

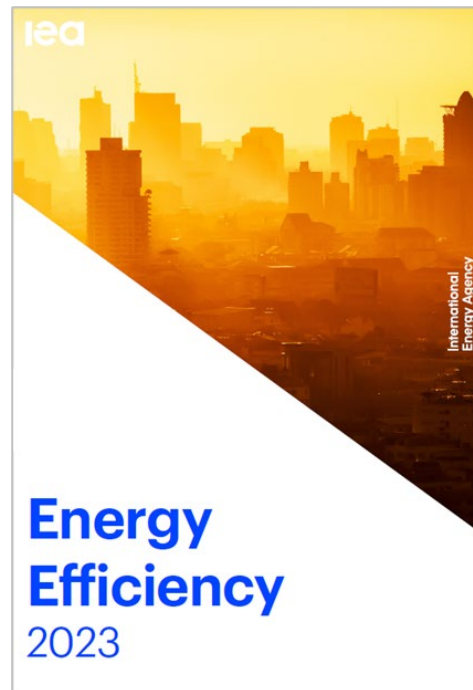


Energy Efficiency 2023

Dr Nicholas Howarth

IEEJ Global Energy Webinar, Tokyo, 21 February

1. Recent trends in energy efficiency markets
 - Energy intensity and demand
 - Energy prices and affordability
 - Sector and system-wide trends
 - Investment and employment
 - Policy progress updates
2. Key issues facing policy makers this year
 - Why is intensity progress slower this year?
 - What does doubling efficiency entail?
 - Record heat drives efficient cooling urgency
 - Energy crisis and gas in residential heating
 - Consumer benefits from system efficiency
 - Cooling in India and thermal comfort for all



Report available for free download at
<https://www.iea.org/reports/energy-efficiency-2023>

Doubling global progress on energy efficiency

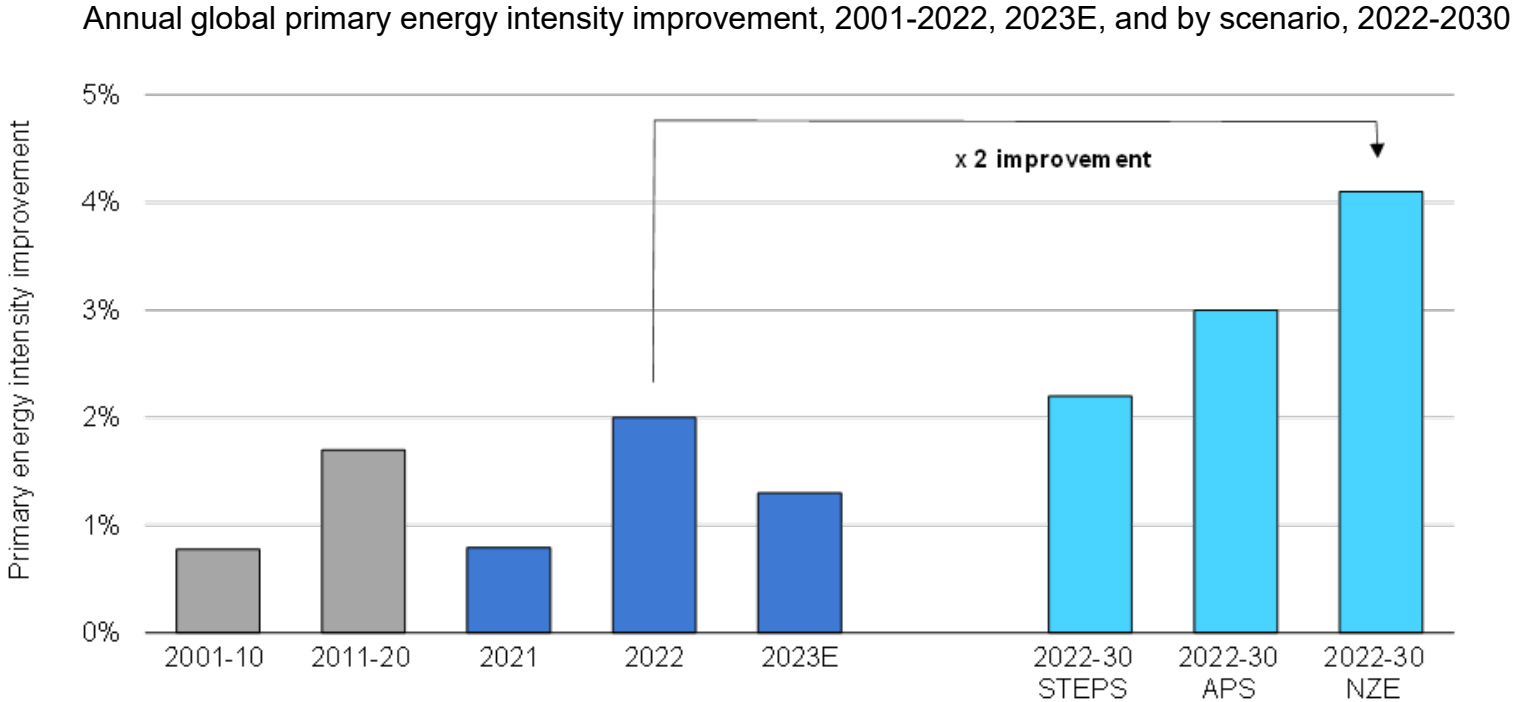


COP28 final text:

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

Energy intensity and demand trends

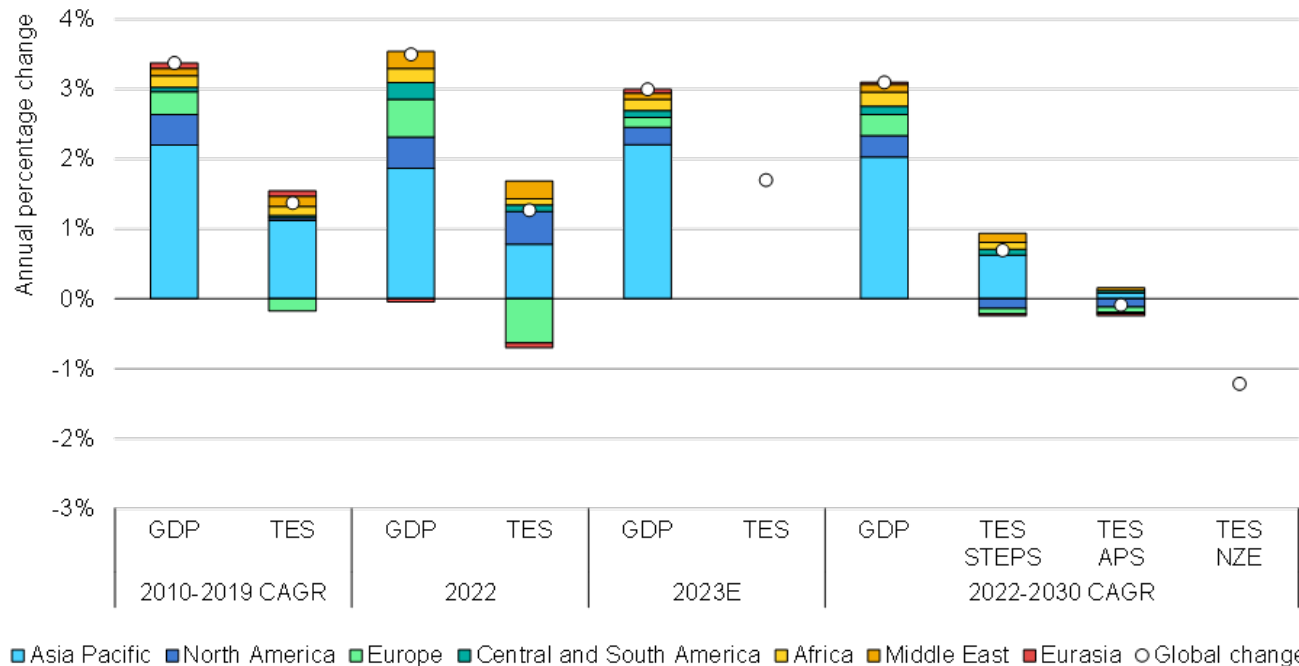
Efficiency policy momentum builds but energy intensity progress slows



Energy intensity progress slows to 1.3% in 2023 driven by higher global energy demand of 1.7%
Momentum builds around a global target to double 2022 rate of progress each year this decade to 4%

