



# Energy Efficiency - The Decade for Action

Ministerial Briefing

IEA 8th Annual Global Conference  
on Energy Efficiency

International  
Energy Agency

Versailles



# INTERNATIONAL ENERGY AGENCY

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The IEA examines the full spectrum of energy issues including oil, gas and coal supply and demand, renewable energy technologies, electricity markets, energy efficiency, access to energy, demand side management and much more. Through its work, the IEA advocates policies that will enhance the reliability, affordability and sustainability of energy in its 31 member countries, 11 association countries and beyond.

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## Highlights

### *Recent trends*

1. **Global energy efficiency progress reached 2.2% in 2022**, twice the average over the previous five years.
2. **Global energy demand grew by around 1% in 2022**. Without progress on energy efficiency, this would have been almost three times higher.
3. **Energy efficiency policies have strengthened globally in the past year**. Countries representing over 70% of the world's energy consumption have introduced new or strengthened efficiency policies since the start of the global energy crisis.
4. **Governments have supported energy consumers**. Over 25 countries launched major awareness campaigns to help reduce energy, and over USD 900 billion has been spent shielding consumers from rising energy bills.
5. **Sales of key efficiency technologies are surging**. Heat pump sales increased by over 10% globally in 2022, and by nearly 40% in Europe. The share of EVs in global car sales in 2022 was 14% and is expected to rise to 18% in 2023.
6. **Efficiency investment is expected to reach record levels in 2023**, to over USD 600 billion, though growth is slowing due to increased cost of capital.

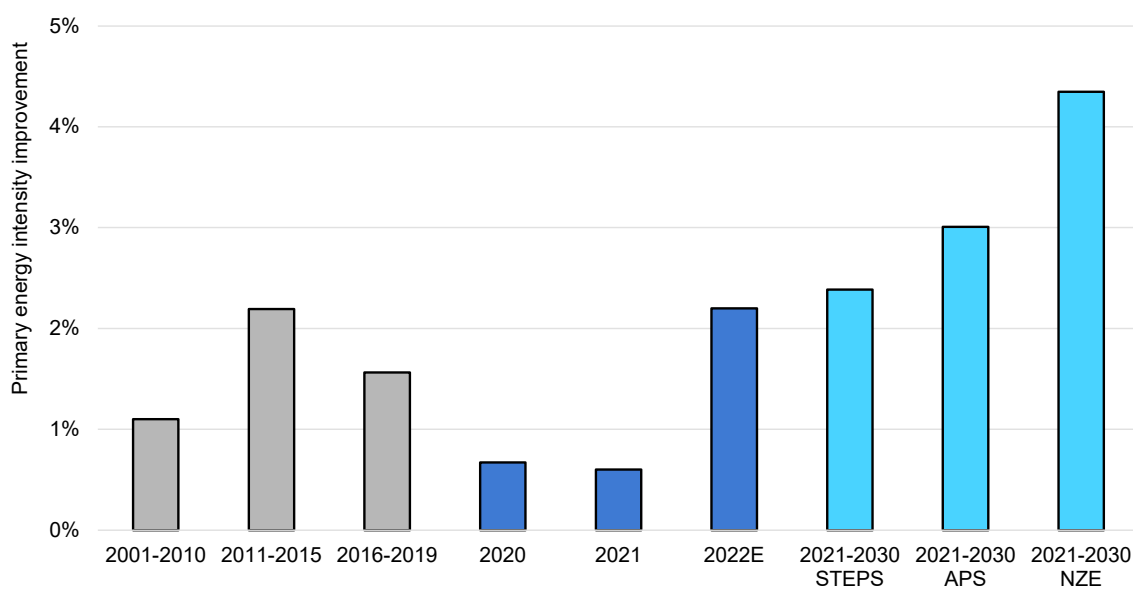
### *An energy efficient future*

7. **Doubling efficiency improvement to above 4% per annum this decade**, to align with the IEA's Net Zero Scenario, would lower global energy demand by 190 EJ and CO<sub>2</sub> emissions from fuel combustion by almost 11 Gt by 2030, almost one third of current global energy consumption and emissions.
8. **Accelerating implementation of all existing policies**. If all currently announced efficiency commitments are implemented quickly and fully, they, along with existing policies, will deliver three quarters of the doubling goal by 2030.
9. **Accelerating efficiency carries additional benefits**. Doubling efficiency progress by 2030 will enhance energy security, create an additional 12 million jobs, and help bring access to electricity to more than 800 million people.
10. **Tripling annual efficiency-related investment for an energy efficient future**. Achieving the goal of doubling the rate of progress will require a tripling in annual efficiency-related investment, from USD 600 bn today to USD 1.8 trillion by the end of the decade.

