Africa Energy Efficiency Policy in Emerging Economies Training Week

Appliances and equipment

Nairobi
18-21 March 2024

International Energy Agency

Appliances & Equipment Course: Monday 18 March 2024 (Day 1)

Introduction

Energy Efficiency of Appliances and Equipment: Overview of the week

Day 1 Monday	**Opening Day: High-Level Plenary Session, first day of course, evening event with integration activity**
Day 1 - 3 Monday, Tuesday & Wednesday	**Appliances and Equipment Stream** **Aim of the course**: prepare participants to successfully advance appliance energy efficiency policy. It does so by introducing the fundamentals to effectively design and implement an energy efficiency policy package integrating regulations, information, and incentives to move appliances towards higher efficiency standards. The stream will offer a mix of lectures, discussions, and interactive activities for the participants. On completion, participants will have a solid understanding of the “big picture” as well as the tools to leverage their own expertise and interest to contribute to advancing energy efficiency in appliances and equipment.
Day 4 Thursday	**Closing Plenary: Communication Strategies, Information Campaigns and Group Activities**

The Team

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Energy Efficiency Policy Analyst
International Energy Agency

Emily McQualter

Global Partnerships Consultant
International Copper Association

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Head of Energy Efficiency in
Emerging Economies (E4) Programme
International Energy Agency

Guest Speakers

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Asteria Markus

Project Officer
SACREEE under the Energy Efficient Lighting and Appliances Project

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Strategy Development Solutions

Cherop Soy

SGD7 global ambassador for youth at SEforALL

Guest Speakers

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Liazzat Rabbiosi

Programme Management Officer
United Nations Environment Programme (UNEP)

George Njer

Chairman of the Kenyan Association of Refrigeration and Air conditioning Engineers of Kenya and Secretary in charge of communication of the African Union for Refrigeration and Air conditioning (U3ARC)

Energy Efficiency of Appliances & Equipment Overview of Day 1

Day 1: Monday, 18th March	
13:30 – 14:00	Introductory Roundtable
14:00 – 15:00	1. Where to start: the role of appliances in the road to net zero Melanie Slade, International Energy Agency
15:00 – 15:30	Coffee and Tea Break
15:30 – 16:15	2. Toolkit: appliance energy efficiency policy options Emily McQualter, International Copper Association
16:15– 17:15	3. Making it Happen: assessing current performance and setting MEPS Clara Camarasa, International Energy Agency Guest Speaker: Hubert Zan, Renewables and Energy Efficiency Directorate, Ghana Energy Commission
17:15 – 17:30	Group Exercise (introduce exercise and groups)
17:30 – 18:30	Integration Activities
19:00 – 21:45	Dinner

What to expect?

Training Philosophy	
	Where to start: we discuss the basic principles
	Toolkit: we discuss what can be done, what are the solutions
	What are the steps: how you can implement what you have learnt

Plenty of activities all aimed to increase your understanding

Actively participate and share experiences!

Use the opportunity to network!

Ask questions

Group Assignment

COMPULSORY ATTENDANCE. We will be taking attendance every day

Who is in the room?

- Name
- Where are you from?
- Organisation
- What do you hope to get of this week?

International Energy Agency

The role of appliances in the road to Net Zero:
Why is appliance energy efficiency important?

Melanie Slade, International Energy Agency

Nairobi, 18 March 2023

Key learning outcomes

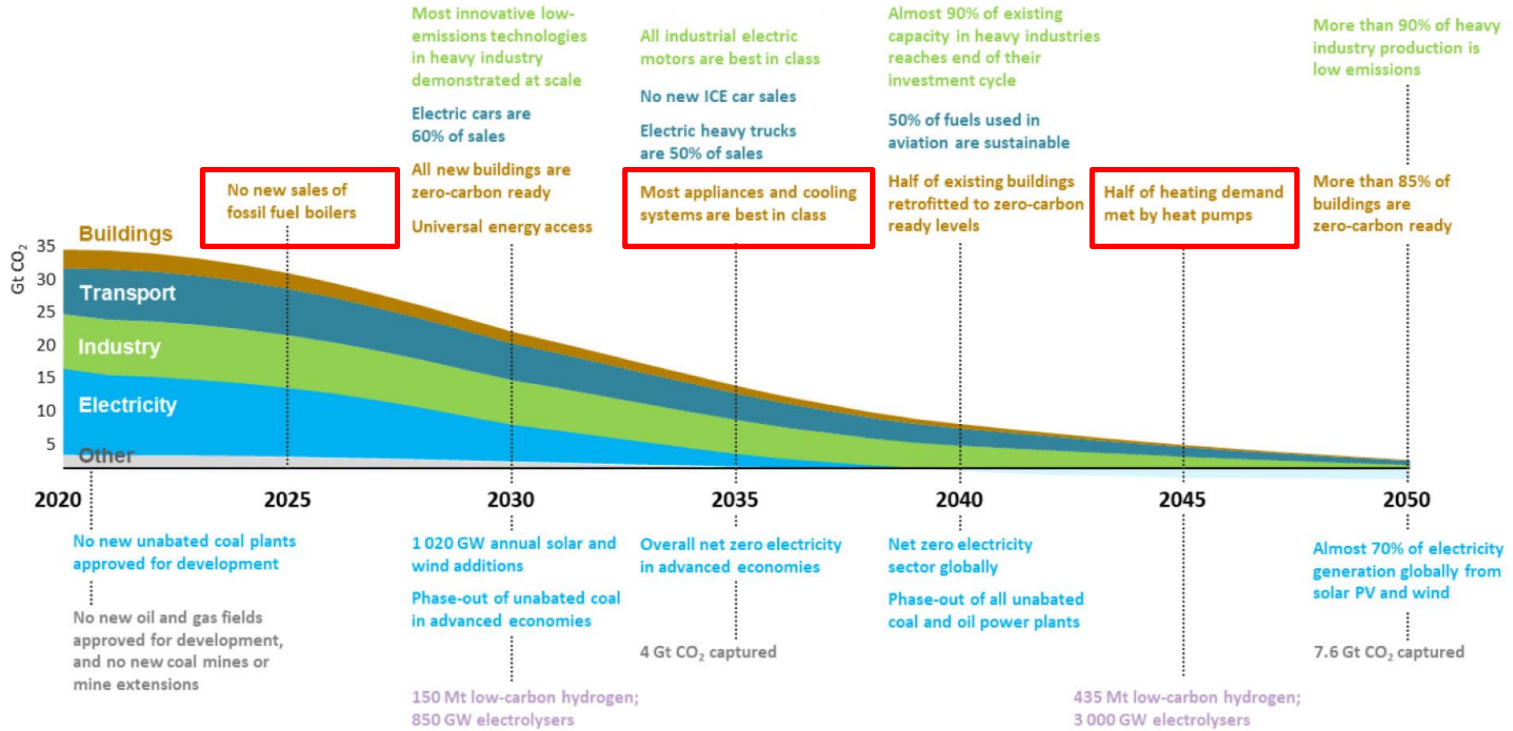
- Understand the critical role of energy efficiency measures on the road to net-zero emissions
- Identify the importance and the significance of energy efficient appliances in creating jobs, improving living standards, cutting energy bills, increasing energy security and reducing emissions
- Get acquainted with the energy efficient policy package integrating regulations, information, and incentives to promote higher efficiency standards for appliances.

Your government wants to develop a Net Zero Roadmap

Discussion question: Why should appliances be included in the Roadmap?

Energy efficiency on the road to net zero emissions

Key milestones in the pathway to IEA Net Zero Scenario



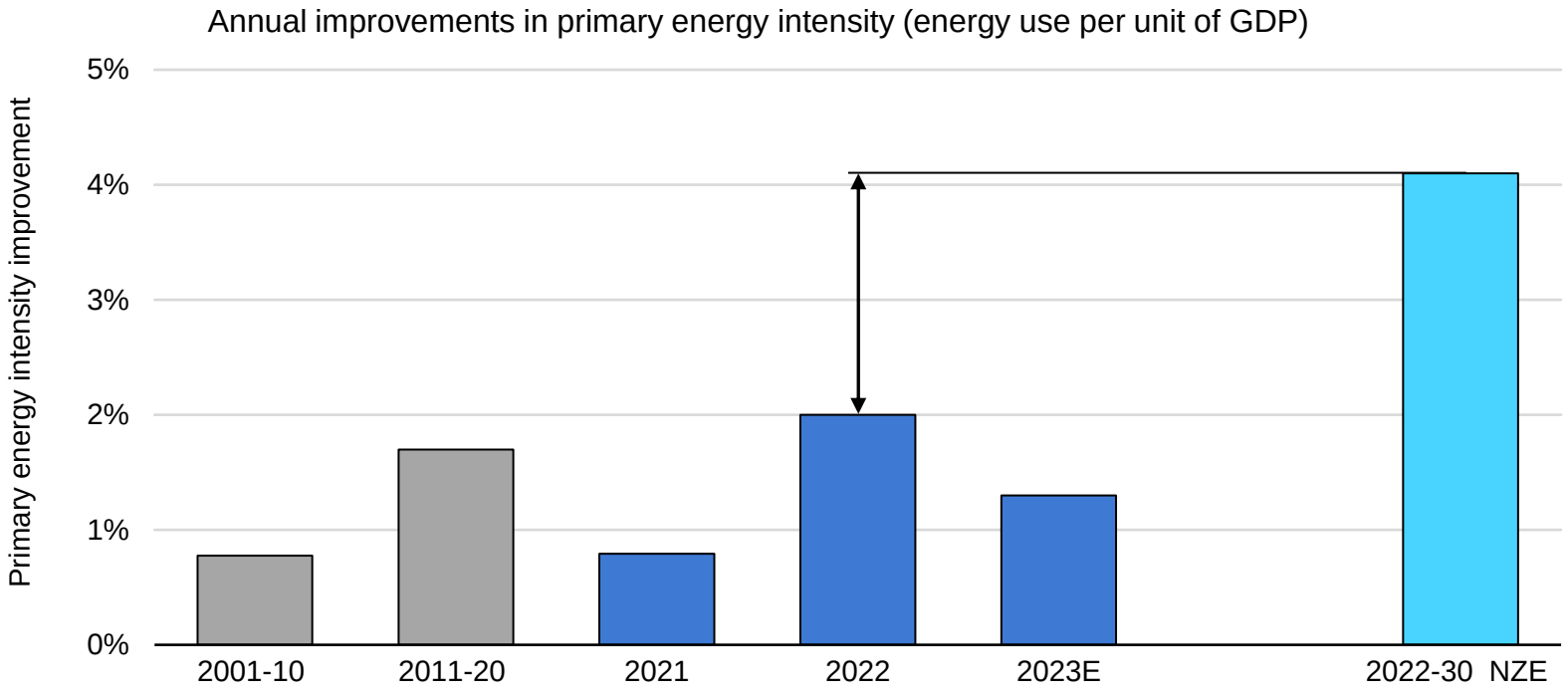
Over 40 efficiency milestones on the road to net zero emissions.
Many energy efficiency actions include cost-effective solutions that are available today.

Doubling global progress on energy efficiency

COP28 final text:

Calls on Parties to contribute to … doubling the global average annual rate of energy efficiency improvements by 2030

What is the doubling goal?



The IEA's Net Zero by 2050 Scenario sees a doubling of annual improvement to 2030

Doubling offers substantial rewards

Why should we double?

A critical step on the path to net zero

Over 7 Gt CO_2 emissions savings in 2030

Today's home energy bills in advanced economies lowered by a third

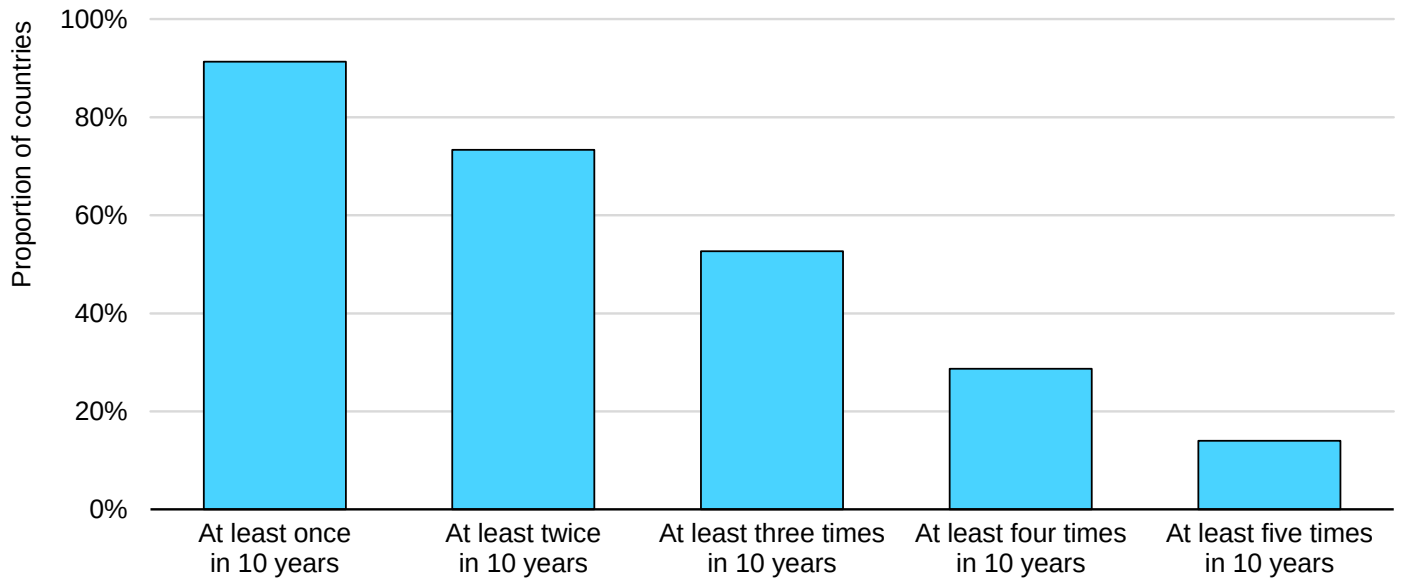
4.5 million more jobs than today

Energy savings equivalent to twice the EU's consumption in 2022

IEA has led the call for a global target to double energy efficiency progress this decade

