, Haiti, Indonesia, the Federated States of Micronesia, Mozambique, Niger, Serbia, the United Kingdom, and Uruguay—have updated the language in their NDC to include appliances and equipment since 2021.

FIGURE 1: PERCENTAGE OF NDCS REFERENCING A SPECIFIC TOPIC



Source: CLASP analysis of the World Resources Institute's Climate Watch data.
Note: Total countries: 197. To determine whether a country's NDC referenced the topic, CLASP performed a keyword search focused on energy efficiency (terms searched: energy efficiency), appliances (terms searched: air conditioner, appliance, cooling appliance, dishwasher, electrical equipment, fan, fridge, freezer, heat pump, heating, industrial equipment, label, labelling, LED, lightbulb, lighting, MEPS, minimum energy performance standard, motor, refrigerator, space heating, washing machine), and appliance standards and labeling (terms searched: label, labeling, MEPS, minimum energy performance standards, standards). This keyword searched was also applied to figures 2-4 in this report.

[4] To view the complete list of countries that reference energy efficiency and appliances in their NDCs, please view our supplementary data spreadsheet, available here.

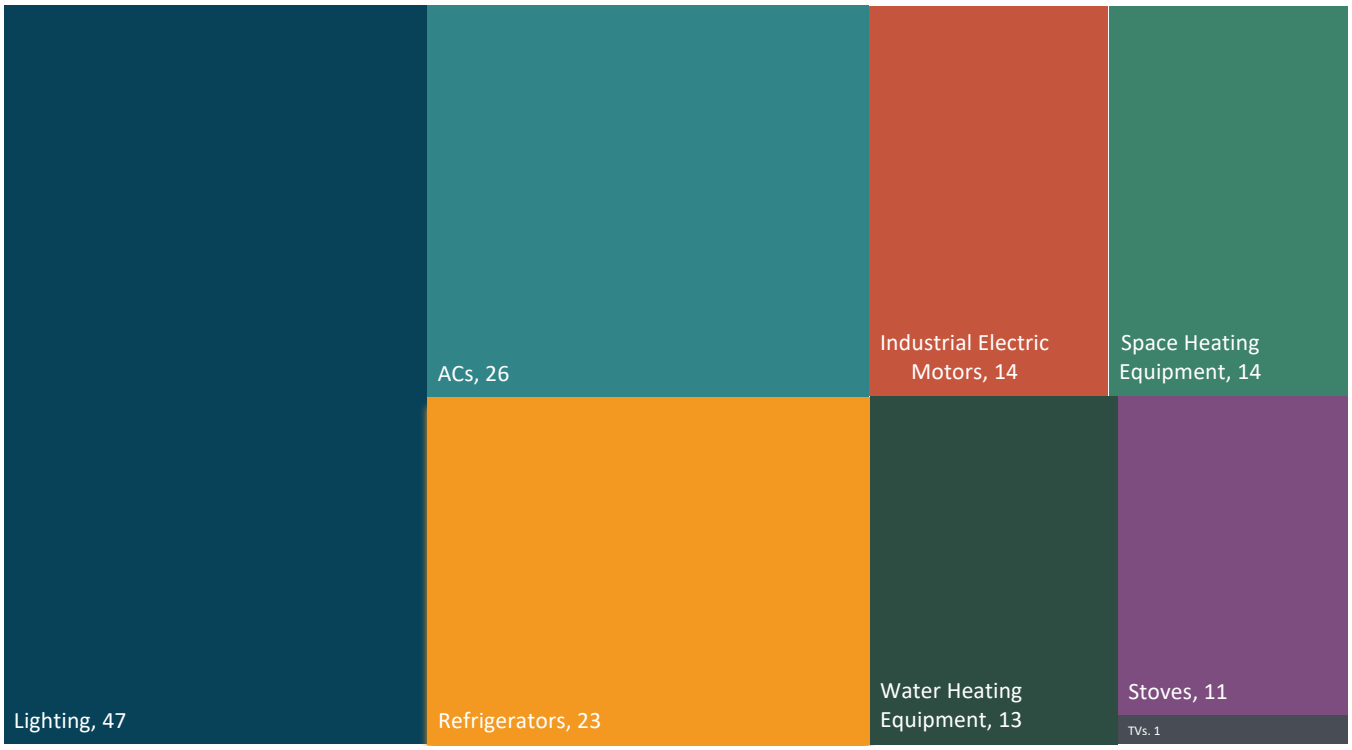
Appliances and equipment are mentioned in 47% of current NDCs, a slight improvement from 41% in 2021.

