2025 International Energy Efficiency Scorecard

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Research Report

ACEEE

About ACEEE

The **American Council for an Energy-Efficient Economy** (ACEEE), a nonprofit research organization, develops policies to reduce energy waste and combat climate change. Its independent analysis advances investments, programs, and behaviors that use energy more effectively and help build an equitable clean energy future.

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Data and licensing information

Contents

Executive summary

Key findings

The *ACEEE International Energy Efficiency Scorecard* ranks the top 25 highest energy-consuming countries on their energy efficiency policies and performance.

- Since the previous *Scorecard* edition was released in 2022, countries have made incremental progress in improving energy efficiency in buildings and industry. However, even the top-performing countries have substantial room for improvement in advancing transportation efficiency.
- Nearly every country could work to significantly reduce travel from personal vehicles, measured as either vehicle miles traveled (VMT) or vehicle kilometers traveled (VKT). **India** and **Indonesia** were the only countries that reported annual VMT less than 500 VMT (805 VKT) per capita.
- Building retrofit policies and financial incentives to support retrofits can substantially reduce energy use from existing buildings. However, only four countries (**France, Germany, Italy,** and the **United Kingdom**) have codes that require energy-efficient upgrades for residential and commercial building renovations and provide financial incentives for retrofits.
- For the second edition in a row, **France** ranked first. It scored 85.5 out of 100 possible points and earned the highest score in the industry and transportation chapters. Rounding out the top five were Germany, United Kingdom, Italy, and (tied for fifth) the People's Republic of China and Spain.
- This year, China was the most improved country. It is the leader in public transit use and is one of only two countries to have national targets for reducing both energy consumption and energy intensity.

Energy efficiency is a necessary strategy for fighting climate change and is "the one energy resource that all countries possess in abundance."[1] Saving energy can reduce air pollution and greenhouse gas (GHG) emissions from energy generation; it can also reduce energy bills and make energy systems more resilient during extreme weather events. Thus, improving energy efficiency is beneficial for affordability as well as for climate change mitigation and adaptation.

Countries have multiple opportunities to advance energy efficiency at the national level as well as in the buildings, industry, and transportation sectors. They can pass policies to require energy-efficient products and processes, and they can track progress on energy performance. Making such data publicly available can help policymakers understand areas for future improvement.

[1] IEA (International Energy Agency). 2017. "Insights Brief: Meeting climate change goals through energy efficiency." https://www.iea.org/reports/insights-brief-meeting-climate-change-goals-through-energy-efficiency.

National lockdowns and pauses in economic activity from the COVID-19 pandemic resulted in significant reductions in energy consumption in the early 2020s. However, such disruptions are not sustainable or effective for achieving long-term energy savings. Instead, countries should invest in programs, research, and infrastructure that promote energy-efficient operations. Specifically, countries should work to reduce national energy intensity (i.e., a country's total energy consumption per unit of economic output). Nationally, **Egypt** achieved a commendable 46.18% reduction in national energy intensity between 2017 and 2022.

Overall, countries varied greatly in their efforts to reduce energy intensity across different sectors. The buildings sector measured energy intensity from both residential and commercial (i.e., nonresidential) buildings. For residential buildings, energy intensity can be measured as energy use per residential floor area or as energy use per capita. For commercial buildings, energy intensity can be measured as energy use per commercial floor area or as energy use per gross domestic product (GDP). Latin American countries such as **Brazil** and **Mexico** reported low energy use intensity (EUI) from both residential and commercial buildings.

We also evaluated the energy intensity of each country's broad industrial sector (measured as energy intensity of industry based on consumed energy per dollar of industrial GDP) and agricultural sector (measured as kilograms of oil equivalent per dollar of agricultural GDP). Many European countries, including the **United Kingdom, Germany, Italy,** and **France,** reported low energy intensity from the broad industrial sector, while Asian countries such as **China, India, Indonesia, Malaysia,** and **Thailand** achieved low energy intensity in the agricultural sector. This diverse range of high performers shows that any country can make energy intensity improvements regardless of geography, income levels, or other distinguishing factors.

Most countries scored highly in the buildings chapter, but even the top-ranked nations could do more to strengthen the energy performance of new and existing buildings. Building retrofit policies can help existing residential and commercial (i.e., nonresidential) buildings lower energy costs and GHG emissions simultaneously. However, only four countries (**France, Germany, Italy,** and the **United Kingdom**) have robust policies for whole-building retrofits and offer financial incentives to encourage retrofitting. Further, only six countries (**France, Germany, Japan, Saudi Arabia, South Africa,** and the **United Kingdom**) have mandatory national codes for residential and commercial buildings that require minimum standards for insulation, window efficiency, air sealing, efficient lighting, efficient heating and cooling systems, and efficient water heating. We urge more nations to set higher energy performance standards for new and existing buildings to help residents save money and live more comfortably while cutting climate pollution.

Notably, the transportation sector is one area in which all countries need to maximize efficiency improvements. Countries can work to improve the fuel economy of light-duty vehicles and pass stringent standards to limit emissions from passenger vehicles. Only three countries (**Italy, Thailand**, and **Turkey**) reported average light-duty vehicle fuel economies greater than 42 miles per gallon in 2022, and only the **United Kingdom** has set passenger vehicle emissions standards that are under 30 gCO_2/km by 2030. **China** has made significant progress in deploying electric vehicles; 48% of passenger vehicles sold in 2024 were electric. This is four times higher than the *Scorecard* average of 12%, indicating that most countries need to invest more resources in deploying highly efficient electric vehicles.

In addition, countries need to support efficient, nonmotorized forms of transportation such as bicycling, walking, and public transit. Only 13 countries have national policies to encourage both bicycling and walking, and only three countries (**Italy, France,** and the **United Kingdom**) invest more in rail infrastructure than highways. These modes of transportation are essential for reducing passenger vehicle use. Nearly every country reported high levels of annual vehicle miles traveled (VMT) and vehicle

kilometers traveled (VKT). **India** and **Indonesia** were notable exceptions; both countries reported annual VMT of less than 500 VMT (805 VKT) per capita. Countries that want to maximize transportation efficiency must invest in infrastructure that accommodates active travel and public transit, not just personal vehicles.

This sixth edition of ACEEE's *International Energy Efficiency Scorecard* ranks the top 25 highest energy-consuming countries on their energy efficiency policies and performance. In 2022, these countries accounted for 83% of global energy consumption. Through 38 distinct metrics, we evaluated each of these nation's energy efficiency progress across four different chapters: national efforts, buildings, industry, and transportation. A country could earn up to 25 points in each chapter, for a maximum of 100 possible points.

As in previous editions, this *Scorecard* assigns more points to energy efficiency policies over energy efficiency performance because policy data are generally more available and robust than performance data. Countries could earn up to 59 points total for passing ambitious policies and up to 41 points total for achieving notable performance outcomes related to energy efficiency. Policy metrics represent a country's commitment to pursuing energy efficiency, such as through national energy savings and climate goals, building retrofit policies, targets for industrial decarbonization, and fuel economy standards. Performance metrics represent concrete progress toward using energy more efficiently, such as reducing nationwide energy intensity as well as energy intensity of buildings and industry. Data for performance metrics were more challenging to find, as not all countries regularly report data. We relied on published data and external experts to supply data points.

France ranked first with a score of 85.5 out of 100 possible points, while **Germany** ranked second, with 82 points. The next highest-scoring countries were the **United Kingdom** (79.5 points), **Italy** (77.5 points), **China** (72.5 points), and **Spain** (72.5 points). **Germany** scored highest in the national efforts and buildings chapters. France scored highest in the industry and transportation chapters. The lowest-ranked countries were **Egypt**, the **United Arab Emirates**, and **Russia.** These countries may have scored highly in some metrics, but they had low scores overall due to limited data availability, as we could not award points in cases where sufficient data were lacking. Figure ES-1 presents the *Scorecard* rankings as a map.

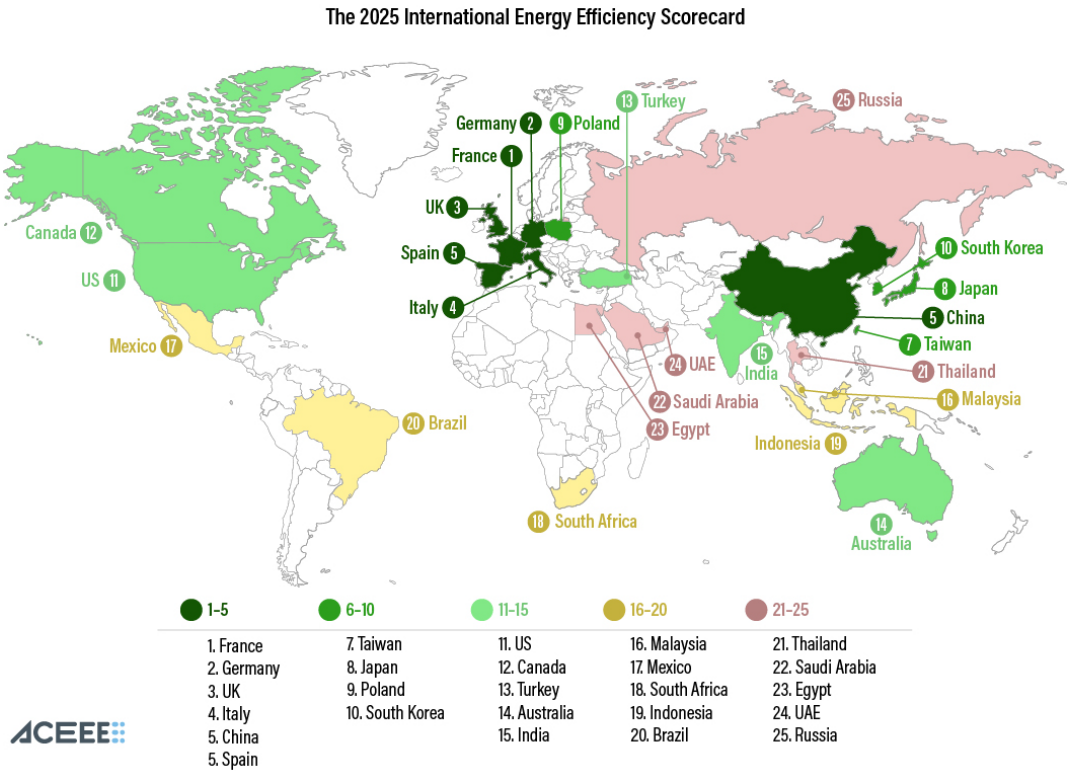

Figure ES-1. Map of country rankings

China was the most improved country, tying for fifth with Spain overall. China earned 72.5 points, up from 57.5 points (a 26% increase) from the previous *Scorecard*. It is the leader in public transit use and is one of only two countries to have national targets for reducing energy consumption *and* energy intensity. Since the 2022 *Scorecard*, China has expanded its energy efficiency tax credit and loan programs to cover more sectors, made voluntary agreements with manufacturers and offered financial incentives to promote industrial energy efficiency, passed more stringent standards for industrial motors, and significantly increased sales share of electric passenger vehicles.

The **United States** fell one place in rankings despite a slight increase (3 points) in overall score. The lower rank is due to larger point gains among the top performers. Nine of the top 10 countries saw an average gain of 9.5 points; of the top 10, only **Japan** lost points between 2022 and 2025.

Given metric and methodology changes, it is difficult to directly compare scores between report editions. However, the average overall score for this edition rose to 53 out of 100 points, an increase of 4.5 points over the average overall score in 2022. All chapters saw a slight gain in points except for transportation. Although the countries in this report represent diverse political, economic, and social circumstances, all have the potential to ramp up energy efficiency efforts. By maximizing energy savings through efficiency improvements, countries can reduce energy costs and emissions while helping their citizens adapt to climate change.

Introduction

The year 2025 marks 10 years since the signing of the Paris Agreement, in which 195 parties pledged to reduce greenhouse gas (GHG) emissions and prevent global temperatures from rising between 1.5°C to 2.0°C above preindustrial levels. The agreement required each country to submit Nationally Determined Contributions (NDCs) that describe how the country will meet its GHG reduction goals (United Nations 2025). The following decade (2015–2024) included the warmest 10 years on record, with the global mean temperature exceeding 1.5°C above preindustrial levels[2] in 2024 (WMO 2025). Extreme weather events such as wildfires, heatwaves, droughts, floods, and storms have grown alongside global temperatures, and climate-related disasters cost the global economy more than $2 trillion in damage between 2000 and 2019 (Charlton 2023; Newman and Noy 2023). The increasing dangers to communities around the globe and the economic consequences of climate change highlight the need for more aggressive climate action, especially at the international level.

Energy efficiency is a key strategy for advancing a clean energy economy, as consuming less energy simultaneously reduces costs and GHG emissions. Globally, energy prices have been rising sharply since 2020 due to supply constraints and increased demand, partly driven by a rise in extreme weather events (Fernández Alvarez and Molnar 2021). During this same period, the growing use of artificial intelligence (AI) and other information technologies has resulted in increased energy consumption from data centers. Energy efficiency has previously mitigated emissions from data center energy use, but more improvements will be necessary to meet the rapidly increasing demand for AI (Nadel 2025; IEA 2023a).

Energy efficiency produces other economic benefits. Energy efficiency can reduce the operating costs of consumer appliances such as refrigerators and televisions, improving quality of life for many households in developing nations. Improving energy efficiency not only lowers bills for households and operating costs for businesses, but it also helps utilities by enhancing grid reliability and deferring system upgrade costs (Abdelsalam 2025). Decreased demand for energy also helps countries preserve fuel availability, making energy more readily accessible. This contributes to national energy security, as countries become less reliant on fuel imports (Ryan and Campbell 2012).

Energy efficiency can help communities adapt to extreme temperatures. For example, retrofitting a building can reduce energy consumption and the associated GHG emissions by requiring less energy for heating and cooling. Building occupants can also benefit from more comfortable indoor temperatures, which can be beneficial and even lifesaving if outdoor temperatures are extremely hot or cold (Hayes et al. 2022; Wijesuriya et al. 2024). Maximizing energy efficiency opportunities can help countries meet their Paris Agreement NDCs while protecting their citizens from the negative effects of climate change.

In 2022, 25 countries were responsible for 83% of the world's energy consumption, with the top three countries (China, the United States, and India) responsible for 51% of global consumption (EIA 2024b). China, the United States, and India were also the top three GHG-emitting countries, contributing 43% of global emissions (Friedrich et al. 2023). Energy efficiency could help these countries significantly slash their energy consumption and emissions. For example, the United States could halve both its energy consumption and its GHG emissions through strategies such as upgrading existing buildings, decarbonizing industry, and improving transportation fuel efficiency (Nadel and Ungar 2019). Moreover, the International Energy Agency (IEA) described energy efficiency as "the one energy resource that all

[2] The World Meteorological Organization (WMO) evaluated six different datasets to assess global mean temperature increases; due to differences in methodology, not all datasets reported a rise above 1.5°C.

countries possess in abundance" (IEA 2017), highlighting opportunities for all countries to improve the energy efficiency of their buildings, industry, and transportation.

The *2025 International Energy Efficiency Scorecard* is the sixth edition of ACEEE's international *Scorecard,* which ranks the top energy-consuming countries on their energy efficiency policies and performance. We evaluated countries' efforts across national energy policy, buildings, industry, and transportation for 2022–2025 (inclusive). For historical comparison, readers can refer to the previous *Scorecard* edition, published in 2022, which primarily used data from 2018 to 2021 (Subramanian et al. 2022).

The *International Energy Efficiency Scorecard* aims to present a comparable overview of how the top energy-consuming countries are advancing energy efficiency. The *Scorecard* contains 40 metrics that reflect commonly available data in the evaluated countries. Our goal in highlighting countries that have made significant progress since 2022 is to demonstrate to other countries how such success can be achieved. We also identify opportunities where countries could improve their national-level energy efficiency and recommend strategies for future progress.

Methodology

This section describes our research process, including our selection of countries, revisions to metrics, and changes since the 2022 *Scorecard*. We also discuss data and analysis limitations.

ACEEE used data from the U.S. Energy Information Administration (EIA) to select the top 25 highest energy-consuming countries for inclusion in the *Scorecard*. Table 1 shows the 25 *Scorecard* countries by region, and figure 1 shows each country's 2022 energy consumption.

Table 1. List of *Scorecard* countries by region

Africa and the Middle East	Americas	Asia-Pacific	East Asia	Europe
Egypt	Brazil	Australia	China	France
Saudi Arabia	Canada	India	Japan	Germany
South Africa	Mexico	Indonesia	South Korea	Italy
United Arab Emirates	United States	Malaysia	Taiwan	Poland
		Thailand		Russia
				Spain
				Turkey*
				United Kingdom

*The 2022 Scorecard classified Turkey as a European country, so we continue to classify it as such for this edition.

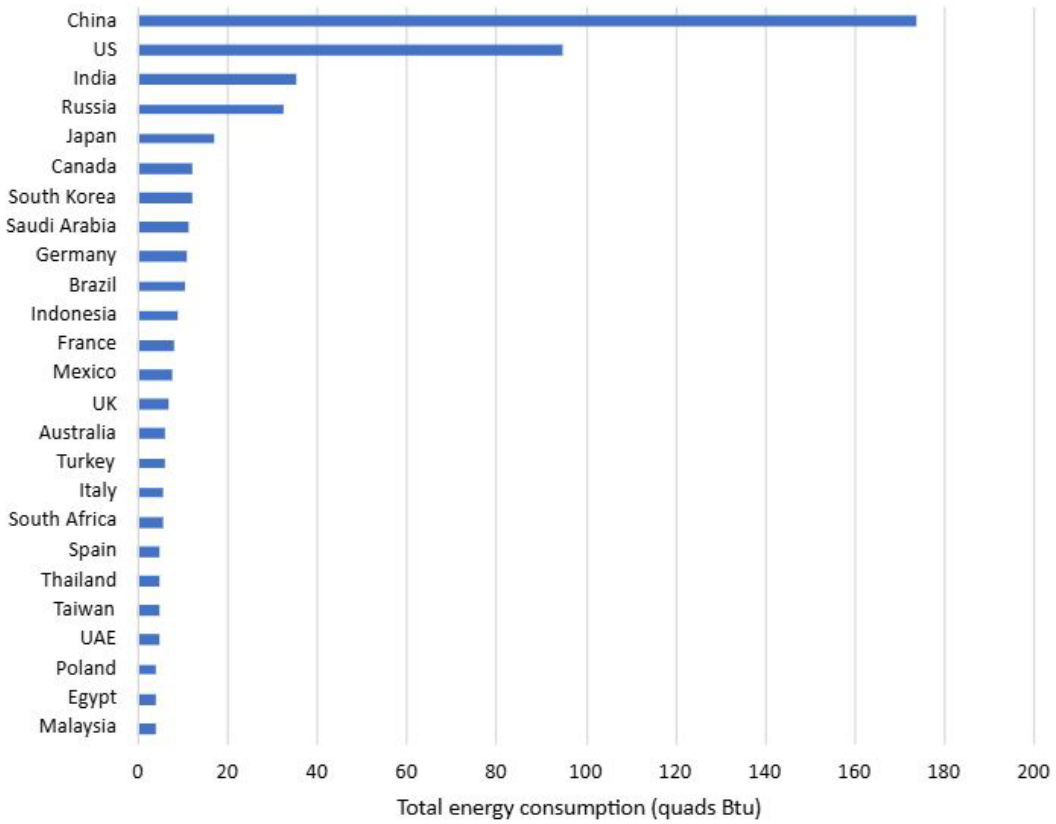

Figure 1. 2022 total energy consumption in quads of British thermal units (Btu). Source: EIA 2024b.

Of the 25 countries, China consumed the most energy (173.96 quads Btu) and Malaysia consumed the least (3.95 quads Btu). Iran (not shown in figure 1) was also a top consumer, but we did not evaluate it due to limited data availability; at 13.50 quads Btu, Iran would have been the sixth-highest energy consumer. This edition was Malaysia's first entry into the top 25 energy-consuming countries, replacing the Netherlands from the 2022 *Scorecard*. The Netherlands showed a notable reduction in energy consumption between 2018 and 2022, which is why it was not featured in this edition. In contrast, Malaysia demonstrated a rise in energy consumption over that same period, resulting from increased demand for gasoline, energy subsidies, growing urbanization and industrialization, and increased private vehicle ownership (EIA 2024a; Ministry of Energy, Green Technology and Water 2015).

What happened to the Netherlands?

Earlier editions of the *International Energy Efficiency Scorecard* have added or removed countries as energy consumption data change. However, the 2025 edition marks the first time that a previously high-ranking country was removed due to lower levels of national energy consumption. In the previous *Scorecard*, the Netherlands tied with Germany for third place. Based on 2022 data from the U.S. Energy Information Administration, the Netherlands was the 32nd highest energy-consuming nation. As a result, we did not evaluate it for the current *Scorecard*.

Several factors could explain the drop in Dutch energy consumption. Between 2019 and 2022, the Netherlands saw notable reductions in energy use from both residential buildings and the agricultural sector. Both sectors were impacted by high energy prices related to the Russia–Ukraine war, spurring behavior change that led to lower energy consumption (Odyssee-Mure 2025). For example, residents lowered their thermostats while greenhouse farmers reduced their production levels. Improved

insulation along with financial incentives for heat pumps and efficient boilers further drove down energy consumption. The Netherlands also had a mild winter in 2022, which reduced demand for heating (PBL Netherlands Environmental Assessment Agency 2023). These reductions in national energy consumption indicate the savings a country can achieve through energy efficiency actions, behavioral changes, and financial incentives.

In addition to energy consumption, we collected data on each country's population and gross domestic product (GDP) expressed in current (2023) U.S. dollars. Table 2 lists these data for each *Scorecard* country.