Doubling is within reach of all countries

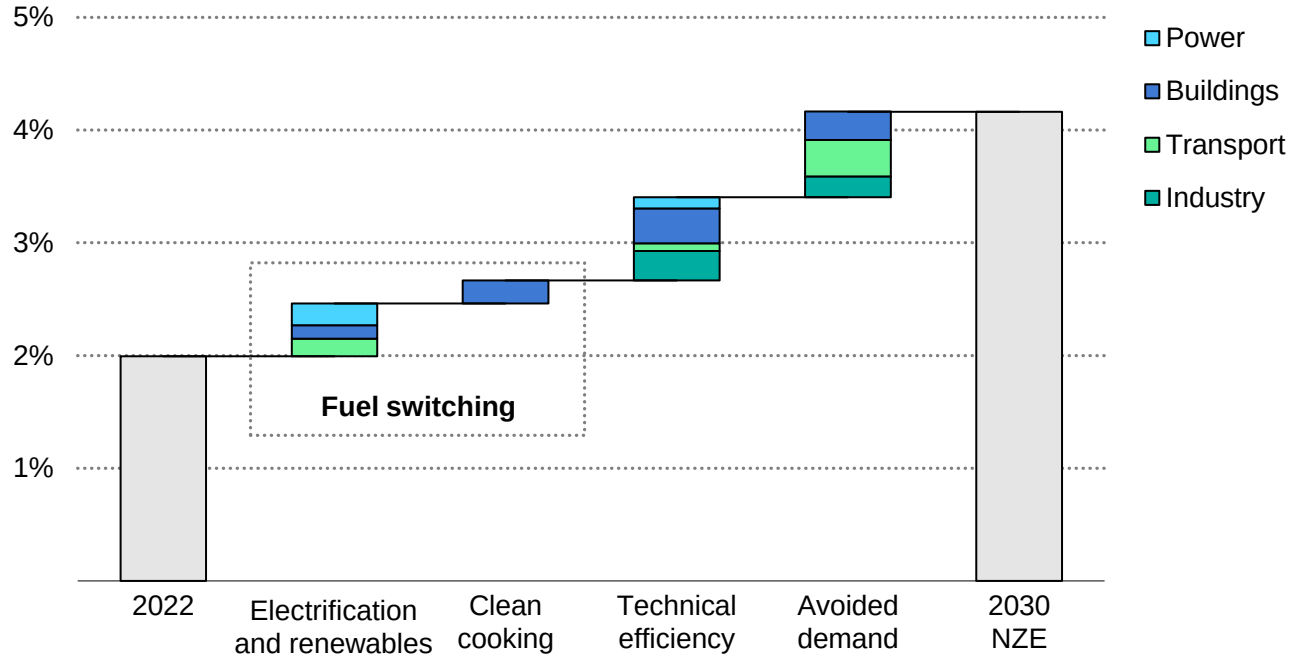
Proportion of countries to surpass a 4% annual energy intensity improvement one or more times, 2012-2021



Over the past 10 years, almost every country has doubled efficiency progress at least once.

Achieving the goal requires action across sectors

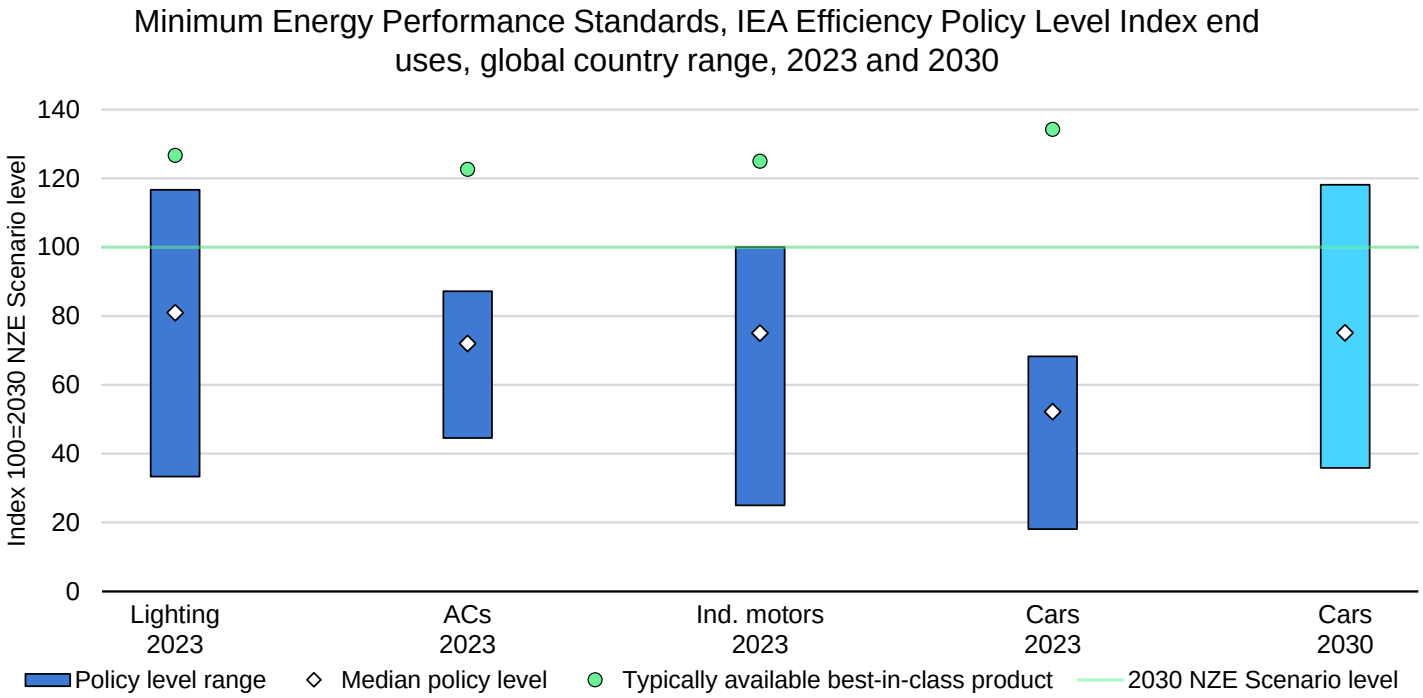
Actions contributing to a doubling in the rate of annual primary energy intensity improvements in the NZE Scenario



Key actions include fuel switching, including electrification; improving the technical efficiency of products and buildings; and avoided demand through behaviour change and materials efficiency

Source: IEA (2023), Net Zero Roadmap: A Global Pathway to Keep the 1.5 °C Goal in Reach: 2023 Update.

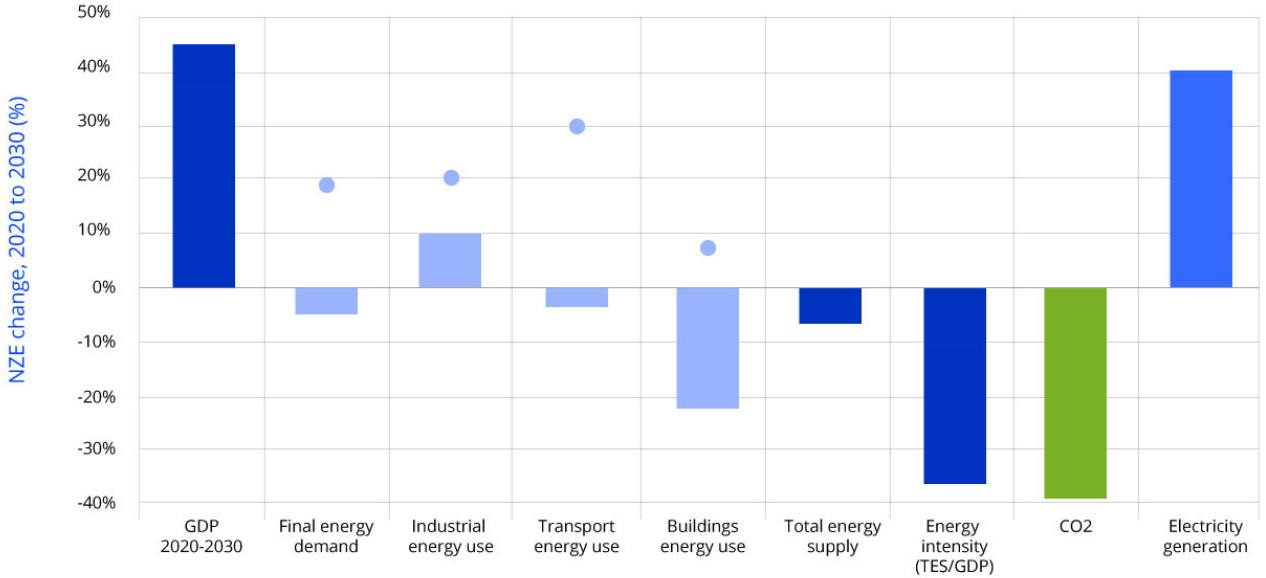
Policies and technologies for doubling already exist



The technologies needed to achieve a doubling already exist, and policy thresholds are rapidly moving towards the required level.

Trends in the Net Zero pathway and the role of energy efficiency

Key energy and economic trends in the Net Zero pathway, 2020-2030



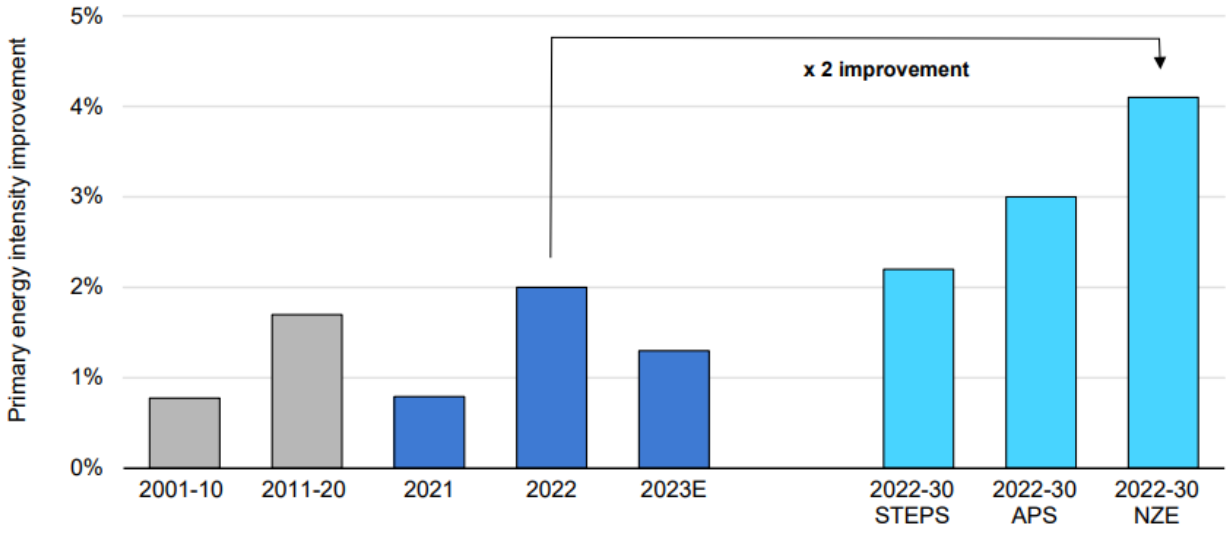
Notes: GDP = gross domestic product; NZE = Net Zero Emission by 2050 Scenario; STEPS = Stated Policies Scenario; TES = total energy supply

See definition of "Energy Intensity" on the Board

By 2030 the economy could grow by 40% using less energy than today, but without strong, early action on efficiency by 2030 net zero by 2050 will be out of reach

Energy efficiency progress vs the Net Zero Scenario, 2020-2030

Annual primary energy intensity improvement, 2001-2022, 2023E, and by scenario, 2022-2030



Notes: STEPS = Stated Policies Scenario; APS = Announced Pledges Scenario; and NZE = Net Zero Emissions by 2050 Scenario. As an indicative range, a GDP growth of 3% with currently expected energy demand growth of between 2% and 1% would yield energy intensity improvement of between 1% and 2%, respectively.

Accelerating efficiency progress to the 4% needed each year to 2030 under the IEA Net Zero Emissions by 2050 Scenario

Net zero emissions pledges in African

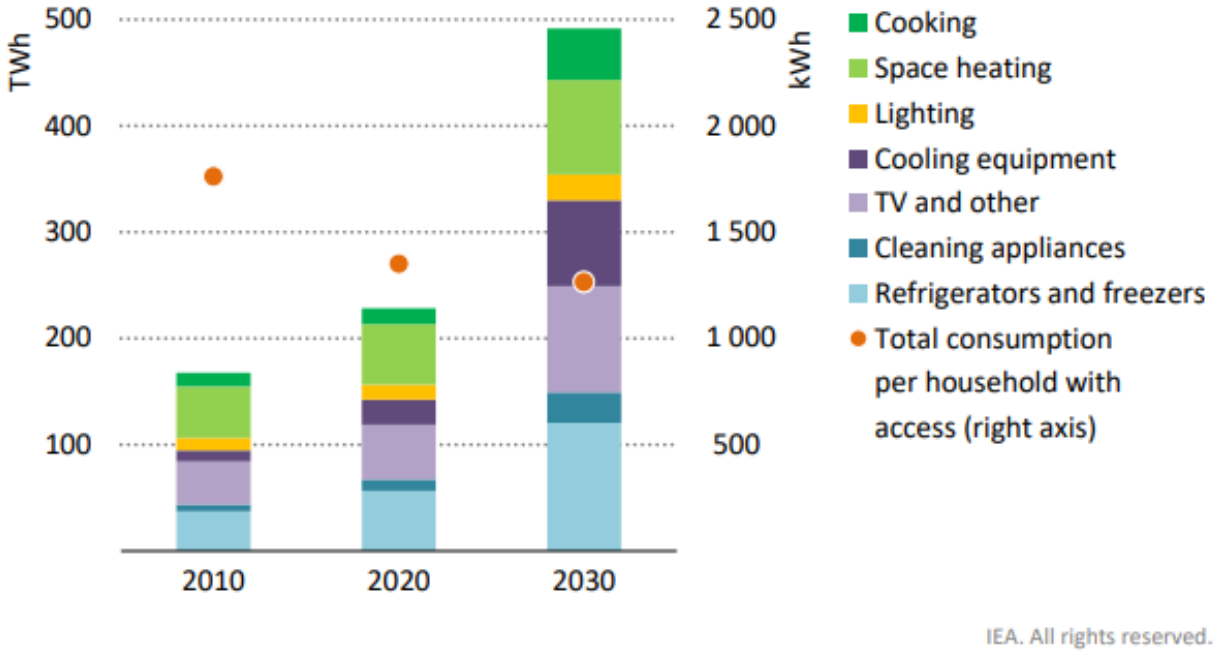
Announced net zero emissions pledges in African countries

	Share of Africa			Announced pledge
	Population	GDP	CO_2 emissions	
Cabo Verde	0.0%	0.1%	0.0%	Climate neutral by 2050
Côte d'Ivoire	2.1%	2.2%	0.8%	Carbon neutral by 2030
Liberia	0.4%	0.1%	0.1%	Climate neutral by 2050
Malawi	1.6%	0.3%	0.1%	Carbon neutral by 2050
Mauritania	0.4%	0.4%	0.3%	Carbon neutral by 2050
Mauritius	0.1%	0.4%	0.3%	Carbon neutral by 2070
Namibia	0.2%	0.4%	0.3%	Climate neutral by 2050
Nigeria	16.7%	16.3%	8.4%	Climate neutral by 2060
Rwanda	1.1%	0.5%	n.a.	Carbon neutral by 2050
São Tomé and Príncipe	0.0%	0.0%	0.0%	Climate neutral achieved in 1998
Seychelles	0.0%	0.0%	0.0%	Climate neutral by 2050
South Africa	4.8%	11.0%	32.7%	Climate neutral by 2050
Total	**27.4%**	**31.7%**	**43.0%**	

Notes: Population, GDP and CO_2 emissions shares are for 2020. Announced pledges include verbal pledges made by heads of state at COP26 as well as formal submissions and announcements. São Tomé and Príncipe reached climate neutrality in 1998, and now deems itself "carbon negative", which refers to the situation where the net effect between the emissions and sinks of a country is negative.