Very few governments mention the specific appliances and equipment they plan to target for efficiency improvement. When NDCs do reference specific appliances, most mention lighting (*e.g.*, light emitting diodes [LEDs]) and cooling appliances (*e.g.,* air conditioners [ACs] and refrigerators) (Figure 2). Three of the appliance categories that make up most of the global appliance energy demand—space heating equipment, water heating equipment, and industrial electric motors —are not frequently referenced in NDCs.

Just 14 NDCs (7%) include a direct mention of electric industrial motors (Figure 2).

Electric motor systems are responsible for 53% of electricity use worldwide and motors represent 74% of electricity consumption in industry.[x] When motors are mentioned, little information is given on the steps governments are taking to lessen their climate impact. To achieve net zero emissions by 2050, the International Energy Agency (IEA) estimates that motor efficiency must improve dramatically, with all motors sold in 2035 being best in class.[xi] The urgent need to meet this critical milestone and the specific steps to achieve it are not reflected in any NDC.

FIGURE 2: COUNT OF APPLIANCE-SPECIFIC MENTIONS IN NDCS



Source: CLASP analysis of World Resources Institute's Climate Watch data
Note: 149 total mentions

Only 25% of NDCs mention specific appliance efficiency policies

Very few NDCs mention the appliance efficiency policies required to reduce energy demand and lower emissions. Just 25% of NDCs mentioned policies such as minimum energy performance standards (MEPS) or labeling programs (Figure 1). While this statistic has increased slightly from 22% in 2021,[xii] the failure to mention appliance efficiency policies in NDCs represents a missed opportunity. These policies have been employed by governments for decades and are some of the lowest-cost solutions for reducing energy consumption and associated emissions, with the benefits of longstanding programs outweighing the costs by a ratio of four to one.[xiii]

Appliances are not the only climate solution being left out of NDCs. As noted in the 2022 edition of this report, the omission of appliance energy efficiency reflects a general lack of specificity among national commitments. For example, 83% of NDCs reference the transportation sector, but only 35% mention a shift to low- or zero-carbon fuels.[xiv] Likewise, 77% of countries reference agriculture, but only 25% include a direct mention of improved cropland management.[xv] As countries think about what revisions they will make to their NDCs in 2025, setting more specific targets for appliances and equipment that are aligned to net zero goals could help bridge the emissions gap between the current trajectory and what is needed to achieve the aims of the Paris Agreement.

CLASP's forthcoming report, "Net Zero Heroes: Scaling Efficient Appliances for Climate Change Mitigation, Adaptation & Resilience," includes net zero–aligned targets for 10 appliance categories representing 35% of global energy demand.[xvi] Adopting these targets in NDCs and national climate plans will help governments increase ambition while delivering large energy and cost savings to consumers.