Efficiency rate will determine the trajectory for global energy demand

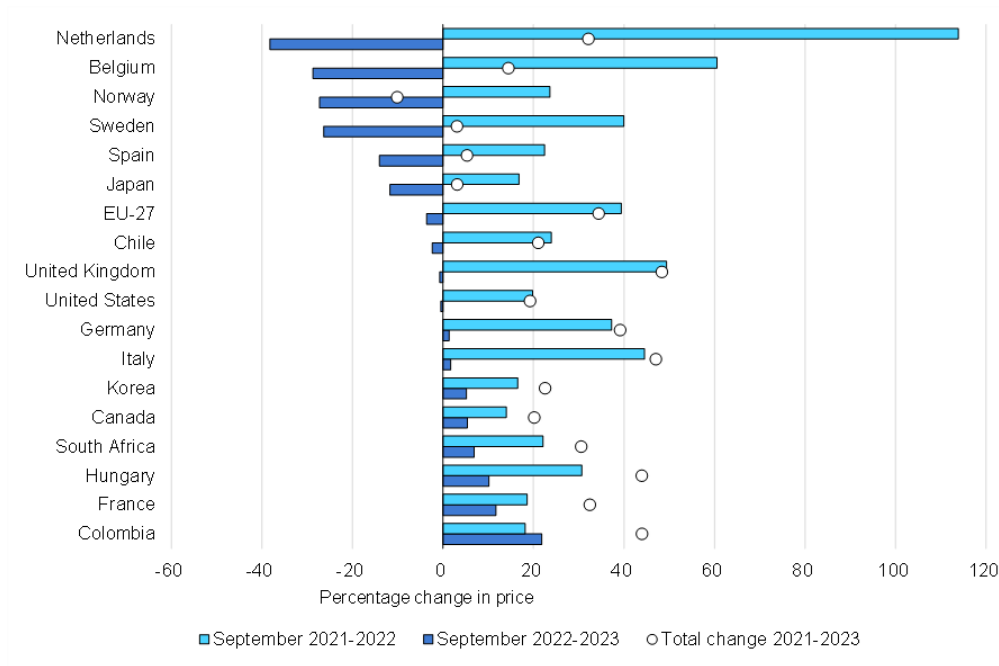
Regional contributions to global changes in GDP and total energy supply, 2010 2023E and by scenario, 2022-2030



**In the three key IEA scenarios energy demand grows at around 1% with current policies (STEPS)
Stabilizes with the announced climate pledges scenario (APS) and falls by about 1% in the Net Zero Scenario (NZE)**

Energy crisis is ongoing as retail energy prices remain elevated

Percentage change in consumer energy prices, year on year, September, selected countries

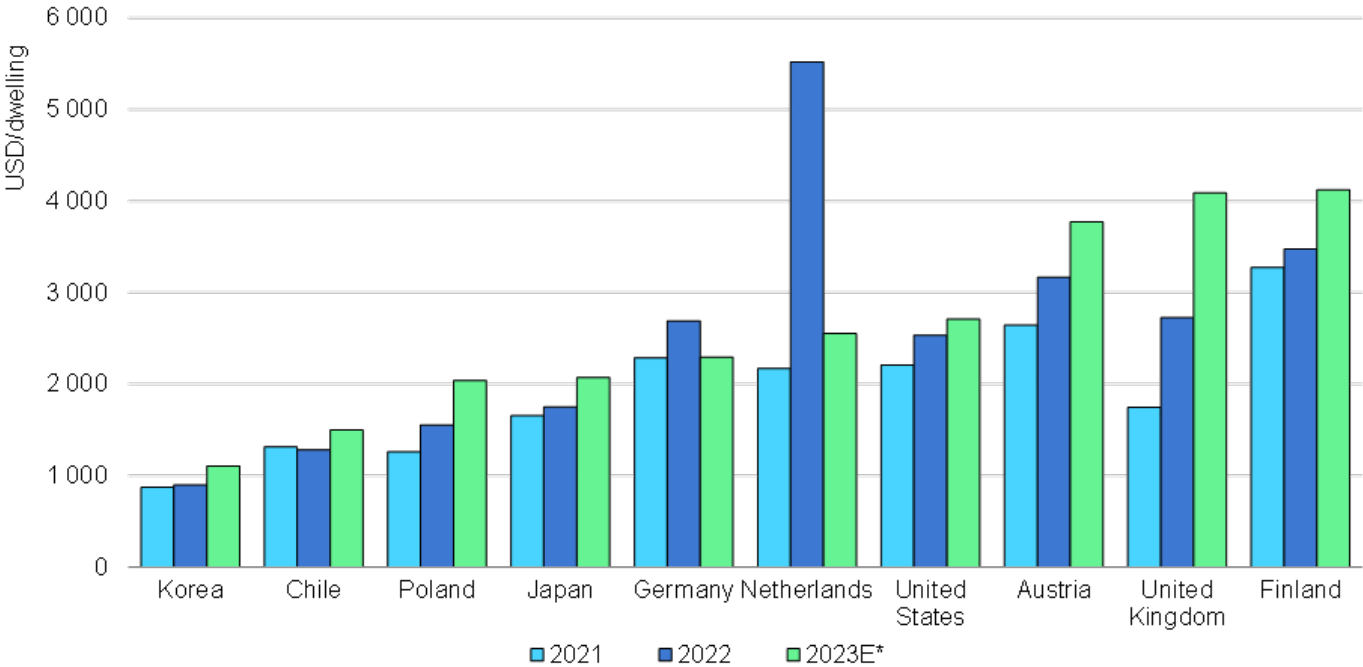


**While commodity prices have fallen it can take time to feed through to energy bills
with cost of living pressures are still causing significant hardship for households and businesses**

Higher retail prices are pushing up household energy expenditure

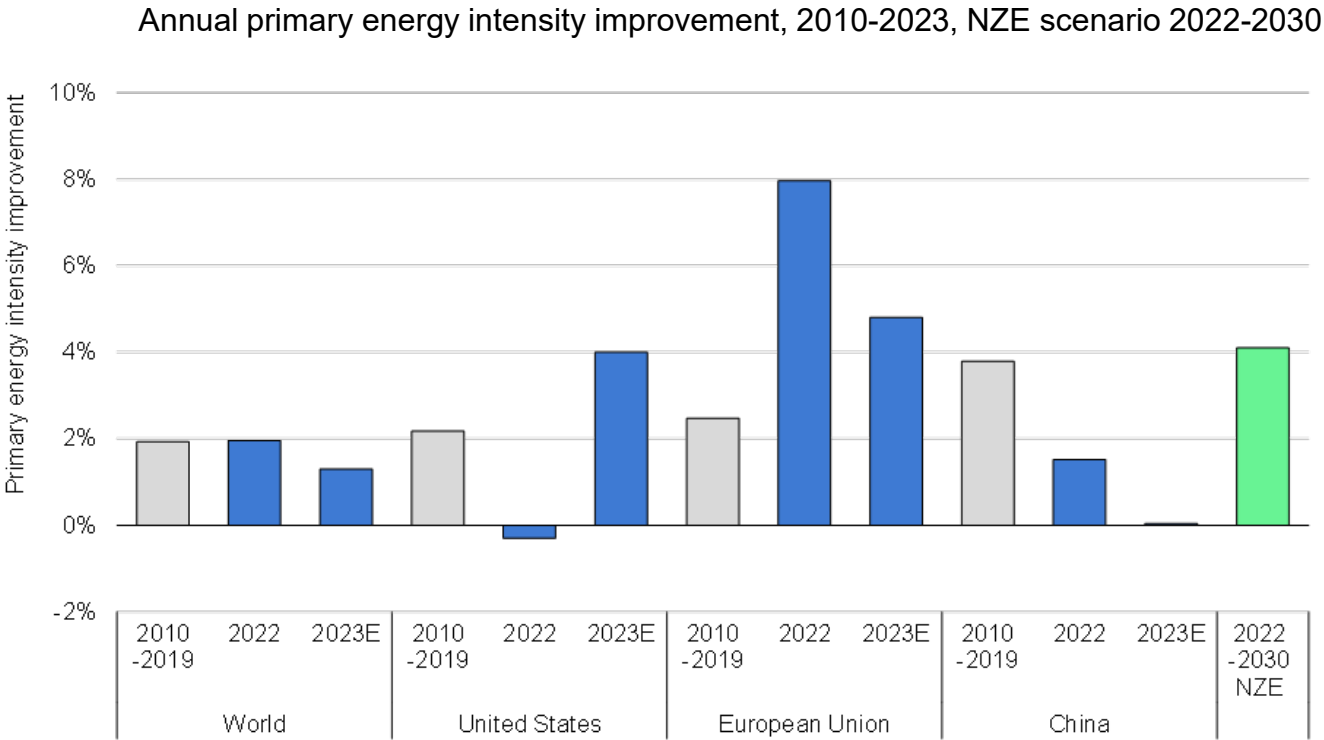


Average home energy expenditure per dwelling, 2021-2023



A decline in consumer transport prices has not been enough to lower energy bills overall