## [1] Global energy efficiency progress reached 2% in 2022

Global energy efficiency progress, as measured by improvements in primary energy intensity, increased to 2.2% in 2022, double the average over the previous five years and four times the rate achieved in the last two years.

### Annual global energy intensity improvement, by scenario, 2001-2030



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Notes: Scenarios based on [WEO 2022](#).

Europe experienced the largest rise, with energy intensity improving by more than 8% in 2022; however, this was influenced by a fall in energy demand, due to a warmer winter, and reduced economic activity in some sectors. When adjusted for these factors, the improvement would have been around 4%.

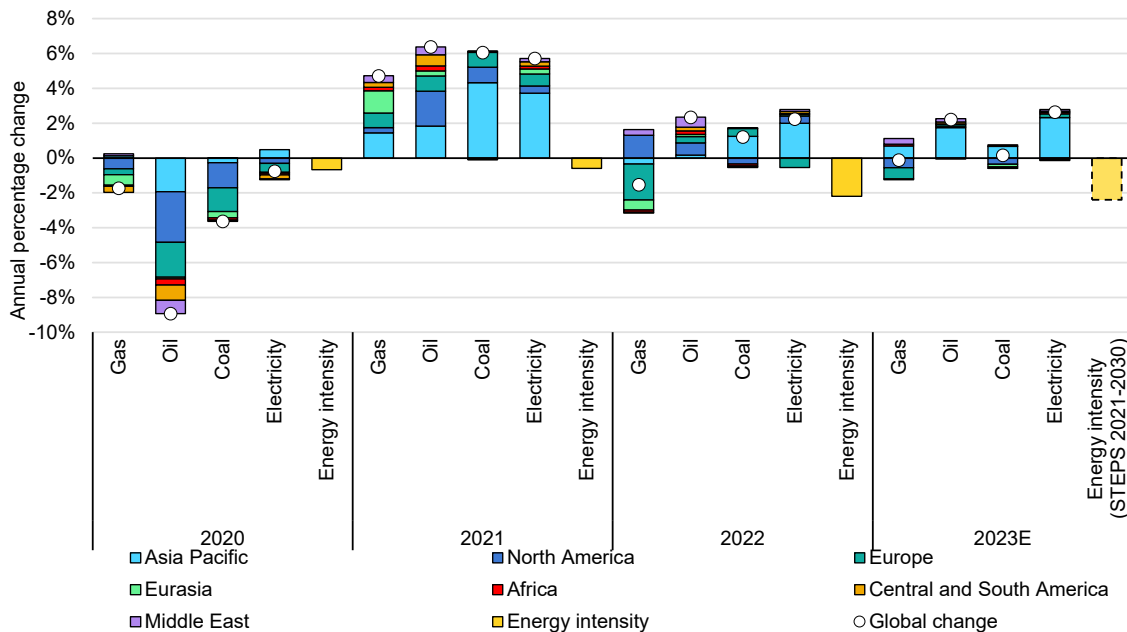
Current efforts to conserve and better manage energy consumption have provided much of the momentum for energy efficiency progress. However, with much of this effort being driven by the need to rein in costs. The number of people without reliable access to clean cooking, one of the most basic of energy services for households, has risen to around 2.4 billion worldwide, and an extra 160 million households have been pushed into energy poverty since 2019.

## [2] Global energy demand grew by 1% in 2022

In 2022, global energy consumption increased by around 1%, with energy-related CO<sub>2</sub> emissions also growing by 0.9% to reach a new high of over [36.8 Gt](#).

Whilst the use of most fuels around the world increased in 2022, the use of gas declined, especially in [Europe](#) which also saw a [fall in electricity demand](#). Increases in coal and electricity use were observed in Asia Pacific in 2022, which are expected to continue in 2023.

Annual change in fuel demand and energy intensity, in selected regions, 2021-2023



IEA. CC BY 4.0.

Sources: IEA Energy Market Reports: [Gas](#), [Oil](#), [Coal](#), [Electricity](#), [Efficiency](#).

Energy demand growth could, however, have been three times higher had global energy efficiency progress not increased from around 0.5% per year in 2020 and 2021 to just over 2% in 2022.