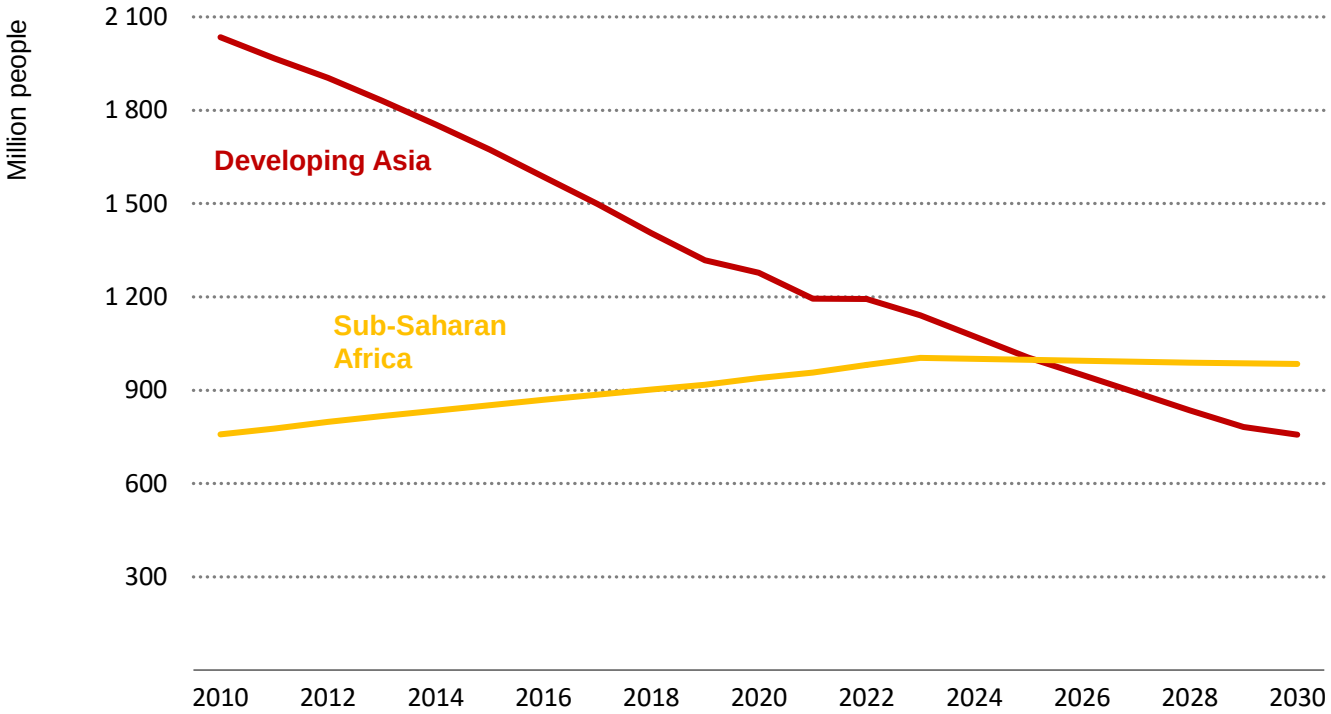
Household electricity consumption in the Sustainable Africa Scenario

Household electricity consumption by type of demand in the Sustainable Africa Scenario (SAS)



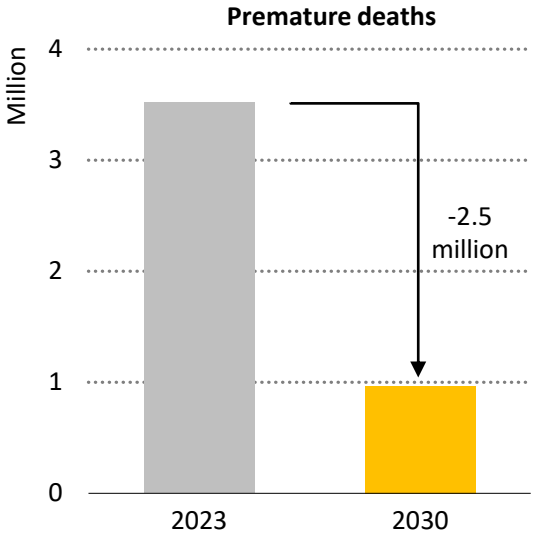
Increasing use of appliances, lighting and air conditioning

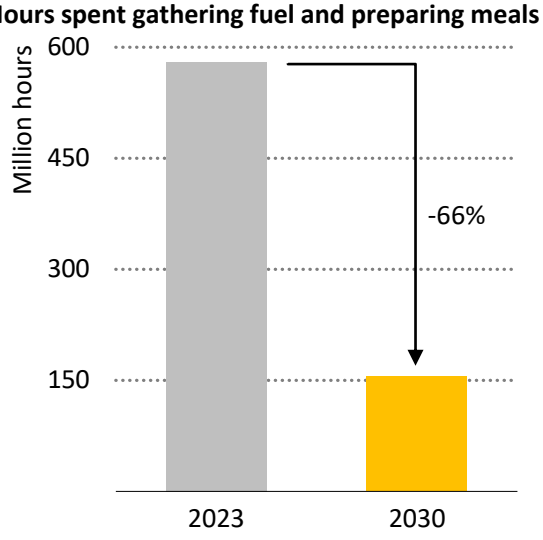
The world remains off track to reach universal access

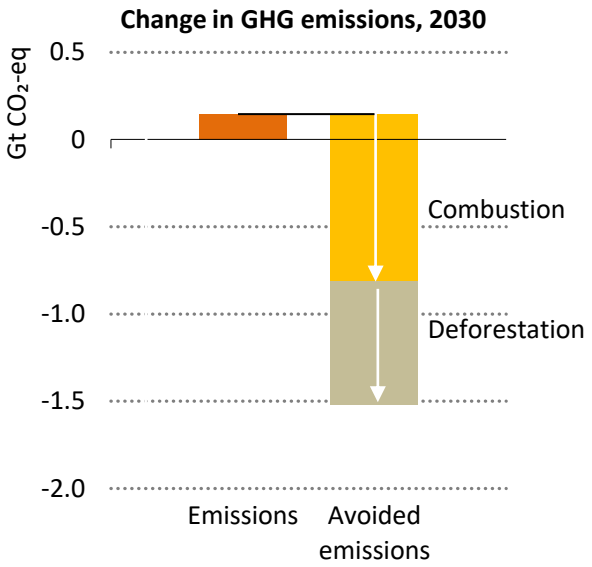


Since 2010, policies in China, India, and Indonesia drove progress, while sub-Saharan Africa lagged behind. With today's policies, most African countries are not expected to reach full access, even in the 2050s.

Reaching universal clean cooking access brings huge benefits







Achieving universal clean cooking access reduces premature deaths, saves time for women to pursue education and work, and decreases global emissions by 1.5 Gt

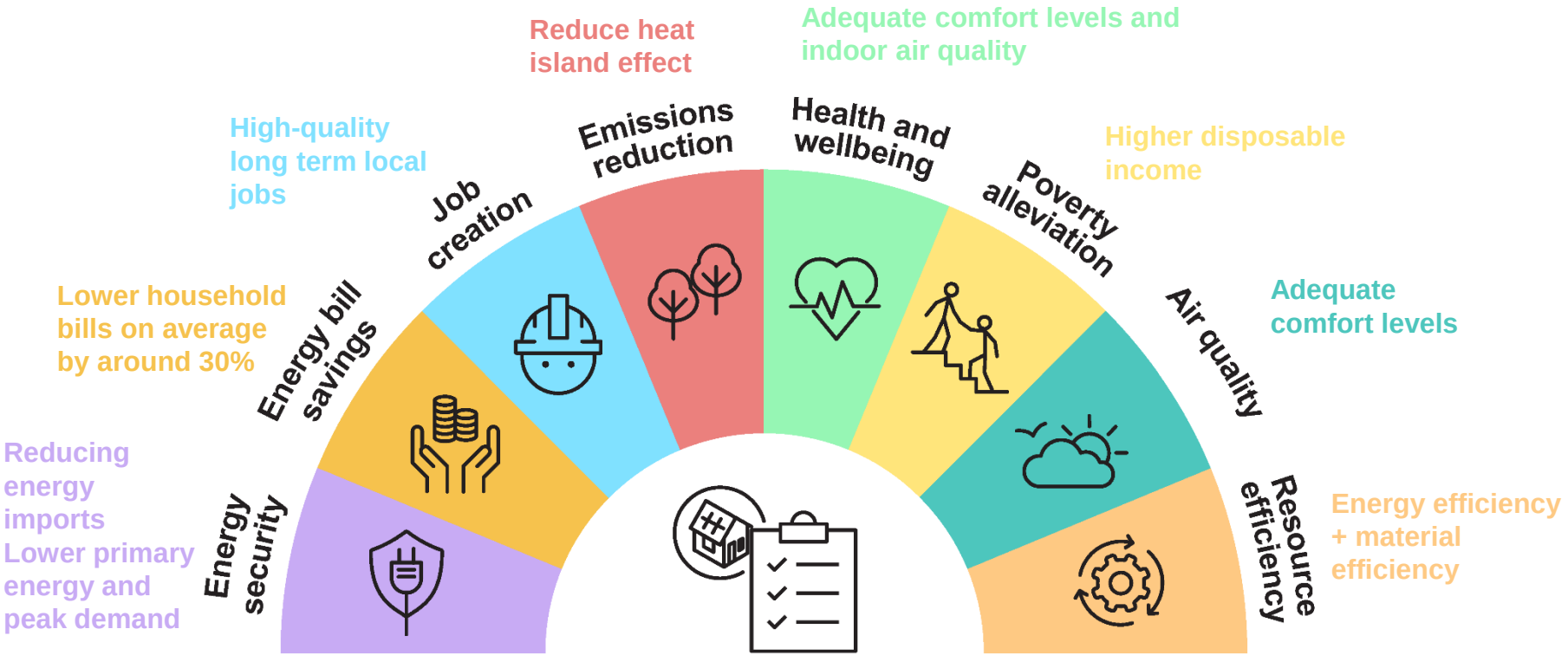
Question

What is the role of energy efficiency in the Net Zero pathway?

How do the appliance efficiency milestones on the road to net zero emissions resonate in the context of your country?

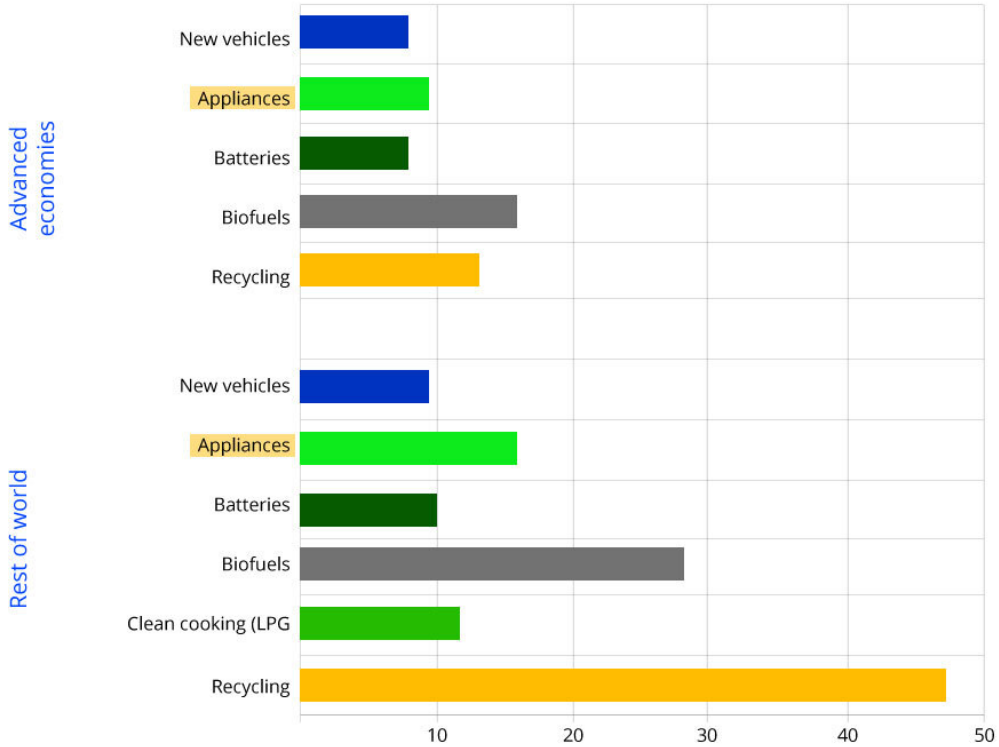
Multiple Benefits of Energy Efficiency

Appliance energy efficiency offers numerous economic, social and environmental benefits