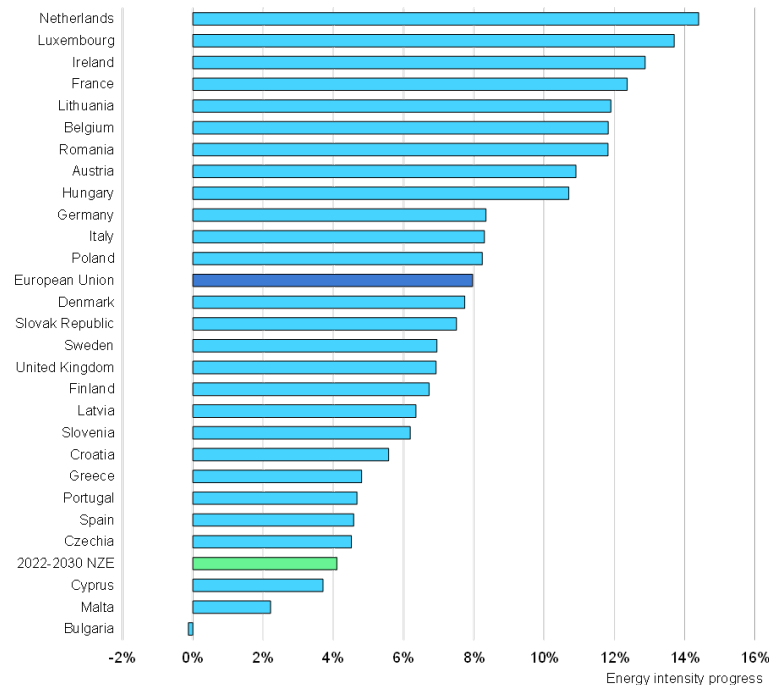
Slower global progress hides transformations underway at country level



Since the crisis over 40 countries have reached or moved beyond the 4% level in the IEA Net Zero Scenario

Energy intensity progress moves to record levels in Europe

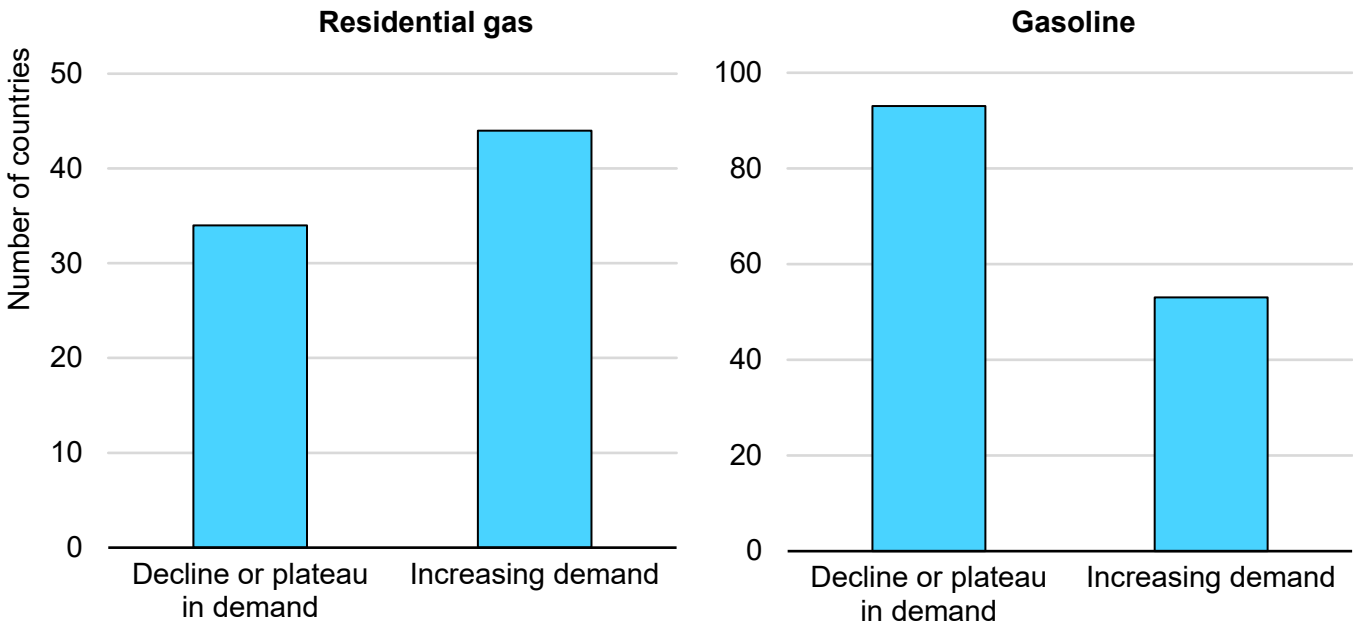
Energy intensity progress, selected EU countries and the United Kingdom, 2022



In 2022 almost all EU countries experienced intensity change between 4% and 14%

Peaking of fossil fuel demand in sight

Number of countries experiencing peaking or increasing of demand, residential gas and gasoline



Highly efficient electrified technologies, like heat pumps and electric vehicles, are contributing towards a peaking in demand for fossil fuels in certain sectors and countries.

More efforts needed to reach efficiency levels for net zero globally

IEA tracking of the key elements related to energy intensity progress

● Buildings

Sub-sectors

- Lighting
- Heating
- Space cooling
- Appliance & equipment

Technologies

- Heat pumps
- Buildings envelope

● Transport

Sub-sectors

- Cars and vans
- Rail
- Trucks and buses
- Aviation
- International shipping

Technologies

- Electric vehicles

● Industry

Sub-sectors

- Light industry
- Chemicals
- Cement
- Aluminium
- Paper
- Steel

● Electricity

Technology and infrastructure

- Demand response
- Grid-scale storage
- Smart grids

Cross-cutting

Energy system overview

- Energy efficiency
- Electrification
- Behavioural changes
- Innovation
- Digitalisation

Infrastructure

- Data centres & transmission networks
- District heating

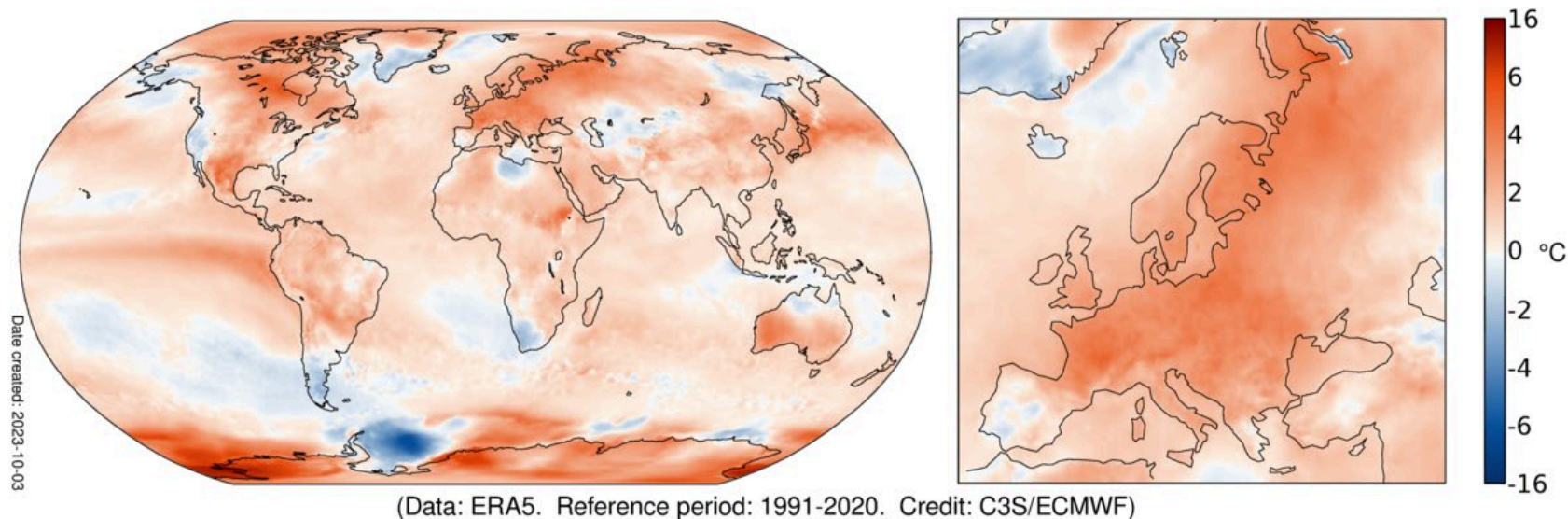
● On track ● More efforts needed ● Not on track

**Between 2000 and 2022 energy intensity improved most in the buildings and transport sectors – by 25%
In industry energy intensity progress was slightly slower with 20%**