In 2023, electricity use is expected to grow around 2.5%, [faster than fossil fuel use](#), with renewables and nuclear meeting around 90% of this extra demand. Oil demand is expected to rise by around 2% in 2023 and future demand is expected to weaken by the end of this decade as electrification of transport gains speed. Global coal and gas demand is expected to remain flat overall this year with declines in Europe and North America offsetting growth in other regions.

### [3] Energy efficiency policies have strengthened globally in the past year

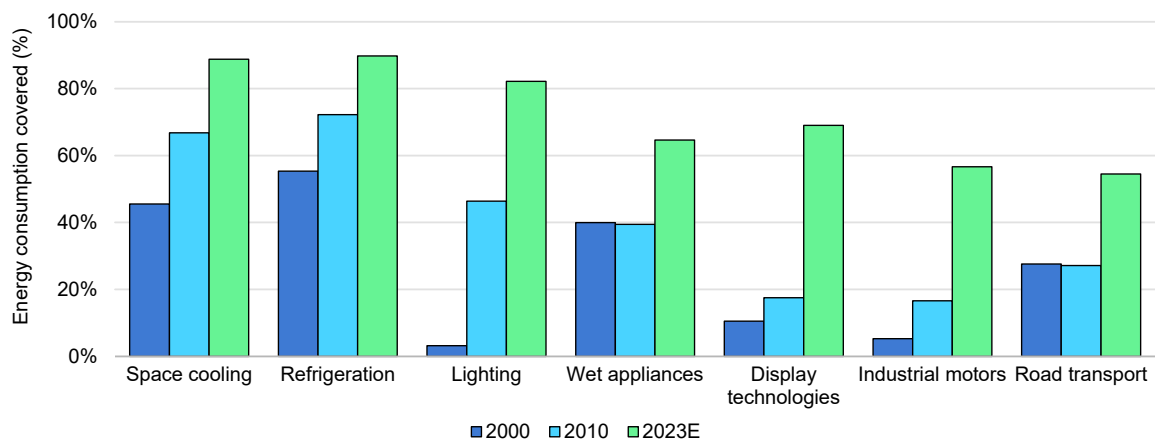
Major energy efficiency-related policy announcements from countries covering over 70% of the world’s energy consumption were introduced in 2022 and 2023. For example:

- The US Inflation Reduction Act is estimated to provide around USD 95 billion for energy efficiency measures, which accounts for 26% of the total package allocated to energy and climate change measures over 10 years.
- Japan’s Green Transformation Plan strengthens the legal basis for improving its energy efficiency ambitions by amending the Act on Rationalizing Energy Use and Building Energy Efficiency.
- Following the REPowerEU plan, the EU Energy Efficiency Directive was updated in 2023, raising the EU’s 2030 energy efficiency target to 11.7% for final and primary energy, and laying out its Energy Efficiency First principle.

Other examples from 2022 include India’s Energy Conservation Amendment bill, Chile’s new Energy Efficiency law, Nigeria’s commitment to carbon [neutrality by 2060](#); whilst in 2023 Argentina is currently developing a new Energy Efficiency bill.

In addition, there were ongoing developments with policy implementation. For example, mandatory minimum energy efficiency performance standards (MEPS) are now in place in over 100 countries. Recent developments include South Africa, where new efficiency requirements for lamps were published, meaning all new lamps sold will need to use energy efficient LED technology.

**Energy use coverage of minimum standards for key end uses, globally, 2000-2023E**



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## [4] Governments have supported energy consumers

In response to the energy crisis, many governments turned to energy saving campaigns to encourage consumers to reduce their energy consumption. The IEA has identified new campaigns in 25 countries, which ranged from prompting short-term behavioural change ([Argentina](#), [India LiFE](#), [Japan](#)) to stimulating longer-term structural actions, like replacing heating and cooling systems ([Netherlands](#), [Poland](#), [United Kingdom](#)). Some governments complemented their [voluntary behavioural](#) campaigns with stronger regulations, for example limiting temperatures in public sector buildings ([France 18°C](#), [Germany 19°C](#), [Korea 17°C](#)). Several behavioural campaigns emphasised reducing electricity use at peak times when power systems were close to maximum capacity, ([France](#), [United Kingdom](#), and [California](#)).