Job creation due to appliance energy efficiency

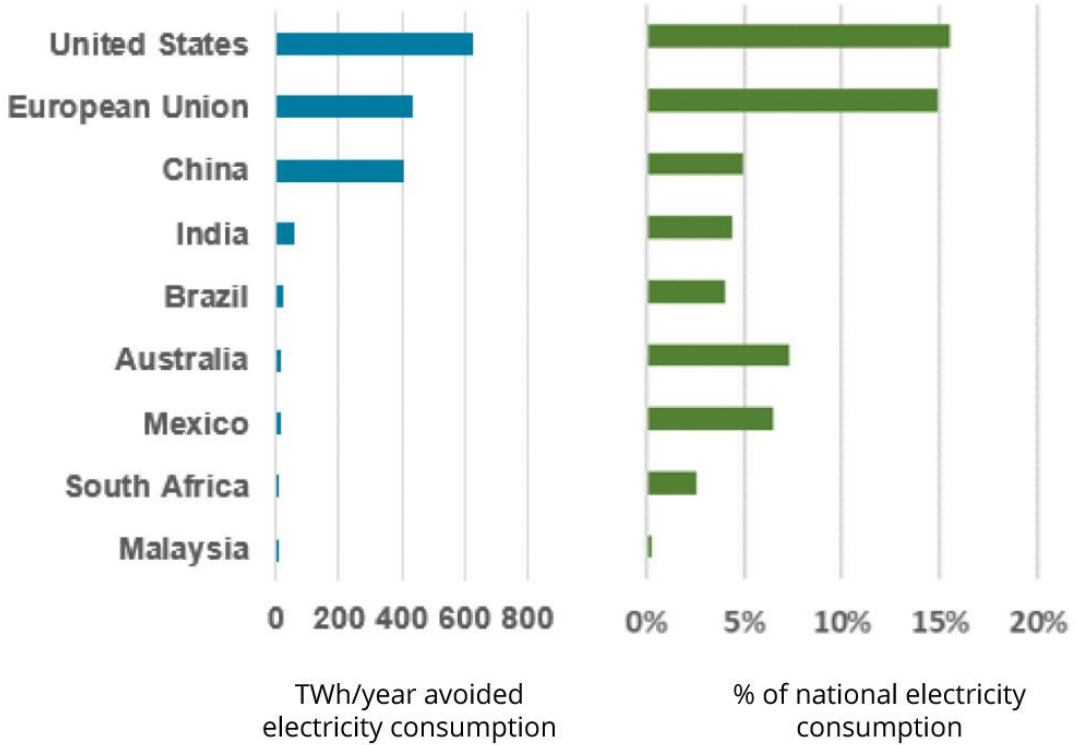
Construction and manufacturing jobs created per million dollars of capital investment and spending by measure



Efficiency creates some of the largest numbers of jobs per unit of investment

Appliance efficiency policy achievements

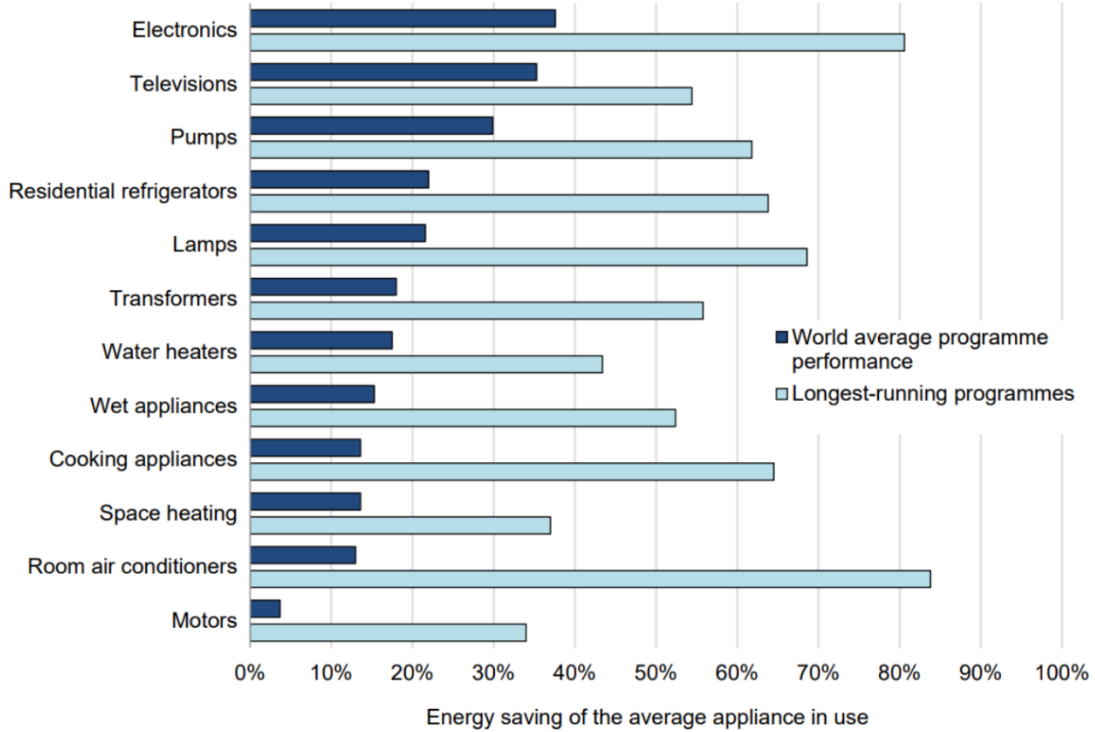
In 2019 total annual global electricity demand was reduced by at least 1600 TWh from Standards and Labels (S&L)



The energy efficiency measures of appliances and equipment is one of the lowest-cost options for reducing energy consumption and associated emissions

Energy savings impact of programmes increases with time

Energy savings from energy efficiency standards and labels over life of programmes

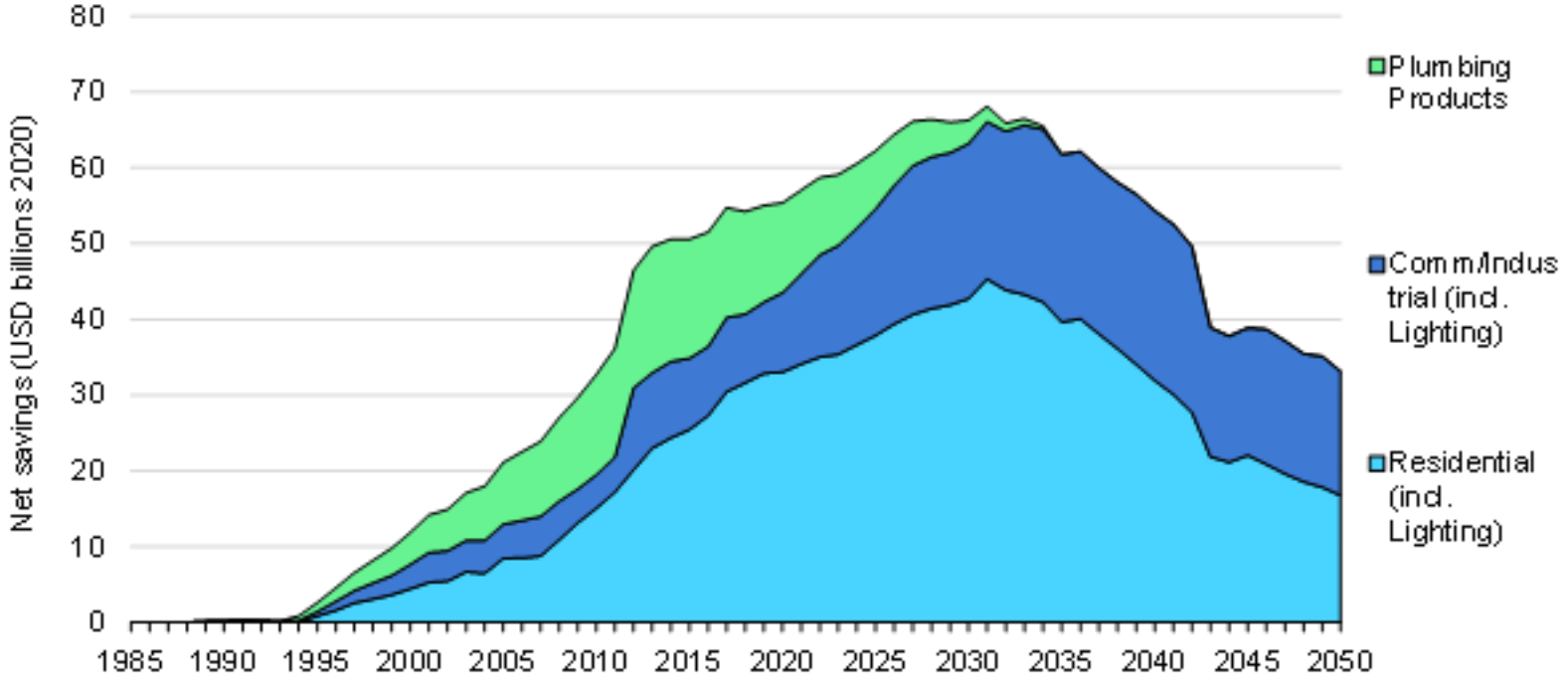


For countries with the longest running and most effective policies have helped to halve the energy consumption of key appliances

Appliance programmes and their capacity to reduce energy bills

Net savings (USD billions 2020) from appliance programmes*. Years 1995 to 2050.

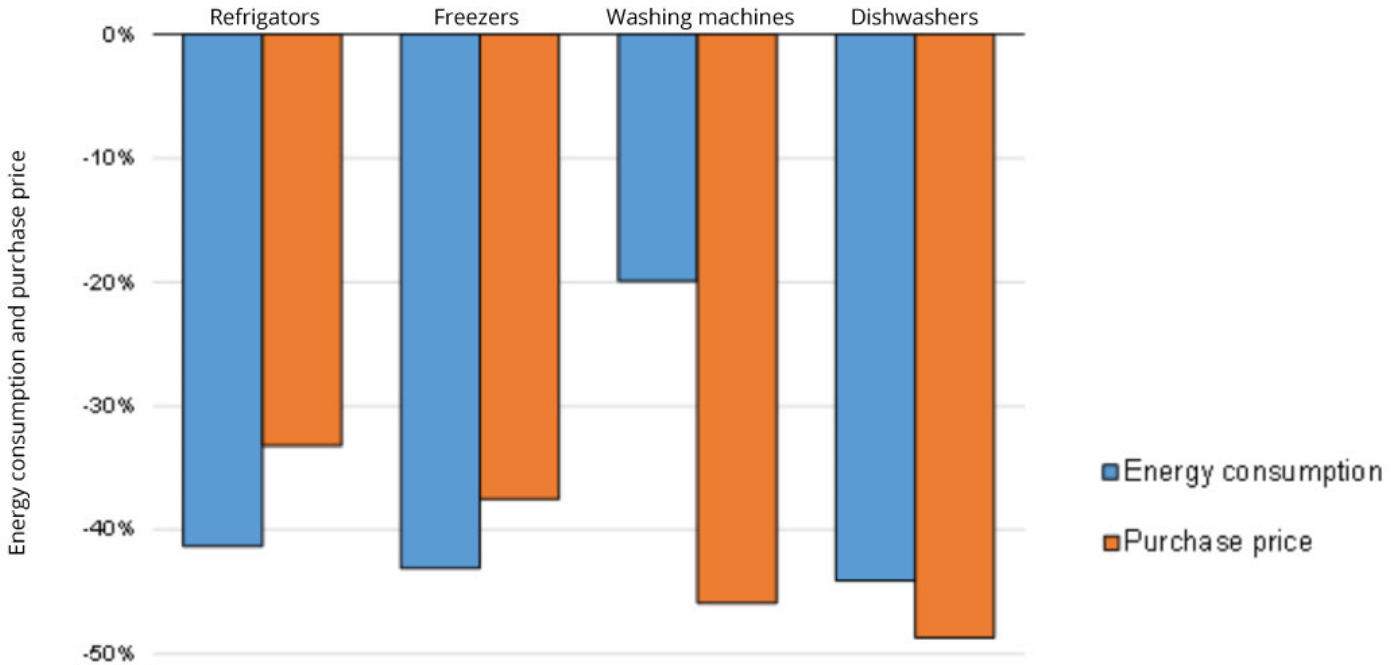
*Annual undiscounted net consumer benefit by year for US MEPS by sector



The US financial benefits for consumers from MEPS are substantial, now reaching over USD 40 billion per annum in reduced energy consumption, or USD 320 per customer each year

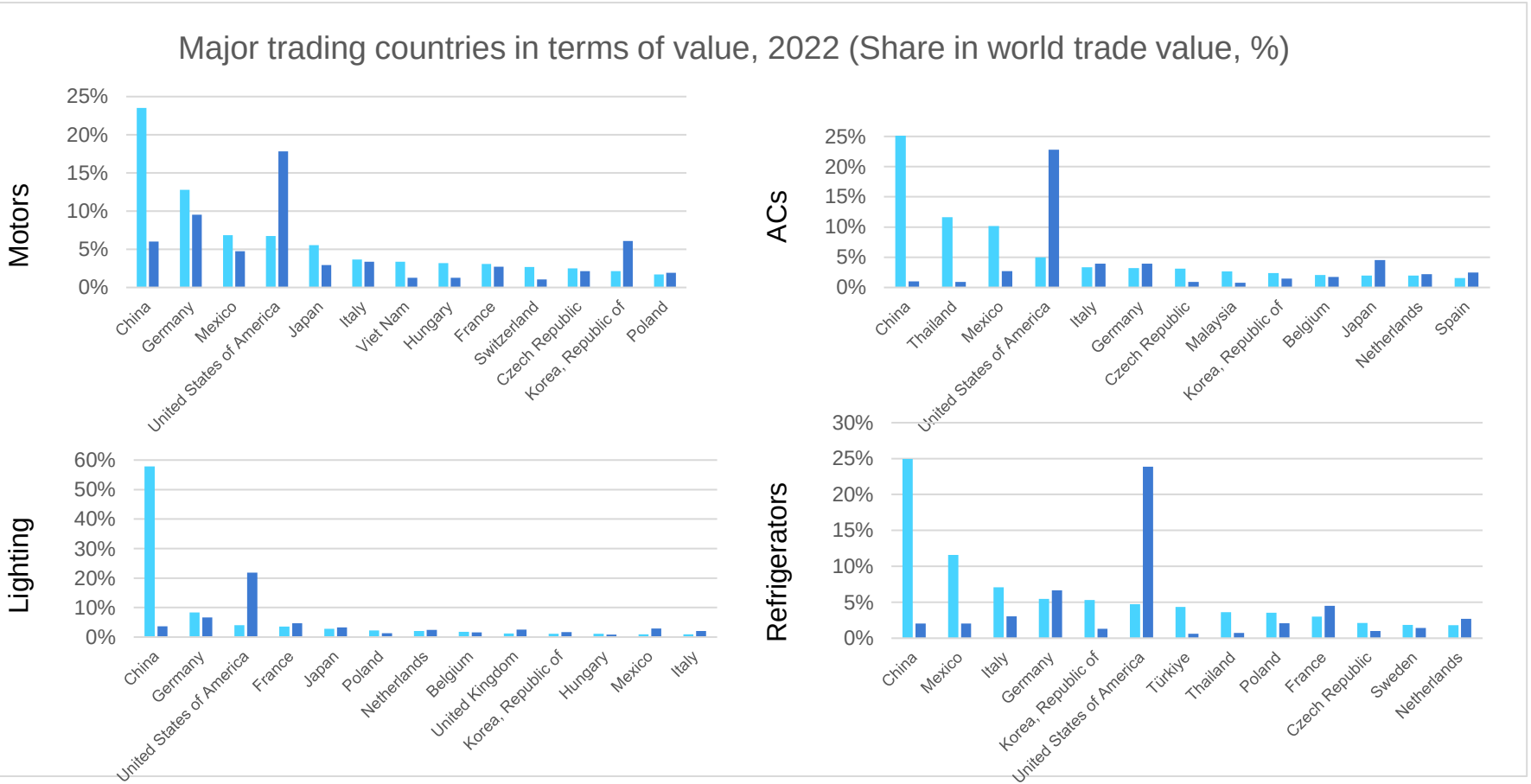
Standards and labelling stimulate innovation