2023 was the hottest year on record: Implications for the future of cooling

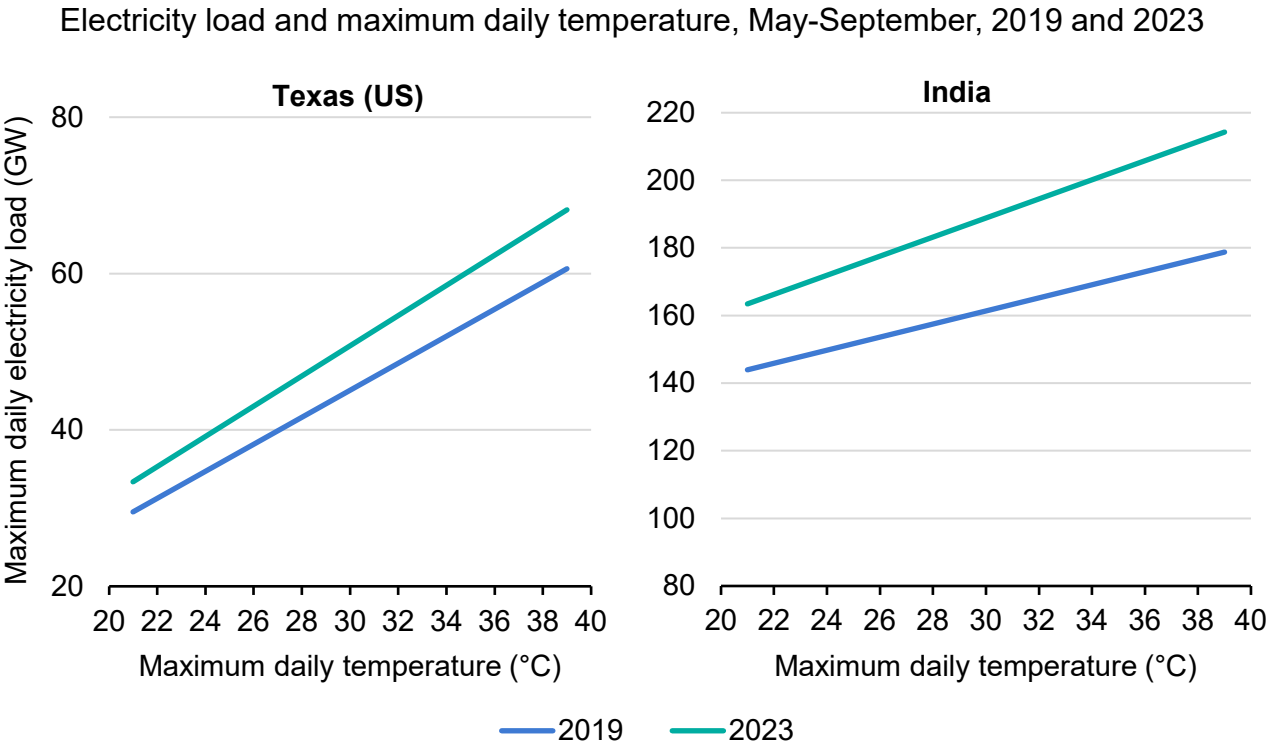
COP28 Global Cooling Pledge comes amid year of global heat records

Surface air temperature anomaly for September 2023



64 countries have signed onto the COP28 Global Cooling Pledge which includes a commitment to increase average efficiency of new AC units sold by 50% by 2030 compared to a 2022 baseline

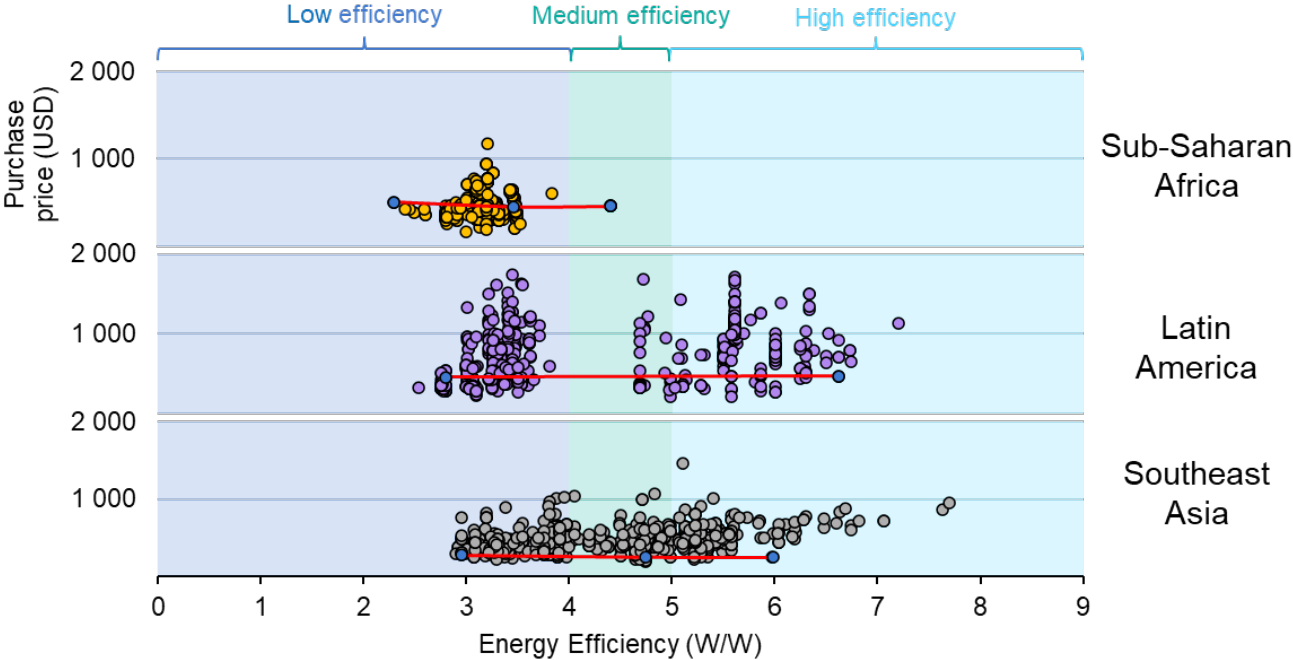
Hot weather drives energy demand for air conditioning



Every 1°C increase in the average daily temperature above 24°C drives a rise of about 4% in electricity demand in Texas, and a 2% gain in India, where air conditioner ownership is much lower.

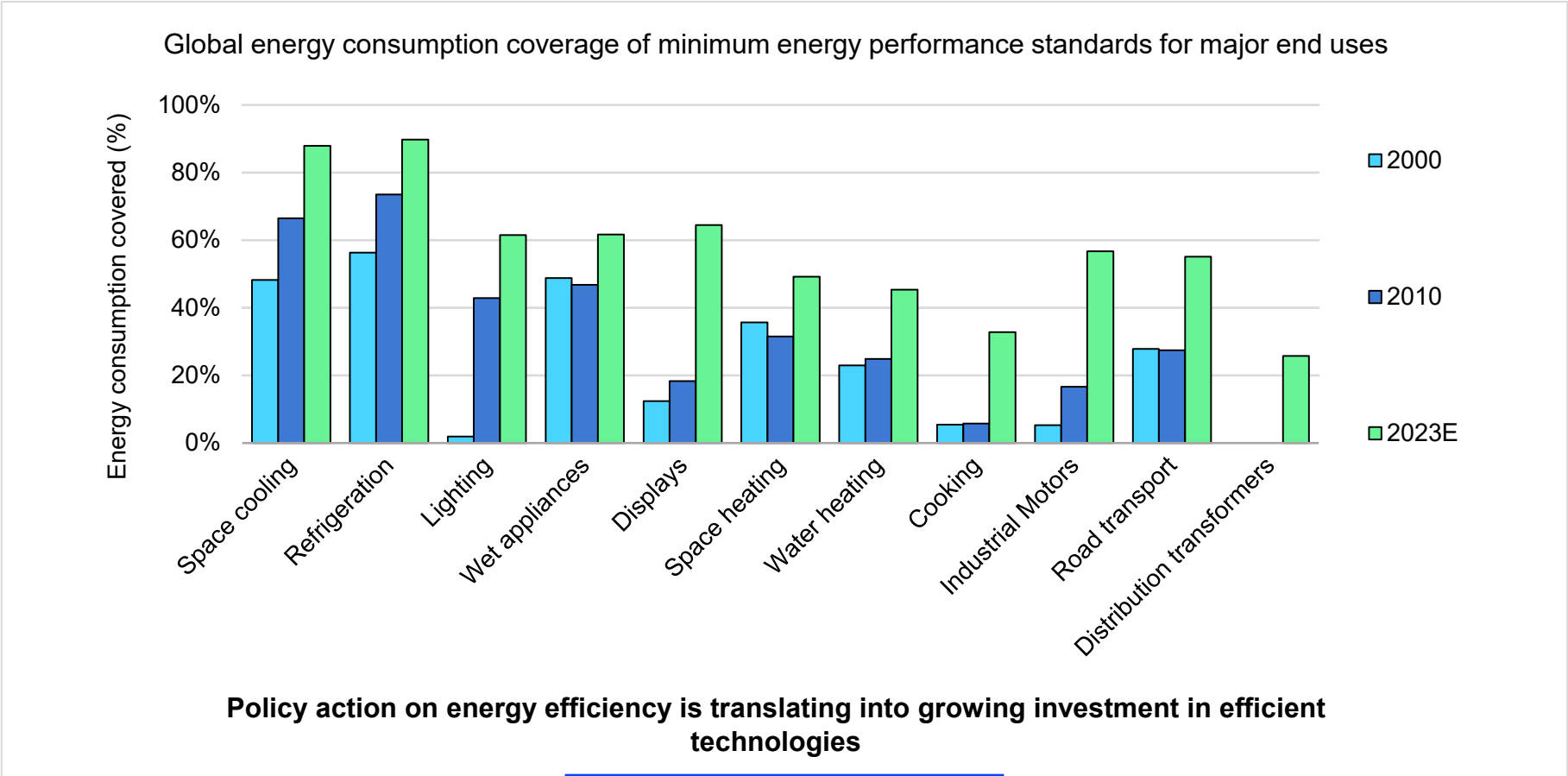
More efficient air conditioners do not incur in higher upfront costs