### Behavioural and Awareness campaigns



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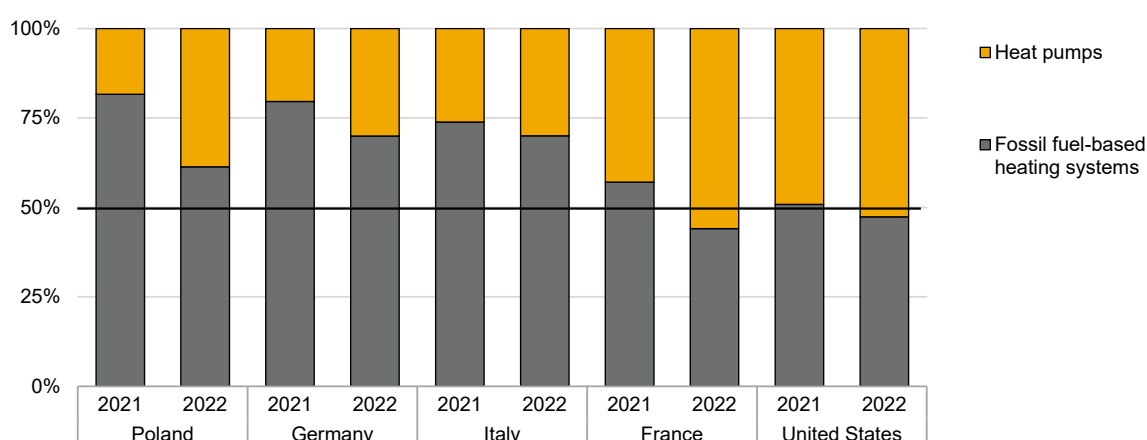
In an EU Commission [survey](#), over 70% of consumers reported changing their habits to save energy at home in response to the energy crisis, while almost 30% reported changing their use of transport. [Market data](#) suggests that across Europe many households reduced their thermostat settings by about **1°C** compared to the winter 2021-2022, as recommended in the IEA's [10-Point Plan to Reduce Gas](#).

As of June 2023, over [USD 900 billion](#) was spent by governments to subsidise consumer energy bills, mainly in advanced economies (with around 15% in emerging and developing economies). Some governments fixed energy prices or capped increases ([El Salvador](#), [France](#), [Thailand](#)), while other shields have included exemptions from various taxes and levies ([Belgium](#), [Ghana](#)). For the most vulnerable, some countries have eased payment terms, banned disconnections for non-payment or subsidised bills ([Germany](#), [India](#), [Japan](#), [Korea](#), [Spain](#)).

## [5] Sales of key efficiency technologies are surging

High efficiency [electric heat pumps](#) are a key technology to decarbonise space and process heating. The latest market data shows that heat pump sales for residential space heating continue to rise significantly with a global increase of [more than 10% in 2022](#). The largest increases were seen in Europe, where sales rose by nearly 40% in 2022, driven by concerns over security of gas supplies and by installation subsidies. In France and the United States, the installation of new residential heat pumps overtook those of fossil fuel-based heating systems for the first time.

**Ratio between sales of heat pumps and fossil fuel-based heating systems for buildings in selected countries, 2021 and 2022**



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In the first quarter of 2023, 2.3 million EVs were sold globally, about 25% more than the same period in 2022. A total of [14 million EVs](#) are expected to be sold for the full year, 18% of total car sales. This follows an already record breaking year in 2022 when more than 10 million EVs were sold, 14% of all new sales. China, Europe and the United States accounted for about 95% of global sales in 2022, but sales in emerging economies continue to increase with a notable boom in electric three-wheeler vehicles in India. Commercial vehicles and heavy-duty vehicles are also increasingly electrified. Electric light commercial vehicle sales increased by more than 90% in 2022. As a result of these record breaking sales, investment in EVs has more than doubled since 2021, reaching USD 130 billion in 2023.

Sales of [efficiency enabling technologies](#), such as smart controls and building energy management systems increased in 2022, but remain far from the 2030 IEA Net Zero targets.