Table 2. GDP, population, and energy consumption of the top 25 highest energy-consuming countries in 2022

Country	GDP (trillions, current 2023 US$)	Population	Total energy consumption (quad Btu)
China	17.88	1,412,175,000	173.964
United States	26.01	333,271,411	94.791
India	3.35	1,425,423,212	35.257
Russia	2.27	144,236,933	32.541
Japan	4.26	125,124,989	16.890
Canada	2.16	38,939,056	12.266
South Korea	1.67	51,672,569	12.204
Saudi Arabia	1.11	32,175,224	11.429
Germany	4.16	83,797,985	11.093
Brazil	1.95	210,306,415	10.766
Indonesia	1.32	278,830,529	9.102
France	2.80	68,065,015	8.290
Mexico	1.29	128,613,117	7.563
United Kingdom	3.11	67,791,000	6.735
Australia	1.69	26,014,399	6.174
Turkey	0.91	84,979,913	6.0246
Italy	2.10	59,013,667	5.806
South Africa	0.41	62,378,410	5.721
Spain	1.45	47,759,127	5.0475
Thailand	0.50	71,735,329	5.016
Taiwan	0.76	23,410,331	4.920
United Arab Emirates	0.50	10,074,977	4.686
Poland	0.70	36,821,749	4.055
Egypt	0.48	112,618,250	4.047
Malaysia	0.41	34,695,493	3.954

Sources: World Bank 2025c, 2025e; EIA 2024b

Based on internal and external feedback on previous *Scorecards*, ACEEE updated this year's metrics to better reflect trends in the energy efficiency sector since 2022. Table 3 lists the new metrics for the 2025 *Scorecard*, and table 4 lists all metrics across the four chapters.

Table 3. New metrics for the 2025 *Scorecard*

Chapter	Metric	Description
National efforts	Low-income energy efficiency	Whether a country has a designated program for improving energy efficiency of low-income households, and whether the country tracks spending data
Industry	Minimum efficiency standards for industrial fans	Whether a country has passed minimum efficiency standards for industrial fans
Industry	National target for industrial electrification	Whether a country has passed a national target requiring a degree of industrial electrification
Transportation	Electric medium- and heavy-duty vehicle sales share	Evaluating a country's progress toward medium- and heavy-duty vehicle electrification, expressed as a percentage of electric van, bus, and truck vehicle sales
Transportation	Freight transport modal share	Measuring a country's percentage of non-road freight modal share (i.e., rail and waterways)
Transportation	Walking and cycling policies	Whether or not a country has a national policy to encourage bicycling or walking

Table 4. Metrics for all sectors

Metric	Type	2022 points	2025 points
National efforts			
Change in energy intensity between 2017 and 2022	Performance	6	6
Total spending on energy efficiency	Policy	5	5
Spending on energy efficiency research and development (R&D)	Policy	2	2
(New) Low-income energy efficiency	**Policy**	**—**	**2**
Energy savings goals	Policy	3	3
Tax credits and loan programs	Policy	2	2
Electric power generation*	Performance	3	3
(Removed) Size of the energy services company (ESCO) market	**Performance**	**2**	**—**
Water efficiency policy	Policy	1	1
Data availability	Policy	1	1
Buildings			
Residential building codes	Policy	3	2
Commercial building codes	Policy	3	2
Appliance and equipment standards	Policy	5	4
Appliance and equipment labeling	Policy	2	2
Building retrofit policies	Policy	4	5
Building rating and disclosure policies	Policy	2	3
Energy intensity of residential buildings	Performance	3	4
Energy intensity of commercial buildings	Performance	3	3
Industry			

Metric	Type	2022 points	2025 points
Energy intensity of the industrial sector	Performance	6	6
Voluntary energy performance agreements with manufacturers	Policy	4	2
Mandate for plant energy managers	Policy	2	2
Mandatory energy audits	Policy	2	2
Policy to encourage energy management	Policy	3	2
Onsite renewable or waste heat recovery share of total installed capacity**	Performance	1	2
Minimum efficiency standards for electric motors	Policy	2	2
(New) Minimum efficiency standards for industrial fans	**Policy**	**—**	**1**
(New) National target for industrial electrification	**Policy**	**—**	**2**
Investment in manufacturing R&D	Policy	2	2
Agricultural energy intensity	Performance	2	2
Transportation			
Passenger-vehicle fuel economy standards for light-duty vehicles	Policy	4	3
Fuel economy of light-duty vehicles	Performance	3	3
Fuel economy/emissions standards for heavy-duty tractor trucks	Policy	3	3
Electric passenger vehicle sales share***	Performance	3	3
(New) Electric medium- and heavy-duty vehicle sales share	**Performance**	**—**	**3**
Vehicle miles traveled per capita	Performance	3	3
(New) Freight transport modal share	**Performance**	**—**	**1**
(Removed) Freight transport per unit of economic activity	**Performance**	**2**	**—**
Smart freight initiatives	Policy	1	1
Investment in rail transit versus roads	Policy	3	2
Use of public transit	Performance	3	2
(New) Walking and cycling policies	**Policy**	**—**	**1**

*Replaces the 2022 "Efficiency of thermal power plants" metric. **Replaces the 2022 “Share of combined heat and power (CHP) in total installed capacity” metric. ***Replaces the 2022 “Electric vehicle sales share” metric.

Our data collection involved desktop research and data requests from external country experts. Whenever possible, we gathered data from centralized sources such as the IEA, the U.S. EIA, the World Bank, and the Organisation for Economic Co-operation and Development (OECD). Other online sources included government websites and publications, academic reports, and research from nongovernmental organizations.

From February through March 2025, we reached out to external contacts in each *Scorecard* country to request data on national energy efficiency efforts, buildings, industry, and transportation. These data requests aimed to fill in research gaps and supply information that was not easily or publicly available. This year, 16 of the 25 *Scorecard* countries had at least one external contact return a data request.

To ensure accuracy, each chapter's data were reviewed by a second member of the research team. The report also went through a rigorous internal and external review process prior to publication.[3]

Countries could earn up to 25 points per chapter, for a total of 100 points. No country earned all 100 points.

Data and analysis limitations

Although we aimed to present a comprehensive review of each country's energy efficiency policies and performance, some areas were out of our project scope. As with the previous *Scorecard*, this edition did not measure countries' efforts to implement or enforce certain policies. For example, we measured countries' national investments in energy efficiency, but we did not evaluate how effectively they spent their funds. We also did not measure how global trade could impact each country's energy use; as a result, we did not distinguish between consumption-based energy use and production-based energy use (i.e., if a country purchased energy-intensive products from overseas, then we would not count that activity toward a country's overall energy consumption). Had we accounted for these differences, we would have seen higher consumption levels from more Western and Southern European countries, which are net importers of embodied energy (Ritchie 2021).

The countries in this *Scorecard* represent a diverse range of political, social, and economic circumstances. For metrics that required monetary calculations, we converted each nation's currency into current U.S. dollars, using 2025 exchange rates. Previous editions of the *International Energy Efficiency Scorecard* have used this methodology to standardize data from many different countries. We acknowledge that variations in exchange rates between the time of reporting and the date of exchange values used could affect how some countries' data are presented. In addition, we did not study *why* countries pursued specific policies or *how* they achieved specific outcomes, as different political and legal structures and norms would make this difficult to easily compare.

Our research also did not account for major world events that affected global energy production, trade, and consumption. For example, our analysis did not evaluate the impacts of recent geopolitical events such as the Russia–Ukraine war or escalating conflict in the Middle East (Dizikes 2022; IEA 2024g). We also did not account for the effects of the COVID-19 pandemic of 2020–2022 despite the pandemic's clear impacts on energy consumption. For example, our energy intensity metric measured a country's energy consumption against its GDP for the years 2017–2022. These years encompass the pandemic, when many countries saw notable decreases in energy demand and generation due to national lockdowns, as well as the rebound when economic activity resumed (Jiang, Fan, and Klemeš 2021; Davis et al. 2022). Although some evidence of the pandemic's impacts was apparent in the data, we did not evaluate why some countries' energy use rebounded more strongly than others.

As in previous editions of the *Scorecard*, the biggest limitation to our research was a lack of consistent data across all the *Scorecard* countries. Not all countries consistently track specific energy efficiency metrics or make the data publicly available. If countries lacked data related to certain metrics, then we could not award points for those metrics. The data availability metric in the national efforts chapter evaluates the percentage of available data for each country across all *Scorecard* metrics. For this edition, the average country had 89% of data available, up from 86% in the previous *Scorecard*. In the absence of

[3] Internal review involved six ACEEE researchers and two communications staff members giving feedback on the report's content and structure, reviewing the data for accuracy, and correcting any errors that the team may have made. External review repeated this process with 19 individuals from outside organizations.

recent, reliable data, we calculated scores based on estimates provided through data requests or used data from the 2022 *Scorecard*.

We used the most recent data available, with a particular focus on updated policies and performance since the previous *Scorecard*. The results in the current *Scorecard* serve as a snapshot of countries' progress at the time of data collection, which concluded in April 2025. With some exceptions,[4] the *Scorecard* does not reflect policies passed or data collected beyond that date.

Finally, we acknowledge that determining scoring thresholds for quantitative metrics is a partially subjective practice. We devised new scoring criteria after collecting initial data, soliciting feedback from ACEEE experts, and comparing thresholds to those from the previous *Scorecard*. Although we aimed to set thresholds that evaluated countries' progress against average performance, there was a degree of subjectivity when determining final cutoff points.

Results

Overall

For the second edition in a row, France ranked first overall, scoring 85.5 out of 100 possible points. France also ranked first in the industry and transportation chapters. Second place went to Germany, which earned 82 points. Germany was the top-performing country in the national efforts and buildings chapters. The United Kingdom (UK), Italy, China, and Spain rounded out the top five (China and Spain tied for fifth). The lowest-scoring countries were Egypt, the United Arab Emirates (UAE), and Russia. Although these countries may have scored highly in individual metrics, their overall low scores were due to limited available data, as Russia was the only one of these three that had more than 80% of data available. If a country lacked data for certain metrics, then they could not earn points for that metric.

For this sixth edition, China was the most improved country. It tied for fifth place with Spain and earned a total score of 72 points. Compared to the previous *Scorecard*, China rose four places in rankings and earned 15 more points, a 26% increase from its 2022 score. China ranked third overall in the transportation chapter, primarily due to notable progress in electric vehicle (EV) sales and widespread public transit use. It also scored highly in the buildings chapter due to low energy intensity from commercial buildings and mandatory retrofit policies applied to urban buildings. Since the 2022 *Scorecard*, China has also expanded its energy efficiency tax credit and loan programs to cover more sectors, made voluntary agreements with manufacturers and offered financial incentives to promote industrial energy efficiency, and passed more stringent standards for industrial motors.

The role of the European Union

The European Union (EU) is a multinational organization consisting of 27 member states. The EU functions as a single market and passes policies that apply to all member states. It has committed to reducing GHG emissions by at least 55% by 2030 and aims to become carbon neutral by 2050 (European Union 2025). The 2019 European Green Deal required member states to submit climate and energy plans that described how they would contribute to EU-wide goals. The Green Deal emphasizes the importance of combining energy efficiency with renewables to decarbonize the power sector.

[4] This report went through external review from June to July 2025. Some of our external reviewers referred us to data that were not available to us during earlier phases of the project.

Energy efficiency priorities include retrofitting buildings, improving multimodal transportation, and adopting circular economy[5] principles for industry (European Commission 2019).

The EU's Energy Efficiency Directive, first passed in 2012, was revised in 2023 to align better with the European Green Deal. The directive advocates an "energy efficiency first" principle to maximize energy savings in all sectors (European Union 2023). It urges member states to account for the societal and health benefits of energy efficiency improvements in addition to cost effectiveness. For example, the directive encourages member states to use funds from the EU's Social Climate Fund to support energy upgrades for low-income households and people living in energy poverty (European Union 2023).

France, Germany, Italy, Poland, and Spain are current EU member states, and the United Kingdom is a former EU member state. All six of these countries ranked in the top 10 for the *International Energy Efficiency Scorecard.* These countries earned high scores due in substantial part to their progress in meeting ambitious goals set by the European Green Deal and the Energy Efficiency Directive. Other policies, such as the EU Unified Water Label for water efficiency, common appliance labels, and common emissions standards for heavy-duty vehicles, also helped these countries earn points for various policy metrics.

In addition to China, three other East Asian countries (Japan, South Korea, and Taiwan) ranked in the top 10. All four of these countries performed notably well in the industry chapter, with accomplishments including stringent standards for industrial motors, a national commitment to industrial decarbonization, and voluntary agreements with manufacturers to make efficiency improvements. These countries all have national goals related to energy efficiency and GHG emissions reduction. Notably, China and South Korea are the only countries studied that have national goals to reduce energy consumption *and* energy intensity. All four East Asian countries have mandatory codes for commercial buildings that cover at least five out of six technical requirements.

Outside of Europe and East Asia, three countries were leaders in their respective regions: the United States, Australia, and South Africa. The United States ranked third in the national efforts chapter due to significant reductions in energy intensity and substantial investments in energy efficiency, particularly low-income energy efficiency and associated research and development (R&D). Australia also scored well in the national efforts chapter, notably reporting low transmission and distribution (T&D) losses from electric power plant generation. South Africa made progress in the buildings chapter due to stringent residential building codes, commercial building codes, and building retrofit policies.

Figure 2 shows each country's rankings as a visual map. Table 5 lists overall scores and rankings and a chapter-by-chapter breakdown. Because small differences in scores are not especially meaningful, the map shows country scores in groups of five, with countries in the same color typically having similar scores. Table 6 shows the scores per metric. Finally, table 7 shows how the scores and rankings changed between 2022 and 2025.

[5] The circular economy model differs from the "linear economy" model that follows a sequence of extraction, production, consumption, and waste. The circular economy emphasizes reduction, reuse, and repair of materials before recycling (European Commission 2019).

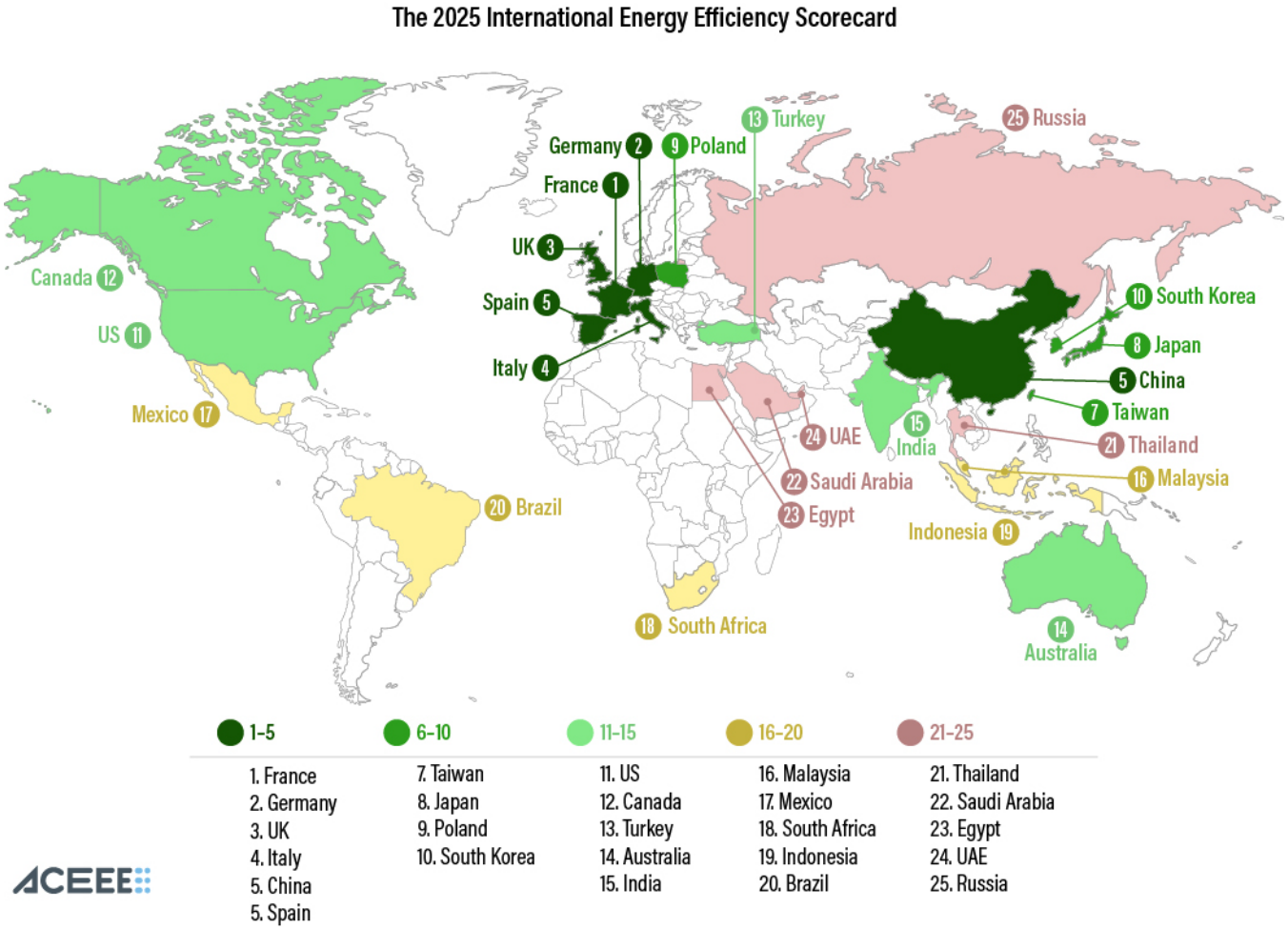

Figure 2. Map of country rankings

Table 5. Overall scores and scores per chapter

Rank	Country	Total score (100 points)	National efforts score (25 points)	Buildings score (25 points)	Industry score (25 points)	Transportation score (25 points)
1	France	85.5	21.5	22.5	24	17.5
2	Germany	82	22	23	23	14
3	UK	79.5	18	21.5	24	16
4	Italy	77.5	17	22.5	23.5	14.5
5	China	72.5	16.5	22	18.5	15.5
5	Spain	72.5	19	22.5	19.5	11.5
7	Taiwan	66.5	13.5	20	23.5	9.5
8	Japan	62.5	15.5	17.5	20.5	9
9	Poland	61.5	15.5	21	15.5	9.5
10	South Korea	60.75	14	19.25	19	8.5
11	U.S.	57	21	17	13	6
12	Canada	56.25	20.5	14.25	11.5	10
13	Turkey	55	12.5	15	18.5	9
14	Australia	48.75	17	17.25	8.5	6
15	India	42.25	6	13.25	15	8
16	Malaysia	39.5	9.5	11.5	16.5	2
17	Mexico	39	10.5	16.5	6.5	5.5
18	South Africa	36.25	6.5	18.75	6.5	4.5
19	Indonesia	35.75	7	12.75	10	6
20	Brazil	35.5	8	12.5	7.5	7.5
21	Thailand	35	8	9	10.5	7.5
21	Saudi Arabia	34.75	8.5	15.25	8.5	2.5
23	Egypt	32.5	11.5	12	4	5
24	UAE	27.75	9	11.25	4.5	3
25	Russia	27.5	10.5	8	5	4

Table 6. Scores for all metrics by chapter

Metric	Max. points	Australia	Brazil	Canada	China	Egypt	France	Germany	India
National efforts total	**25**	**17**	**8**	**20.5**	**16.5**	**11.5**	**21.5**	**22**	**6**
Change in energy intensity (2017–2022)	6	3	0	5	2	6	4	5	1
Per capita spending on energy efficiency	5	3	1	3	5	0	5	5	0
Per capita spending on energy efficiency R&D	2	0.5	0.5	2	0	0	2	1	0
Low-income energy efficiency	2	2	2	2	0	0	2	2	0
Energy savings goals	3	2	1	2	3	3	3	3	1
Tax credits and loan programs	2	2	1	2	2	2	2	2	2
Electric power plant generation	3	2.5	1.5	2.5	2.5	0	1.5	2.5	0.5
Water efficiency policy	1	1	0	1	1	0.5	1	0.5	1
Data availability	1	1	1	1	1	0	1	1	0.5
Buildings total	**25**	**17.25**	**12.5**	**14.25**	**22**	**12**	**22.5**	**23**	**13.25**
Residential building codes	2	1.5	0	1.5	1.5	2	2	2	0.75
Commercial building codes	2	1.5	0	1.5	2	1	2	2	1.5
Appliance and equipment standards	4	3	2	4	4	2	4	4	4
Appliance and equipment labeling	2	1.25	1.5	0.75	2	1.5	1.5	1.5	1.5
Building retrofit policies	5	3	1	4	4	0	5	5	0
Building rating and disclosure	3	2	1	0	2	0	3	3	0
Energy intensity in residential buildings	4	2	4	1.5	3.5	3.5	2.5	2.5	3.5
Energy intensity in commercial buildings	3	3	3	1	3	2	2.5	3	2
Industry total	**25**	**8.5**	**7.5**	**11.5**	**18.5**	**4**	**24**	**23**	**15**
Industrial sector energy intensity	6	2	0	0	2	1	6	6	0
Agriculture energy intensity	2	1.5	1.5	0	2	0	1.5	1.5	2
Voluntary energy performance agreements with manufacturers	2	0	0	2	2	0	2	1	2
Mandate for plant energy managers	2	0	0	0	2	0	2	2	2
Mandatory energy audits	2	0	0	0	2	0	2	2	2
Policy to encourage energy management	2	0	1	1	1	0	2	2	2
Standards for motors	2	1	2	2	2	2	2	2	1
Standards for fans	1	0	0	1	1	0	1	1	1
Investment in manufacturing R&D	2	1.5	1	1.5	1.5	1	2	2	0.5
Target for industrial decarbonization	2	1	0	2	2	0	2	2	1