Changes in residential appliance prices and energy performance in Australia, 1993 - 2014

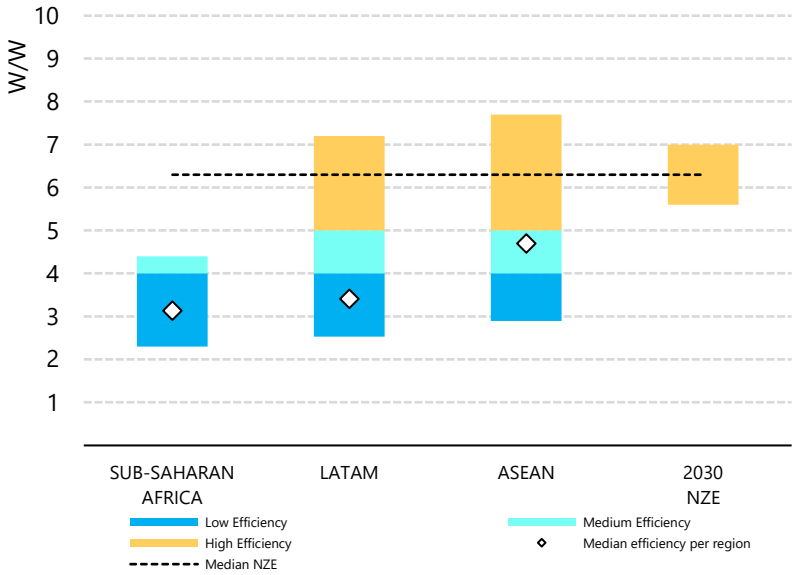


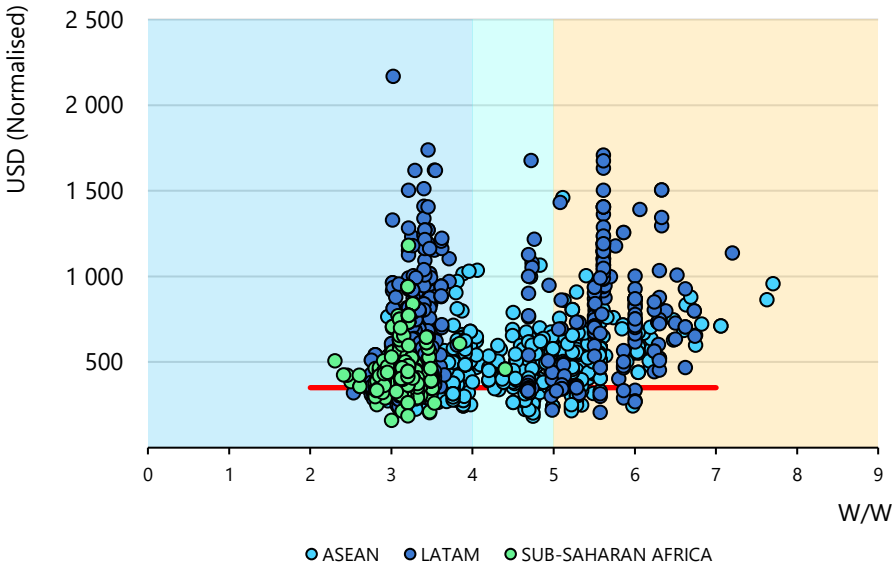
New appliance purchase prices have continued to decline – around 40% cheaper over 20 years, whilst average energy consumption has fallen by one-third

Major trading countries of the 4 key products



Air conditioners efficiency and cost in developing regions





The average efficiency of air conditioners rises by 60% in emerging economies over 2022-30 in the NZE Scenario, but a very efficient models are already available today at similar cost

Notes: ASEAN, including Indonesia, the Philippines, Thailand, and Vietnam, in late 2022. LATAM, including Argentina, Brazil, Colombia, Mexico, and Panama. Sub-Saharan Africa, including Ghana, Kenya, and South Africa. Purchase prices are normalised to 12 000 BTU/hour cooling capacity. Low efficiency = below 4 W/W; Medium efficiency = 4-5 W/W; High efficiency = above 5 W/W. BAT = best available technology

Question

Are there S&L programmes in your country/State?
If so, how long have they been in place?
What do you think have been the impacts of these programmes?

Your government wants to develop a Net Zero Roadmap

Discussion question: Why should appliances be included in the Roadmap?

Resources

- International Energy Agency, “Security of Clean Energy Transitions,” Accessed: Nov. 03, 2022. [Online]. Available: www.iea.org/t&c.
- IEA (2023), Net Zero Roadmap: A Global Pathway to Keep the 1.5 °C Goal in Reach, IEA, Paris https://www.iea.org/reports/net-zero-roadmap-a-global-pathway-to-keep-the-15-0c-goal-in-reach, License: CC BY 4.0
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- IEA, Capturing the Multiple Benefits of Energy Efficiency https://iea.blob.core.windows.net/assets/28f84ed8-4101-4e95-ae51-9536b6436f14/Multiple_Benefits_of_Energy_Efficiency-148x199.pdf
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- IEA, “Roadmap towards Sustainable and Energy-Efficient Space Cooling in the Association of Southeast Asian Nations” Paris, 2022, [Online]. Available: https://www.iea.org/reports/roadmap-towards-sustainable-and-energy-efficient-space-cooling-in-the-association-of-southeast-asian-nations
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- IEA (2023), A Vision for Clean Cooking Access for All, IEA, Paris https://www.iea.org/reports/a-vision-for-clean-cooking-access-for-all, Licence: CC BY 4.0

Coffee and Tea Break

See you in 30 minutes!

International Energy Agency

Toolkit: Appliance Energy Efficiency Policy Options

Emily McQualter, International Copper Association

Nairobi, 18 March 2024

Key learning outcomes

- Learn about the types of policy choices.
- Understand the energy efficient policy package - integrating regulations, information, and incentives to promote higher efficiency standards for appliances.
- Reflect on how to apply the appliance energy efficiency policy package.

[Discussion question]

There has been a change of government and the incoming government wants a range of options for interventions to rapidly increase residential energy efficiency for appliances, equipment and lighting.

> Identify three interventions that in your view have the highest priority in your country in the next 5 years, reflect on pros and cons of each intervention.

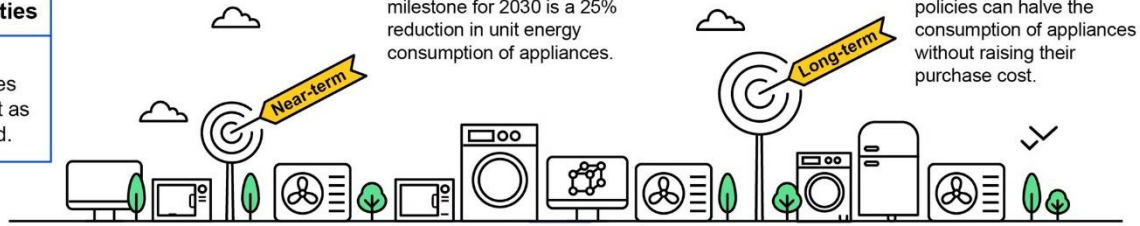
Appliance Energy Efficiency Policy Package

Immediate opportunities

In most markets, it is possible to buy appliances that are twice as efficient as those typically purchased.

The **Net Zero** Scenario milestone for 2030 is a 25% reduction in unit energy consumption of appliances.

Long-term appliance policies can halve the consumption of appliances without raising their purchase cost.



REGULATION

- **Minimum Energy Performance Standards** exclude the least efficient products from the market; they should be in line with international best practice, while reflecting good understanding of local circumstances; and be regularly updated. Regulations are essential for moving the market towards the best available technology in line with achieving net zero targets.
- **Regulation** can ensure that new appliances are "demand response ready" in order to offer flexibility to the end-user and the overall system and reduce peak demand.

INFORMATION

- **Labels** inform consumers, identifying the most efficient appliances and encouraging purchases based on life time costs.
- **High Efficiency Performance Specifications** identify the best performing products and are often used as the basis for labels and incentives.
- **Consumer information campaigns**, help people make informed decisions. These are most effective when based on behavioural insights and targeted strategies.
- **Smart meters** enable feedback and targeted guidance to consumers about their energy use and how they can make savings.

INCENTIVES

- **Rebates, grants and other financial offers** motivate consumers to buy highly efficient appliances.
- **Finance or taxation benefits** encourage manufacturers to produce appliances that are more efficient.
- **Well-designed procurement processes** can increase market share of highly efficient appliances and drive innovation.
- **Dynamic electricity pricing** helps incentivise flexible demand.

Appliance Efficiency Policy Package - Regulation

REGULATION

- **Minimum Energy Performance Standards** exclude the least efficient products from the market; they should be in line with international best practice, while reflecting good understanding of local circumstances; and be regularly updated. Regulations are essential for moving the market towards the best available technology in line with achieving net zero targets.
- **Regulation** can ensure that new appliances are “demand response ready” in order to offer flexibility to the end-user and the overall system and reduce peak demand.

- A **Minimum Energy Performance Standard (MEPS)** is a specification, containing a number of performance requirements for an energy-using device, that effectively limits the maximum amount of energy that may be consumed by a product in performing a specified task.
- **Minimum Energy Performance Standards (MEPS)** are a highly cost-effective way to improve equipment efficiency.
- Standards should be accompanied by **mandatory labelling,** and targeted **incentives** to make, sell and install the most efficient appliances.

Question

What is your experience with appliance energy efficiency regulation in your country?

Opportunities for Regional Harmonisation of Appliance Standards

- International cooperation can also be used to promote the progressive harmonisation of efficiency standards.
- Standards harmonisation can support industry transitions by reducing variance between national requirements and enabling greater efficiency at scale.
- For instance, the Australian and New Zealand governments jointly administer the Trans-Tasman Equipment Energy Efficiency programme, which delivers a single integrated package on energy efficiency standards and energy labelling for equipment and appliances and has secured large energy savings benefits for both markets.
- This approach of developing common standards across countries is also used in the European Union and North America.
- Activity on regional harmonisation is also underway in ASEAN.
- The Southern African Development Community (SADC) has officially approved harmonised regional Minimum Energy Performance Standards for air conditioners and residential refrigeration appliances.

Appliance Efficiency Policy Package – Information

INFORMATION

- **Labels** inform consumers, identifying the most efficient appliances and encouraging purchases based on life time costs.
- **High Efficiency Performance Specifications** identify the best performing products and are often used as the basis for labels and incentives.
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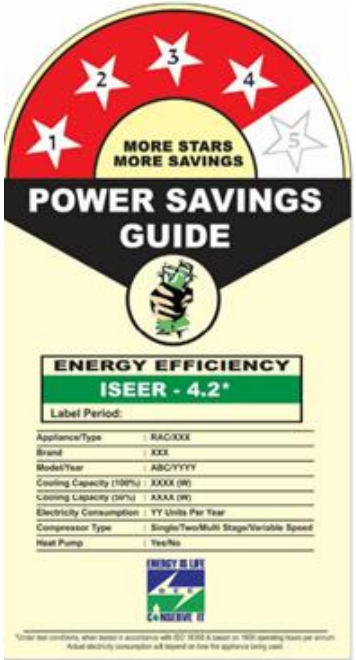
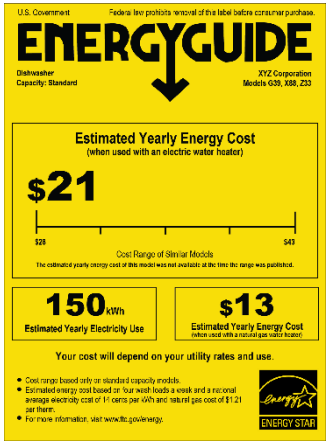
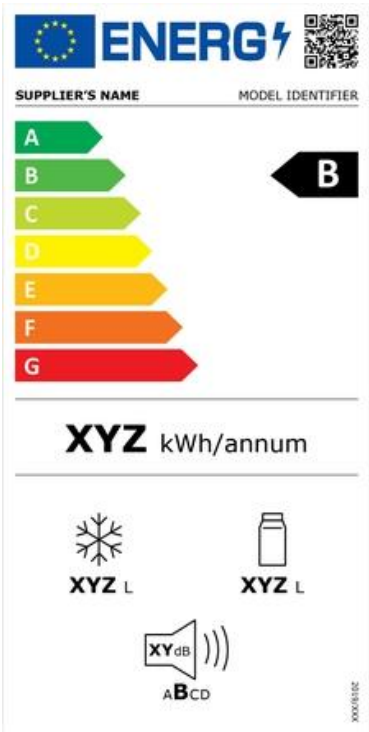






Question

What is your experience with appliance energy efficiency information and awareness campaigns in your country?

Awareness raising in schools in Tonga

"Teach a child a good habit and he or she will never depart from it as they grow up." – Mr Sione Misi, Energy Efficiency Officer

Organised by
- Tonga Department of Energy
- Secretariat of Pacific Community (SPC)

Target audience
- 9 primary schools (700 students)

Purpose
- Raise awareness about the energy rating label and to promote behavioural change

Approach
- Colouring and activity book on energy efficiency concepts.