Air conditioners (wall-mounted type) efficiency and cost in Latin America, Southeast Asia, and sub-Saharan Africa, 2023.



Highly efficient air conditioning models are as affordable as less efficient devices in Latin America and Southeast Asia

Policy coverage has been expanding significantly

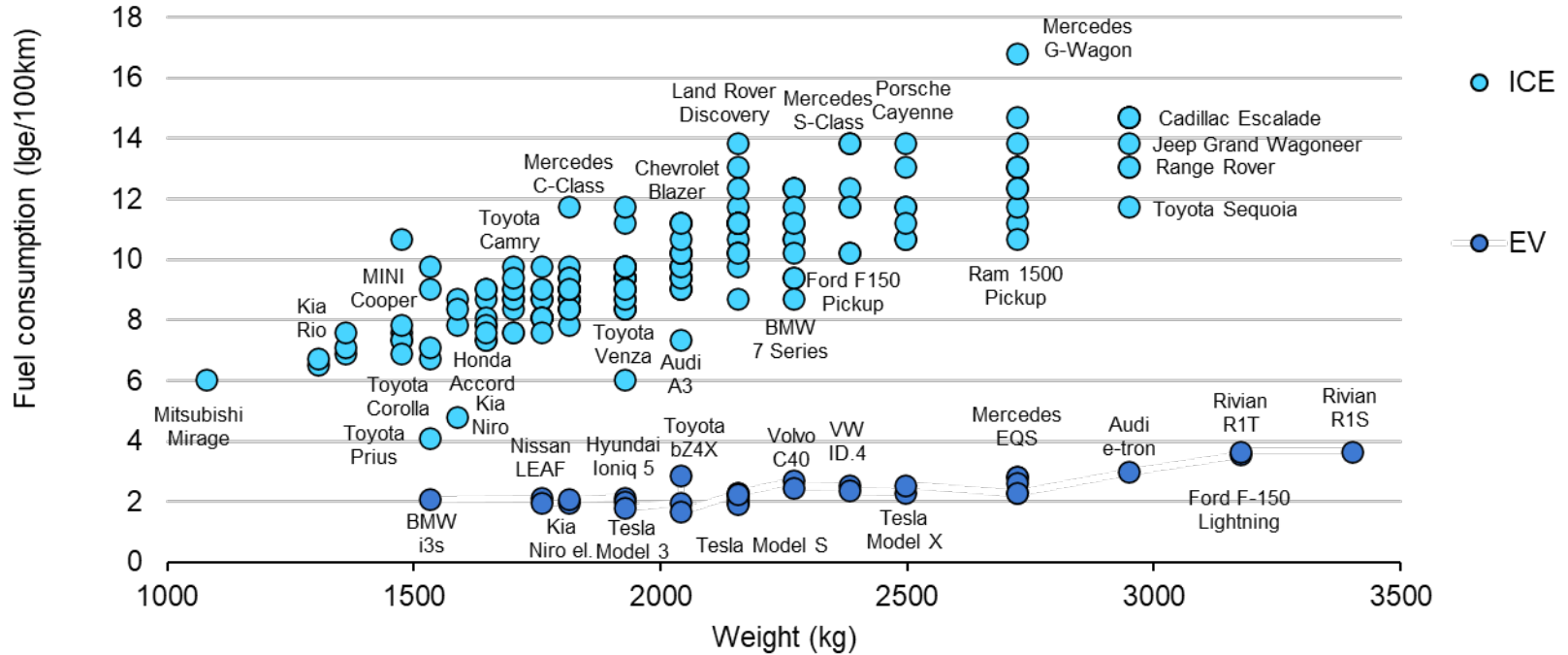


Evolution of energy efficiency

**Electrification, digitalisation, renewables
integration and demand side management**

Almost 1 in every 5 cars sold in 2023 were electric

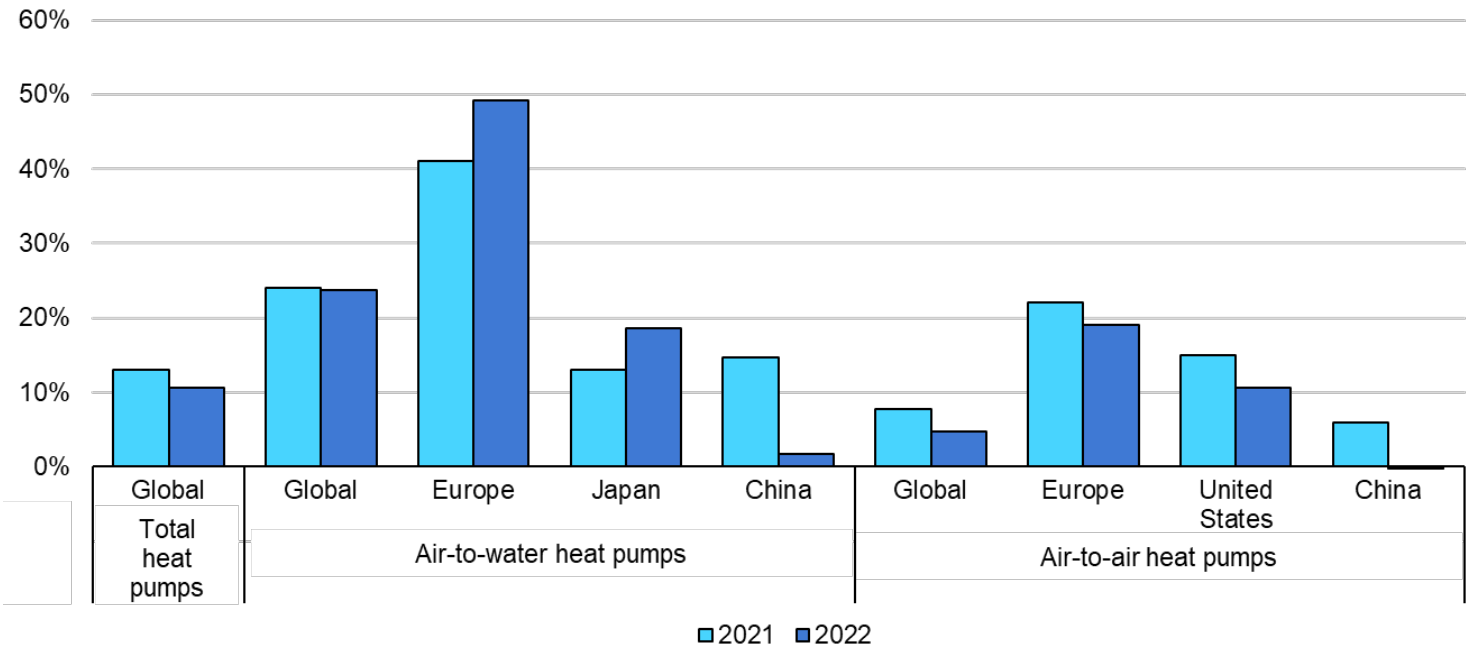
Vehicle efficiency (tank to wheel) and weight, new vehicles, United States, 2023