Metric	Max. points	Australia	Brazil	Canada	China	Egypt	France	Germany	India
Final energy consumption by electricity, heat, waste, or biofuel	2	1.5	2	2	1	0	1.5	1.5	1.5
Transportation total	**25**	**6**	**7.5**	**10**	**15.5**	**5**	**17.5**	**14**	**8**
Fuel economy standards for passenger vehicles	3	1	0	1	1	0	2	2	1
Fuel economy of light-duty vehicles	3	0	1	0	1	1	2	1	2
Fuel economy/emissions standards for heavy-duty tractor trucks	3	0	0	2	2	0	3	3	0
Electric vehicle sales share	6	2	1	2.5	5.5	0	4.5	3	0
Vehicle miles traveled per capita	3	1	2	1	2	2.5	1	1	3
Investment in rail transit versus roads	2	0.5	0	0.5	0	1	2	1	1
Use of public transit	2	0.5	1	0	2	0	0.5	0.5	0
Walking and cycling policies	1	0	1	1	0	0.5	1	1	1
Freight modal share	1	1	0.5	1	1	0	0.5	0.5	0
Smart freight initiatives	1	0	1	1	1	0	1	1	0
Total	**100**	**48.75**	**35.5**	**56.25**	**72.5**	**32.5**	**85.5**	**82**	**42.25**

Metric	Max. points	Indonesia	Italy	Japan	Malaysia	Mexico	Poland	Russia	Saudi Arabia
National efforts total	**25**	**7**	**17**	**15.5**	**9.5**	**10.5**	**15.5**	**10.5**	**8.5**
Change in energy intensity (2017–2022)	6	0	2	0	2	4	5	5	5
Per capita spending on energy efficiency	5	0	4	4	0	0	0	2	0
Per capita spending on energy efficiency R&D	2	0	1	1.5	0	0	0.5	0	0
Low-income energy efficiency	2	2	1	1	0	1	2	0	0
Energy savings goals	3	2	3	3	3	3	3	2	1
Tax credits and loan programs	2	0.5	2	2	2	1	2	0.5	1
Electric power plant generation	3	1	2.5	2	1	0	1.5	0.5	0.5
Water efficiency policy	1	1	0.5	1	1	0.5	0.5	0	1
Data availability	1	0.5	1	1	0.5	1	1	0.5	0
Buildings total	**25**	**12.75**	**22.5**	**17.5**	**11.5**	**16.5**	**21**	**8**	**15.25**
Residential building codes	2	0	2	2	0.5	0.75	2	1.5	2
Commercial building codes	2	2	2	2	0.75	0.75	2	1.5	2
Appliance and equipment standards	4	1	4	3	0	3	4	0	2
Appliance and equipment labeling	2	1.25	1.5	0	1.25	1	1.5	0	1.25
Building retrofit policies	5	0	5	4	3	4	4	3	4

Metric	Max. points	Indonesia	Italy	Japan	Malaysia	Mexico	Poland	Russia	Saudi Arabia
Building rating and disclosure	3	2	3	2	2	0	3	2	1
Energy intensity in residential buildings	4	4	2.5	2.5	3.5	4	2.5	0	2.5
Energy intensity in commercial buildings	3	2.5	2.5	2	0.5	3	2	0	0.5
Industry total	**25**	**10**	**23.5**	**20.5**	**16.5**	**6.5**	**15.5**	**5**	**8.5**
Energy intensity of the industrial sector	6	1	6	6	5	1	3	0	2
Agriculture energy intensity	2	2	1.5	1	2	1.5	1	1	2
Voluntary energy performance agreements with manufacturers	2	1	2	2	1	0	2	0	0
Mandate for plant energy managers	2	2	2	2	2	0	0	0	0
Mandatory energy audits	2	2	2	2	2	0	2	2	2
Policy to encourage energy management	2	0	2	1	1	0	0	0	0
Standards for motors	2	0	2	2	0	2	2	0	2
Standards for fans	1	0	1	0	1	0	1	0	0
Investment in manufacturing R&D	2	0	1.5	2	0.5	0	1	0.5	0.5
Target for industrial decarbonization	2	1	2	1	1	0	2	0	0
Final energy consumption by electricity, heat, waste, or biofuel	2	1	1.5	1.5	1	2	1.5	1.5	0
Transportation total	**25**	**6**	**14.5**	**9**	**2**	**5.5**	**9.5**	**4**	**2.5**
Fuel economy standards for passenger vehicles	3	0	2	1	0	1	2	0	1
Fuel economy of light-duty vehicles	3	0	3	2	1	1	1	0	0
Fuel economy/emissions standards for heavy-duty tractor trucks	3	0	3	1	0	0	3	0	0
Electric vehicle sales share	6	1	1.5	0	0	0	1	0	0
Vehicle miles traveled per capita	3	3	1	1.5	0	0	1	2	1
Investment in rail transit versus roads	2	0	2	0.5	0	0.5	0.5	1	0
Use of public transit	2	0	0.5	1	0	0.5	1	0	0
Walking and cycling policies	1	1	0.5	1	1	1	0	0	0.5
Freight modal share	1	0	0	0	0	0.5	0	1	0
Smart freight initiatives	1	1	1	1	0	1	0	0	0
Total	**100**	**35.75**	**77.5**	**62.5**	**39.5**	**39**	**61.5**	**27.5**	**34.75**

Metric	Max. points	South Africa	South Korea	Spain	Taiwan	Thailand	Turkey	UAE	UK	US
National efforts total	**25**	**6.5**	**14**	**19**	**13.5**	**8**	**12.5**	**9**	**18**	**21**
Change in energy intensity (2017–2022)	6	1	1	2	2	2	1	3	5	5
Per capita spending on energy efficiency	5	0	1	5	2	0	4	0	3	5
Per capita spending on energy efficiency R&D	2	0	1.5	2	1	0	0	0	1.5	2
Low-income energy efficiency	2	0	2	2	1	0	0	0	2	2
Energy savings goals	3	3	3	2	2	2	3	3	1	1
Tax credits and loan programs	2	2	2	2	2	2	2	0.5	2	2
Electric power plant generation	3	0	1.5	2	1.5	1	2	1.5	2	2
Water efficiency policy	1	0.5	1	1	1	1	0	1	0.5	1
Data availability	1	0	1	1	1	0	0.5	0	1	1
Buildings total	**25**	**18.75**	**19.25**	**22.5**	**20**	**9**	**15**	**11.25**	**21.5**	**17**
Residential building codes	2	2	2	2	2	1.75	1.5	1.5	2	1.5
Commercial building codes	2	2	2	2	2	1.75	1.5	1.5	2	1.5
Appliance and equipment standards	4	2	3.5	4	3	0	0	0	4	4
Appliance and equipment labeling	2	1.25	1.75	1.5	1.5	0	1	1.25	1.5	1
Building retrofit policies	5	4	4	4	3	2	4	2	5	4
Building rating and disclosure	3	2	2	3	2	0	3	2	2	1
Energy intensity in residential buildings	4	3.5	2.5	3	3.5	2	3	3	2.5	1.5
Energy intensity in commercial buildings	3	2	1.5	3	3	1.5	1	0	2.5	2.5
Industry total	**25**	**6.5**	**19**	**19.5**	**23.5**	**10.5**	**18.5**	**4.5**	**24**	**13**
Energy intensity of the industrial sector	6	0	5	4	6	1	4	0	6	5
Agriculture energy intensity	2	0.5	1	1.5	1.5	2	1.5	1.5	1.5	1
Voluntary energy performance agreements with manufacturers	2	1	2	2	2	2	2	0	2	1
Mandate for plant energy managers	2	0	0	0	2	0	2	0	2	0
Mandatory energy audits	2	0	2	2	2	2	2	0	2	0

Metric	Max. points	South Africa	South Korea	Spain	Taiwan	Thailand	Turkey	UAE	UK	US
Policy to encourage energy management	2	0	1	2	2	1	1	0	2	1
Standards for motors	2	2	2	2	2	0	2	0	2	2
Standards for fans	1	0	1	1	1	0	0	1	1	0
Investment in manufacturing R&D	2	0.5	2	1.5	2	1	1	1	2	2
Target for industrial decarbonization	2	1	1	2	1	0	2	1	2	0
Final energy consumption by electricity, heat, waste, or biofuel	2	1.5	2	1.5	2	1.5	1	0	1.5	1
Transportation total	**25**	**4.5**	**8.5**	**11.5**	**9.5**	**7.5**	**9**	**3**	**16**	**6**
Fuel economy standards for passenger vehicles	3	0	1	2	1	0	0	0	3	1
Fuel economy of light-duty vehicles	3	1	0	0	1	3	3	0	1	0
Fuel economy/emissions standards for heavy-duty tractor trucks	3	0	0	3	0	0	0	0	2	2
Electric vehicle sales share	6	0	2	2.5	2.5	2	2	2	4.5	1
Vehicle miles traveled per capita	3	2.5	1.5	1.5	1.5	2	2.5	1	1	0
Investment in rail transit versus roads	2	0	1	1	1	0	0.5	0	2	0
Use of public transit	2	0	1	0.5	0.5	0	1	0	0.5	0
Walking and cycling policies	1	1	1	1	1	0	0	0	1	0.5
Freight modal share	1	0	0	0	0	0.5	0	0	0	0.5
Smart freight initiatives	1	0	1	0	1	0	0	0	1	1
Total	**100**	**36.25**	**60.75**	**72.5**	**66.5**	**35**	**55**	**27.75**	**79.5**	**57**

Table 7. Change in score by country from 2022 to 2025

Country	2022 points	2025 points	2022 rank	2025 rank
Australia	35.5	48.75	18	14
Brazil	34	35.5	19	20
Canada	49.5	56.25	13	12
China	57.5	72.5	9	**5**
Egypt	31.5	32.5	20	23
France	74.5	85.5	1	1
Germany	71.5	82	3	2
India	41.5	42.25	16	15
Indonesia	38	35.75	17	19
Italy	68.5	77.5	5	4
Japan	63.5	62.5	7	8
Malaysia	—	39.5	—	16
Mexico	46	39	14	17
Netherlands	71.5	—	3	—
Poland	51	61.5	12	9
Russia	28	27.5	22	25
Saudi Arabia	25	34.75	23	22
South Africa	23.5	36.25	24	18
South Korea	53	60.75	11	10
Spain	66	72.5	6	5
Taiwan	58.5	66.5	8	7
Thailand	31.5	35	20	21
Turkey	45.5	55	15	13
UAE	21.5	27.75	25	24
UK	72.5	79.5	2	3
U.S.	54	57	10	11

A dash (—) indicates that the country was not included in the scoring for a given year. Green rows show which countries rose in rankings and red rows show which countries dropped in rankings between Scorecard editions. Yellow rows indicate that a country's rank stayed the same.

Policy metrics

Policy metrics recognize countries that have passed policies to advance energy efficiency nationally and across different sectors. These metrics include national energy savings goals, investments in energy efficiency, building codes, and mandatory standards for appliances, industrial equipment, and vehicle fuel economy. Table 8 shows the metric point allocation for both the current and previous *Scorecards,* while table 9 shows how each country scored on policy metrics.

Table 8. Point allocation for policy metrics, 2022 and 2025

Metric	2022 points	2025 points
National efforts		
Per capita spending on energy efficiency	5	5
Per capita spending on energy efficiency R&D	2	2
(New) Low-income energy efficiency	**—**	**2**
Energy savings goals	3	3
Tax credits and loan programs	2	2
Water efficiency policy	1	1
Data availability	1	1
Buildings		
Residential building codes	**3**	**2**
Commercial building codes	**3**	**2**
Appliance and equipment standards	**5**	**4**
Appliance and equipment labeling	2	2
Building retrofit policies	**4**	**5**
Building rating and disclosure	**2**	**3**
Industry		
Voluntary energy performance agreements with manufacturers	**4**	**2**
Energy management policy	**3**	**2**
Mandate for energy managers	2	2
Mandatory energy audits	2	2
Standards for motors	2	2
(New) Standards for industrial fans	**—**	**1**
(New) National target for industrial electrification	**—**	**2**
Investment in manufacturing R&D	2	2
(Removed) Policy to encourage CHP	**1**	**—**
Transportation		
Passenger-vehicle fuel economy standards for light-duty vehicles	**4**	**3**
Fuel economy/emissions standards for heavy-duty tractor trucks	3	3
Smart freight initiatives	1	1
Investment in rail transit versus roads	**3**	**2**
(New) Walking and cycling policies	**—**	**1**
Total	60	59

Bold text indicates a change in scoring or the addition or removal of a metric.

The rankings for policy metrics very closely follow the overall country rankings. Many of the European Union (EU) countries ranked highly due to common policies that apply to member states. The United Kingdom, a former EU member state, also scored highly. China was the highest-scoring non-European

country, largely due to its policies that support energy efficiency in buildings. Many of the lower-scoring countries suffered due to a shortage of available data.

Table 9. Countries ranked by total score on policy metrics (59 possible points)

Rank	Country	Points
1	France	57.5
2	Germany	54
3	Italy	53
4	UK	51.5
5	Spain	51
6	China	45
7	Japan	43
8	South Korea	41.75
9	Taiwan	41.5
10	Poland	41
11	Canada	39.75
12	U.S.	37.5
13	Turkey	33
14	Australia	28.75
15	India	26.75
16	South Africa	24.25
17	Malaysia	23.5
18	Mexico	21.5
18	Saudi Arabia	21.25
20	Indonesia	20.25
21	Brazil	18
22	Egypt	16.5
22	Thailand	16.5
24	Russia	16.5
25	UAE	15.75

Performance metrics

Performance metrics recognize quantitative evidence of a country's energy efficiency outcomes across multiple sectors. These metrics include different measures of energy intensity, industrial efficiency, EV sales, and use of public transit. Table 10 shows the metric point breakdown for both the current and previous *Scorecards,* while table 11 shows how each country scored on performance metrics.

Table 10. Point allocation for performance metrics, 2022 and 2025

Metric	2022 points	2025 points
National efforts		
Changes in energy intensity	6	6
Thermal power plant generation*	3	3
(Removed) Size of the energy services company (ESCO) market	**2**	**—**
Buildings		
Energy intensity of residential buildings	**3**	**4**
Energy intensity of commercial buildings	3	3
Industry		
Energy intensity of the industrial sector	6	6
(New) Onsite renewable or waste heat recovery share of total installed capacity**	**1**	**2**
Agricultural energy intensity	2	2
Transportation		
Fuel economy of light-duty vehicles	3	3
Electric vehicle sales share***	**3**	**6**
Vehicle miles traveled per capita	3	3
(Removed) Freight transport per unit of economic activity	**2**	**—**
(New) Freight transport modal share	**—**	**1**
Use of public transit	**3**	**2**
Total	40	41

Bold text indicates a change in scoring or the relabeling, addition, or removal of a metric. *In 2022, this metric went by the name "Efficiency of thermal power plants." **This metric replaces the "Share of combined heat and power (CHP) in total installed capacity" metric from the 2022 Scorecard. ***This metric now distinguishes between electric vehicle passenger sales share (3 points) and medium- and heavy-duty vehicle sales share (3 ponts).

Performance rankings showed more variation in the leading countries. While many European countries continued to score highly, the top 10 included many East Asian countries along with Australia. Large reductions in energy intensity nationally and within specific sectors (e.g., residential buildings, commercial buildings, industry, agriculture) contributed to these countries' scores. South Africa, the United Arab Emirates, and Russia scored the lowest in performance metrics. These countries reported higher-than-average energy intensity, especially in the industrial sector, and therefore they did not earn points.

Table 11. Countries ranked by total score on performance metrics (41 possible points)

Rank	Country	Points
1	France	28
1	Germany	28
1	UK	28
4	China	27.5
5	Taiwan	25
6	Italy	24.5
7	Turkey	22
7	Spain	21.5
9	Poland	20.5
10	Australia	20
11	Japan	19.5
11	U.S.	19.5
13	South Korea	19
14	Thailand	18.5
15	Brazil	17.5
15	Mexico	17.5
17	Canada	16.5
18	Egypt	16
18	Malaysia	16
20	Indonesia	15.5
20	India	15.5
22	Saudi Arabia	13.5
23	South Africa	12
23	UAE	12
25	Russia	11

National efforts

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This chapter scores countries on broad energy efficiency performance as well as policy commitments to advancing energy efficiency on a national scale.

We first present each country's change in energy intensity from 2017 to 2022. We then score countries on their energy efficiency spending, calculating separate metrics for total national spending and R&D spending. The low-income energy efficiency metric, which is new for 2025, notes whether a country has a designated low-income energy efficiency program and tracks spending. Next, we recognize countries with energy savings and emissions-reduction targets along with tax incentives and loan programs to promote private-sector energy efficiency. We then evaluate a performance metric that measures transmission and distribution losses and renewable energy generation from thermal power plant generation. We also credit countries that have water efficiency policies and water conservation programs due to the impact of water consumption on energy consumption. Finally, we score countries by the degree of energy efficiency data that is publicly available, as a country’s efforts to track relevant data indicate its prioritization of energy efficiency.

The EU countries continue to rank highly in this chapter, particularly on total energy efficiency spending, tax incentives and loan programs, and energy savings goals. For the sixth time in a row, Germany ranked first, earning 22 out of 25 maximum points. Germany scored highly in the total energy efficiency spending, low-income energy efficiency, energy savings goals, and electric power generation metrics. Since the 2022 *Scorecard*, Russia was the most improved country, jumping from 4.5 points (24th place) in the previous edition to 10.5 points (16th place, tied with Mexico) in the current edition. The lowest-ranked countries were Indonesia, South Africa, and India. These low scores were largely due to low investments in energy efficiency spending and minimal reduction in national energy intensity between 2017 and 2022. Table 12 shows the overall results from this chapter.

Table 12. National efforts scores

Country	Total score (25 pts)	Changes in energy intensity (6 pts)	Per capita spending on energy efficiency (5 pts)	Per capita spending on energy efficiency R&D (2 pts)	Low-income energy efficiency (2 pts)	Energy savings and climate goals (3 pts)	Tax incentives and loan programs (2 pts)	Electric power generation (3 pts)	Water efficiency policy (1 pt)	Data availability (1 pt)
Germany	22	5	5	1	2	3	2	2.5	0.5	1
France	21.5	4	5	2	2	3	2	1.5	1	1
U.S.	21	5	5	2	2	1	2	2	1	1
Canada	20.5	5	3	2	2	2	2	2.5	1	1
Spain	19	2	5	2	2	2	2	2	1	1
UK	18	5	3	1.5	2	1	2	2	0.5	1
Australia	17	3	3	0.5	2	2	2	2.5	1	1
Italy	17	2	4	1	1	3	2	2.5	0.5	1
China	16.5	2	5	0	0	3	2	2.5	1	1
Japan	15.5	0	4	1.5	1	3	2	2	1	1
Poland	15.5	5	0	0.5	2	3	2	1.5	0.5	1
Taiwan	13.5	2	2	1	1	2	2	1.5	1	1
South Korea	14	1	1	1.5	2	3	2	1.5	1	1
Turkey	12.5	1	4	0	0	3	2	2	0	0.5
Egypt	11.5	6	0	0	0	3	2	0	0.5	0
Mexico	10.5	4	0	0	1	3	1	0	0.5	1
Russia	10.5	5	2	0	0	2	0.5	0.5	0	0.5
Malaysia	9.5	2	0	0	0	3	2	1	1	0.5
UAE	9	3	0	0	0	3	0.5	1.5	1	0
Saudi Arabia	8.5	5	0	0	0	1	1	0.5	1	0
Brazil	8	0	1	0.5	2	1	1	1.5	0	1
Thailand	8	2	0	0	0	2	2	1	1	0
Indonesia	7	0	0	0	2	2	0.5	1	1	0.5
South Africa	6.5	1	0	0	0	3	2	0	0.5	0
India	6	1	0	0	0	1	2	0.5	1	0.5

Changes in energy intensity (6 points)

Energy *intensity* measures a country's total energy consumption per unit of economic output. Thus, it is a useful proxy for estimating a country's energy *efficiency*, or the ability to produce greater goods and services with lower energy inputs (U.S. DOE 2025b). Lower energy intensity means that a country requires less energy to develop its economy. Economic changes, such as a shift to less energy-intensive industries, or behavioral changes, such as using more cooling in response to warmer weather, can cause a country's energy intensity to shift from year to year (U.S. DOE 2025b; Subramanian et al. 2022). Evaluating changes in energy intensity over multiple years can give a more comprehensive estimate of how a country's economy is becoming more energy efficient.

For this metric, we scored countries on changes in their energy intensity between 2017 and 2022 (an update from 2013–2018 in the previous *Scorecard* edition). Many countries saw a notable decrease in energy consumption, GDP, and energy intensity between 2019 and 2020 due to lockdowns associated with the COVID-19 pandemic. In fact, average energy intensity reduction nearly doubled compared to the previous *Scorecard*, likely due to the large reduction in economic activity during COVID-19 lockdowns. These values generally rebounded in 2021 and 2022 as countries' economies reopened. Countries with a reduction of 40.00% or more in primary energy intensity between 2017 and 2022 received 6 points. Those with a reduction of 22.00–39.99% earned 5 points, a reduction of 18.00–21.99% earned 4 points, a reduction of 14.00–17.99% earned 3 points, a reduction of 4.00–13.99% earned 2 points, and a reduction of 3.00% or less earned 1 point.

The three countries that saw an increase in their primary energy intensity—Indonesia, Japan, and Brazil—did not receive points. Egypt was the only country to earn full points, achieving a commendable 46.18% reduction in energy intensity. Table 13 shows each country's score.

Table 13. Scores for percentage change in primary energy intensity

Country	Percentage change in energy intensity, 2017–2022	Points
Egypt	–46.18%	6
Saudi Arabia	–38.10%	5
Poland	–28.86%	5
UK	–26.39%	5
Russia	–25.12%	5
Canada	–25.12%	5
Germany	–24.34%	5
U.S.	–23.87%	5
France	–21.52%	4
Mexico	–19.91%	4
UAE	–17.36%	3
Australia	–14.69%	3
Taiwan	–13.82%	2
Thailand	–13.62%	2
Italy	–13.54%	2
Spain	–13.08%	2

Country	Percentage change in energy intensity, 2017–2022	Points
China	–9.87%	2
Malaysia	–7.92%	2
South Africa	–5.53%	1
Turkey	–4.42%	1
South Korea	–3.50%	1
India	–2.97%	1
Indonesia	2.67%	0
Japan	4.16%	0
Brazil	11.94%	0

Sources: EIA 2024b; World Bank 2025c; UNCTAD 2025

Per capita spending on energy efficiency (5 points)

Spending levels can indicate how much a country prioritizes energy efficiency. This chapter contains two metrics that evaluate a country's investment in energy efficiency. The total spending metric measures how much a country's national government and utility sector spent on energy efficiency per capita for the most recent year that data are available. All spending values were converted into current U.S. dollars for consistency. As in the previous *Scorecard*, this value does not represent savings achieved through spending. It also does not measure all of the spending on building electrification, renewable energy, low-carbon transportation (including EVs), or other clean energy initiatives.