Appliance Efficiency Policy Package - Incentives

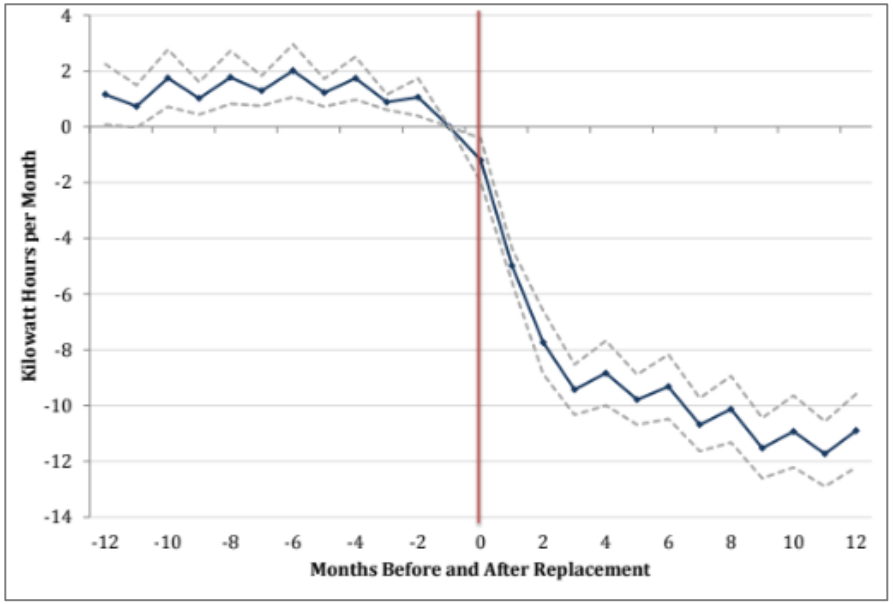
- An **incentive** policy is any system adopted to **motivate the behaviour of people**.
- In appliance policy it is a way to persuade consumers to buy more efficient products and/or to motivate technology suppliers to produce more efficient products.
- Some examples of financial incentives are **rebates**, **grants, subsidies, finance and taxation benefits.**
- Other incentives are **high energy performance standards (or HEPS), as well as procurement and dynamic electricity pricing.**

Question

What is your experience with appliance energy efficiency incentives in your country?

Mexico: Cash for Coolers (C4C) Program 2009-2011

The effect of refrigerator replacement on household electricity consumption



How it Worked?

- Subsidy when a retailer replaced an old cooling appliance (>10 yrs: refrigerators/AC) with a new efficient one.
- One appliance per household, mostly +90% refrigerators

Results

- About ~25 million eligible household (15%) had participated.
- **Refrigerator replacement reduced energy consumption by 7%.**

[Discussion question]

There has been a change of government and the incoming government wants a range of options for interventions to rapidly increase residential energy efficiency for appliances, equipment and lighting.

> Identify three interventions that in your view have the highest priority in your country in the next 5 years, reflect on pros and cons of each intervention.

Brainstorm Appliance Energy Efficiency Policy Package

!
Focus on immediate steps/actions

Resources

- International Energy Agency, “Security of Clean Energy Transitions,” Accessed: Nov. 03, 2022. [Online]. Available: www.iea.org/t&c.
- IEA, “Sustainable Recovery: World Energy Outlook Special Report.,” World Energy Outlook, p. 185, 2020, [Online]. Available: https://www.iea.org/reports/sustainable-recovery%0Ahttps://webstore.iea.org/download/direct/4022?fileName=Energy_Technology_Perspectives_2020_-_Special_Report_on_Clean_Energy_Innovation.pdf.
- IIEA/4E TCP, “Achievements of Energy Efficiency Appliance and Equipment Standards and Labelling Programmes,” Paris, 2021.
- IEA, “A call to action on efficient and smart appliances,” Paris, 2021.
- IEA, “Energy Efficiency 2022,” Paris, 2022.
- United Kingdom Government, “Find Energy Grants and Ways to Save Energy in Your Home,” 2022.
- USDA, “Energy Efficiency and Conservation Loan Program,” 2022.
- United Kingdom Government, “Environmental taxes, reliefs and schemes for businesses,” 2022.
- K. Mizobuchi and K. Takeuchi, “The influences of financial and non-financial factors on energy-saving behaviour: A field experiment in Japan,” Energy Policy, vol. 63, pp. 775–787, Dec. 2013, doi: 10.1016/j.enpol.2013.08.064.
- US DOE, “Energy Auditor Training Grant Program.”

International Energy Agency

Making it Happen: Assessing current performance and setting MEPS

Clara Camarasa, International Energy Agency and Hubert Zan, Government of Ghana

Nairobi, 18 March 2024

Key learning outcomes

- What are Minimum Energy Performance Standards or MEPS?
- Why are MEPS important?
- How to set MEPS
- Prioritisation of products
- Setting product coverage
- Setting standards
- How do MEPS affect product prices?

What are MEPS and why are they important?

Minimum Energy Performance Standards

REGULATION

- **Minimum Energy Performance Standards** exclude the least efficient products from the market; they should be in line with international best practice, while reflecting good understanding of local circumstances; and be regularly updated. Regulations are essential for moving the market towards the best available technology in line with achieving net zero targets.
- **Regulation** can ensure that new appliances are “demand response ready” in order to offer flexibility to the end-user and the overall system and reduce peak demand.

- **MEPS** specify the **minimum** level of **energy performance** that appliances, lighting and electrical equipment (products) must meet or exceed before they can be offered for sale or used for commercial purposes
- **Inefficient products are prevented from entering the marketplace.**
- Of the policy tools available, MEPS are **generally the most cost-effective** and have the **greatest impact** as a single policy measure.
- **Targeted energy efficiency policies have helped halve the energy consumption of key appliances** in the longest-running efficiency programmes.

How to set MEPS

Introducing MEPS

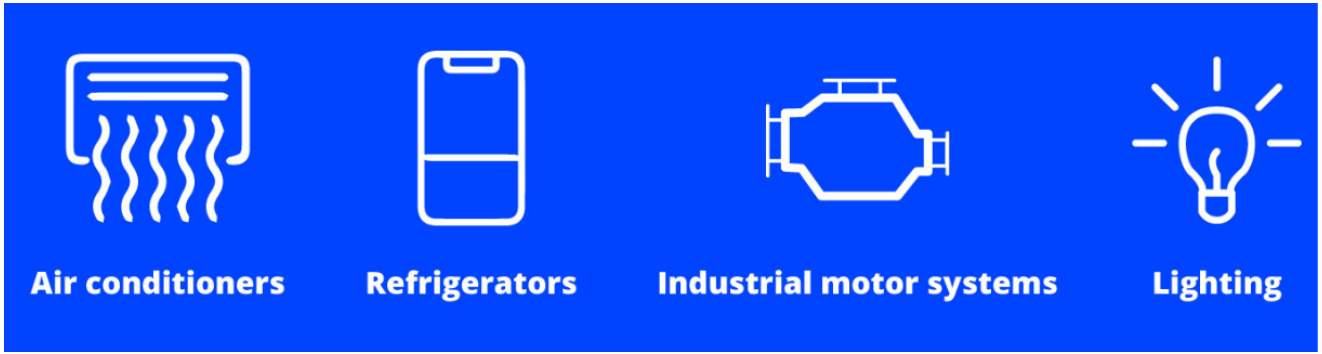
- MEPS should be introduced so that **manufacturers are given appropriate signals and time to increase product efficiency**.
- Good practice to **consult stakeholders**.
- For **consumers**, MEPS mean that **products** available in the market **use less energy and have lower running costs over their lifetime.**
- For **manufacturers**, MEPS **give appropriate signals to increase product efficiency.**

REGULATION

- **Minimum Energy Performance Standards** exclude the least efficient products from the market; they should be in line with international best practice, while reflecting good understanding of local circumstances; and be regularly updated. Regulations are essential for moving the market towards the best available technology in line with achieving net zero targets.
- **Regulation** can ensure that new appliances are “demand response ready” in order to offer flexibility to the end-user and the overall system and reduce peak demand.

Prioritisation of Products

- First task is to decide what products to cover first:
    1. Follow the example set by others
    2. Analyse the energy use by product and select the product(s) with the greatest energy savings to regulate first



Prioritisation of Products

- Apply a phased approach:
  - First, carry out an initial screening of all the appliances based on some simple criteria and analysis, including number of products and the power draw.
  - Secondly, select the three highest priorities based on your initial estimates and carry out a more detailed analysis. This will typically need more data.

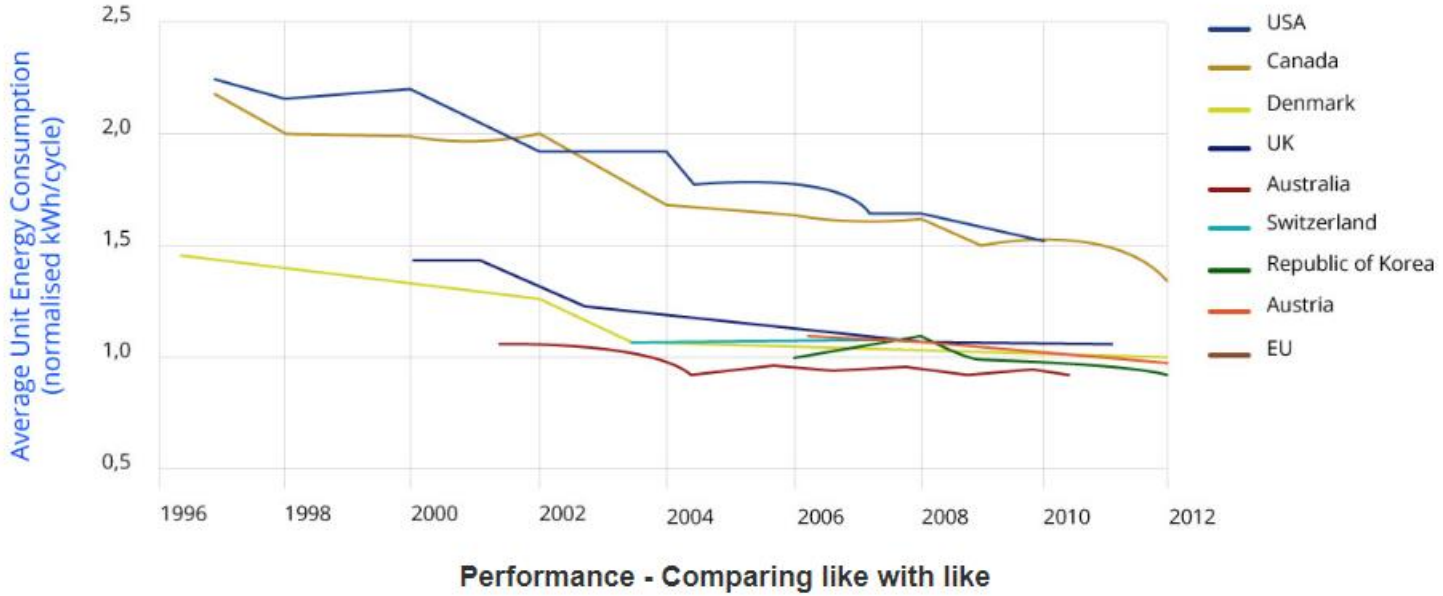
[Discussion question]

If products deliver the same service using different technologies, do you set different MEPS by technology or one for each type of service?

For example, how would you set MEPS for the following:

- Lighting by technology – e.g., fluorescent, high-intensity discharge, LED
- Air conditioners – e.g., fixed speed, inverter.

Setting the Scope: Residential washing machine efficiency

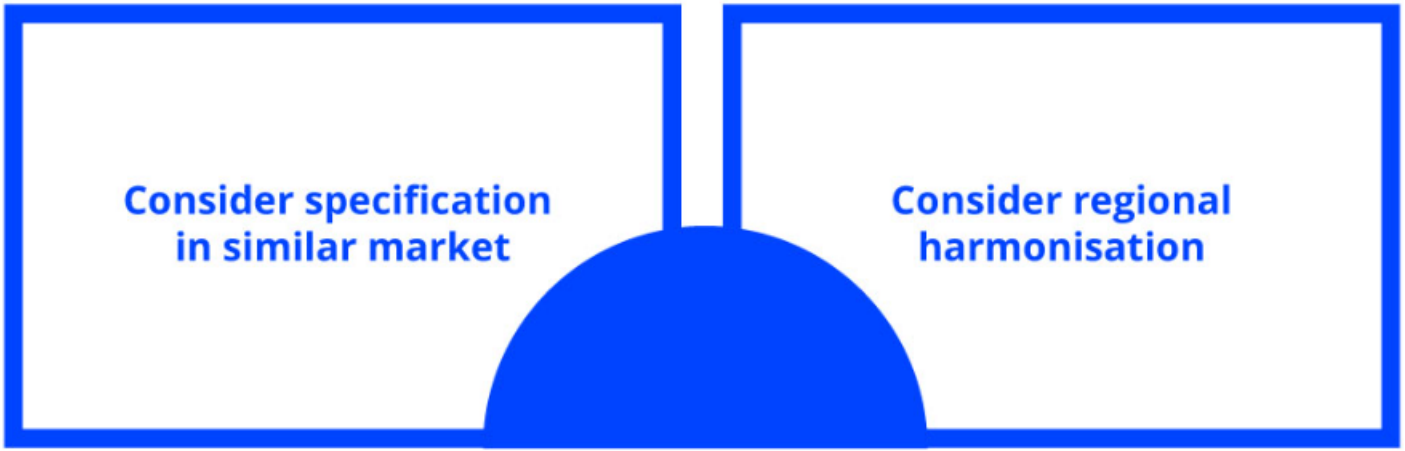


Performance – Examine other markets and compare like with like

Setting MEPS

- Learning from other countries
- Harmonising standards with those of other countries
- Using existing benchmarks, such as performance ladders
- Setting your own standards based on data analysis