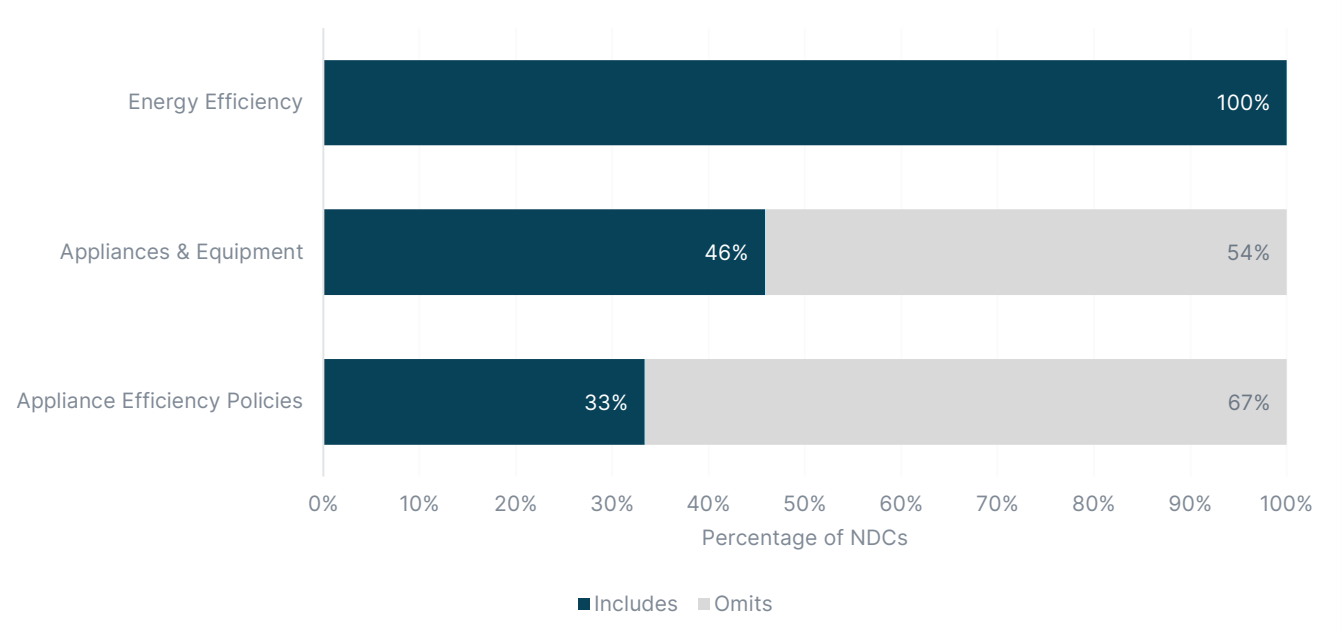
3. Deep Dive: Appliances, NDCs, & Countries with Existing Commitments to Appliance Efficiency

3. Deep Dive

Many countries have made large commitments to improving appliance efficiency. CLASP's 2022 report included a deep dive into two appliance efficiency initiatives: the Super-Efficient Equipment and Appliance Deployment (SEAD) Initiative and the SEAD Product Efficiency Call to Action (Call to Action). This section looks at the countries participating in these initiatives and evaluates whether their NDCs have changed since CLASP published the first iteration of this report in 2022.

The SEAD Initiative is a voluntary collaboration of governments working to promote the manufacture, purchase, and use of energy efficient lighting, appliances, and equipment worldwide.[xvii] In 2023, all SEAD members[5] mentioned energy efficiency in their NDCs, but only 33% referenced specific appliance efficiency policies (Figure 3). This statistic has not changed since 2021.[xviii]

FIGURE 3: PERCENTAGE SEAD MEMBER NDCS REFERENCING A SPECIFIC TOPIC



Source: CLASP analysis of World Resources Institute's Climate Watch data.
Note: Total countries: 25.