Collecting consistent data was challenging, especially for utility spending. Not all countries encourage utilities to invest in energy efficiency, so the *Scorecard* primarily reports spending by the national government. Even national governments that do track energy efficiency spending do not consistently make their data publicly available. Therefore, the research team primarily relied on external data requests to supply spending values. In the absence of recent data, we used values from the 2022 *Scorecard*, converting with 2025 exchange rates when applicable.

We awarded 5 points for per capita spending of US$95.00 or more, 4 points for $60.00–94.99, 3 points for $15.00–59.99, 2 points for $10.00–14.99, and 1 point for $5.00–9.99. Table 14 shows the results.

Table 14. Scores for total spending on energy efficiency, ranked by total spending per capita

Country	Annual spending on energy efficiency by the government	Annual spending on energy efficiency by utilities	Total spending on energy efficiency (US$/capita)	Score
Spain	10,461,582,756	No data available	216.38	5
Germany	13,101,240,000	No data available	157.32	5
US	2,024,000,000	7,700,000,000	140.65	5
China	Number hidden*	No data available	134.29	5
France	873,416,000	6,004,735,000	103.43	5
Turkey	5,656,000,000	No data available	64.66	4
Italy	3,779,195,520	No data available	62.55	4

Country	Annual spending on energy efficiency by the government	Annual spending on energy efficiency by utilities	Total spending on energy efficiency (US$/capita)	Score
Japan	6,462,584,537	No data available	52.22	4
Australia	586,297,809	560,901,954	42.17	3
UK	2,847,284,000	No data available	41.18	3
Canada	222,511,206	1,099,867,860	32.98	3
Russia	No data available	2,431,540,000**	16.91	2
Taiwan	267,399,468	43,960,230	13.29	2
South Korea	324,601,254	No data available	6.28	1
Brazil	1,080,000,000	No data available	5.09	1
Thailand	108,378,357	No data available	1.51	0
Malaysia	12,219,183	No data available	0.35	0
Poland	8,767,050	No data available	0.24	0
South Africa	12,495,539	No data available	0.21	0
Indonesia	10,000,000	No data available	0.04	0
Mexico	3,823,259	199,787	0.03	0
India	7,107,306	No data available	0.01	0
Egypt	No data available	No data available	-	0
Saudi Arabia	No data available	No data available	-	0
UAE	No data available	No data available	-	0

*We are not allowed to publicize this exact value and used it only to calculate the country's score. **This value reflects primarily private-sector funding of energy-efficient apartment renovations and may underestimate the country's total spending. Sources: World Bank 2025e; National Development Council 2024; ACEEE country research.

Per capita spending on energy efficiency R&D (2 points)

In addition to broad energy efficiency spending, we also measured countries' investments in energy efficiency R&D. We primarily drew from IEA's Energy Technology R&D Budgets Dataset, which had data up to 2021 for many of the listed *Scorecard* countries. We specifically evaluated public R&D spending, as there were limited data on private R&D spending. As with the total spending metric, we do not measure R&D spending on electrification, renewables, or other clean energy initiatives.

We gave 2 points for per capita spending of at least US$6, 1.5 points for at least $3, 1 point for at least $1, and 0.5 points for at least 20 cents. Table 15 shows the results.

Table 15. Scores for spending on energy efficiency R&D

Country	Total energy efficiency R&D spending in millions of US$ (2023 prices and exchange rates)	Spending in US$/capita (2023 prices and exchange rates)	Score
Canada	615.433	$ 15.35	2
Spain	398.905	$ 8.35	2
France	566.414	$ 8.29	2
U.S.	2625.308	$ 7.84	2
UK	309.775	$ 4.53	1.5
Japan	434.215	$ 3.49	1.5
South Korea	171.039	$ 3.31	1.5
Germany	208.071	$ 2.50	1
Italy	119.061	$ 2.01	1
Taiwan	26.403	$ 1.13	1
Poland	28.827	$ 0.78	0.5
Australia	14.478	$ 0.54	0.5
Brazil	64.022	$ 0.30	0.5
Turkey	3.877	$ 0.05	0
Mexico	0.115	$ 0.00	0
China	Data unavailable	$ -	0
Thailand	Data unavailable	$ -	0
Russia	Data unavailable	$ -	0
Malaysia	Data unavailable	$ -	0
South Africa	Data unavailable	$ -	0
Indonesia	Data unavailable	$ -	0
India	Data unavailable	$ -	0
Egypt	Data unavailable	$ -	0
Saudi Arabia	Data unavailable	$ -	0
UAE	Data unavailable	$ -	0

Sources: IEA 2024b; ACEEE country research

Low-income energy efficiency (2 points)

Globally, 1.18 billion people live in energy poverty, which means that they cannot afford reliable energy for powering necessary household activities (Min et al. 2024). In the United States, energy poverty is commonly called *energy insecurity*, and it encompasses the housing, health, and behavioral consequences of unaffordable energy bills (Hernández 2016). An inability to afford reliable energy services can have life-threatening consequences; this is especially true in developing countries. Due to cost concerns, households may choose not to heat or cool their homes during extreme weather events, or they may lack in-home heating and cooling entirely (Morales and Nadel 2022; Sustainable Energy for All 2025). Even in developed countries such as the United States, low-income households[6] spend a median of 8.3% of their annual income on energy bills—nearly three times the national median of 2.9% (Ayala and Dewey 2024).

Energy-efficient home upgrades can make a big difference in the lives of low-income households. Improving home energy efficiency can help residents reduce their energy burdens; it can also produce health benefits such as reduced exposure to thermal stress and indoor air pollutants (Hayes et al. 2022). However, reaching low-income residents can be challenging due to limited finances, limited technological access, geographic isolation, distrust of utilities, and other barriers (Mah and Sussman 2023). Thus, investing in specialized low-income energy efficiency programs is crucial for overcoming such barriers and bringing clean energy benefits to these underserved communities.

The low-income energy efficiency metric recognizes countries that have made significant investments in this area, particularly through national programs that support residential energy upgrades. Finding data for this metric was a challenge, especially for calculating spending levels per eligible low-income customer. We found that definitions of "low income" varied greatly by country; common definitions included social housing residents, individuals living below a poverty threshold, and individuals experiencing energy poverty. Given these issues, we credited countries if they had available data on low-income energy efficiency investments and estimations of their low-income populations.

Countries earned 1 point if they operate a national-level program that improves energy efficiency of low-income residences. Some countries operate programs at the regional or local level, but we did not score these examples. Countries could earn an additional point if they collect data on low-income energy efficiency spending and low-income customers. Table 16 shows the results.

Table 16. National low-income energy efficiency programs and low-income spending data availability by country

Country	National low-income energy efficiency program	Spending data available	Score
Australia	Social Housing Energy Performance Initiative	Yes	2
Brazil	Energy Efficiency Program	Yes	2
Canada	Canada Greener Homes Initiative	Yes	2
France	MaPrimeRénov'	Yes	2
Germany	Klima- und Transformationsfonds*	Yes	2
Indonesia	Green Affordable Housing Program	Yes	2
Poland	Clean Air 2.0 Program	Yes	2

[6] This is frequently defined as having income at 200% or below of the federal poverty level (Morales and Nadel 2022).

Country	National low-income energy efficiency program	Spending data available	Score
South Korea	Energy Voucher Program	Yes	2
Spain	Programa PREE and Programa PREE 5000	Yes	2
Taiwan	Energy Research Development Fund*	Yes	2
UK	Energy Company Obligation	Yes	2
U.S.	Weatherization Assistance Program (WAP) and Low-Income Home Energy Assistance Program (LIHEAP)	Yes	2
Italy	Social Climate Fund**	No	1
Japan	Comprehensive Improvement Project for Public Housing Stock and Childcare Green Housing Support Program	No	1
Mexico	EcoCasa	No	1
China	None	—	0
Egypt	None	—	0
India	None	—	0
Malaysia	None	—	0
Russia	None	—	0
Saudi Arabia	None	—	0
South Africa	None	—	0
Thailand	None	—	0
Turkey	None	—	0
UAE	None	—	0

*A national fund that allows local governments to apply for energy-saving initiatives, including low-income energy efficiency. **A European Union program. Source: ACEEE country research.

Energy poverty metrics

Multiple metrics can measure inequities in a country's energy system. Energy poverty can be evaluated through energy burden, the percentage of household income spent on energy bills, or a lack of energy services (e.g., utility shutoffs) (Drehobl, Ross, and Ayala 2020; Cong et al. 2022). In developing nations with high levels of rural poverty, notable indicators of energy poverty are lack of electricity, modern cooking fuels, and household appliances (Sustainable Energy for All 2023; Nussbaumer et al. 2011).

Countries use different methods for measuring poverty. The poverty rate measures the proportion of a population that falls below the poverty line, a threshold often expressed as dollars per day (OECD 2025; World Bank 2025f). Despite the long-standing recognition of the international poverty line, the threshold for calculating extreme poverty (currently $2.15 per day) has traditionally accounted only for developing countries (World Bank 2025f; Chandy and Smith 2014). As a result, it fails to adequately measure poor individuals in wealthy nations, where $30 per day is a more accurate threshold for estimating poverty (Roser 2021).

Due to these variations in countries' economic circumstances and in methods for measuring poverty, we refrained from using a single definition of poverty or low-income status when evaluating low-income energy efficiency. Perhaps a future *Scorecard* can expand this metric further to capture more data related to energy poverty and low-income energy efficiency benefits.

Energy savings and climate goals (3 points)

Given the links between energy consumption and GHG emissions, goals that encourage energy savings are important for addressing the climate crisis. Many countries have pledged to reduce their national energy consumption by a certain date, often to complement their Paris Agreement's NDCs. Other countries have passed related goals to reduce energy intensity or to improve energy productivity.

We awarded 3 points for countries with a goal to reduce energy consumption ***and*** a goal to reduce GHG emissions. Countries received 2 points for goals related to energy savings (e.g., energy intensity, energy productivity improvement) ***and*** a GHG reduction target. We awarded 1 point to countries that had ***only*** a GHG reduction target. Table 17 shows the results.

Table 17. Energy savings and climate goals by country

Country	Energy savings goal	GHG reduction goal	Score
China	Energy consumption and energy intensity reduction goals	Yes	3
Egypt	Energy consumption reduction goal	Yes	3
France	Energy consumption reduction goal	Yes	3
Germany	Energy consumption reduction goal	Yes	3
Italy	Energy consumption reduction goal	Yes	3
Japan	Energy savings goal	Yes	3
Malaysia	Energy savings goal	Yes	3
Mexico	Energy consumption reduction goal	Yes	3
Poland	Energy consumption reduction goal	Yes	3
South Africa	Energy consumption reduction goal	Yes	3
South Korea	Energy consumption reduction and energy intensity reduction goals	Yes	3
Turkey	Energy consumption reduction goal	Yes	3
UAE	Energy consumption reduction goal	Yes	3
Australia	Energy productivity improvement goal	Yes	2
Canada	Energy efficiency improvement goal	Yes	2

Country	Energy savings goal	GHG reduction goal	Score
Indonesia	Energy efficiency rate goal	Yes	2
Russia	Energy intensity reduction goal	Yes	2
Spain	Energy efficiency improvement goal	Yes	2
Taiwan	Energy efficiency improvement goal and energy intensity goal	Yes	2
Thailand	Energy intensity reduction goal	Yes	2
Brazil	None	Yes	1
India	None	Yes	1
Saudi Arabia	None	Yes	1
UK	None	Yes	1
U.S.	Sector-specific goals, but no national savings goal	Yes	1

Sources: UNFCCC 2025; ACEEE country research

Tax credits and loan programs (2 points)

In addition to direct public spending, national governments can spur private-sector investment in energy efficiency by offering loan programs and tax incentives. These financial incentives can apply to businesses or individuals and can cover general energy-efficient upgrades or specific sectors. Sectors funded include products or activities related to transportation (e.g., EVs), buildings (e.g., green retrofits, appliance upgrades), and industry.

We gave the full 2 points to countries with both loan programs and tax incentives that cover more than one economic sector, and 1 point to countries with either loan programs or tax incentives that cover more than one economic sector. We also awarded 1 point to countries with single-sector loans and credits and 0.5 points for tax incentives or loan programs available to just one sector. Table 18 shows the results.

Table 18. Available tax credits and loan programs by country

Country	Tax incentives and loan programs	Sector(s) covered	Score
Australia	Both	Small businesses, agriculture, electric vehicles*	2
Canada	Both	Home upgrades, zero-emission vehicles	2
China	Both	Buildings, industry, electric vehicles	2
Egypt	Both	Equipment, industry	2
France	Both	Buildings, industry	2
Germany	Both	Buildings, industry	2

Country	Tax incentives and loan programs	Sector(s) covered	Score
India	Both	Equipment, electric vehicles, buildings	2
Italy	Both	Buildings, industry	2
Japan	Both	Electric vehicles, commercial businesses	2
Malaysia	Both	Appliances, industry, buildings	2
Poland	Both	Buildings, industry	2
South Africa	Both	Manufacturing, tourism sector, commercial businesses	2
South Korea	Both	Appliances, electric vehicles	2
Spain	Both	Buildings, industry	2
Taiwan	Both	Green buildings, clean transportation, appliances	2
Thailand	Both	Buildings, equipment, manufacturing*	2
Turkey	Both	Buildings, electric vehicles	2
UK	Both	Buildings, electric vehicles, appliances	2
U.S.	Both	Buildings, electric vehicles, industry*	2
Brazil	Loans only	Industry, street lighting	1
Mexico	Loans only	Industrial equipment, green homes	1
Saudi Arabia	Loans only	Buildings, electric vehicles	1
Indonesia	Loans only	Green loans for unspecified energy efficiency upgrades	0.5
UAE	Loans only	Unspecified financing solutions for helping businesses become energy efficient	0.5
Russia	None		

*A non-exhaustive list of potential uses. Source: ACEEE country research.

Electric power generation (3 points)

In 2023, 89% of the world's energy was produced by fossil fuels such as coal, natural gas, petroleum, and other liquids (EIA 2024b). Electric power generation often results in energy losses during the T&D process, underscoring the importance of improving these power plants' operational efficiency (Subramanian et al. 2022).

The *2022 International Energy Efficiency Scorecard* measured both T&D losses and operational efficiency of thermal power plants. The 2018 edition evaluated these values alongside electricity generation from renewables. Given that the data sources used in these previous *Scorecards* are no longer available to ACEEE, we revised the methodology.

This year, we measured electric power generation more generally; specifically, we measured the percentage of T&D losses and the percentage of renewable generation per country. Higher renewable generation shows a country's progress toward moving away from fossil fuel energy, while lower T&D losses show a country's commitment to maximizing efficiency. Countries could earn up to 1.5 points for minimizing T&D losses and up to 1.5 points for increasing renewable energy production for a combined maximum score of 3 points. Table 19 shows point allocations for percentage of T&D losses and percentage of renewable energy generation. Table 20 shows the total scores.

Table 19. Point allocations for T&D losses and renewable energy generation

T&D losses		Renewable energy generation	
Values	Points	Values	Points
0–4.9%	1.5	40.0% and up	1.5
5.0–7.9%	1	30.0–39.9%	1
8.0–9.9%	0.5	20.0–29.9%	0.5
10.0% and up	0	19.9% and below	0

Table 20. Scores for electric power generation and transmission

Country	T&D losses (%)	% from renewables	Score
Australia	4.5	35.1	2.5
Canada	5.1	67.4	2.5
China	3.4	31.0	2.5
Germany	5.0	50.2	2.5
Italy	6.7	44.2	2.5
Japan	4.1	23.4	2
Spain	8.6	52.4	2
Turkey	9.1	42.9	2
UK	9.1	50.2	2
U.S.	4.5	23.0	2
Brazil	15.1	89.0	1.5
France	6.8	28.5	1.5
Poland	6.2	27.7	1.5
South Korea	3.3	8.4	1.5
Taiwan	3.2	9.6	1.5

Country	T&D losses (%)	% from renewables	Score
UAE	4.7	5.0	1.5
Indonesia	7.2	18.0	1
Malaysia	6.9	19.1	1
Thailand	7.4	18.3	1
India	17.7	22.6	0.5
Russia	8.6	18.5	0.5
Saudi Arabia	9.1	0.7	0.5
Egypt	21.9	12.6	0
Mexico	11.9	17.2	0
South Africa	10.2	8.5	0

Sources: EIA 2025; World Bank 2025b; ACEEE country research

Why we removed the size of the ESCO market metric

Energy service companies (ESCOs) are private companies that provide energy efficiency and value-added energy services. ESCOs primarily offer performance contracting, which allows a client to receive equipment installation and maintenance from the ESCO in exchange for payments tied to energy savings (Henner and Howard 2022). This allows ESCOs to address the typically high upfront costs of energy-efficient upgrades, allowing more customers to enjoy the benefits of energy efficiency. The size of a country's ESCO market reflects the country's commitment to financing energy efficiency.

ESCO projects can vary greatly across countries. In the United States, ESCOs primarily fund upgrades in municipal, educational, and healthcare buildings (Henner and Howard 2022). Meanwhile, many Asian countries, including China, India, South Korea, and Thailand, report substantial ESCO activity in the industrial sector (IEA 2018). As a result, making direct comparisons across countries is difficult. However, ESCO projects have been consistent in producing substantial energy savings.

Previous editions of the *International Energy Efficiency Scorecard* have measured each country's ESCO market size as a percentage of national GDP. The IEA collects data on national ESCO market revenue, but most countries lack data beyond 2018. Although we tried to obtain more recent data through external data requests and independent research, we found that most countries have not publicized recent data on ESCO revenue. Thus, we are no longer awarding points for this metric.

Water efficiency policy (1 point)

Reducing water consumption can help a country reduce its overall energy consumption. The process of extracting, treating, and delivering water to consumers requires substantial energy in addition to the energy needed for water heating, cooking, and other end uses (U.S. DOE 2014). Just as national energy efficiency goals, policies, and programs have proven effective in reducing energy consumption, similar initiatives related to water have been successful in reducing a country's water demand (Demartini, Malinowski, and Yu 2021).

This metric recognizes countries that have passed national water efficiency policies and created water efficiency programs to help consumers save water. Many countries have national legislation that outlines water rights, water quality control, and even protection of aquatic ecosystems. For this *Scorecard*, we credit legislation that aims to reduce water demand, conserve water supply, and promote more efficient use of water. We also recognize programs that set efficiency standards for water-consuming appliances (e.g., faucets, showerheads, toilets, and washing machines) or educate consumers on conserving water.

We gave 1 point to countries with both a national water law that incorporates conservation principles and a water efficiency program aimed at consumers. Countries that have either a water law or a water efficiency program received 0.5 points. Table 21 shows the results.

Table 21. Scores for water efficiency

Country	Water efficiency efforts	Water efficiency law	Water efficiency program	Score
Australia	Law and program	National Water Initiative	Water Efficiency Labelling and Standards	1
Canada	Law and program	Canada Water Act	WaterSense label	1
China	Law and program	Water and Soil Conservation Law of the People's Republic of China	China Water Efficiency Labeling Program	1
France	Law and program	Plan eau 2023–2030 (Water plan 2023–2030)	European Union (EU) Unified Water Label	1
India	Law and program	National Water Policy of 2002	Jal Shakti Abhiyan (Catch the Rain) campaign	1
Indonesia	Law	Law Number 7 of 2004 Regarding Water Resources	Water Scarcity Program	1
Japan	Law and program	Basic Act on Water Cycle (2014)	Basic Plan on Water Cycle (2024)	1
Saudi Arabia	Law and program	National Water Efficiency and Conservation Center (MAEE)	Qatrah Program	1
South Korea	Law and program	Article 15 (Management of Water Demand), Framework Act on Water Management	Master Plan for National Water Management	1
Spain	Law and program	Global Water Strategy	EU Unified Water Label	1
Taiwan	Law and program	Water Supply Act	Water Efficiency Labels	1
UAE	Law and program	Water Strategy 2036	Water Demand Management Programme	1
U.S.	Law and program	Energy Independence and Security Act of 2007 and	WaterSense label	1

Country	Water efficiency efforts	Water efficiency law	Water efficiency program	Score
		Energy Efficiency Improvement Act of 2015		
Egypt	Law	Water Resources and Irrigation Law		0.5
Germany	Program		EU Unified Water Label	0.5
Italy	Program		EU Unified Water Label	0.5
Malaysia	Program		Water Efficient Product Labelling Scheme	0.5
Mexico	Law	National Water Plan		0.5
Poland	Program		EU Unified Water Label	0.5
South Africa	Law	National Water Strategy		0.5
Thailand	Law	Water Act		0.5
UK	Program		Water Efficiency Fund	0.5
Brazil	None			0
Russia	None			0
Turkey	None			0

Source: ACEEE country research

Data availability (1 point)

Data on energy consumption, carbon emissions, and efforts to achieve energy, water, and climate goals are crucial to the ability to achieve success. The information in this *Scorecard* comes from publicly available data and data shared by external country experts. Not all countries regularly collect and publish data related to energy efficiency performance. Countries that do track this will better understand their progress toward decarbonizing their economies through energy efficiency. They can then adjust their policies accordingly to achieve even higher energy and emissions reductions.

We evaluated 38 metrics across the four *Scorecard* chapters (national efforts, buildings, industry, and transportation). We then calculated the percentage of available data across these metrics. We gave 1 point to countries that had at least 90% of the data accessible for the evaluated metrics. Countries earned 0.5 points if at least 80% of their data were available to us. We awarded no points to countries with little information available through centralized or country-specific sources. Table 22 shows the results.