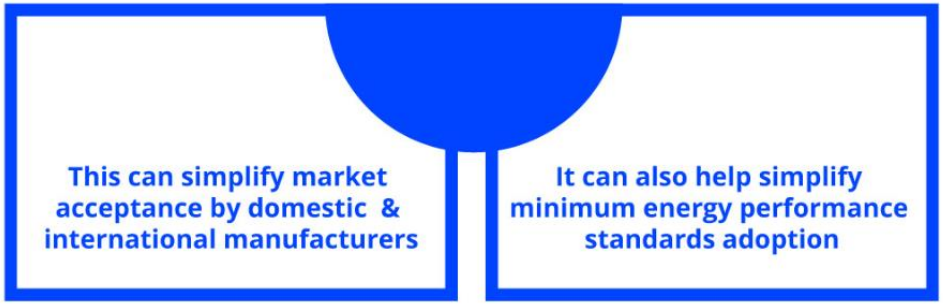
Setting MEPS



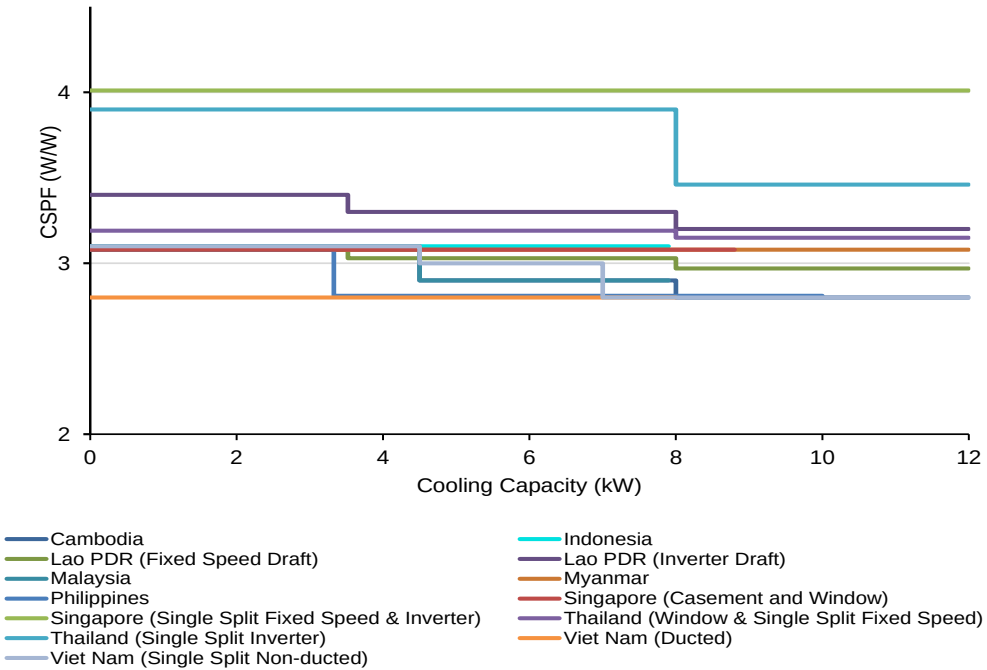
Existing Programme in Trading Partner / Neighbouring Economy

Pacific Islands Case Study

- Limited data on household energy use and appliance uptake
- Issues with customs classification for appliance
- Limited capacity and resources available
- Opted to adopt S&L based on main country of origin and focusing on highest consuming appliances



Current MEPS – Air Conditioners in Southeast Asia



Significant energy saving benefit to be gained from harmonising test standards and aligning performance standards

Setting standards using data analysis

- Though regional harmonisation works for some situations, it may also be worthwhile in certain cases to develop MEPS specifically for your country.
- To do this, you need to analyse data to establish the costs and benefits of the different options.
- There are two basic approaches:
    1. Use a market analysis to identify the full range of products sold in the market and finding out what the lowest and highest lifecycle cost is.
    2. Undertake an engineering analysis to identify the least lifecycle cost.

Setting own standards: Market data vs an engineering approach

- Examples in this presentation so far have used market data, which shows what is available on the market today. This relies on being able to obtain good quality data on performance however which can be difficult, particularly in countries without a categorical label.

- The market data may be incomplete – in particular, there may be more energy efficient technology available than is evident in the market data. The Best Available Technology (BAT) may not be sold in your country or may be sold in numbers too low to register.

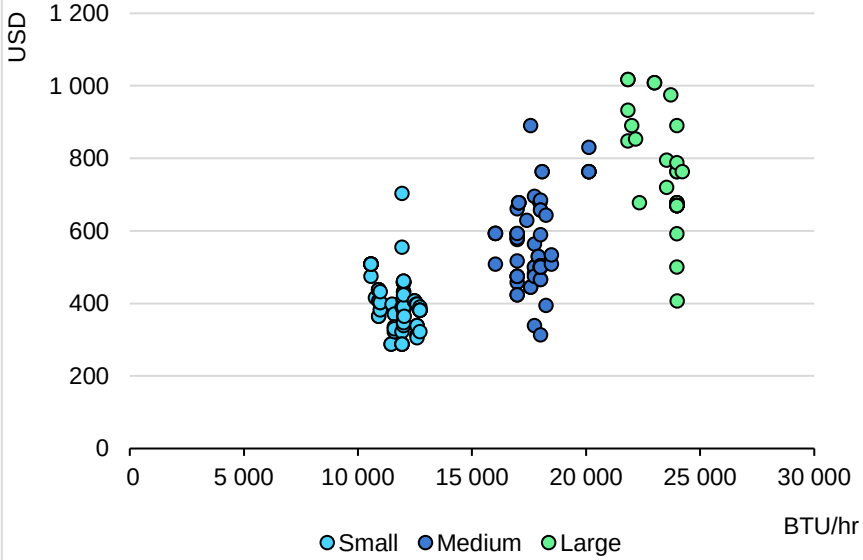
- There are different ways of improving energy efficiency where different products on the market each incorporate some practices, but no single product combines them all.

- An engineering approach can overcome these limitations and create a lifecycle cost curve based on all possible technical options.

- The engineering approach is used in the United States and European Union (EU) for developing MEPS, where regulations mandate that MEPS must be set at the minimum lifecycle cost. The engineering analysis approach is considered in general to be more robust than market analysis.

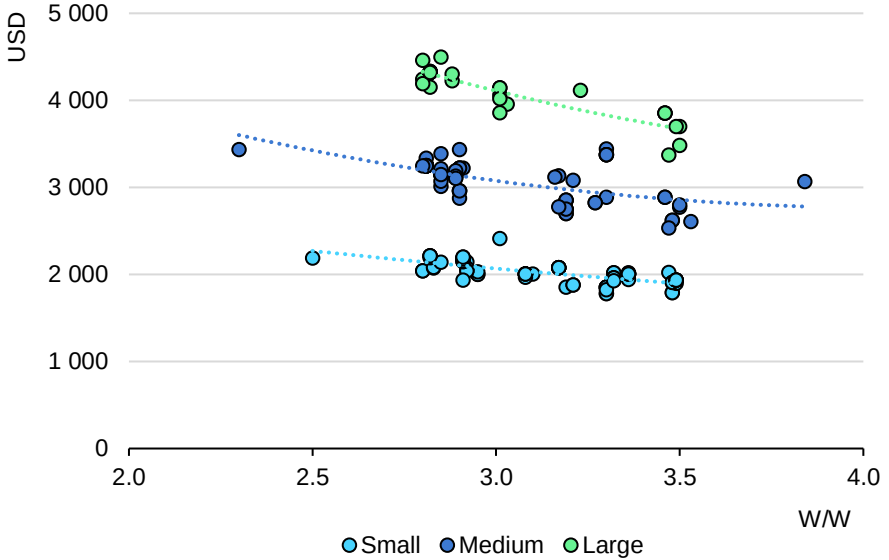
Air Conditioners: Ghana

Purchase price (USD) vs. cooling capacity (BTU/hr) in Ghana, 2023



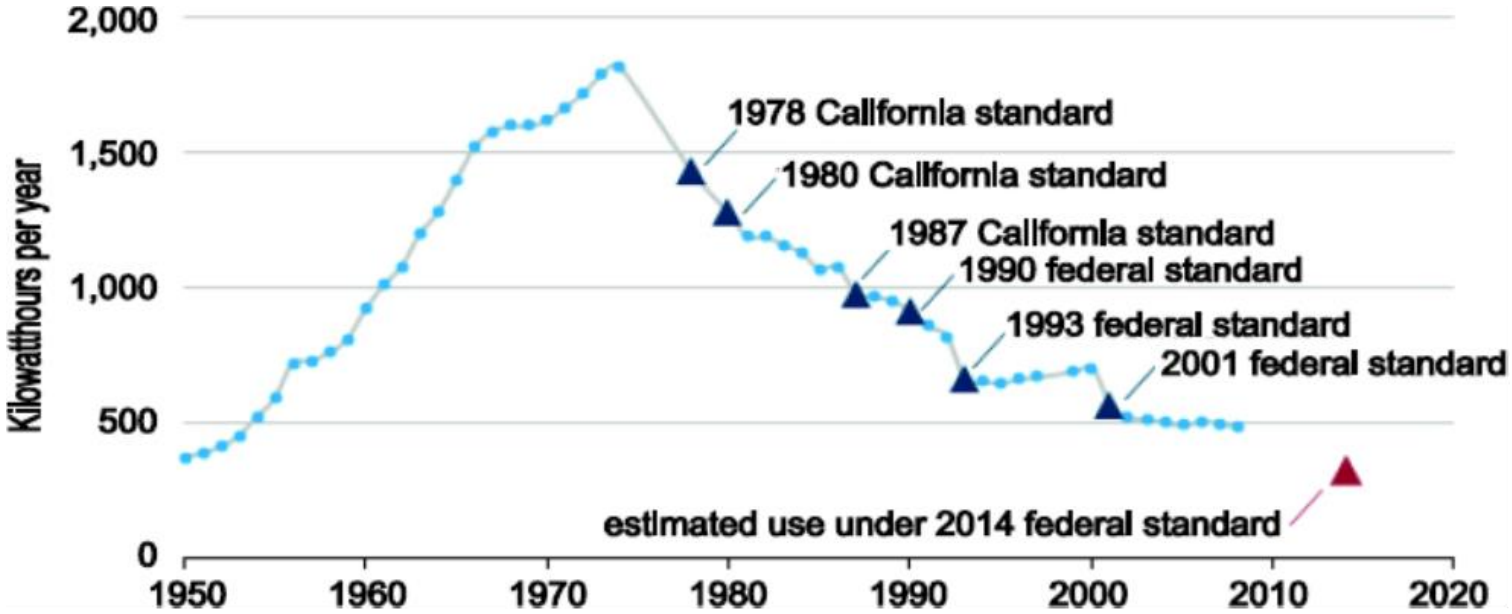
A higher cooling capacity does not necessarily correspond to higher prices. It is possible to purchase air conditioning units of various sizes for similar or even lower prices.

Lifecycle cost (USD) vs. energy efficiency (W/W) based on cooling capacity size in Ghana, 2023



ACs with larger cooling capacity will lead to higher lifecycle costs over their lifespan. Adequate AC size is needed to avoid excessive energy consumption

US: Efficiency and prices, regulation of refrigerators energy efficiency

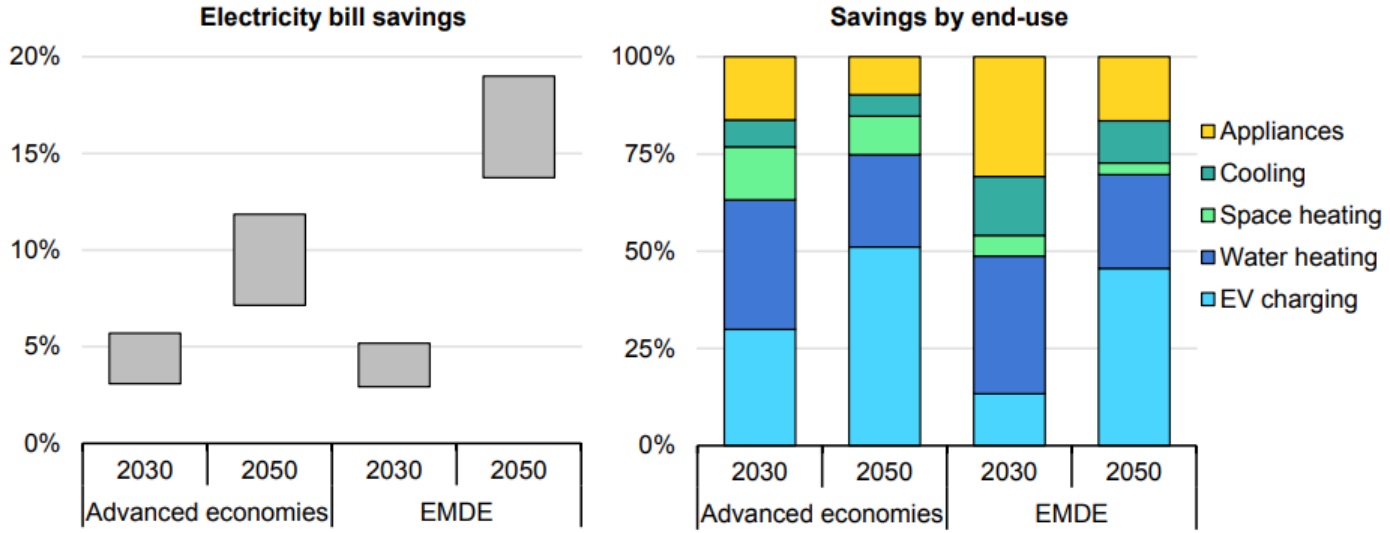


Source:EIA,2013

Ratcheting MEPS has reduced energy consumption of new US refrigerators by 75%

Demand-side measures to meet Net Zero by 2050 Scenario ambitions

Electricity bill savings from demand response for households and by end use in the Net Zero by 2050 Scenario, 2030 and 2050



Notes: EMDE = emerging market and developing economies. Demand response refers to the ability of a consumer to shift consumption in time with no or limited impact on comfort. Estimates of the potential demand-response measures account for technology and acceptability limitations.

Source: IEA (2023), World Energy Outlook 2023.