An electric car can use between 50% to 80% less energy to travel 100 km

Strong global heat pump sales show signs of slowing

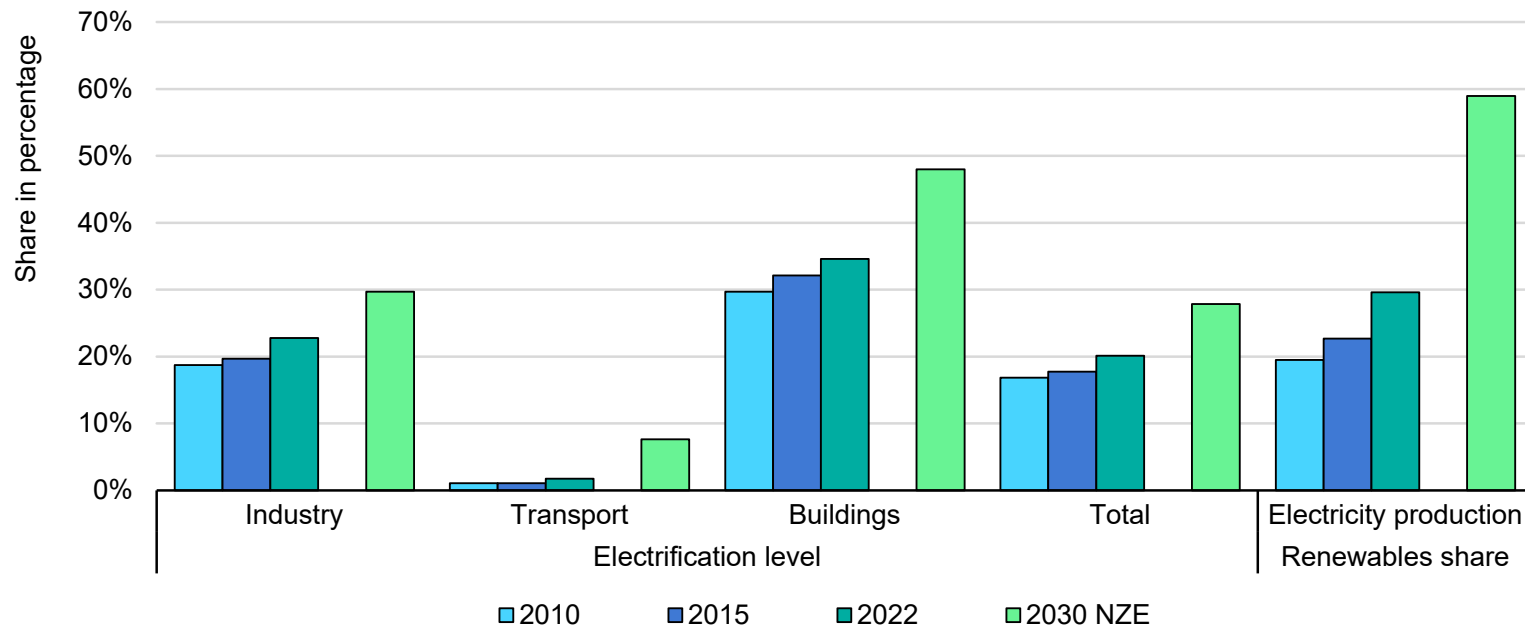
Annual growth for heat pump sales in buildings worldwide and in selected markets, 2021 and 2022



**Currently around 100 million households or 1 in 10 use a heat pump for hot water and space heating needs
To meet net zero goals this will need to rise to 2 to 3 in 10 homes by 2030**

Increasing electrification of end uses and share of renewables

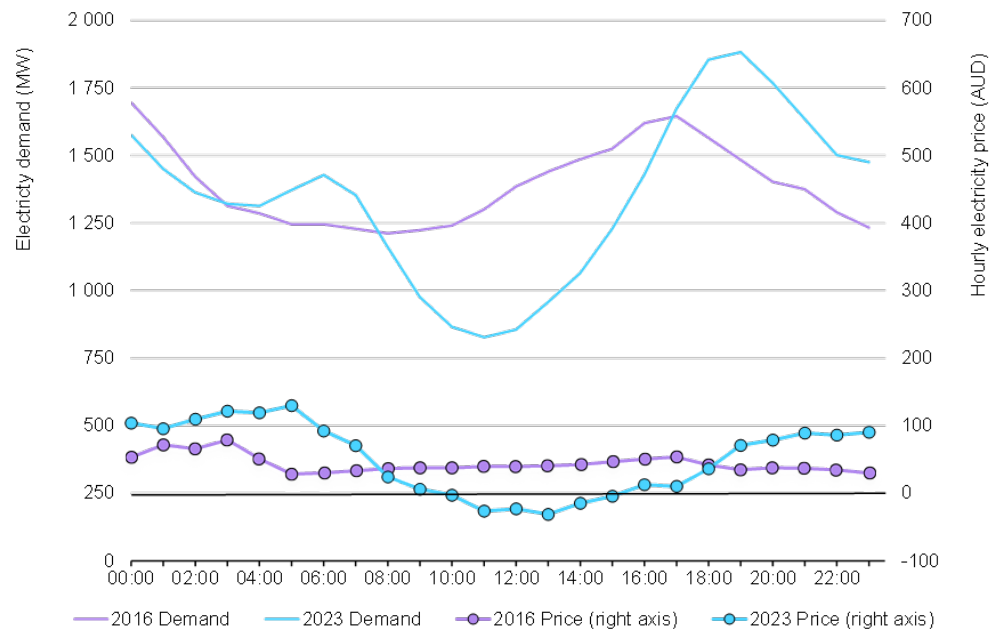
Share of electricity in final energy consumption by sector and renewables share in electricity production, 2010-2022 and 2030 for the Net Zero by 2050 Scenario



Expanded electrification of end uses such as EVs and clean cooking as well as rising consumption of appliances such as ACs create more variable energy demand which is not in line with the growing variability of production

With more variable renewable energy – the role of efficiency evolves

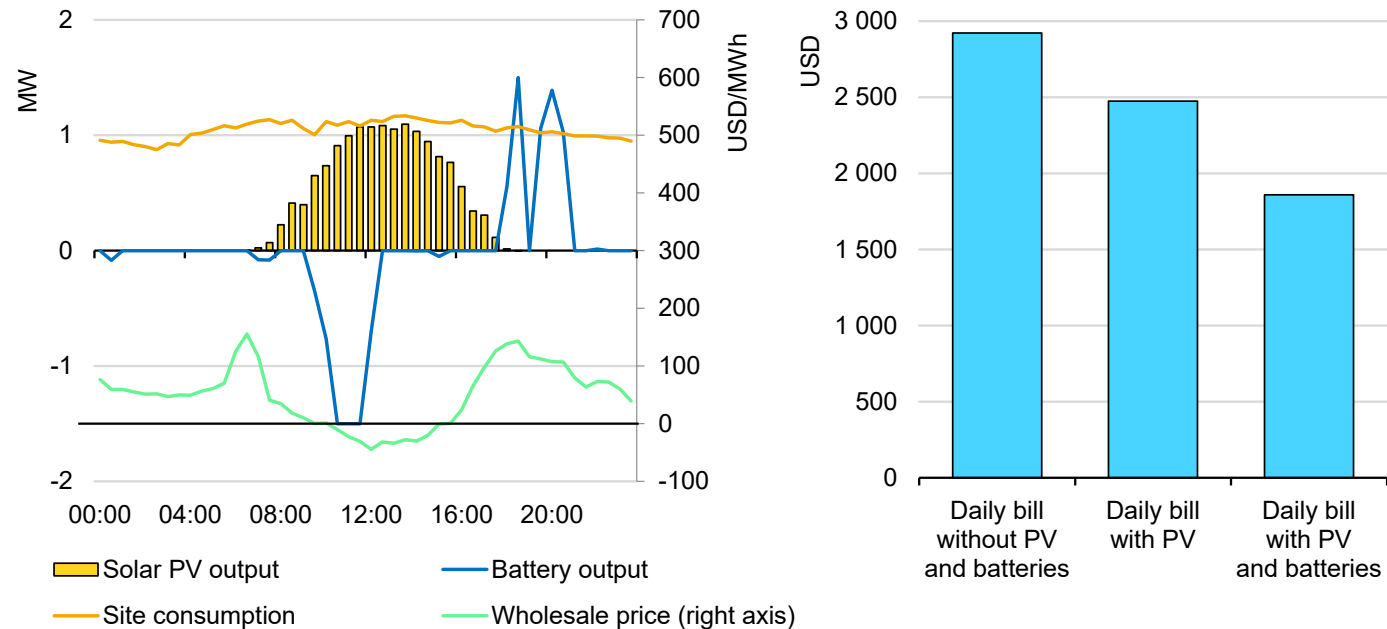
Net electricity demand and wholesale prices in South Australia, hourly, January 2016 and 2023