Table 22. Data availability by country

Country	% data available	Score
Australia	100	1
Germany	100	1
Japan	100	1
Taiwan	100	1

Poland	100	1
U.S.	100	1
Canada	97	1
South Korea	97	1
France	95	1
Italy	95	1
Spain	95	1
UK	95	1
Brazil	92	1
China	92	1
Mexico	90	1
India	87	0.5
Turkey	87	0.5
Indonesia	85	0.5
Malaysia	82	0.5
Russia	82	0.5
South Africa	77	0
Thailand	77	0
UAE	77	0
Saudi Arabia	74	0
Egypt	72	0

Source: ACEEE country research

National efforts: best practices

National efforts are critical to energy efficiency and to achieving a high score in the *Scorecard*. Countries seeking to increase their scores can follow the models of Germany, France, and the United States. Although these countries all have strong economies, smaller countries or those with lower GDPs can nevertheless implement many of these solutions. As we now describe, these model countries invested significantly in energy efficiency programs, operated energy efficiency programs for low-income households, and offered extensive tax credits and loans for private-sector efficiency investments.

Germany. Germany scored the highest in performance metrics, indicating clear progress in improving national energy efficiency**.** Since the previous *Scorecard*, Germany has improved its scores in energy intensity reduction and total energy efficiency spending. It achieved a 24.3% reduction in energy intensity between 2017 and 2022 (versus 9.8% reduction between 2013 and 2018). In 2023, the national government invested €12 billion in energy efficiency, a twofold increase from the €6 billion invested in 2018. Germany also funds low-income energy efficiency work through the national Klima- und Transformationsfonds (Climate and Transformation Fund).

France. France scored the highest in policy metrics, reflecting the French government's commitment to national energy efficiency efforts. In 2024, the national government committed €800 million to building retrofits alone, with additional investments in low-carbon transportation. In 2023, the French government released a national water saving plan to cut water use by 10% by 2030, primarily through tracking leakage rates. Most notably, France runs multiple programs for helping residents access energy efficiency benefits. While most of these programs are available to all, many have special provisions for low- and moderate-income households; examples include the following:

- MaPrimeRénov' is a no-cost home renovation program that provides insulation and heating upgrades.
- Energy cheques provides energy bill assistance for energy-poor households that spend at least 10% of their annual income on energy bills.
- Certificats d'économie d'énergie provides energy=saving certificates for financing energy upgrades, including insulation, heating and cooling, hot water heating, and ventilation.

United States. The U.S. Inflation Reduction Act of 2022 was the country's largest ever investment in clean energy and climate action. It provided billions of dollars of financial incentives for retrofitting buildings, decarbonizing industry, and purchasing electric vehicles. The United States also runs two notable programs for improving low-income energy efficiency: the Weatherization Assistance Program (WAP), which offers no-cost health and safety services and residential energy upgrades for households living below the national poverty line, and the Low-Income Home Energy Assistance Program (LIHEAP), which provides emergency bill assistance for low-income households struggling to pay their energy bills.

Buildings

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Buildings account for approximately 34% of global final energy consumption and contribute to 37% of energy- and process-related carbon dioxide (CO_2) emissions (UNEP 2024).[7] In this chapter, countries could earn up to 25 points across eight metrics for energy efficiency policies and programs targeting residential and commercial buildings.[8] We focused on several best-practice policies that have the largest potential for energy and GHG savings in buildings; these include building energy codes, appliance standards and labeling, building energy benchmarking and disclosure policies, and retrofit policies. We also included a metric that scored countries on the EUI [9] of residential and commercial buildings to evaluate the performance of each country's existing building stock.

In this year's *International Scorecard*, we gave greater weight to the energy intensity in residential buildings metric to emphasize the importance of performance-based metrics, moving beyond simply the existence of favorable policies. This change reflects the need to more accurately assess the actual performance of buildings in each country. The building retrofit policies metric saw an increase in weight from 4 to 5 points, which accounts for the fact that retrofitting existing buildings will be critical for reducing emissions in the building sector going forward. Across the developed world, it is estimated that around 80% of buildings in cities today will exist in 2050 and, therefore, retrofitting efforts and incentives are urgent and important (World Economic Forum 2022). Lastly, we gave building ratings and disclosures more weight to highlight the crucial role of transparency in communicating the benefits of energy efficiency. By improving building ratings and making this information widely available, countries can better support retrofitting efforts and provide critical data for future policy decisions, ensuring that energy efficiency improvements are prioritized and effective across commercial and residential buildings.

Germany topped the buildings chapter of this year's *Scorecard*, with 23 points, reflecting the country's strong, comprehensive approach to building energy efficiency. This high score highlights Germany's well-established policies for both new and existing buildings, along with EU's wide-ranging appliance standards and labeling. While Germany made notable progress in improving commercial building performance, room remains for it to achieve higher performance in the residential sector.

France, Spain, and Italy tied for second place in the buildings chapter, each scoring 22.5 points out of 25. Like many of the EU countries, France and Spain performed well on policy metrics. France earned a perfect score of 5 in the building retrofit policies metric, reflecting the country's strong commitment to upgrading existing buildings. Key measures include requiring larger commercial buildings to meet energy performance targets, banning the rental of homes with low Energy Performance Diagnosis scores until improved, offering incentives to replace inefficient heating systems and envelope components, and reducing gas and fossil fuel use in commercial and residential buildings. Spain also stood out for its top score in building energy codes, thanks to its mandatory policies that apply to both commercial and residential buildings. While Spain's retrofit policies are not as comprehensive as those of other top scorers, the country mandates that energy code requirements apply to the renovated portions of all

[7] The 37% figure includes both direct emissions from on-site fossil fuel use and indirect emissions from electricity consumption, reflecting power sector emissions attributable to buildings.

[8] In this report, "commercial buildings" refers to both nonresidential buildings, such as offices, schools, and retail spaces, and large multifamily residential buildings, which are commonly subject to commercial energy code requirements.

[9] Adjusted for climate and service-sector GDP.

building types, contributing to its strong performance. Spain earned full points in building rating and disclosure due to a strong national framework requiring energy performance certificates for all buildings, mandatory public label displays, and clear enforcement. The country also performed the best among the top four EU scorers in the commercial and residential energy intensity metrics, earning full points for these metrics.

Italy also received a strong score due to its robust policy frameworks, including mandatory energy codes for both residential and commercial buildings; required energy performance labeling; and EU appliance and equipment labeling standards. The key difference between Italy, France, and Spain's scores lies in Spain's less stringent building retrofit requirements. However, Spain outperformed both countries in residential and commercial energy intensity, indicating more efficient building performance overall.

In this edition of the *International Scorecard*, China ranked among the top five countries in the buildings chapter—following Germany, France, Spain, and Italy—with a total score of 22. This ranking, which is consistent with the previous *Scorecard*, reflects China's improvements across several areas, especially in building rating and disclosure, where it earned a high score for policies that promote and incentivize retrofits in existing commercial buildings, and energy disclosure in new and renovated buildings. China also stands out as a global leader in appliance and equipment standards and labeling, with the most comprehensive set of mandatory product labeling requirements and the highest number of appliance and equipment categories covered by minimum energy performance standards (MEPS) among non-EU and non-Western countries. Its strong score on building retrofit policies is driven by a 2022 code that applies to renovations in residential and commercial buildings, requires detailed reporting on energy use and carbon emissions, and prioritizes operational energy management to achieve significant carbon reductions, demonstrating that non-Western countries can successfully implement effective policies to drive energy efficiency and climate progress. However, China's 2022 code is limited in scope, applying only to commercial and residential buildings in urban areas.

Table 23 shows the total scores and individual metric scores for the buildings policies in all 25 countries.

Table 23. Overall score summary for countries

Country	Total score (25 pts)	Residential building codes (2 pts)	Commercial building codes (2 pts)	Appliance and equipment standards (4 pts)	Appliance and equipment labeling (2 pts)	Building retrofit policies (5 pts)	Building rating and disclosure (3 pts)	Energy intensity in residential buildings* (4 pts)	Energy intensity in commercial buildings (3 pts)
Germany	23	2	2	4	1.5	5	3	2.5	3
France	22.5	2	2	4	1.5	5	3	2.5	2.5
Spain	22.5	2	2	4	1.5	4	3	3	3
Italy	22.5	2	2	4	1.5	5	3	2.5	2.5
China	22	1.5	2	4	2	4	2	3.5	3
UK	21.5	2	2	4	1.5	5	2	2.5	2.5
Poland	21	2	2	4	1.5	4	3	2.5	2
Taiwan	20	2	2	3	1.5	3	2	3.5	3
South Korea	19.25	2	2	3.5	1.75	4	2	2.5	1.5
South Africa	18.75	2	2	2	1.25	4	2	3.5	2
Japan	17.5	2	2	3	0	4	2	2.5	2
Australia	17.25	1.5	1.5	3	1.25	3	2	2	3
U.S.	17	1.5	1.5	4	1	4	1	1.5	2.5
Mexico	16.5	0.75	0.75	3	1	4	0	4	3
Saudi Arabia	15.25	2	2	2	1.25	4	1	2.5	0.5
Turkey	15	1.5	1.5	0	1	4	3	3	1
Canada	14.25	1.5	1.5	4	0.75	4	0	1.5	1
India	13.25	0.75	1.5	4	1.5	0	0	3.5	2
Indonesia	12.75	0	2	1	1.25	0	2	4	2.5
Brazil	12.5	0	0	2	1.5	1	1	4	3
Egypt	12	2	1	2	1.5	0	0	3.5	2

Country	Total score (25 pts)	Residential building codes (2 pts)	Commercial building codes (2 pts)	Appliance and equipment standards (4 pts)	Appliance and equipment labeling (2 pts)	Building retrofit policies (5 pts)	Building rating and disclosure (3 pts)	Energy intensity in residential buildings* (4 pts)	Energy intensity in commercial buildings (3 pts)
Malaysia	11.5	0.5	0.75	0	1.25	3	2	3.5	0.5
UAE	11.25	1.5	1.5	0	1.25	2	2	3	0
Thailand	9	1.75	1.75	0	0	2	0	2	1.5
Russia	8	1.5	1.5	0	0	3	2	0	0

*The energy intensity scores for residential buildings reflect the amount of energy consumed per unit of floor area. It is important to note that lower energy intensity values in some countries may not necessarily indicate higher energy efficiency but could instead reflect lower appliance ownership, usage patterns, or other socioeconomic factors. Therefore, while energy intensity provides useful comparative insights, it should be interpreted alongside contextual factors that influence energy consumption behavior.

Residential and commercial building codes (2 Points Each)

We based scores for residential and commercial building codes on the presence of national mandatory energy codes and the technical areas they cover. Within each building sector (residential and commercial), we awarded 1 point to countries with mandatory national building codes. Many countries do not set federal codes but rather develop model energy codes that states, territories, and localities can adopt. Countries with high adoption rates of model codes that cover the majority of their populations (often called mixed codes) received 0.5 points; those with low code adoption rates, voluntary codes, or no codes received no points.

We also examined whether the energy codes covered key technical areas as follows:

- **Building shell**
    - *Insulation in walls and ceiling.* Does the code require levels of insulation for building shell components that are relevant to the climate?
    - *U-factors and shading/solar heat gain coefficient for windows.* Does the code require U-factors and shading/solar heat gain coefficients for windows and doors that are relevant to the climate? The U-factor measures the rate of heat transfer through a window and rates how well the window insulates. The solar heat gain coefficient measures the fraction of solar energy transmitted, indicating how well the window blocks heat from solar radiation.
    - *Air sealing.* Does the code require buildings to meet certain air-tightness levels, verified by testing?
- **Building systems**
    - *Efficient lighting.* Does the code include minimum standards for lighting efficiency, lamps, and/or lighting controls?
    - *Efficient heating, ventilating, and air-conditioning systems.* Does the code require a level of efficiency for heating, ventilating, and cooling systems? Does the code have design requirements for these systems?
    - *Efficient water heating.* Does the code require minimum efficiency levels for hot-water systems?

We allocated 1 point based on the code's building technical requirements (building shell and systems). Countries meeting five or more of the technical requirements earned the full point. Those satisfying three or four requirements earned 0.75 points, while those meeting two earned 0.5 points, and those meeting one earned 0.25 points.

Each country's final score for the residential building codes metric is a combined total, up to 2 possible points, comprised of the two components described above: up to 1 point for the type of building code (mandatory, voluntary, mixed, or none) and up to 1 point for the number of technical requirements the residential code includes.

Further, although we do not score building codes on implementation or compliance, we recognize that implementation and enforcement are critical to advancing energy savings in buildings. We also recognize that these key factors vary widely across countries and that many countries lack meaningful enforcement policies and processes. Unfortunately, we do not have the data to score countries on their implementation and enforcement at this time. When reviewing each country's scores, please keep in

mind that while they may have adopted a code with several technical requirements, it does not guarantee that new construction meets those requirements.

Tables 24 and 25 show scores for the residential and commercial sectors, respectively.

Table 24. Scores for residential building codes

Country	Code type	Code type score	Number of technical requirements covered (out of 6)	Score for technical requirements	Combined score
France	Mandatory	1	6	1	2
Germany	Mandatory	1	6	1	2
Japan	Mandatory	1	6	1	2
Saudi Arabia	Mandatory	1	6	1	2
South Africa	Mandatory	1	6	1	2
UK*	Mandatory	1	6	1	2
Egypt	Mandatory	1	5	1	2
Italy	Mandatory	1	5	1	2
Poland	Mandatory	1	5	1	2
South Korea	Mandatory	1	5	1	2
Spain	Mandatory	1	5	1	2
Taiwan	Mandatory	1	5	1	2
Thailand	Mandatory	1	3	0.75	1.75
Australia	Mixed	0.5	6	1	1.5
U.S.	Mixed	0.5	6	1	1.5
Canada	Mixed	0.5	5	1	1.5
China**	Mixed	0.5	5	1	1.5
UAE***	Mixed	0.5	5	1	1.5
Russia	Mandatory	1	2	0.5	1.5
Turkey	Mandatory	1	2	0.5	1.5
Mexico	Voluntary	0	4	0.75	0.75
India	Voluntary	0	3	0.75	0.75
Malaysia	Voluntary	0	2	0.5	0.5
Brazil	No code	0	0	0	0
Indonesia	No code	0	0	0	0

*The UK has different codes across its countries, but all are mandatory. For technical requirements, we used the mandatory code for England and Wales, which covers the majority of the UK's population. **China's residential building was scored as "mixed" because it does not apply to rural areas. ***In the UAE, building codes vary by emirate. To score the number of technical requirements covered by the code, we assessed Abu Dhabi's building energy code, as it is the most populous of the emirates. Source: Government of the United Kindgom 2023; NHBC n.d.; Government of Abu Dhabi 2013; ACEEE country research.

Table 25. Scores for commercial building codes

Country	Code type	Code type score	Number of technical requirements covered (out of 6)	Score for technical requirements	Combined score
China	Mandatory	1	6	1	2
France	Mandatory	1	6	1	2
Germany	Mandatory	1	6	1	2
Japan	Mandatory	1	6	1	2
Saudi Arabia	Mandatory	1	6	1	2
South Africa	Mandatory	1	6	1	2
UK	Mandatory	1	6	1	2
Indonesia	Mandatory	1	5	1	2
Italy	Mandatory	1	5	1	2
Poland	Mandatory	1	5	1	2
South Korea	Mandatory	1	5	1	2
Spain	Mandatory	1	5	1	2
Taiwan	Mandatory	1	5	1	2
Thailand	Mandatory	1	4	0.75	1.75
Australia	Mixed	0.5	6	1	1.5
Canada	Mixed	0.5	6	1	1.5
U.S.	Mixed	0.5	6	1	1.5
India	Mixed	0.5	5	1	1.5
UAE*	Mixed	0.5	5	1	1.5
Russia	Mandatory	1	2	0.5	1.5
Turkey	Mandatory	1	2	0.5	1.5
Egypt	Mandatory	1	0	0	1
Malaysia	Voluntary	0	4	0.75	0.75
Mexico	Voluntary	0	4	0.75	0.75
Brazil	No code	0	0	0	0

*The United Arab Emirates' commercial building codes vary by emirate. To score the number of technical requirements covered by the code, we assessed Abu Dhabi's building energy code, as it is the most populous of the emirates. Source: Government of Abu Dhabi 2013; ACEEE country research.

Appliance and equipment standards (4 points)

MEPS establish limits on the energy consumption of appliances, and they are a vital tool for reducing carbon emissions and the energy use of buildings worldwide. In the *Scorecard*, policies requiring MEPS for appliances and equipment could receive up to 4 points.

As table 26 shows, we evaluated policies covering five key commercial and residential building end uses: space heating, space cooling, water heating, refrigeration, and lighting. Commercial-related appliances and equipment are indicated; all others are residential. A country receives credit for a category if it has MEPS in place for at least two of the listed appliance or equipment types within that end use.

To account for different climate conditions and market realities, we used two separate scoring rubrics:

- **Rubric A:** Applies to countries with fewer than 500 heating degree days (HDD) and does not require space heating standards. This ensures we do not unfairly penalize countries with little or no heating demand due to their warm climates.
- **Rubric B:** Applies to countries with 500 HDD or more, where space heating is expected to be a significant end use and thus is included in the scoring.

Appendix B lists the HDDs used for each country.

Scoring rubrics

Rubric A – Countries with <500 HDD

Number of appliance groups with MEPS	Points
4	4
3	3
2	2
1	1
0	0

Rubric B – Countries with >500 HDD

Number of appliance groups with MEPS	Points
5	4
4	3.5
3	3
2	2
1	1
0	0

Table 26. Standards required to receive points for covering energy-intensive end uses

End use	Residential/commercial appliance and equipment standards to receive points
Space heating	Boiler or furnace
	Heat pump
Space cooling	Central air conditioning (AC) or room AC/mini-split
	Chiller (commercial)
Water heating	Instantaneous water heater/storage water heater
Refrigeration	Refrigerator (including refrigerator-freezers)
	Walk-in cooler and freezer (commercial)
	Commercial refrigeration equipment (refrigerated display case, visicooler, etc.)

Lighting	Linear lighting (commercial)
	General service lighting

We also combined certain subcategories within each end use where it would be unrealistic to expect coverage of every product due to limited market access or penetration. For example, in the water heating category, we allowed either instantaneous or storage water heaters to count toward the appliance/equipment standard count for this end use, rather than having these as two separate required items. In countries such as Brazil, where 97% of residential water heaters are instantaneous, or Indonesia, where only 2% of the population owns water heating technology, it would be unfair to require storage water heaters as a separate scoring criterion. Doing so would skew the methodology in favor of wealthier countries with broader appliance coverage and stronger market conditions. Table 27 shows the results.

Table 27. Scores for appliance and equipment standards

Country	Number of key appliance groups with MEPS	Rubric used	Score
China	5	B	4
Canada	5	B	4
France	5	B	4
Germany	5	B	4
Italy	5	B	4
Poland	5	B	4
Spain	5	B	4
UK	5	B	4
U.S.	5	B	4
India	4	A	4
South Korea	4	B	3.5
Taiwan	3	A	3
Japan	3	B	3
Australia	3	B	3
Mexico	3	A	3
Brazil	2	A	2
Egypt	2	A	2
Saudia Arabia	2	A	2
South Africa	2	B	2
Indonesia	1	A	1
Malaysia	0	A	0
Russia	0	B	0
Thailand	0	A	0
Turkey	0	B	0
UAE	0	A	0

Sources: CLASP 2025; ACEEE country research

Appliance and equipment labeling (2 points)

Labeling programs empower customers to make informed purchasing decisions by disclosing how much energy an appliance or piece of equipment uses compared to similar products. In countries with long-standing, comprehensive labeling programs, appliances now consume over 30% less energy than in countries without such programs (IEA 2021). These labels have driven manufacturers to innovate and helped consumers shift toward considering energy efficiency as part of their purchasing behaviors. Labels typically present this information using either a categorical rating or a continuous scale. Categorical labels assign ranking, such as letter grades or numbers, based on energy use or efficiency, while continuous labels place products on a scale between the highest and lowest performing models. Figure 3 shows examples of both the EU's categorical letter grade system and the U.S. EnergyGuide's continuous-scale format.