Example of policies and programmes to promote demand response

Country	End use	Policy, description	Year	Status	Type
European Union	Building	**Energy Performance of Buildings Directive – Smart Readiness Indicator.** Quantifying the energy flexibility capability of buildings and representing it in a meaningful way for stakeholders.	2024	In force	Information
United States, California	Building	**Building Energy Efficiency Standards.** Requirements to install demand response automated systems for heating and cooling as well as lighting using OpenADR, a common open standard for two-way communication.	2022	In force	Regulation
United Kingdom	All appliances	**Smart Systems and Flexibility Plan.** Mandate for large domestic-scale appliances to be interoperable with demand-side response service providers.	2024	Planned	Regulation
European Union	All appliances	**Code of conduct for the energy-smart appliances manufacturers.** Aiming at developing of Interoperability requirements.	2024	To be launched	Regulation
Australia	Air conditioners	**Greenhouse & Energy Minimum Standards Demand Response Readiness.** Requirements for room air conditioners to publicly register if they are "demand-response-ready". Since 2023 only air conditioners that meet the demand response capability requirements can be connected to the South Australian electricity distribution network.	2023	In force	Regulation

Examples of standards and norms to control and monitor equipment

Region	Name	Description	Type
European Union	Norm EN 50631-1:2020: European Norm	Describes the necessary control and monitoring for household appliances.	Norm
United Kingdom	PAS 1878:2021	Requirements and criteria for electrical appliance to be classified as energy smart.	Norm
Australia	AS 4755 – Demand Response Standard	Demand response capability and modes of appliances and smart device.	Standard
United States	ANSI/CTA-2045	Specifies a modular communications interface to facilitate communications with residential devices for applications such as energy management.	Standard
International	IEC 62746-10-1	Open automated demand response system interface between the smart appliance, system or energy management system and the controlling entity.	International standard
United States, California	Senate Bill 49 – The Flexible Demand Appliance Standards	Authorises the Energy Commission to adopt standards for appliances to facilitate the deployment of flexible demand technologies.	Bill

Resources

- “Setting the scope: residential clothes washers efficiency”,
  IEA 4E Benchmarking report for Washing Machines (clothes washers), 2012
  Available from **https://www.iea-4e.org/peet/news/washing-machines-benchmarking-report-published/**

- IEA/SEAD, Energy performance ladders, presentation at COP26, 2021
  https://energyefficiencyhub.org/task-groups/https-energyefficiencyhub-org-task-groups-sead/

- “Case study – European Union: Engineering approach – domestic refrigeration”
  VHK and ARMINES, Preparatory/review study for Ecodesign and energy labelling of household refrigeration appliances, 2016
  https://www.vhk.nl/research/reports.htm

- “Case study – European Union: Rapid change, first MEPS for TVs ”
  TopTen, European TV market 2007 – 2013 Energy efficiency before and during the implementation of the Ecodesign and Energy Labelling regulations, 2014
  https://storage.topten.eu/source/files/European_TV_market_2007%E2%80%932013_July14.pdf

- “Case study - United States: Regulation of refrigerator energy efficiency”
  ACEEE,. Energy-Saving States of America: How Every State Benefits from National Appliance Standards, 2017
  https://www.aceee.org/white-paper/energy-saving-states-america

ENERGY COMMISSION

Securing Ghana's Energy Future Today

Making it happen: Assessing current performance and setting MEPS

African Training Week (2024)

Hubert Zan

Energy Commission-Ghana

OUTLINE OF PROGRAM

- Introduction
- Policy packages
- MRV&E
- Digitalization and Digitization
- Challenges
- Way forward

LABELING SCHEME AND MEPS

- **MINIMUM ENERGY PERFORMANCE STANDARDS (MEPS): It indicates the minimum acceptable performance of any products to be sold in a country or region. It is used as a tool to prohibit sub-standards and used obsolete appliances.**

- **LABELING SCHEME: Is used to indicate the efficiency level of products being sold in the market. It helps consumers to be able to make and informed decision. wide**

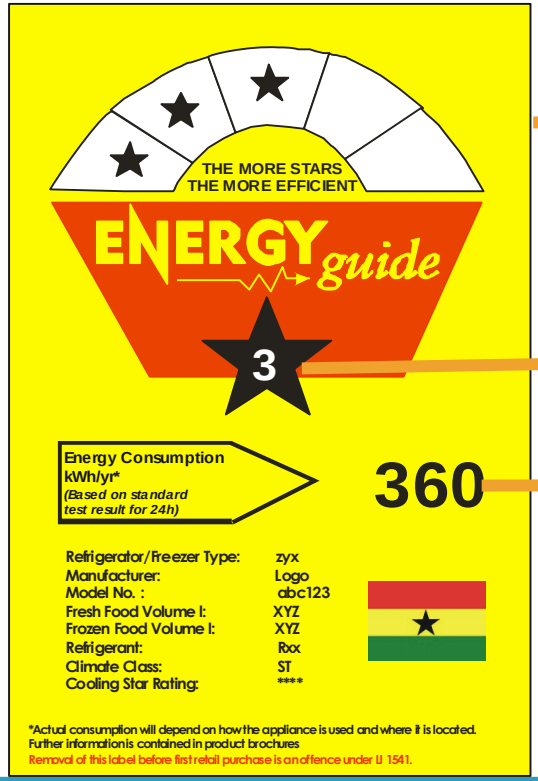
Enactment of Laws to make S&L Legally enforceable

- Energy Efficiency Standards and Labelling (Non-Ducted Air-conditioners and Self-Ballasted Fluorescent Lamps) Regulations, 2005 (LI 1815)
- Energy Efficiency (Prohibition of Manufacture, Sale or Importation of Incandescent Filament Lamp, Used Refrigerator, Used Refrigerator-Freezer, Used Freezer and Used Air-conditioner) Regulations, 2008 (LI 1932)
- Energy Efficiency Standards and Labelling (Household Refrigerating Appliances) Regulations, 2009(LI 1958) and LI 1970

PROCESS OF MEPS

- ADOPTION OF STANDARDS (IEC & ISO)
- RESEARCH ON BENCHMARKS FOR PARTICULAR APPLIANCES
- NO NEED TO RE-INVENT THE WHEEL IN SETTING MEPS
- AGREE ON RATINGS FOR SPECIFIC APPLIANCES

Key features on the label

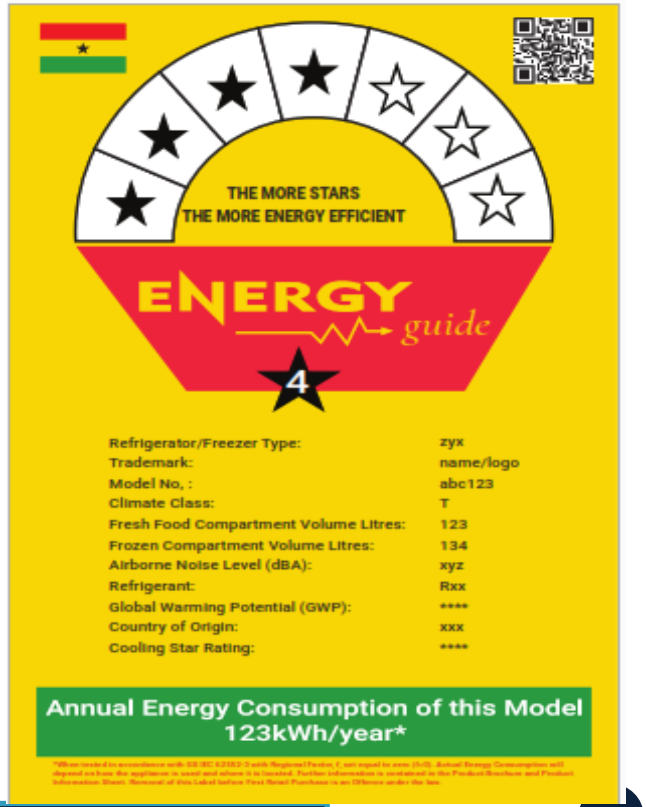


STAR RATING

THREE STAR RATING

ANNUAL ENERGY CONSUMPTION

ADDITIONAL SPECIFICATIONS



S&L is a market transformation tool. Refrigerating Appliance Market. Trend of imports from 2005 to 2020

EVIDENCE OF APPLIANCE MARKET TRANSFORMATION FROM 2005 – 2021

Figures A and B show that the proportion of new refrigerators imported into the country, between 2005 – 2021. Over 3.8 million new refrigerators imported over the period.

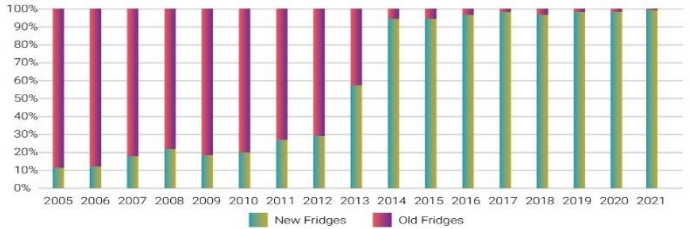


Figure A: Evidence of Transformed Market through MEPS from 2005 - 2021

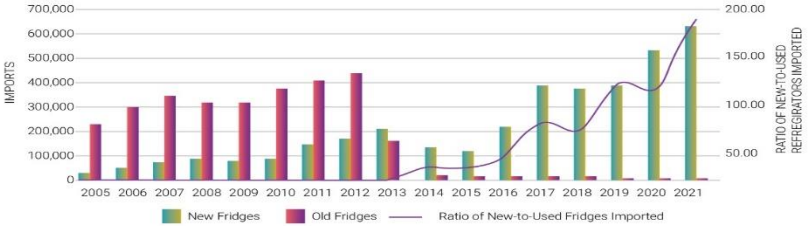


Figure B: Yearly Trends in New Versus Used Refrigerators Imports from 2005 – 2021

Figure C presents the yearly downward trend of used refrigerators, especially from 2013 due to the enforcement of L.I 1932.

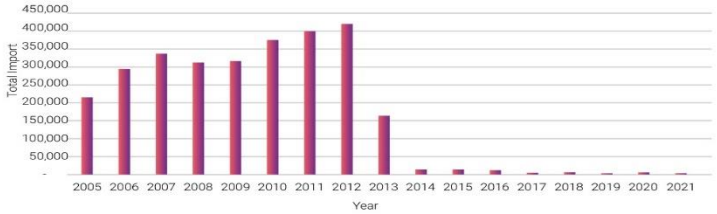


Figure C: Yearly Trend in Imported Used Refrigerating Appliances to Ghana from 2005 to 2021

Figure D: Trends in Compliance Levels for Refrigerating Appliances and RACs from 2017 - 2021

Ideal policy packages for improving EE?

Evidence of Seizures-Smuggling (Challenges)

Evidence of Seizures

Hydrochlorofluorocarbon Phase-Out Management Plan (HPMP)

PUBLIC NOTICE

PN.038022022

PHASING OUT OF THE IMPORTATION OF HYDROCHLOROFLUOROCARBON-BASED AIR CONDITIONERS IN GHANA

In partial fulfilment of Ghana's obligations to phase out the consumption of Hydrochlorofluorocarbon (HCFCs), mainly R22 under the Montreal Protocol, a Hydrochlorofluorocarbon Phase-out Management Plan (HPMP) was developed to guide the implementation of the phasing out process.

As part of measures to fulfil this obligation, controls on the importation of R22 and R22 based equipment including air conditioners (ACs) was incorporated into the legislative instrument (L.I 1812) in tandem with the phase-out reduction scenario. Furthermore, in view of the need to take necessary measures to avoid dumping on our markets as the phase-out date approaches, the EPA in collaboration with the Energy Commission, hereinafter referred to as the implementing institutions held a stakeholder meeting with importers of air conditioners and reached an understanding to enforce an implementation of a quota system to control the volumes of R22 based ACs imported into the country starting January 1, 2022. The quota allocation was based on historical importation data of importers for the years 2018-2021

All importers who have been allocated importation quotas will be written to and are expected to heed to the quantities approved effective January 2022.

The Energy Commission will from same date (January 2022) reject applications for import from non-quota beneficiaries.

For further information please contact, **Mr. Emmanuel Osae-Quansah** on **0501301418**; **Mr. Joseph Baffoe** on **0501301478** or **Mr. Hubert Zan** on **0242867902.**

Please take note and comply accordingly.

Refrigerator & AC testing facility in Ghana-Verification testing

New Regulations

* Microwave
* Water Heaters
* Clothes Washing machine
* Television
* Computers
* Rice cooker
* Ventilating fans
* Industrial fans
* Comfort fans
* Refrigerators (Revised)
* Air conditioners (Revised)
* Distribution Transformers
* Electric motors
* Electric Kettle
* Public Lighting
* Set-Top Boxes
* Solar Panels
* Inverters
* Renewable Energy Batteries
* Prohibition on import of used Electrical Appliances
* Prohibition on manufacture of incandescent Filament lamps

Success Story

- Appliance standards and labelling (S&L) regime was introduced in 2005
- Between 2013 - 2020, MEPS implementation using MEPSY Model resulted in:

- 10,754 GWh (10.8TWh) of electricity savings for both Refs. & ACs (Close to TOTAL Thermal Electricity \ generated (10,885GWh) in 2019,i.e 60% of the total generation in that year;
- 7.5 Mt of CO_2 savings;

- Over 1billion USD savings on electricity bills; and

- Delayed the construction of 1,455 MW Power Plant Capacity.

- The enormous financial saving and environmental benefit resulting from deferred electricity consumption amplifies the positive implication of energy efficiency and MEPS programmes.
- Transformed cooling appliances and lighting market

ECOFRIDGES
GO Green, Save Money

ENERGY COMMISSION

1,746 New
Air conditions sold

Reduction in energy
Consumption 34,570 MWh
Of total energy savings
Noting the peak load when it come to air conditions

2,465 New
Refrigerators sold

Total finance mobilized
Ghs 25.38 million

Reduction in direct &
Indirect GHS emissions
28,760 tonnes of CO_2

AS AT NOVEMBER 2023

ENERGY COMMISSION

Securing Ghana's Energy Future Today

THANK YOU FOR YOUR ATTENTION

Follow us

EnergyCommissionGhana

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Group Exercise

Scenario

- In 2016, the government of your country signed the Paris Agreement, and in 2018, ratified the Kigali Amendment to the Montreal Protocol on phasing down HFCs worldwide. The President has decided to develop a new agency.
- You and your group are the newly employed staff members of the **Department of Energy Efficiency** (DEE).
- Energy efficiency rewards action. Countries that really pushed on energy efficiency over the last few decades now see lower consumer costs, lower fuel imports, and lower emissions.
- 2023 has been already been a year of momentous changes in global energy policy. The impacts of the ongoing pandemic, energy security issues, and the worsening climate emergency mean now, more than ever, we need to come together as a global community to ensure a reliable, resilient, and secure, global energy system. The president is looking to see your plan for the country, include quick wins and long-term actions.
- The president is also receiving some negative feedback about his decisions, some opponents are questioning how it will benefit the country.

Instructions

1. You will be assigned to a group that will represent the Department of Energy Efficiency (DEE) in “your country”. **Please make up a name for your country**.
2. As a group, you will need to develop components of an energy efficiency plan.
3. You will be provided with a list of specific questions that you should consider when developing your energy efficiency plan.
4. You will be given some time each day to work on these plans and apply the knowledge you have learnt throughout the course.
5. Each group will be required to present their plan (e.g. PowerPoint) back to the President and Committee on the last day of the course (Wednesday).
6. Presentations should be no more than 10 minutes in length. Be creative!
7. Followed by 3 minutes Q&A from the President and the committee!

Group Organisation

- Everyone should participate in the group work
- Chose 1-2 speakers to present the proposal
- Allocate some group members to develop the presentation