A convergence of delivering energy savings, flexibility and localised renewables

Systems efficiency can help reduce consumer bills

Site production, storage and consumption (left) and daily bill (right) of a large commercial energy user in South Australia on a typical day in 2023



Smart building systems can time energy consumption to help bring down energy costs by around 36%

COP28 Doubling energy efficiency progress

Doubling global progress on energy efficiency



COP28 final text:

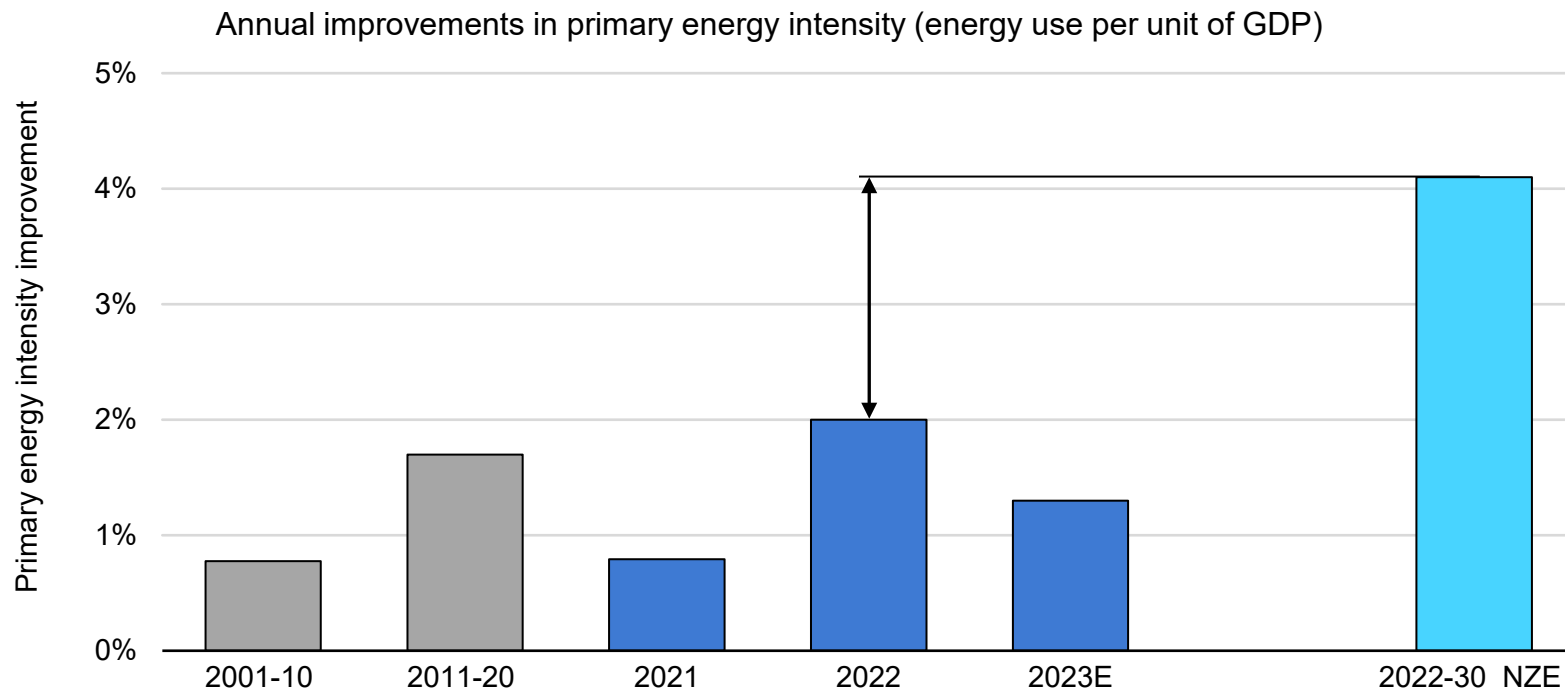
Calls on Parties to contribute to ... doubling the global average annual rate of energy efficiency improvements by 2030

GLOBAL RENEWABLES AND ENERGY EFFICIENCY PLEDGE



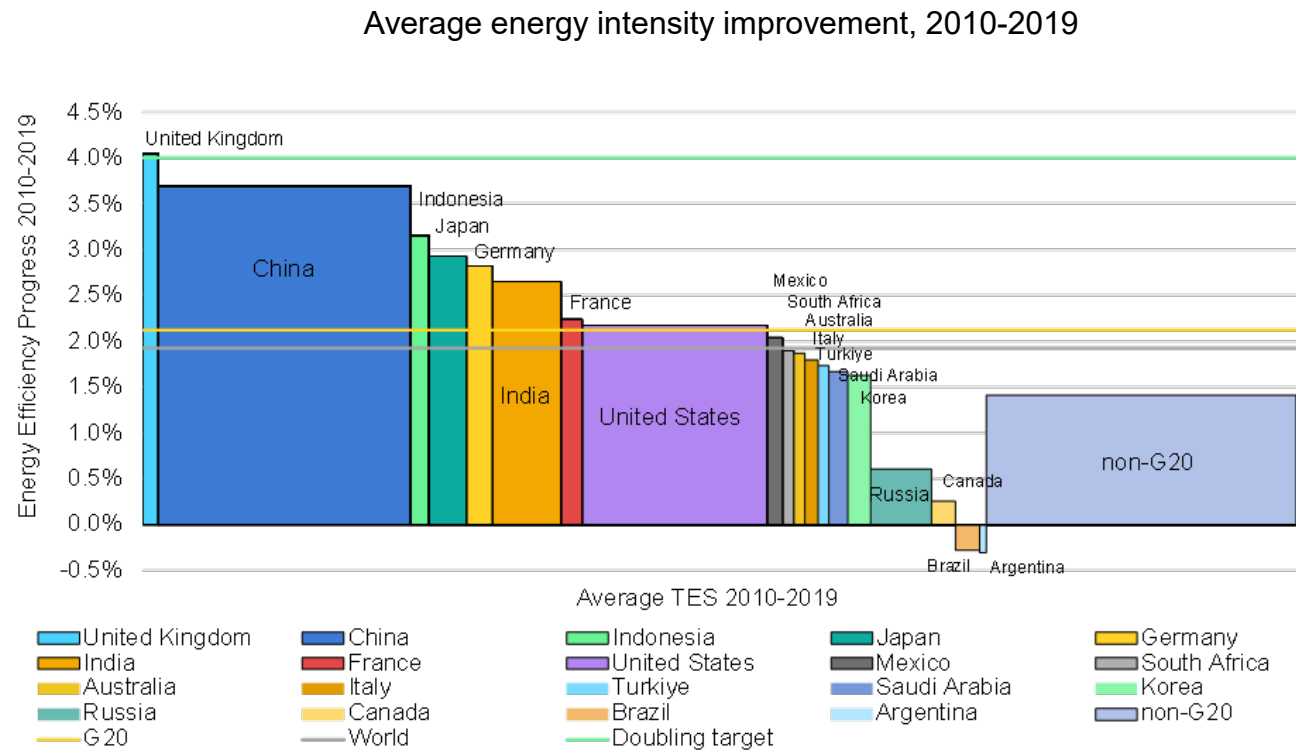
“Commit to work together in order to collectively double the global average annual rate of energy efficiency improvements from around 2% to over 4% every year until 2030.” [132 countries]

What is the doubling goal?



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

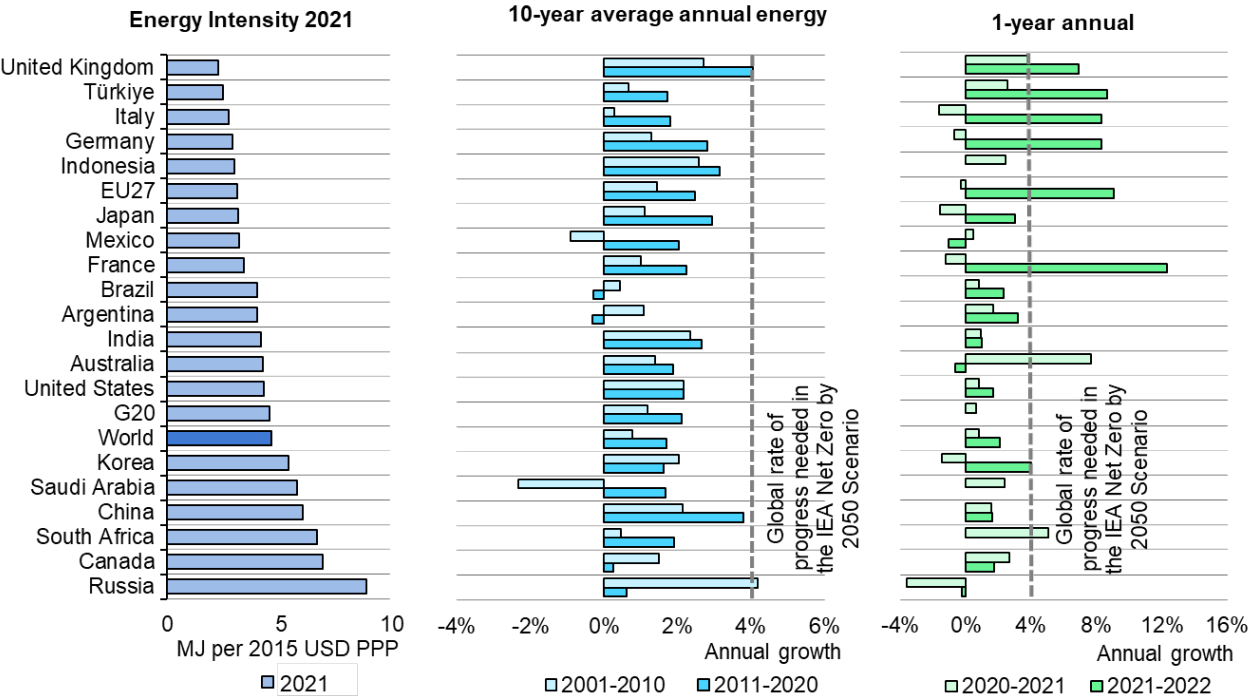
Key historical trends in national energy intensity progress