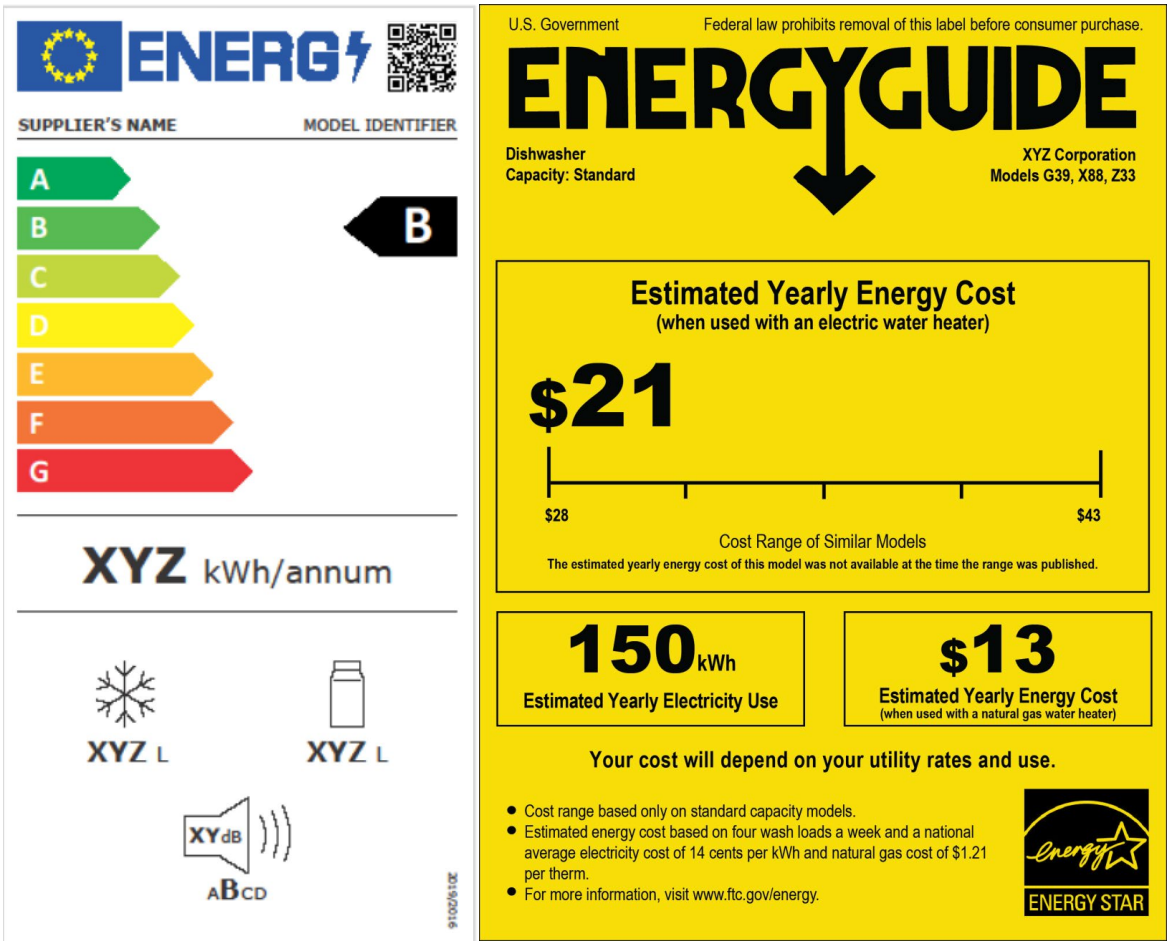

Figure 3. Categorical (left) and continuous (right) styles of appliance labeling

In this analysis, we focused exclusively on comparative energy labels, which communicate how a product's energy performance compares to others on the market. We did not score endorsement labels, which simply indicate that a product meets a set performance threshold without providing comparative information. Only countries with mandatory labeling programs were eligible for points in this metric. We

awarded 1 point for categorical labels and 0.5 points for continuous labels, reflecting research showing that categorical labels have proven to be better understood and more motivating than continuous labels (Thorne and Egan 2002).

We also awarded up to 1 additional point based on the number of appliance categories covered by mandatory labels:

- 31+ categories = 1 point
- 21–30 categories = 0.75 points
- 11–20 categories = 0.5 points
- 6–10 categories = 0.25 points
- 5 or fewer categories = 0 points

Labeling policies vary significantly across countries, with some covering residential, commercial, and even industrial appliances and equipment, while others focus solely on residential end uses, substantially influencing the total number of categories covered.

Table 28 shows the scores on this metric.

Table 28. Scores for appliance and equipment labeling

Country	Mandatory or voluntary	Categorical or continuous	Score	Appliance categories	Score	Total
China	Mandatory	Categorical	1	41	1	2
South Korea	Mandatory	Categorical	1	22	0.75	1.75
France	Mandatory	Categorical	1	16	0.5	1.5
Germany	Mandatory	Categorical	1	16	0.5	1.5
Italy	Mandatory	Categorical	1	16	0.5	1.5
Poland	Mandatory	Categorical	1	16	0.5	1.5
Spain	Mandatory	Categorical	1	16	0.5	1.5
UK	Mandatory	Categorical	1	16	0.5	1.5
India	Mandatory	Categorical	1	16	0.5	1.5
Taiwan	Mandatory	Categorical	1	16	0.5	1.5
Egypt	Mandatory	Categorical	1	11	0.5	1.5
Brazil	Mandatory	Categorical	1	12	0.5	1.5
Saudia Arabia	Mandatory	Categorical	1	10	0.25	1.25
UAE	Mandatory	Categorical	1	9	0.25	1.25
Australia	Mandatory	Categorical	1	8	0.25	1.25
South Africa	Mandatory	Categorical	1	8	0.25	1.25
Indonesia	Mandatory	Categorical	1	7	0.25	1.25
Malaysia	Mandatory	Categorical	1	7	0.25	1.25
Mexico	Mandatory	Continuous	0.5	14	0.5	1
Turkey	Mandatory	Categorical	1	2	0	1
U.S.	Mandatory	Continuous	0.5	13	0.5	1
Canada	Mandatory	Continuous	0.5	8	0.25	0.75

Japan	Voluntary	Categorical	0	8	0	0
Russia	Voluntary	Categorical	0	0	0	0
Thailand	Voluntary	Categorical	0	0	0	0

Sources: CLASP 2025; ACEEE country research; Appliance Standards Awareness Project 2025; APEC 2012; European Commission n.d.; Natural Resources Canada 2025.; U.S. Federal Trade Commission 2022

Building retrofit policies (5 points)

Globally, most existing buildings are old and inefficient, presenting a major opportunity for retrofits to reduce energy use and emissions. Given that around 80% of today's urban buildings will still be standing in 2050, retrofitting is essential for tackling the long-term impact of the built environment (World Economic Forum 2022). Building codes are often designed to target new construction. However, many include provisions that apply to the retrofitted portion of existing buildings or, in some cases once a retrofit is initiated, they can apply to the entire building. Such retrofits are an essential strategy for improving the performance of the structures that will make up the majority of the building stock for decades to come.

In this edition of *International Scorecard*, countries could earn up to 5 points for having retrofit policies in place. We awarded points as follows:

- **4 points** to countries with robust policies that require energy-efficient upgrades within a set timeframe, mandate whole-building performance improvements during renovations or additions, or restrict the sale or rental of buildings with poor energy performance (BPIE 2015).
    - Table 29 labels this as "Mandatory national codes apply to residential and commercial buildings" and "Policy bans the rental or sale of buildings that do not meet a minimum energy performance standard."
- **3 points** to countries with national codes that require energy-efficient upgrades for only the portion of a building being renovated for both commercial and residential buildings OR state or provincial codes that apply to two-thirds of the population.
    - Table 29 labels this as "Mandatory national codes apply to residential and commercial renovations for only the renovated portion of the building" and "State or provincial codes that cover [specific condition from the country's policy]."
- **2 points** to countries with state or provincial retrofit codes covering either residential or commercial buildings or countries with mandatory national codes that apply to EITHER residential or commercial buildings (but not both).
    - Table 29 labels this as "State or provincial codes vary in coverage of residential and commercial buildings" and "Mandatory national codes apply to renovations for some buildings," indicated either by the specific building type covered or the minimum area requirement for buildings to be impacted by the policy.
- **1 additional point** was awarded to countries offering federal incentives to encourage retrofits.
    - Table 29 indicates this with a "0" in the column for building retrofit policies and "1" in the column for incentives.

Table 29 summarizes the retrofit policies in each country and their corresponding scores.

Table 29. Scores for building retrofit policies

Country	Building retrofit policies	Score	Incentives	Score	Total score
France	Mandatory national codes apply to residential and commercial renovations Policy bans the rental or sale of buildings that do not meet a minimum energy performance standard	4	Rebates and grants	1	5
Germany	Mandatory national codes apply to residential and commercial buildings Policy bans the rental or sale of buildings that do not meet a minimum energy performance standard	4	Loans and grants	1	5
Italy	Mandatory national codes apply to residential and commercial buildings Policy bans the rental or sale of buildings that do not meet a minimum energy performance standard	4	Subsidy	1	5
UK	Mandatory national codes apply to residential and commercial buildings (England only) Policy bans the rental of residential buildings that do not meet a minimum energy performance standard[10]	4	Rebates and grant	1	5
Canada	State or provincial codes that cover two-thirds of the population and apply to the renovated portion of residential and commercial buildings	3	Loans, grants, and rebates	1	4
China	Mandatory national codes apply to renovations in commercial buildings and urban residential buildings, but not to rural residential buildings	3	Grants and subsidies	1	4
Mexico	Mandatory national codes apply to residential and commercial renovations for only the renovated portion of the building	3	Subsidies and Loans	1	4
Poland	Mandatory national codes apply to residential and commercial renovations for only the renovated portion of the building	3	Grants	1	4
Saudi Arabia	Mandatory national codes apply to residential and commercial renovations for only the renovated portion of the building	3	Rebates	1	4
South Africa	Mandatory national codes apply to residential and commercial buildings for only the renovated portion of the building	3	Tax incentive	1	4

[10] https://www.gov.uk/guidance/domestic-private-rented-property-minimum-energy-efficiency-standard-landlord-guidance.

Country	Building retrofit policies	Score	Incentives	Score	Total score
South Korea	Mandatory national codes apply to residential and commercial buildings for only the renovated portion of the building	3	Rebates	1	4
Spain	Mandatory national codes apply to residential and commercial buildings for only the renovated portion of the building.	3	Loans and grants	1	4
Turkey	Mandatory national codes apply to residential and commercial buildings for only the renovated portion of the building	3	Loans and grants	1	4
U.S.	State codes that cover two-thirds of population apply to residential and commercial renovations	3	Loans, rebates, grants, and tax incentives	1	4
Japan	Mandatory national codes apply to residential and commercial buildings for only the renovated portion of the building	3	Grants	1	4
Australia	State or provincial codes vary in coverage of residential and commercial buildings	2	Loans and grants	1	3
Malaysia	Mandatory building performance standard that applies only to commercial buildings	2	Loans	1	3
Russia	Mandatory national codes apply to residential and commercial renovations for only the renovated part portion of the building	3	None	0	3
Taiwan	Mandatory national codes apply to any retrofit projects of 1,000 sq. meters or more	2	Subsidy	1	3
UAE	State or provincial codes vary in coverage of residential and commercial buildings	2	None	0	2
Thailand	Mandatory national codes apply only to commercial renovations	2	None	0	2
Brazil	No code	0	Loans	1	1
Egypt	No code or policy	0	None	0	0
India	Voluntary national code does not apply to retrofits	0	None	0	0
Indonesia	No code or policy	0	None	0	0

Source: ACEEE country research

Building rating and disclosure policies (3 points)

The building rating and disclosure policies metric awards points to countries based on the types of policies they have implemented, such as energy performance certificates, which require a standardized energy rating for buildings. These ratings provide building owners and occupants with clear information about a building's energy use and associated costs, much like appliance labels. Mandating the disclosure

of this information can help buyers, tenants, and lenders better understand the value of energy efficiency during transactions such as purchases, leases, or refinancing. It also offers policymakers key insights into building energy performance across the market. Scores for this metric are based on the presence of both a mandatory building rating system and mandatory disclosure of energy use.

We awarded the full 3 points for this metric to countries with mandatory building rating and disclosure requirements covering all building types, including new and existing commercial and residential buildings. Countries received 2 points if their mandatory policies applied only to new buildings or to a limited subset of buildings (e.g., only commercial ones). We gave 1 point to countries with voluntary rating and disclosure policies that apply across all building types. Countries without any such policies in place received 0 points. Table 30 lists the scores on this metric.

Table 30. Scores for building rating and disclosure policies

Country	Building rating	Buildings covered	Score
France	Mandatory	All	3
Germany	Mandatory	All	3
Italy	Mandatory	All	3
Poland	Mandatory	All	3
Spain	Mandatory	All	3
Turkey	Mandatory	All	3
UAE	Mandatory	Some	2
UK	Mandatory	All*	3
Australia	Mandatory	Some	2
China	Mandatory	Some	2
Indonesia	Mandatory	Some	2
Japan	Mandatory	Some	2
Malaysia	Mandatory	Some	2
Russia	Mandatory	Some	2
South Africa	Mandatory	Some	2
South Korea	Mandatory	Some	2
Taiwan	Mandatory	Some	2
Brazil	Voluntary	All	1
Saudi Arabia	Voluntary	All	1
U.S.	Voluntary	All	1
Canada	Voluntary	Some	0
Egypt	No labeling	—	0
India	Voluntary	Some	0
Mexico	Voluntary	Some	0
Thailand	No labeling	—	0

*Requirements in UK are the same as in France, Germany, and so on.

Energy intensity of residential and commercial buildings

Energy use intensity (EUI) of buildings measures how much energy a building consumes relative to its size. EUI reflects the efficiency of the building's structure, systems, and appliances, and it is influenced by factors such as floor area, climate, occupancy, and economic activity (IPEEC 2015). EUI is calculated by dividing total energy consumption by the building's gross floor area, with lower EUI values generally indicating better energy performance.

For this *Scorecard* edition, we calculated EUI for each country's residential and commercial building stock. Our evaluation accounted for GDP, population size, and floor area differences, with adjustments made for climate and service-sector GDP to ensure comparability across countries.

Countries could earn up to 3 points for the commercial building energy intensity metric and 4 points for residential buildings, for a total of up to 7 points. We received residential and commercial floor space data for a subset of countries from the IEA's Energy Efficiency Indicators database and paired it with IEA data on building sector energy use. Due to licensing restrictions, we are unable to display country-specific data in a table. Instead, Figures 4 and 5 present the results for residential and commercial EUI per unit of floor area.

Residential (4 points)

We used two key metrics to assess residential building energy use across the evaluated countries: EUI per unit of floor area and energy use per capita.

The EUI metric measures residential energy consumption relative to total floor area, which indicates how efficiently homes operate based on their size. As buildings become more efficient through better insulation, tighter envelopes, and more efficient equipment and appliances, less energy is needed to serve the same amount of space.

The second metric, residential energy use per capita, reflects how much energy is used across the residential building stock in relation to the population it serves. This helps normalize for home size and account for population-driven energy demand, offering insight into how efficiently a country provides energy services to its residents.

Average home size varies significantly by country, which affects how these metrics should be interpreted. For example, homes in the United States, Canada, and Australia are nearly twice as large as those in many other countries (World Population Review 2025). Although energy use for space heating and cooling tends to scale with building size, other end uses, such as cooking, refrigeration, and water heating, do not. As a result, countries with larger homes can appear more energy efficient under the EUI metric, even if their total energy use per household is higher (IPEEC 2015).

To ensure consistency, we applied the same methodology across countries when calculating both EUI and per capita energy use. Most countries track residential floor area or floor area per capita through national censuses. In cases where data were missing, we calculated residential floor area using alternative data sources, such as average dwelling size, the total number of dwellings, and the share of total building stock classified as residential.

We used final energy consumption[11] for residential buildings, as primary energy use by sector was not available for every country. To improve comparability across climates, we adjusted EUI values based on heating and cooling degree days[12] (HDDs and CDDs) and the share of residential energy used for space conditioning in each country. This climate normalization helps ensure that countries with extreme temperatures are not unfairly penalized compared to those in milder climates.

In this edition of the *Scorecard*, we increased the maximum points available for residential building energy intensity from 3 to 4. This change lets us recognize countries with strong policies aimed at reducing building energy use, as well as to give greater credit for the actual energy performance of their residential building stock. Appendix B describes our full methodology for normalizing heating and cooling energy use across countries.

Tables 31 and 32 show point allocations for residential energy intensity and residential building energy use per capita, and table 33 provides the energy intensity values and corresponding scores for the residential sector. Because residential building energy intensity was normalized for climate using HDDs and CDDs, the values in table 33 should be interpreted as relative indicators rather than absolute comparisons.

Table 31. Scoring criteria for residential energy intensity

Final energy use per unit of floor area (MMBtu/m^2)	Score
0.0–0.29+ MMBtu	2
0.3–0.49 MMBtu	1.5
0.50–0.69 MMBtu	1
0.70+ MMBtu	0

Table 32. Scoring criteria for residential energy intensity per capita

Final energy use per capita (MMBtu/capita)	Score
<6.0	2
6.0–11.9	1.5
12.0–17.9	1
≥ 18.0	0

Table 33. Scores for residential energy intensity

Country	Score for MMBtu/m2	MMBtu/capita	Score for MMBtu/capita	Total score
Brazil	2	5.5	2	4
Indonesia	2	2.85	2	4
Mexico	2	5.89	2	4

[11] Final energy consumption is the energy used by all end uses. For buildings, final energy consumption would be the energy used by all residential buildings or services (commercial) buildings. Final energy consumption is sometimes referred to as site energy consumption.

[12] Heating degree days and cooling degree days are measurements designed to reflect the demand for energy needed to heat or cool a home or business to a human comfort level of 18°C (65°F).

Country	Score for MMBtu/m2	MMBtu/capita	Score for MMBtu/capita	Total score
China	2	8.57	1.5	3.5
Egypt	1.5	4.19	2	3.5
India	1.5	4.39	2	3.5
Malaysia	1.5	4.33	2	3.5
South Africa	1.5	5.63	2	3.5
Taiwan	2	9.90	1.5	3.5
Spain	2	12.10	1	3
Turkey	1.5	10.48	1.5	3
UAE	1.5	7.86	1.5	3
France	1.5	14.59	1	2.5
Germany	1.5	17.83	1	2.5
Italy	1.5	17.89	1	2.5
Japan	1.5	12.72	1	2.5
Poland	1.5	14.04	1	2.5
Saudi Arabia	1.5	12.12	1	2.5
South Korea	1.5	13.81	1	2.5
UK	1.5	12.58	1	2.5
Australia	2	22.82	0	2
Thailand	0	4.00	2	2
Canada	1.5	24.80	0	1.5
U.S.	1.5	29.93	0	1.5
Russia	0	23.03	0	0

Sources: IEA 2025b (for floor space); IEA country profiles (energy consumption in residential buildings); ACEEE data requests; World Bank 2025e (population data)

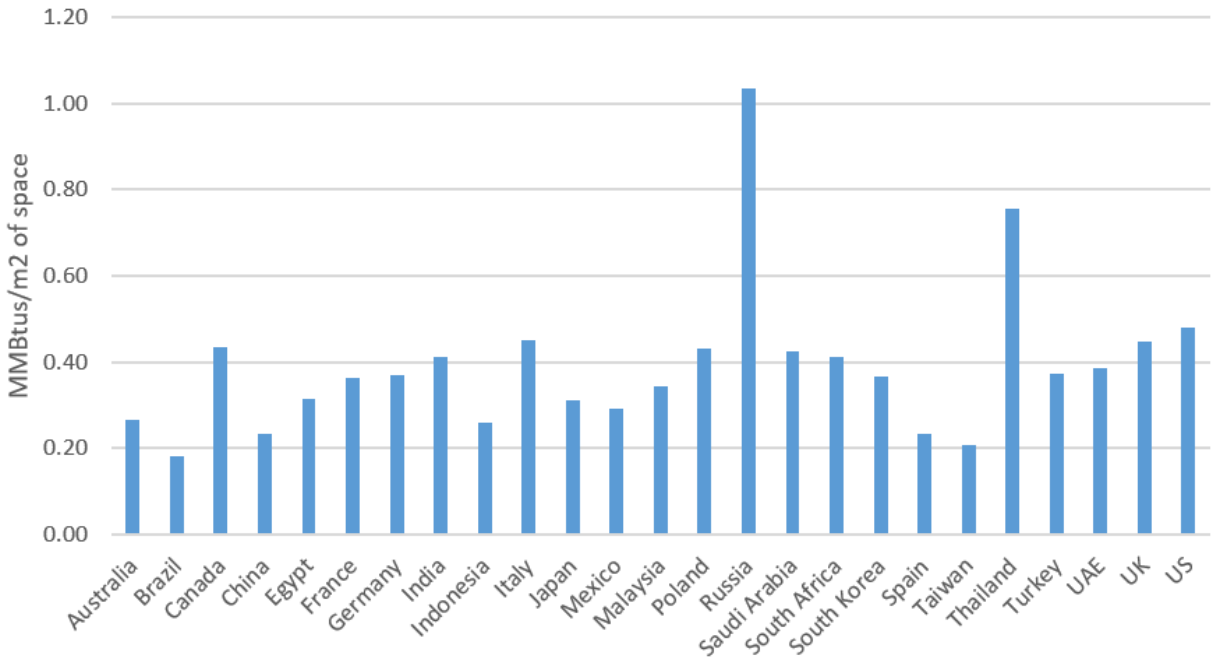

Figure 4. Final energy intensity in residential buildings (MMBtu/m^2)

Commercial (3 points)

We evaluated the energy intensity of commercial buildings using two metrics: energy use per unit of floor area and energy use per dollar of service-sector GDP, which helps isolate building energy trends from broader economic differences. Because many countries do not consistently report commercial floor area data, we relied on the best available information from different years. To estimate commercial-specific figures, we used data such as the total number of buildings, the share of commercial buildings in the overall building stock, and the total floor area across both residential and commercial sectors. However, differences in the level of energy services such as equipment penetration rates and usage intensity across countries can also influence commercial energy use, but are not fully captured by these metrics. This is an important caveat when comparing countries.

Tables 34 and 35 show point allocations for commercial energy intensity and commercial energy use per unit of service-sector GDP, respectively. Table 36 shows the results and scores.