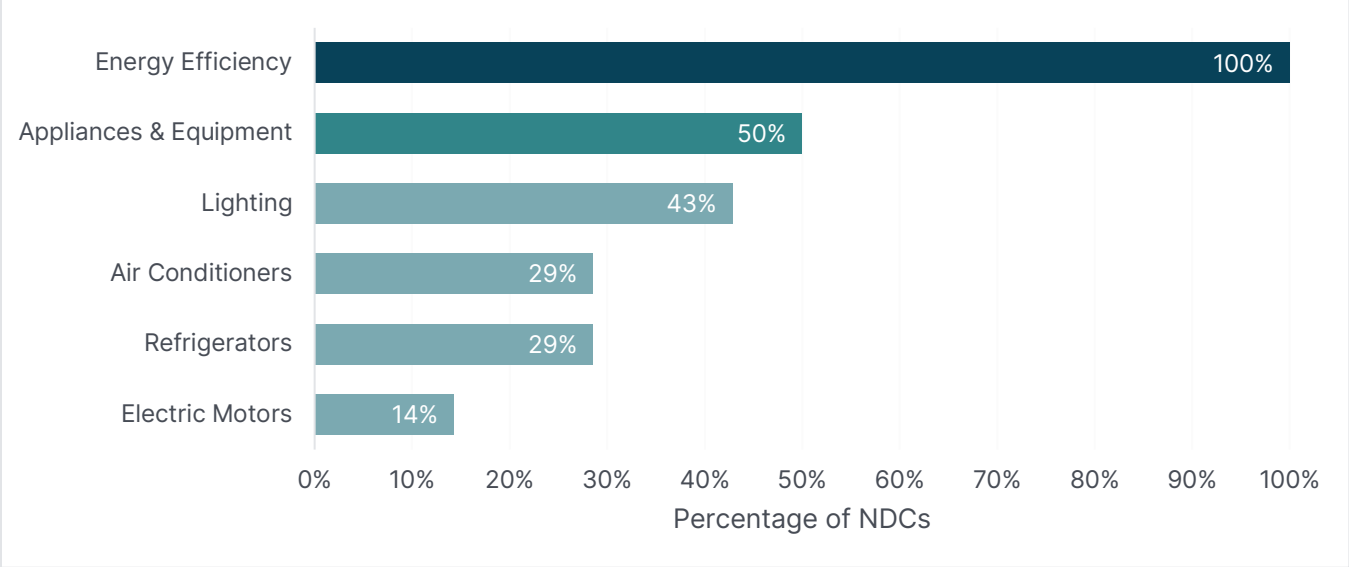
[5] SEAD members include: Argentina, Australia, Brazil, Canada, Chile, China, Colombia, Denmark, the European Commission, Germany, Ghana, India, Indonesia, Japan, Korea, Mexico, Nigeria, Panama, Russia, Saudi Arabia, South Africa, Sweden, Turkey, the United Kingdom, and the United States.

Similar trends emerge when examining the NDCs of Call to Action signatories, which are a subset of SEAD Initiative members. In 2021, the Call to Action became the largest global energy efficiency commitment to date.[xix] Fourteen governments[6] committed to doubling the efficiency of air conditioners, electric motors, LED lighting, and refrigerators by 2030.[xx] Engagement efforts led by the SEAD Initiative are currently underway to encourage these countries to adopt the policies needed to meet their ambitious commitments.

As of October 2023, 50% of Call to Action signatories directly referenced appliances or appliance energy efficiency policies in their NDCs. CLASP also assessed whether signatories directly mention the four appliances covered in the Call to Action. Our analysis finds that many do not. Only 45% of signatory NDCs reference lighting, while 29% mention air conditioners and refrigerators and 14% discuss electric motors.

There is a large opportunity for signatories to revise their NDCs to align with the goals of the Call to Action. Doing so would not only help these governments raise the ambition of their national climate pledges, but also contribute to the alignment of national priorities on appliance energy efficiency and elevate appliances in national climate change mitigation strategies.

FIGURE 4: PERCENTAGE OF CALL TO ACTION SIGNATORY NDCS REFERENCING A SPECIFIC TOPIC OR APPLIANCE



Source: CLASP analysis of World Resources Institute's Climate Watch data.
Note: Total countries: 14.

[6] The 14 SEAD Member governments that signed the Call to Action are: Australia, Brazil, Chile, Colombia, Denmark, Germany, Ghana, India, Indonesia, Japan, Nigeria, Panama, South Korea, and Sweden.

4. Conclusions & Recommendations

4. Conclusion & Recommendations

Appliance efficiency is a cost-effective mitigation solution.[xxi] Governments must make it a greater priority if they are to limit global warming to 1.5 °C. CLASP recommends that they take the following steps:

- Submit a revised NDC by 2025 that includes ambitious and specific efficiency targets for high-energy-consuming appliances.
- Establish or expand national appliance efficiency programs to implement and enforce the policies needed to achieve those targets.