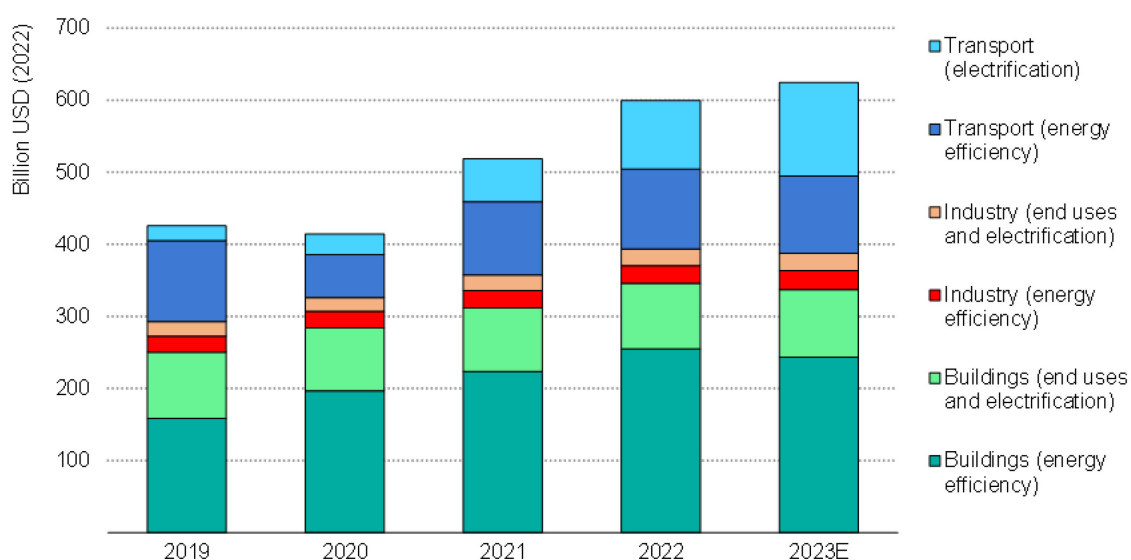


## [6] Energy efficiency investment is expected to reach record levels in 2023

While global energy efficiency investment reached record levels of USD 600 billion in 2022, driven by spending on buildings and strong EV sales, overall growth could slow down in 2023 to around [USD 624 billion](#).

Investment in the electrification of transport is expected to continue increasing in 2023. However, investment in energy efficient buildings is likely to be constrained by the higher cost of capital.

**Global energy efficiency-related investment, 2019-2023E**



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Investment in digital-related efficiency continues to grow, reaching a new high of USD 63 billion in 2022, with expanded EV charging infrastructure the main source of growth in 2022. Global investment in public EV charging increased more than ten-fold from USD 1.5 billion in 2018 to USD 16.8 billion in 2022, reflecting the steadily increasing number of EVs.

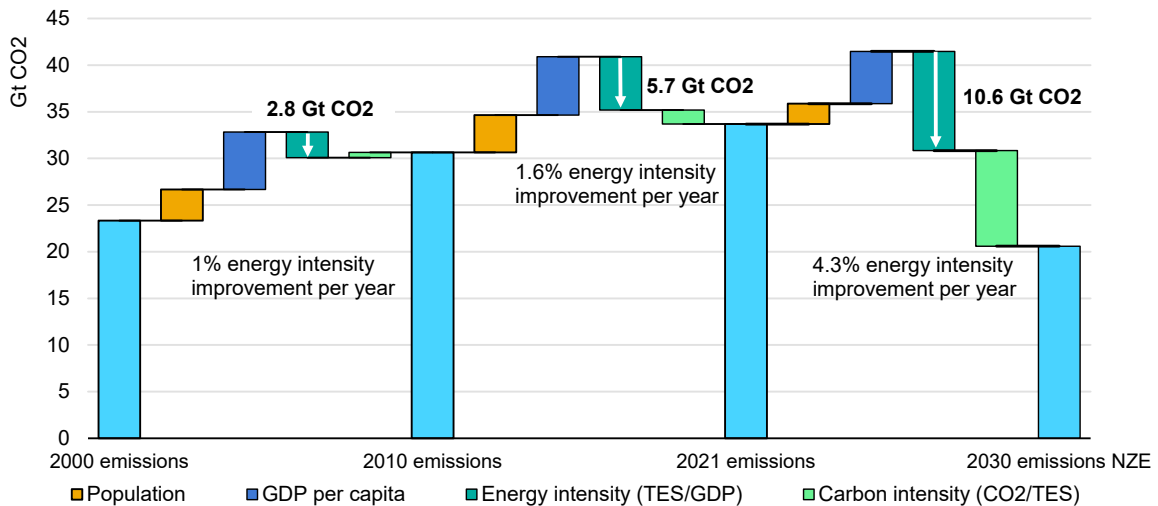
For the first time in a decade, total investment in smart meters decreased in 2022, as many countries have already achieved full or close to full roll-out. Global sales of Energy Management Systems (EMS), enabled by digitalisation, [are expected](#) to increase by over 17% in 2023.