Table 34. Scoring criteria for commercial energy intensity

Final energy use per unit of floor area (MMBtu/m^2)	Score
0.0–0.69 MMBtu	1.5
0.71–1.30 MMBtu	1
1.31–2.00 MMBtu	0.5
2.01+ MMBtu	0

Table 35. Scoring criteria for commercial energy use per unit of service-sector GDP

Final energy use per service-sector GDP (MMBtu/$GDP)	Score
<450	1.5

450–649	1
650–849	0.5
≥ 850	0

Table 36. Scores for energy intensity in commercial buildings

Country	Score for MMBtu/m^2	MMBtu/ service $GDP	Score for MMBtu/service $GDP	Total score
Australia	1.5	262	1.5	3
Brazil	1.5	443	1.5	3
China	1.5	396	1.5	3
Germany	1.5	346	1.5	3
Mexico	1.5	134	1.5	3
Spain	1.5	331	1.5	3
Taiwan	1.5	441	1.5	3
France	1	367	1.5	2.5
Indonesia	1.5	466	1.0	2.5
Italy	1	375	1.5	2.5
UK	1	208	1.5	2.5
U.S.	1	406	1.5	2.5
Egypt	1.5	740	0.5	2
India	1	507	1.0	2
Japan	1	602	1.0	2
Poland	1.5	687	0.5	2
South Africa	1.5	722	0.5	2
South Korea	1	811	0.5	1.5
Thailand	0.5	624	1.0	1.5
Canada	0.5	719	0.5	1
Turkey	1	940	0.0	1
Malaysia	0	843	0.5	0.5
Saudi Arabia	0.5	891	0.0	0.5
Russia	0	1373	0.0	0.0
UAE	0	895	0.0	0.0

Sources: IEA Energy Efficiency Indicators 2025 (for floor space data); IEA country profiles (energy consumption in commercial buildings); ACEEE data requests; World Bank 2025c (GDP)

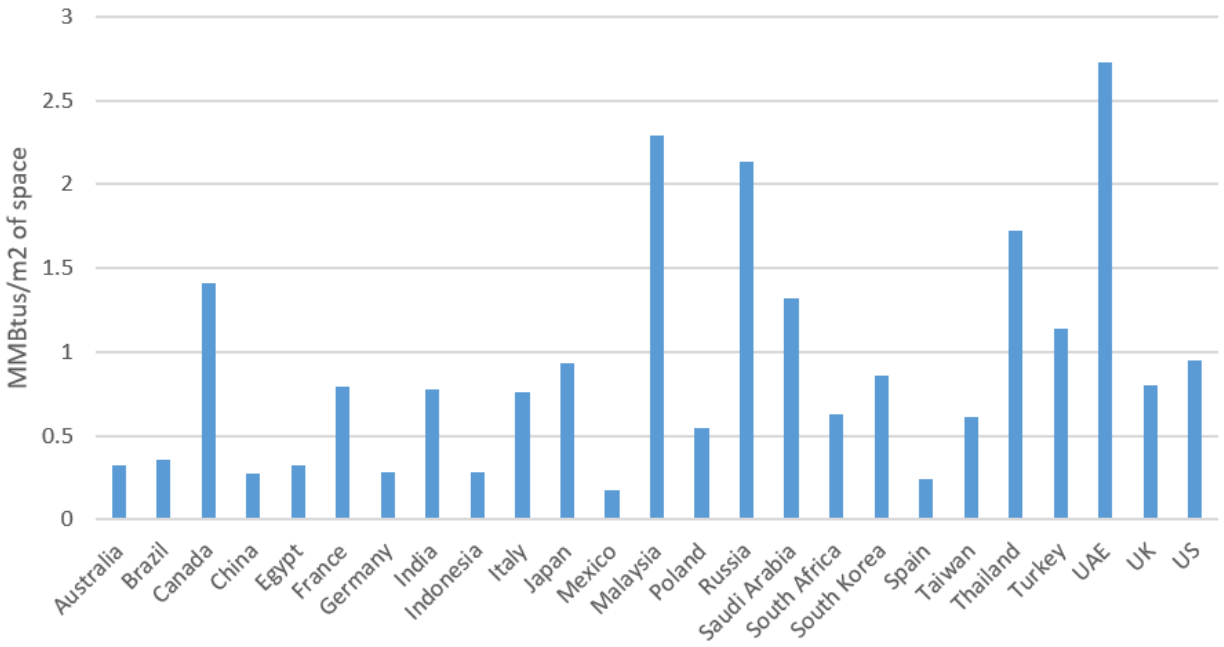

Figure 5. Final energy intensity in commercial buildings (MMBtu/m^2)

Buildings best practices

Germany. Germany earned the highest score in the 2025 *Scorecard's* building chapter, with 23 points. Most of these points come from Germany's robust building policies. Its residential and commercial building codes cover all the building envelope and system components that the *Scorecard* evaluates. Germany's Building Energy Act plays a central role in ensuring that existing buildings also improve efficiency, mandating upgrades to insulation and replacement of oil and gas heating systems that are more than 30 years old in buildings larger than 250 square meters. The act also requires energy performance certificates for all existing buildings with space heating or cooling that are listed for sale or rent.

As with all EU countries in the *Scorecard*, Germany follows the region's mandatory appliance and equipment labeling and minimum energy performance standards (MEPS), earning strong marks for these metrics due to their consistent and mandatory application. In terms of performance metrics, Germany showed improvement in the energy intensity of commercial buildings, achieving lower energy use per square meter and per unit of service-sector GDP compared to 2022. However, residential energy performance lagged behind top scorers such as China and Spain, indicating that despite its strong policy foundation, Germany still has room to accelerate efficiency gains in the residential sector.

France, Italy, and Spain. France, Italy, and Spain tied for second place in this year's buildings chapter, each earning 22.5 points due to their strong policy frameworks and alignment with EU MEPS and appliance standards. **France's** comprehensive codes apply to both commercial and residential buildings, require efficiency improvements during major renovations, and include a provision targeted at requiring existing buildings with a floor area of 1,000 square meters or more to meet energy performance targets. To drive retrofits and encourage energy efficiency in existing buildings, the Climate and Resilience Law enacted a provision, effective in 2025, that prohibits the rental of

properties rated with the lowest score on the national energy performance certificate framework. Rental restrictions remain in place until the property's rating is improved through energy-saving upgrades. Programs such as MaPrimeRénov provide incentives for upgrading insulation or replacing heating and hot water systems.

Spain has similarly comprehensive codes and building rating and disclosure policies, but it lost a point for this metric for not requiring renovations to improve overall building performance. It benefits from EU-wide appliance standards and labeling. Spain's strong policies are reflected in performance metrics, with each showing lower residential energy intensity per capita and commercial energy intensity per unit of service-sector GDP compared to previous *Scorecards*.

Italy. Italy received many points across the same policy areas as Spain, France, and Germany, including appliance and equipment labeling, mandatory energy codes for residential and commercial buildings, and building retrofit policy. The nation's Superbonus government incentive offers tax deductions for residential energy efficiency upgrades such as insulation, efficient windows, and heating, ventilation, and air conditioning (HVAC) systems, provided projects meet specific performance targets. However, in terms of performance, Italy had the highest residential energy use intensity per capita and per square meter among the three tied countries, indicating that its buildings are less energy efficient than those in France and Spain.

China. China maintained its rank in this year's buildings chapter, rounding out the top five highest scorers in the chapter with a score of 21.75. China has comprehensive building codes for both commercial and residential buildings, though residential codes are mandatory only in urban areas and air sealing is not covered. Following the United States and EU countries, China stands out for its extensive MEPS for appliances and equipment. It leads all *Scorecard* countries in the number of product types with mandatory categorical energy labels—41 in total—which help guide energy-efficient purchasing decisions.

However, China's building rating and disclosure policies lag top scorers, as current requirements apply only to new, expanded, or reconstructed buildings and (unlike in the EU) they are not linked to energy upgrade obligations. On performance metrics, China showed stable residential energy intensity per capita and a notable improvement in commercial building efficiency, achieving the fourth-lowest energy intensity per unit of service-sector GDP among all countries analyzed.

United States. Alongside France and Spain, the United States has long been a leader in advancing energy efficiency policies for buildings. While residential and commercial building codes are adopted at the state and local levels—preventing the United States from receiving full points in those *Scorecard* categories—the country's model energy codes are among the most advanced globally. These codes include a comprehensive set of design and performance requirements for building envelopes and energy systems, and they are projected to deliver $138 billion in energy cost savings and avoid 900 million metric tons of CO_2 emissions cumulatively from 2010 to 2040 (U.S. DOE 2025a).The U.S. score could be strengthened further by adopting mandatory building codes nationwide and implementing a mandatory building energy performance labeling system, as the current ENERGY STAR certification remains voluntary.

Industry

Author: Andrew Hoffmeister

The industrial sector accounts for approximately 37% (166 exajoules) of the world's total final energy consumed, more than any other end-use sector. The sector also contributed 23% of global emissions, not including its electricity consumption (IEA 2025e). In 2019, the most recent year for which such data are available, industry was responsible for almost 42% of global electricity consumption (IEA 2019). For the *International Scorecard* industry chapter, we captured country-specific data on energy efficiency performance and policies for 11 different metrics, with a maximum possible score of 25 points. We measured the energy intensity of industry and agriculture, as well as industry's R&D investment. We also evaluated national targets for industrial decarbonization (with an extra point awarded for electrification goals) and standards for industrial motors and fans. We scored voluntary agreements with manufacturers, mandates for naming energy managers, mandatory energy audits, and the presence of a policy encouraging energy management systems (EnMS). Finally, we determined each country's final energy consumption in industry and awarded points for higher proportions of that energy supplied by electricity, waste heat, and biofuels. We discuss the scope of these metrics in the following sections.

France and the UK tied for the highest score (24 points each), followed by Italy and Taiwan (23.5 points each) and Germany (23 points). The highest scoring countries had low energy intensities (worth 6 total points) as well as standards and mandatory industrial activities to meet those standards. Industrial electrification, newly evaluated in this *International Scorecard* edition is often the lowest-cost, most-efficient approach to de-fossilizing industrial process heat use. Final energy consumption provided by electricity and national targets for electrifying carried the highest scoring countries to their final standings.

The policies used to encourage best-practice energy efficiency measures vary between countries with regional differences and varying development levels. No country earned a perfect score. The variations in industrial energy mix and regional policies are discussed in the next section. As with previous *Scorecards*, European countries performed well across most metrics, as the EU requires various standards and energy audits for industrial facilities of certain sizes.

We added several new measures to more accurately capture the progressing landscape of industrial energy efficiency best practices. The first new metric was standards for industrial fans (worth 1 point); countries earned their scores based on MEPS, fan motor efficiency grades, or what we considered to be functionally equivalent regulations. We added a category on national targets for industrial decarbonization—inclusive of measures that have net-zero or carbon neutral or negative goals economy wide—and electrification objectives (worth 2 points). We also evaluated final energy consumption of industry and awarded points for percentages provided by electricity, waste heat, and/or biofuels (worth 2 points). This final category replaced CHP installed capacity, which we did not consider adequate to reflect best available efficiency efforts in the industrial space. To accommodate new categories, we reduced the maximum scores possible in voluntary agreements with manufacturers by 2 points and policies to encourage energy management systems by 1 point.

Table 37 shows each country's total and metric specific scores.

Table 37. Industry chapter scores

Country	Total score (25 points)	Energy intensity of industry (6 points)	Energy intensity of agriculture (2 points)	Voluntary agreements with manufacturers (2 points)	Mandate for energy managers (2 points)	Mandatory energy audits (2 points)	Energy management systems policy (2 points)	Standards for motors (2 points)	Standards for fans (1 point)	Investment in R&D (2 points)	Target for industrial decarbonization (2 points)	Final energy consumption (2 points)
France	24.0	6	1.5	2	2	2	2	2	1	2	2	1.5
UK	24.0	6	1.5	2	2	2	2	2	1	2	2	1.5
Italy	23.5	6	1.5	2	2	2	2	2	1	1.5	2	1.5
Taiwan	23.5	6	1.5	2	2	2	2	2	1	2	1	2
Germany	23.0	6	1.5	1	2	2	2	2	1	2	2	1.5
Japan	20.5	6	1	2	2	2	1	2	0	2	1	1.5
Spain	19.5	4	1.5	2	0	2	2	2	1	1.5	2	1.5
South Korea	19.0	5	1	2	0	2	1	2	1	2	1	2
China	18.5	2	2	2	2	2	1	2	1	1.5	2	1
Turkey	18.5	4	1.5	2	2	2	1	2	0	1	2	1
Malaysia	16.5	5	2	1	2	2	1	0	1	0.5	1	1
Poland	15.5	3	1	2	0	2	0	2	1	1	2	1.5
India	15.0	0	2	2	2	2	2	1	1	0.5	1	1.5
U.S.	13.0	5	1	1	0	0	1	2	0	2	0	1
Canada	11.5	0	0	2	0	0	1	2	1	1.5	2	2
Thailand	10.5	1	2	2	0	2	1	0	0	1	0	1.5
Indonesia	10.0	1	2	1	2	2	0	0	0	0	1	1
Australia	8.5	2	1.5	0	0	0	0	1	0	1.5	1	1.5
Saudi Arabia	8.5	2	2	0	0	2	0	2	0	0.5	0	0
Brazil	7.5	0	1.5	0	0	0	1	2	0	1	0	2
Mexico	6.5	1	1.5	0	0	0	0	2	0	0	0	2
South Africa	6.5	0	0.5	1	0	0	0	2	0	0.5	1	1.5

Country	Total score (25 points)	Energy intensity of industry (6 points)	Energy intensity of agriculture (2 points)	Voluntary agreements with manufacturers (2 points)	Mandate for energy managers (2 points)	Mandatory energy audits (2 points)	Energy management systems policy (2 points)	Standards for motors (2 points)	Standards for fans (1 point)	Investment in R&D (2 points)	Target for industrial decarbonization (2 points)	Final energy consumption (2 points)
Russia	5.0	0	1	0	0	2	0	0	0	0.5	0	1.5
UAE	4.5	0	1.5	0	0	0	0	0	1	1	1	0
Egypt	4.0	1	0	0	0	0	0	2	0	1	0	0

Energy intensity of industry (6 points)

Countries differ significantly in the makeup of their industrial sectors. Some rely heavily on large, energy-intensive manufacturing, while others have different priorities and end uses due to geography, available resources, and economies. Energy consumption changes according to these end uses, as do the best pathways toward encouraging and regulating energy efficiency. The scope of this *Scorecard* and metric is also limited by available data, and it does not include imports and exports but rather evaluates the energy intensity of industry as a whole based on consumed energy per dollar of industrial GDP.

We calculated our final figures by finding raw energy intensities of industry in overall consumption and overall industrial GDP. We adjusted these numbers (for the reasons stated above) by developing a weighting factor and determining a value-added additive, which is new to this *Scorecard* edition. For a full description of our methodology in this metric, see Appendix A.

Utilizing a performance metric that intends to compare industrial energy intensity is inherently problematic because of the limits on available data and the disparity in the economic and infrastructure development of countries around the world. Countries with more GDP to support R&D and more infrastructure buildout have an inherent advantage over countries that are still developing. The weighted measure of energy intensity accounts for this difference to some degree, but the value in comparison is primarily to identify best practices and variation in outcome, rather than to indicate a disparity in intention.

If possible, future *Scorecard* editions should look to evaluate import and export effects as part of the broader analysis. However, even this information is limited as some countries have significantly more information available on their industrial energy end uses than others.

Table 38 shows the scores by country. Six countries received full points for this metric, for total combined energy intensities <8. These figures differ significantly from previous editions of the *Scorecard* because of different International Standard Industrial Classification (ISIC) data points available and new data available for value added by manufacturing sectors (World Bank 2025d). Some industrial sectors evaluated in past *Scorecards* did not have ISIC data, while some new ones did.

Table 38. Scores for energy intensity of industry

Country	Weighted intensity	Value-added intensity (kBtu/2023 US$ added)	Total (kBtu/2023 US$)	Score
UK	2.20745863	2.946375	5.153834	6
Germany	2.7554016	2.529418	5.28482	6
Italy	2.8184902	2.784871	5.603361	6
France	2.7266896	3.599474	6.326164	6
Japan	2.9582375	3.648747	6.606985	6
Taiwan	3.28258155	4.243493	7.526074	6
South Korea	3.89231359	4.532542	8.424856	5
U.S.	3.96195104	4.464582	8.426533	5
Malaysia	0.42712206	8.407288	8.83441	5
Spain	5.26262767	4.003894	9.266522	4
Poland	5.6953937	4.409612	10.10501	4
Turkey	4.17575436	6.060195	10.23595	3

Country	Weighted intensity	Value-added intensity (kBtu/2023 US$ added)	Total (kBtu/2023 US$)	Score
Australia	1.47237175	9.718834	11.19121	2
Saudi Arabia	1.00785432	10.26021	11.26806	2
China	2.358771	9.615086	11.97386	2
Egypt	1.5381832	10.61479	12.15297	1
Mexico	8.8318039	3.537266	12.36907	1
Indonesia	2.20548297	10.60065	12.80614	1
Thailand	3.71853176	9.754873	13.4734	1
Brazil	7.06410639	11.72403	18.78814	0
UAE	1.54315185	21.73899	23.28215	0
South Africa	5.81087034	17.86388	23.67475	0
India	4.38728721	23.4046	27.79189	0
Russia	4.93091013	23.81313	28.74405	0
Canada	17.7674984	12.34471	30.11221	0

Sources: IEA 2025a, 2023b; World Bank 2025c, 2025d

Voluntary agreements with manufacturers (2 points)

Voluntary agreements are arrangements between governments and industrial companies or industry groups through which manufacturers commit to energy efficiency improvements in their processes beyond regulatory requirements. We gave a maximum of 2 points for this category to countries that have programs that establish such agreements to reduce energy consumption and offer financial incentives or other support for participation or special achievement.

We decreased the score of this metric compared to the previous *Scorecard* due to limited changes in the creation of new voluntary agreements, as well as to reward other metrics demonstrating progress. Countries with agreements but no incentives received 1 point. Table 39 shows the scores by country; 13 countries received full points for this metric.

Mandate for energy managers (2 points)

Mandates for energy managers are laws or regulations requiring industrial facilities of a certain size to employ onsite experts in energy use or sustainability. Energy managers are critical for improving process energy efficiency, identifying new technologies for improvements, and integrating best practices into facilities. Smaller facilities may not have the financial means to hire a dedicated energy manager, and in some countries, federal programs exist to provide similar energy audit and recommendation services free of charge. This practice should be replicated along with the mandate to ensure that the entire sector has access to the resources needed to acquire energy efficiency savings and the cost reductions they enable.

Countries with a mandate received 2 points. As table 39 shows, in this *Scorecard*, 11 countries received points.

Mandatory energy audits (2 points)

Energy audits are regular, systematic evaluations of facility energy use. The audits are designed to help industrials identify opportunities for energy efficiency and technology improvements, as well as to identify inefficiencies and potential corrections.

We awarded 2 points to countries that had national regulations requiring recurrent energy assessments of large facilities. As table 40 shows, 16 countries received points for this metric.

Table 39. Scores for voluntary agreements with manufacturers, mandate for energy managers, and mandatory energy audits

Country	Voluntary agreements with manufacturers	Mandate for energy managers	Mandatory energy audits	Total score
China	Agreements and incentives	Yes	Yes	6
France	Agreements and incentives	Yes	Yes	6
India	Agreements and incentives	Yes	Yes	6
Italy	Agreements and incentives	Yes	Yes	6
Japan	Agreements and incentives	Yes	Yes	6
Taiwan	Agreements and incentives	Yes	Yes	6
Turkey	Agreements and incentives	Yes	Yes	6
UK	Agreements and incentives	Yes	Yes	6
Germany	Incentives	Yes	Yes	5
Indonesia	Agreements	Yes	Yes	5
Malaysia	Incentives	Yes	Yes	5
Poland	Agreements and incentives	No	Yes	4
Spain	Agreements and incentives	No	Yes	4
Thailand	Agreements and incentives	No	Yes	4
South Korea	Agreements and incentives	No	Yes	4
Russia	No agreements or incentives	No	Yes	2
Saudi Arabia	No agreements or incentives	No	Yes	2
Canada	Agreements and incentives	No	No	2
U.S.	Agreements	No	No	1
South Africa	Incentives	No	No	1
Australia	No agreements or incentives	No	No	0
Brazil	No agreements or incentives	No	No	0
Egypt	No agreements or incentives	No	No	0
Mexico	No agreements or incentives	No	No	0
UAE	No agreements or incentives	No	No	0

Sources: IEA 2025d, ACEEE country research

Policy to encourage energy management (2 points)

An EnMS is a framework that assists industrial organizations in managing energy use and efficiency improvements, and provides guidance for integrating EnMS practices into facility-level management. National governments can encourage the incorporation of EnMS practices in industrial facilities and can

require international standards for large industrials. For example, the International Standards Organization (ISO) adopted the ISO 50001 EnMS standard in 2011, which provides a common framework for energy management across industrial facilities. By 2023, more than 58,000 sites had achieved ISO 50001 certification, with thousands more still navigating the process (ISO 2023). This number has increased by almost 16,000 since the last *Scorecard* and is expected to continue to climb as companies develop more stringent corporate sustainability plans in line with energy and emissions reduction goals.

Because the number of ISO 50001 certified facilities depends on multiple factors, including the industrialization of a country's economy, we awarded points based on a percentage of participation. We found a total number of manufacturing facilities by country and compared the proportion of those facilities participating in the ISO standard. We awarded 2 points to countries with a national EnMS policy and more than 0.5% of their facilities certified ISO 50001. We awarded 1 point to those with a national EnMS policy and less than 0.5% of facilities certified under ISO 50001. Countries without an EnMS policy received no points.

Seven countries earned full points for this metric, as table 40 shows.

Table 40. Scores for policy to encourage energy management

Country	Energy management policy	Number of ISO 50001-certified facilities (2023)	Participation percentage	Score
Germany	Yes	24,028	11.66%	2
France	Yes	6,327	3.12%	2
Spain	Yes	4,957	2.88%	2
UK	Yes	3,466	2.51%	2
Italy	Yes	4,263	1.13%	2
Taiwan	Yes	1,403	0.89%	2
India	Yes	1,484	0.67%	2
Turkey	Yes	894	0.23%	1
South Korea	Yes	152	0.18%	1
U.S.	Yes	385	0.13%	1
Brazil	Yes	175	0.11%	1
China	Yes	143	0.04%	1
Canada	Yes	27	0.03%	1
Malaysia	Yes	69	0.03%	1
Thailand	Yes	150	0.03%	1
Japan	Yes	22	0.01%	1
Egypt	None	76	0.97%	0
UAE	None	182	0.56%	0
Indonesia	None	81	0.24%	0
Poland	None	415	0.18%	0
Mexico	None	59	0.08%	0
Saudi Arabia	None	61	0.06%	0
South Africa	None	22	0.04%	0
Russia	None	78	0.03%	0
Australia	None	29	0.02%	0

Sources: ISO 2023; UNIDO 2025

National target for industrial decarbonization (2 points)

National goals for industrial decarbonization, whether established in statute or in more informal private–public partnerships, are critical for progress in energy efficiency and other energy savings measures. They operate to inform industrials on the timelines for acquiring and/or installing recommended practices and technologies to reduce energy consumption and fossil fuel use. The certainty provided by national decarbonization targets enables more decisive market action and more rapid commercialization of critical technologies and their uptake in industrial processes.