RECOMMENDATION 1: SUBMIT A REVISED NDC BY 2025 THAT INCLUDES AMBITIOUS AND SPECIFIC EFFICIENCY TARGETS FOR HIGH-ENERGY-CONSUMING APPLIANCES

Improving the energy efficiency of appliances and equipment will be critical to achieving net zero emissions by 2050. CLASP analysis has shown that if governments commit to achieving targets for 10 high-energy-consuming appliances[7] today, they could avoid the release of 9 gigatons (Gt) of CO_2 collectively in 2050.[xxii]

Setting clear, defined, and timebound targets for appliance efficiency with the emissions reductions that can be achieved through specific policies and programs will provide greater clarity into how governments plan to meet their climate goals and help shape national policy priorities. For greatest impact, governments should prioritize high-energy-consuming appliances like electric motors systems, air conditioners, lighting equipment, and electric space- and water-heating equipment. Adding a specific date by which the goal should be achieved, the key policy mechanism (*e.g.,* MEPS), and the estimated impact on energy demand and emissions is highly recommended. Doing so will help to define a clear course of action. Widespread embrace of appliance efficiency will help elevate the status of appliances in global climate dialogues and help build political support and momentum for the policies needed to achieve the stated emissions reductions.

Finally, where possible, countries should align appliance efficiency targets with existing pledges and/or commitments under other international conventions. For example, Call to Action signatories should revise their NDCs to include the 2030 doubling goal for air conditioners, electric motors, lighting equipment, and

[7] The 10 appliances are: air conditioners, electric cookers, fans, heat pump space heaters, heat pump water heaters, industrial electric motors, LED lighting, refrigerator-freezers, televisions, and solar water pumps.

refrigerators. Countries that have ratified the Kigali Amendment to the Montreal Protocol on Substances that Deplete the Ozone Layer[8], which calls for a gradual reduction in the consumption and production of hydrofluorocarbons (HFCs), should ensure that any existing targets to phase down HFCs in existing National Cooling Action Plans are also reflected in their NDCs.[xxiii] Finally, countries that have ratified the Minamata Convention on Mercury[9] should update their NDCs to include a target to phase out compact fluorescent lamps by 2025, a decision made at the fourth Conference of Parties in 2022.[xxiv]

RECOMMENDATION 2: ESTABLISH OR EXPAND NATIONAL APPLIANCE EFFICIENCY PROGRAMS TO IMPLEMENT AND ENFORCE POLICIES AND ACHIEVE NDC TARGETS

National climate roadmaps and policies must support and reinforce the mitigation pathways and targets outlined in NDCs. Governments can develop national roadmaps with concrete steps and milestones for improving appliance efficiency. Standards and labeling programs are the primary vehicles for delivering large reductions in appliance and equipment energy consumption and emissions. Where appropriate, roadmaps should leverage existing international test methods and standards, use performance ladders based on international standards, and align with other guidelines, like National Cooling Action Plans.

Adopting a ladder approach for efficiency policies will help governments chart a clear path for raising ambition over time and enable harmonization across multiple economies. The IEA's energy performance ladders are a simple tool that governments can use to increase ambition over time. Each step on the ladder represents a level of energy efficiency that a distinct policy threshold is set at. Ladders can be used to chart a clear trajectory for improving appliance energy efficiency.[xxv] As policies move up the ladder over time, appliance energy efficiency improves. To develop the ladder, a party must: agree on a testing procedure to measure energy efficiency; define efficiency thresholds (*i.e.,* the different rungs on the ladder); map existing efficiency requirements on the ladder; and set new targets for how products will "climb the ladder."

When considering a ladder approach for electric motors, for example, a country or set of countries may agree to use an internationally agreed-upon test method (*e.g.,* IEC 60034-2-1) to measure efficiency and employ the International Efficiency (IE) classification scheme (IEC 60034-30-1) to