## [7] Doubling efficiency improvement to above 4% per annum this decade

Over the last two decades, energy efficiency has cut in half the CO<sub>2</sub> emissions from fuel combustion which would have otherwise resulted from increasing global population and income (GDP per capita).

Doubling the rate of improvement in the energy intensity of the global economy from its current rate of around 2% per year to over 4%, in alignment with the IEA’s Net Zero Scenario, would reduce global energy-related CO<sub>2</sub> emissions by almost 11 Gt CO<sub>2</sub> in 2030. In this case, increased efficiency (energy intensity) more than offsets upwards pressure on emissions from rising population and income and helps facilitate a faster transition to clean energy sources (lower carbon intensity).

### Drivers of global carbon emissions, fuel combustion, NZE, 2000-2030



IEA. CC BY 4.0.

Notes: Decomposition of global fuel combustion-related carbon emissions based on [WEO 2022](#).

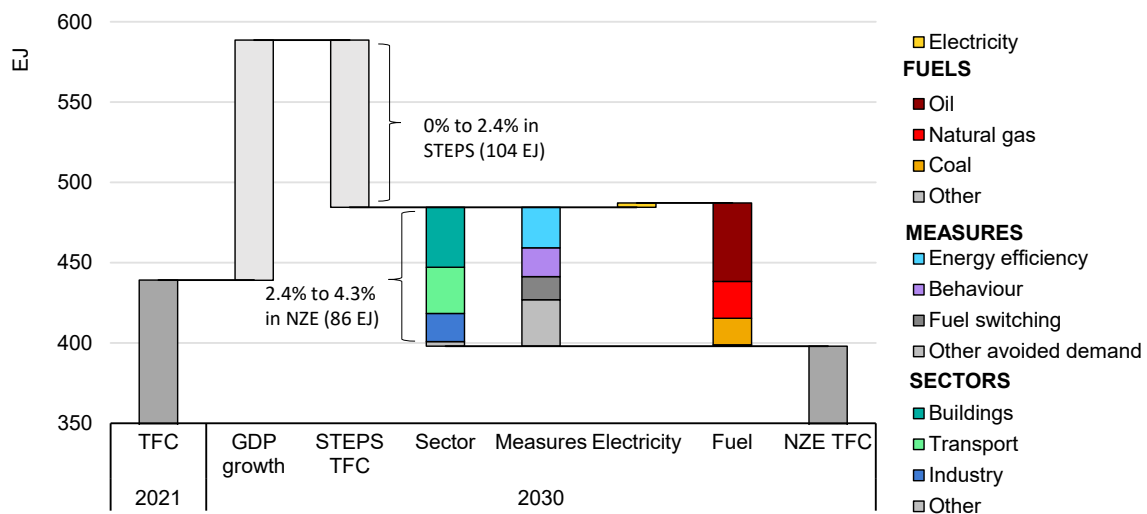
In the Net Zero Scenario, a doubling of efficiency by 2030 leads to energy demand which is around 190 EJ lower than would be the case if expected GDP growth of 3.3% per year was realised with current efficiency levels. Combined with a tripling of renewable power capacity, and lower carbon intensity of energy supply, this results in CO<sub>2</sub> emissions from fuel combustion that are around 40% lower in 2030 compared with 2021 levels at around 20 Gt CO<sub>2</sub>.

## [8] Accelerating implementation of all existing policies

Expected energy intensity improvements of around 2.4% per annum on average from 2021-2030 in the Stated Policies Scenario sees global final energy consumption rise by around 1% a year to 2030, from 440 EJ to 480 EJ. This achievement helps avoid around 100 EJ of energy demand – equivalent to the entire final energy consumption of China – that would have otherwise occurred if energy intensity remained steady at 2021 levels. This is around half of the avoided energy demand needed in the IEA Net Zero Scenario.

By accelerating action on energy efficiency, improving energy intensity from 2.4% (expected with Stated Policies) to 4.3% per annum, consistent with the IEA's Net Zero scenario, a further reduction of 86 EJ and 5 Gt CO<sub>2</sub> could be realised. Countries delivering on their announced climate and energy targets as described in the IEA's Announced Pledges Scenario (APS) could deliver 34 EJ or 40% of this additional amount. This means that if announced climate and energy targets are implemented around 137 EJ or about three quarters of the total 190 EJ of avoided energy demand needed in the Net Zero Scenario could be realised.