On average countries will need to increase to 4% annual energy intensity improvement (2023-2030)

Each country has a different starting point

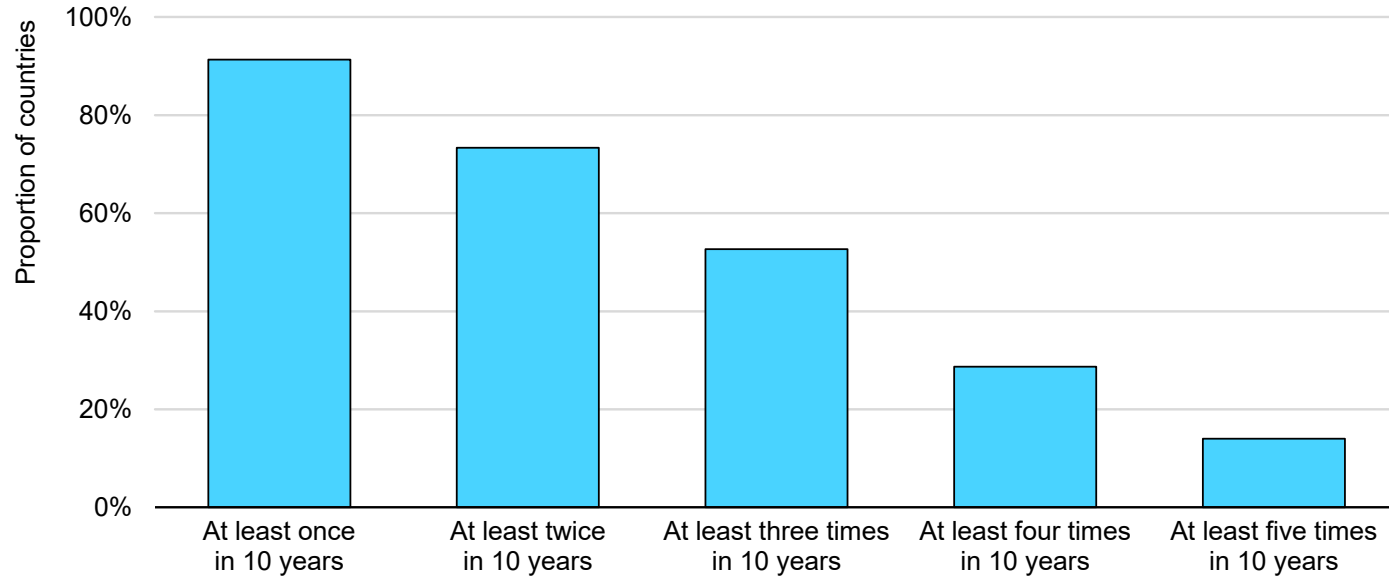
Primary energy intensity trends, G20 countries, 2001-2022



In Russia it can takes around 3 times more energy to produce a unit of GDP that the UK or Türkiye

Achieving the 4% doubling target is in reach of all countries

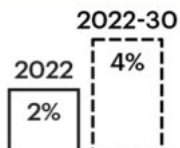
Proportion of countries to surpass a 4% annual energy intensity improvement one or more times, 2012-2021



**Over the past 10 years, almost every country has hit the 4% doubling rate at least once.
The challenge will be to consistently achieve it on average over this decade**

Doubling energy efficiency progress offers substantial rewards

What is doubling?



Global annual progress on energy intensity doubles this decade



The target is global, all countries have a part to play



The target will be formally considered at COP28

Why should we double?



A critical step on the path to net zero



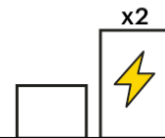
Over 7 Gt CO₂ emissions savings in 2030



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



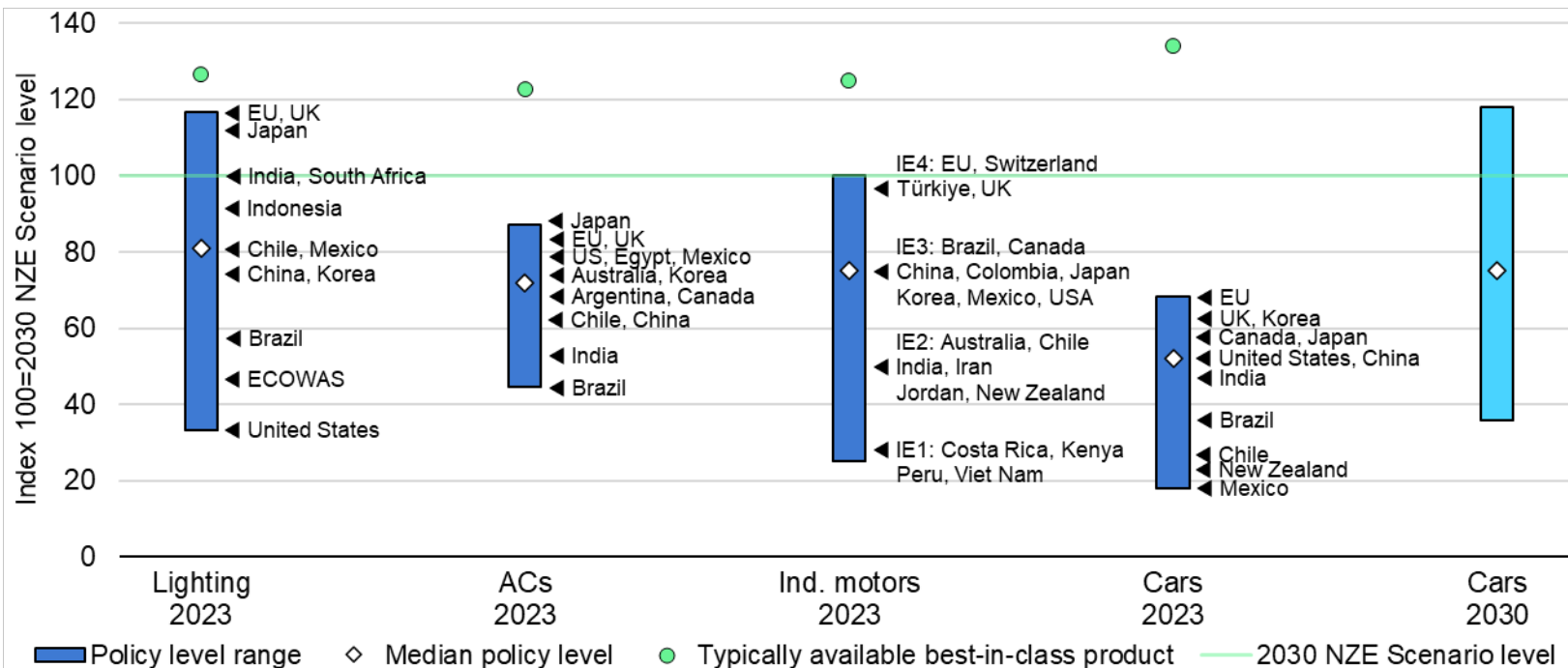
4.5 million more jobs than today



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

Policies and technologies for doubling already exist

Minimum Energy Performance Standards, IEA Efficiency Policy Level Index end uses, global country range, 2023 and 2030



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

- The 8th conference held in Versailles, June 2023
- 46 governments endorsed the goal of doubling global energy efficiency progress by 2030
 - 118 countries signed up to the pledge at COP28 so far

9th conference in Nairobi, 21-23 May 2024