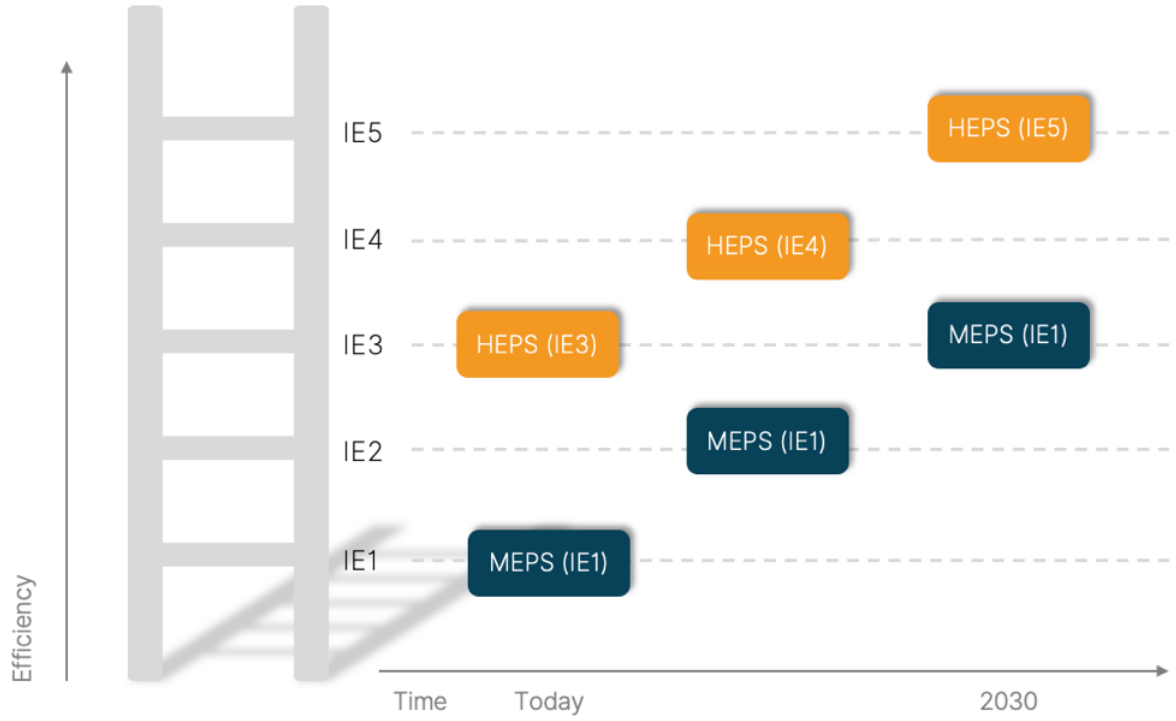
[8] The Montreal Protocol on Substances that Deplete the Ozone Layer (Montreal Protocol) is an international treaty that aims to protect the ozone layer by phasing out the production of ozone-depleting substances. The Kigali Amendment to the Montreal Protocol calls for a gradual reduction in the consumption and production of hydrofluorocarbons ("HFCs"), which are potent greenhouse gases.

[9] The Minamata Convention on Mercury is an international treaty designed to protect human health and the environment from anthropogenic emissions and releases of mercury and mercury compounds.

set different levels for MEPS and comparative labels. Countries could then set future MEPS and high energy performance standards (HEPS) for moving up the ladder and implement them at different times based on market conditions (Figure 5). When developing a policy ladder for other products, governments should consult international test procedures and model regulations, such as United for Efficiency's model regulation guidelines for air conditioners, distribution transformers, electric motors, lighting, and refrigerators.

Finally, governments should put in place systems to ensure compliance with policies and safeguard the energy and climate benefits of appliance efficiency programs. In 2019, the European Commission estimated that around 10% to 25% of products sold on the market were non-compliant, resulting in an estimated 10% decrease in energy savings — equivalent to the annual electricity consumption of Sweden and Hungary.[xxvi] Therefore, compliance programs are critical to meeting the energy and emissions targets in NDCs.

FIGURE 5: EXAMPLE ENERGY EFFICIENCY PERFORMANCE LADDER FOR INDUSTRIAL ELECTRIC MOTORS



Source: Adapted from IEA. "COP26 Product Efficiency Call to Action: Doubling the Energy Efficiency of Key Products Globally by 2030." November 12, 2020. https://iea.blob.core.windows.net/assets/cfa3df18-80aa-48c1-870f-113a4e8766e0/K.Lane_COP26_Workshop_SE-ASEA.pdf.

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