**Global final energy consumption by measure, 2021 to 2030, STEPS and NZE**



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Note: Data based on WEO 2022. TFC= Total Final Consumption; STEPS= Stated Energy Policies Scenario, policies currently in place; NZE = Net Zero Emissions by 2050 scenario; Fuel switching includes mainly electrification. Other avoided demand includes resource and material efficiency gains, circular economy effects and structural and economic effects, such as the response of consumers to higher prices.

## [9] Accelerating efficiency carries additional benefits

Despite recent progress, [the value of urgent action on energy efficiency](#) remains high. In addition to energy savings and carbon emission reductions, other benefits accrue from continuing to increase energy efficiency.

Around 12 million new jobs would be created on the energy demand side by 2030 to achieve the efficiency improvements laid out in the IEA's Net Zero scenario. This includes mostly high and medium skilled workers in the professional, construction and manufacturing sectors to support renovations and new buildings, electric vehicle deployment and energy management.

This occurs even as the global economy grows by nearly a third by 2030, and around 800 million more people gain access to electricity.

Importantly, more efficient and lower energy demand supports faster universal access to modern affordable energy in emerging and developing countries. The phase out of the traditional use of biomass, such as charcoal and wood, for heating and cooking, brings multiple benefits in terms of improved air quality and health.

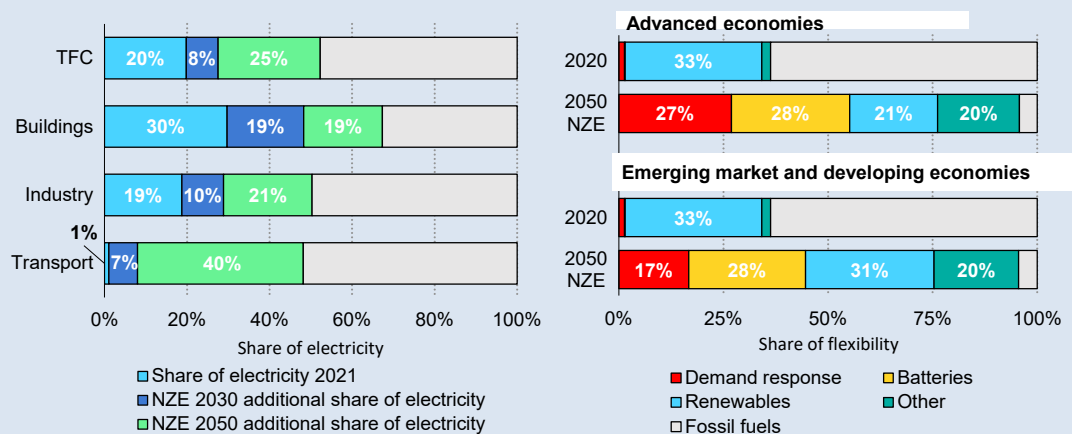
As a result of the energy crisis, the number of people spending at least 10% of their income on energy in their home increased by 160 million in 2022, compared with 2019 levels. Current and past energy efficiency policy is already delivering energy savings. For example, efficiency measures introduced since 2000 decreased consumers' energy bills in IEA countries by USD 680 billion in 2022.

Boosting efficiency from current levels of 2% to over 4% this decade will increase energy security for importing countries. By 2030, this could avoid around 49 EJ per year of oil consumption the equivalent of 27 million barrels of oil per day, around triple Russia's average production in 2021. These reductions would reduce energy costs by around USD 650 billion per year assuming current Brent 2030 forward prices. Energy security is further enhanced by reductions in coal by 17 EJ and natural gas by 23 EJ.

### The importance of digitalisation and demand flexibility

As variable electricity supply increases, especially from wind and solar PV sources, electricity grid systems will have to become more flexible to keep operating effectively. Demand response could help reduce curtailment of renewables by up to 25% by 2030, and, by 2050, could provide at least 2 000 GW of flexibility, up from 166 GW today. This increase in demand response is based on its favourable economics, low capital cost and high speed of implementation.

### Electricity share of final consumption (left) and flexibility supply by source, region, and scenario (right)



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Notes: Based on World Energy Outlook 2022

Demand response will be provided by a range of assets such as heat pumps, electric water heaters, and EVs. The large number and distributed nature of these assets mean that their flexibility can be harnessed through digitalisation, automation, energy management and control systems, e.g., smart HVAC controls.

Moreover, digitalisation could help existing grid infrastructure last longer, and enable better targeted investment in grids, thus saving costs to consumers. For instance, by extending the lifetime of grid assets, digital technologies could save an estimated USD 1.8 trillion of grid investment globally through to 2050.

Without action to develop digitalisation and flexibility, power outages due to unreliable grids would cause economic losses of almost USD 1.3 trillion in the period through to 2030 in emerging markets and developing economies.

Additionally, digitalisation can help [counteract](#) many of the barriers faced when implementing energy efficiency measures, such as lack of data and monitoring, difficulty in verifying and monetising savings, and complexity.

This makes digitalisation an increasing consideration for energy efficiency policy and a key theme for the IEA [G7 Energy Efficiency report](#) this year; along with the IEA's [3DEN initiative](#), supported by the Italian Government.

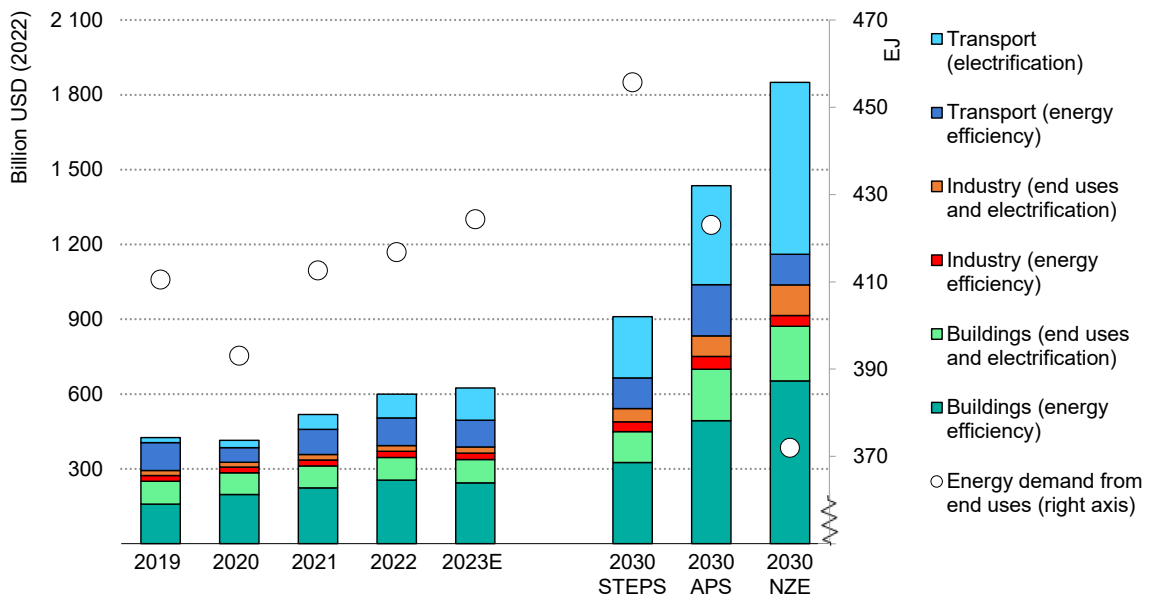
## [10] Tripling annual efficiency-related investment for an energy efficient future

In 2023, investment growth in energy efficiency-related measures is expected to slow from 16% last year to 4% to reach USD 624 billion.

Under current expected and announced policies, efficiency-related investment is projected to rise by a further 50%, to almost USD 910 billion per year by 2030. However, these levels are still around half of the energy efficiency-related investment needed in the second half of the decade to realise the Net Zero Scenario goals of over USD 1.8 trillion in 2030.

Policy commitments announced by governments in the Announced Pledges Scenario, such as national emission reduction plans, if backed up by appropriate policies will deliver much of the investment needed to meet the IEA’s Net Zero by 2050 Scenario.

### Global investment on energy efficiency, electrification, by sector, and scenario, 2019-2030



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Most of the increase in investment will be for increasing the energy efficiency of buildings (such as improving building envelopes) and the transition to EVs.

Government policy is key to driving investment in energy efficiency. Insights into the policy considerations for delivering enhanced energy efficiency are provided in an *Energy Efficiency Policy Toolkit 2023: From Sønderborg to Versailles*.

To continue its support for stronger action on efficiency, the IEA developed this ministerial briefing on the occasion of the 8th Annual Global Conference on Energy Efficiency, in Versailles, co-hosted by the IEA Executive Director, Dr. Fatih Birol, and French Minister for Energy Transition, Her Excellency Agnès Pannier-Runacher.

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