We awarded 1 point for the presence of a national target for industrial decarbonization, regardless of end date or final goal. We included those policies that do not specifically mention industry but that include the entire economy. We awarded 1 extra point for goals that focus on industrial electrification, which we consider a best practice for encouraging decarbonization and efficiency, as electric technology alternatives can often operate 4–5 times (or higher) more efficiently compared to fossil fuel incumbents (Rightor et al. 2022). Electrification targets are essential for transforming the market for electric technologies and providing timelines for industrials to replace long-lasting inefficient systems.

Nine countries earned full points for this metric, as table 41 shows.

Table 41. Scores for national target for industrial decarbonization

Country	National commitment to industrial decarbonization	Electrification target	Score
Canada	Yes	Yes	2
China	Yes	Yes	2
France	Yes	Yes	2
Germany	Yes	Yes	2
Italy	Yes	Yes	2
Poland	Yes	Yes	2
Spain	Yes	Yes	2
Turkey	Yes	Yes	2
UK	Yes	Yes	2
Australia	Yes	No	1
India	Yes	No	1
Indonesia	Yes	No	1
Japan	Yes	No	1
Malaysia	Yes	No	1
South Africa	Yes	No	1
South Korea	Yes	No	1
Taiwan	Yes	No	1
UAE	Yes	No	1
Brazil	No	No	0
Egypt	No	No	0
Mexico	No	No	0
Russia	No	No	0
Saudi Arabia	No	No	0
Thailand	No	No	0

Country	National commitment to industrial decarbonization	Electrification target	Score
U.S.	No	No	0

Sources: IEA 2025c, ACEEE country research

Standards for motors (2 points)

Electric motor driven systems are responsible for more than 65% of total industrial electricity consumption (Gomez et al. 2020). Industrial motors are used to drive fans, pumps, compressors, and other essential equipment. Countries establish mandatory MEPS to ensure that their industrial sectors utilize the most efficient technologies available.

We scored this metric according to the efficiency classifications in place for electric motors. Countries with standards IE3 or higher received 2 points. Countries with a MEPS of IE2 or lower were given 1 point, while countries with no standards received 0 points.

A total of 18 countries received full points for this metric, as table 42 shows.

Standards for fans (1 point)

Industrial fans are large fans with no internationally specified size or capacity; they operate to provide ventilation, exhaust, drying, cooling, and other functions. In many industrials, fans are among the highest consumers of electricity. Although motors and motor standards do apply to the electric motors that drive fans, they do not fully account for their efficiency, which is also determined by factors including impeller design, fan housing, drive systems, and aerodynamic design (AMCA 2024).

Because there are no international standards for large commercial and industrial fans, we evaluated countries based on the presence of any laws standardizing fan efficiency. There are international societies and supranationals with their own fan standards, such as the American Society of Heating, Refrigerating and Air-Conditioning Engineers' (ASHRAE) Air Movement and Control Association International (AMCA) 208 for fan energy index and the EU's Fan Motor Efficiency Grade. In future *Scorecards*, there will hopefully be internationally agreed upon standards by which national laws can be compared.

As table 42 shows, 13 countries received points for fan standards.

Table 42. Scores for standards for motors and standards for fans

Country	Standards for motors	Standards for fans	Score
Canada	Yes > = IE3	Yes	3
China	Yes > = IE3	Yes	3
France	Yes > = IE3	Yes	3
Germany	Yes > = IE3	Yes	3
Italy	Yes > = IE3	Yes	3
Poland	Yes > = IE3	Yes	3
South Korea	Yes > = IE3	Yes	3
Spain	Yes > = IE3	Yes	3
Taiwan	Yes > = IE3	Yes	3
UK	Yes > = IE3	Yes	3
Brazil	Yes > = IE3	No	2

Country	Standards for motors	Standards for fans	Score
Egypt	Yes > = IE3	No	2
India	Yes	Yes	2
Japan	Yes > = IE3	No	2
Mexico	Yes > = IE3	No	2
Saudi Arabia	Yes > = IE3	No	2
South Africa	Yes > = IE3	No	2
Turkey	Yes > = IE3	No	2
U.S.	Yes > = IE3	No	2
Australia	Yes	No	1
Malaysia	No	Yes	1
UAE	No	Yes	1
Indonesia	No	No	0
Russia	No	No	0
Thailand	No	No	0

Sources: IEA 2024c, ACEEE country research

Investment in industrial R&D (2 points)

Energy efficiency and other energy savings technologies are a major outcome of industrial R&D investments (Laitner et al. 2012). We evaluated spending on industrial sector R&D as a percentage of total industrial GDP.

We awarded 2 points for R&D investments greater than 8% of industrial GDP, 1.5 points for 5–7.9%, 1 point for 3–4.9%, and 0.5 points for 1–2.9%. As table 43 shows, seven countries were awarded full points under this metric.

Table 43. Scores for investment in industrial R&D

Country	2024 investment in industrial R&D (% of industrial GDP)	Score
U.S.	20.45	2
UK	16.57	2
South Korea	16.46	2
Japan	12.64	2
France	11.89	2
Germany	11.57	2
Taiwan	9.95	2
Canada	7.56	1.5
Spain	6.97	1.5
Australia	6.86	1.5
China	6.79	1.5
Italy	6.11	1.5
Brazil	4.93	1
Poland	4.98	1
Turkey	4.58	1

Country	2024 investment in industrial R&D (% of industrial GDP)	Score
Thailand	3.65	1
UAE	3.14	1
Egypt	3.12	1
Russia	2.94	0.5
Malaysia	2.65	0.5
South Africa	2.44	0.5
India	2.40	0.5
Saudi Arabia	1.28	0.5
Mexico	0.95	0
Indonesia	0.75	0

Source: World Bank 2025g

Energy intensity of agriculture (2 points)

Agriculture is a key economic subsector that can be highly energy intensive. This subsector is included as part of industry in many energy calculations, but it is important to evaluate it separately from other industrial sectors. Agriculture should be considered distinct from manufacturing, especially because the two subsectors use different technologies and energy efficiency practices to save energy.

Important regional and economic differences must also be considered. Energy use can be higher in colder regions and in countries that have more industrialized agricultural sectors. The production of different crops and the cultivation of animals vary in energy use demands and conditions across countries. The sourcing and transportation of water are additional factors, along with food waste and practices that minimize waste.

Because of the scope and data constraints, we did not evaluate agricultural energy intensity weighted by specific end use. Instead, we measured energy intensity as the amount of energy consumed divided by agricultural GDP. Countries with an intensity of less than 0.05 kilograms of oil equivalent (koe) per dollar of GDP received 2 points, while countries with 0.05–0.10 received 1.5 points, countries with 0.15–0.20 received 1 point, and countries with 0.25–0.20 received 0.5 points.

Six countries received full points for the metric; table 44 shows the results by country.

Table 44. Scores for energy intensity of agriculture

Country	Energy intensity of agriculture (koe/$ agricultural GDP)	Score
Indonesia	0.006	2
Malaysia	0.014	2
Saudi Arabia	0.015	2
China	0.039	2
India	0.041	2
Thailand	0.049	2
UK	0.061	1.5
Mexico	0.062	1.5
Australia	0.065	1.5
Spain	0.065	1.5

Country	Energy intensity of agriculture (koe/$ agricultural GDP)	Score
Turkey	0.071	1.5
Taiwan	0.081	1.5
Brazil	0.083	1.5
France	0.087	1.5
Italy	0.087	1.5
UAE	0.087	1.5
Germany	0.095	1.5
U.S.	0.103	1
Japan	0.108	1
South Korea	0.120	1
Poland	0.142	1
Russia	0.149	1
South Africa	0.192	0.5
Canada	0.294	0
Egypt	0.347	0

Source: World Bank 2025a

Final industrial energy consumption (2 points)

Fossil fuels still account for more than 65% of the total energy consumed by industry. Industrial energy use is dominated by process heat—that is, the thermal energy used in manufacturing to create or treat finished products. Other industrial energy uses include process cooling and refrigeration, machine drives, and other processes. Common industries across the countries evaluated, including food and beverage, pulp and paper, chemicals, and refining, have process heat needs that can be met by electricity, waste heat, and biofuels. Technologies are developing further to reach even higher temperatures at extremely high efficiencies. This metric compares countries by the percentages of their final energy consumption provided by these alternative sources. The higher a country's consumption by electricity, waste heat, or biofuels, the lower their reliance on fossil fuel technologies to provide industrial process heat, and the more efficient, resilient, reliable, and future-proofed their manufacturing sector. This value also captures combined heat and power (CHP), the installed capacity of which was evaluated in previous *Scorecard* editions. As noted in the energy intensity of industry section, imports and exports are a significant factor as yet to be evaluated in the *Scorecard*. Imports of energy-intensive, fossil-fuel reliant products that are manufactured in other countries are not accounted for in this metric. The nature of global supply chains means that only the fuel mix of domestic manufacturing can be accurately measured. In future editions of the *Scorecard*, should data be available, it would be ideal to determine a weighting factor to heavy importing countries to adjust for products such as steel, iron, plastics, and others that are predominantly manufactured using fossil fuel driven heat.

For this *Scorecard*, we awarded 2 points for greater than 50% of final energy consumption provided by the alternative sources listed above, 1.5 points for greater than 40%, and 1 point for greater than 30%. For future *Scorecard* editions, it would be beneficial to compare data over multiple years to determine percentage changes in consumption over time and to evaluate energy consumption by percentages of industry with low-medium process heat needs to more accurately compare progress. Although light industry (food, beverage, chemicals, pulp and paper) has more electrification and other fossil fuel alternative applications ready for immediate implementation, there are rapidly advancing technology

options for other, harder to abate manufacturing subsectors. We broadly account for these differences in the energy intensity of industry metric. In future *Scorecard* editions, it would be ideal to identify percentages of electricity, biofuels, and waste heat consumption limited to process heat applications so as not to include other final energy uses. It would also be helpful to evaluate this metric while analyzing imported and exported goods to fully capture the impact of higher consuming, import heavy nations.

As table 45 shows, five countries received full points for this metric.

Table 45. Scores for final industrial energy consumption

Country	Final energy consumption—electricity (% of total)	Final energy consumption—biofuels, and waste heat (% of total)	Combined total (%)	Score
Brazil	22.50	48.30	70.80	2
Canada	35.20	12.90	48.10	2
Mexico	47.60	4.60	52.20	2
South Korea	50.40	11.70	62.10	2
Taiwan	53.20	8.00	61.20	2
Australia	29.80	11.00	40.80	1.5
France	34.40	7.0	41.40	1.5
Germany	33.40	9.00	42.40	1.5
India	18.60	28.80	47.40	1.5
Italy	38.70	3.10	41.80	1.5
Japan	36.30	5.10	41.40	1.5
Poland	30.30	15.70	46.00	1.5
Russia	20.90	28.60	49.50	1.5
South Africa	37.80	6.90	44.70	1.5
Spain	34.20	11.50	45.70	1.5
Thailand	24.20	23.40	47.60	1.5
UK	35.20	8.40	43.60	1.5
China	34.20	0.00	34.20	1
Indonesia	20.30	12.30	32.60	1
Malaysia	35.40	0.00	35.40	1
Turkey	33.20	6.20	39.40	1
U.S.	25.90	12.40	38.30	1
Egypt	25.70	0.00	25.70	0
Saudi Arabia	9.90	0.00	9.90	0
UAE	6.50	0.00	6.50	0

Source: IEA 2025a

Industry best practices

Taiwan improved its industrial energy efficiency ranking (from seventh to third) over the previous *Scorecard*, despite manufacturing several high energy-intensive products in high quantities (pharmaceuticals, machinery, and metals). It accomplished this through a deeply integrated decarbonization strategy reliant on public–private cooperation and smart manufacturing. Taiwan requires large energy users to perform regular energy audits, while also encouraging the use of Industry 4.0 strategies and technologies, including sensors and predictive measures to optimize energy use (MOEA 2025). Amid rising electricity costs for industrial end users, Taiwan's government offers efficiency best-practice diagnostic counseling, incentives for reducing energy use, and technology investment deductions (20–50% of improvement costs). Taiwan's Ministry of Economic Affairs works closely with ESCOs to help companies implement energy efficiency plans (Deloitte 2020). Taiwan also offers incentives for waste heat and cold recovery.

Germany has remained at or near the top of the *International Scorecard* industrial section for several successive editions. Germany's initiatives include Energy Efficiency Networks, wherein similar industrials form network groups of 10–15 peer companies that exchange best practices and set collaborative goals (Federal Ministry for Economic Affairs and Energy 2025). Germany also offers robust financial incentives through grants and low interest loans for small and medium enterprises (SMEs) to purchase efficient technologies—including electric tech and waste heat recovery options. Germany's energy efficiency policies are explicitly tied to strong climate goals; German industrials are required to meet specific energy efficiency targets as part of national climate regulations (Federal Ministry for Economic Affairs and Energy 2014). German industry also has a strong culture of engineering excellence and best-practice energy efficiency. The Germans have consistently remained at the top of ISO-50001 certified facilities, with almost 12% of manufacturing facilities certified (ISO 2023).

In France, there is a mandatory system where energy suppliers, rather than industrials themselves, are required to achieve energy savings for their clients by directly funding or incentivizing energy efficiency or other energy-saving measures (NValue 2024). Industrials request financial assistance to make upgrades to equipment and optimize their processes. France supplements these funding opportunities with additional grants including Agency for Ecological Transition (ADEME) grants and the Diwatt Program (French Agency for Ecological Transition 2025). France also requires the mandatory energy audits regulated by the EU's Energy Efficiency Directive but holds its industrials to more stringent penalties for noncompliance, including fines. France emphasizes a particular focus on circular economy efforts; it notably consumed more than 34% of its final energy used in industry as electricity (IEA 2025a).

Transportation

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The transportation sector is a major contributor to global final energy use (at 28%) and is also responsible for almost 25% of CO_2 emissions from energy use (IEA 2022; IRENA n.d.). Many countries have pledged to clean transportation goals—including zero-emissions vehicle targets to phase out cars, trucks, and buses—as part of their broader climate pledges. For the transportation chapter, we scored the 25 countries across 11 metrics—including 3 new ones—for a total of 25 points in this year's *Scorecard*. We scored countries for their fuel and emissions standards, EV sales share, efficiency of passenger and freight transportation systems, public transit use, and investments. These metrics represent a range of standards across different transportation modes that countries should aspire to improve in to reduce national fuel consumption and energy usage, as well as to achieve their clean transportation goals, which more and more countries are pledging to. For the most part, the metrics exclude aviation and shipping, which may be included in future *Scorecards*.

The 2025 International Energy Efficiency Scorecard points for transportation were distributed as follows:

- Fuel economy and emissions standards (9 points)
  - Fuel economy/emissions standards for passenger vehicles (3 points)
  - Fuel economy for light-duty vehicles (LDVs) (3 points)
  - Fuel economy/emissions standards for heavy-duty trucks (3 points)
- Electric vehicle (EV) sales share (6 points)
  - Electric light-duty passenger vehicles sales share (3 points)
  - Electric medium- and heavy-duty (MDHD) vehicles sales share (3 points) ***NEW***
- Vehicle miles traveled (VMT) per capita (3 points)
- Investment in rail transit versus road infrastructure (2 points)
- Use of public transit (2 points)
- Walking and cycling policies (1 point) ***NEW***
- Freight transport modal share (1 point) ***NEW***
- Smart freight initiatives (1 point)

France and UK were the top two performing countries in transportation this year, with 17.5 and 16 points, respectively. China, the third-best performing country with 15.5 points, made it back into the top five for the first time since 2018. Rounding out the top five were Italy and Germany. Most countries (18 of 25) scored less than 10 points. Since the previous *Scorecard*, Thailand had the largest point increase (4.5 points) due to improvements in metrics such as EV sales and fuel economy; it also benefitted from new metrics, such as non-road freight modal share. Spain saw the largest decline in points (3.5 points), due largely to not performing well in the fuel economy metric.

Countries did not perform well on the transportation metric in this *Scorecard*. With a total of 25 possible points overall, no country scored more than 20 points. As these results indicate, many countries have a long way to go in terms of improving the performance of their national transportation systems.

Countries can do better in implementing transportation policies that reduce energy use and promote energy-efficient modes of transportation, such as through more public transit use, lower VMT per capita, and increased EV deployments. Table 46 shows the results from the chapter.

Table 46. Transportation chapter scores

Country	Total score	Fuel economy/ emissions standards for passenger-vehicles (3 pts)	Fuel economy for light-duty vehicles (3 pts)	Fuel economy/emissions standards for heavy-duty tractor trucks (3 pts)	EV sales share—LDVs, MDVs, and HDVs (6 pts)	Vehicle miles traveled per capita (3 pts)	Investment in rail transit versus road infrastructure (2 pts)	Use of public transit (2 pts)	Walking and cycling policies (1 pt)	Freight transport modal share (1 pt)	Smart freight initiatives (1 pt)
France	17.5	2	2	3	4.5	1	2	0.5	1	0.5	1
UK	16	3	1	2	4.5	1	2	0.5	1	0	1
China	15.5	1	1	2	5.5	2	0	2	0	1	1
Italy	14.5	2	3	3	1.5	1	2	0.5	0.5	0	1
Germany	14	2	1	3	3	1	1	0.5	1	0.5	1
Spain	11.5	2	0	3	2.5	1.5	1	0.5	1	0	0
Canada	10	1	0	2	2.5	1	0.5	0	1	1	1
Poland	9.5	2	1	3	1	1	0.5	1	0	0	0
Taiwan	9.5	1	1	0	2.5	1.5	1	0.5	1	0	1
Japan	9	1	2	1	0	1.5	0.5	1	1	0	1
Turkey	9	0	3	0	2	2.5	0.5	1	0	0	0
South Korea	8.5	1	0	0	2	1.5	1	1	1	0	1
India	8	1	2	0	0	3	1	0	1	0	0
Brazil	7.5	0	1	0	1	2	0	1	1	0.5	1
Thailand	7.5	0	3	0	2	2	0	0	0	0.5	0
U.S.	6	1	0	2	1	0	0	0	0.5	0.5	1
Indonesia	6	0	0	0	1	3	0	0	1	0	1
Australia	6	1	0	0	2	1	0.5	0.5	0	1	0
Mexico	5.5	1	1	0	0	0	0.5	0.5	1	0.5	1
Egypt	5	0	1	0	0	2.5	1	0	0.5	0	0
South Africa	4.5	0	1	0	0	2.5	0	0	1	0	0
Russia	4	0	0	0	0	2	1	0	0	1	0
UAE	3	0	0	0	2	1	0	0	0	0	0

Country	Total score	Fuel economy/ emissions standards for passenger-vehicles (3 pts)	Fuel economy for light-duty vehicles (3 pts)	Fuel economy/emissions standards for heavy-duty tractor trucks (3 pts)	EV sales share—LDVs, MDVs, and HDVs (6 pts)	Vehicle miles traveled per capita (3 pts)	Investment in rail transit versus road infrastructure (2 pts)	Use of public transit (2 pts)	Walking and cycling policies (1 pt)	Freight transport modal share (1 pt)	Smart freight initiatives (1 pt)
Saudi Arabia	2.5	1	0	0	0	1	0	0	0.5	0	0
Malaysia	2	0	1	0	0	0	0	0	1	0	0

Fuel economy and emissions standards

Fuel economy/emissions standards for passenger vehicles (3 points)

Many countries set fuel economy and/or emissions standards to promote the efficient use of fuel and reduce GHG emissions for passenger vehicles. Fuel/emissions standards are indicative of a country's commitment to incorporating efficient fuel use for its vehicle fleets, improving public health, saving money, protecting the environment, and reducing its dependency on fossil fuels. These standards are set at the national level and often increase in stringency over time. Vehicle manufacturers are generally required to build vehicles that meet these national standards (usually averaged over their entire fleet). Fuel economy and emissions standards can be set on a wide range of metrics, such as liters of fuel used per 100 km (l/100 km), miles per gallon (mpg), and grams of carbon dioxide emitted per kilometer (gCO_2/km) or miles traveled (gCO_2/mi).

Traditionally, fuel economy has dictated vehicle efficiency. However, with an increase in global decarbonization targets and plans, countries are also choosing to set CO_2/GHG emissions standards instead of or in addition to fuel economy standards.

For this metric, we used the International Council on Clean Transportation (ICCT) "Passenger vehicle greenhouse gas emissions and fuel consumption data" tables, which provide information on national fuel consumption and emissions standards for cars (ICCT 2024). We used the passenger car emissions standards in gCO_2/km, standardized to the New European Driving Cycle (NEDC) test cycle as provided in ICCT's November 2024 data table.

Countries with passenger vehicle emissions standards resulting in less than 30 gCO_2/km by 2030 received the full score of 3 points, countries with emissions standards between 30–50 gCO_2/km by 2030 received 2 points, and countries with standards resulting in emissions of more than 50 gCO_2/km by 2030 received 1 point. For countries that did not update their fuel or emissions standards since the 2022 *Scorecard*, we used the values reported in 2022 for scoring. Some countries set standards for criteria air pollutant emissions such as carbon monoxide, nitrogen oxides, and particulate matter. While this metric did not score these non-fuel consumption and non-GHG emissions standards, they are nevertheless critical from a public health perspective.

Only the UK received the full 3 points for this category, as its target requires passenger cars to limit emissions to 22 gCO_2/km by 2030 (ICCT 2024). While countries such as the United States and those in the EU have updated and set emissions standards going beyond 2030 (to meet ambitious national targets), few of the countries we scored for this round had newer fuel or emissions standards. Canada received partial points for this metric, as it has not updated its emissions standards past 2026 since the previous *Scorecard*. However, it does have a mandatory national zero-emissions vehicle sales target of 100% for cars by 2035 (Government of Canada 2024). India is in the process of updating its fuel consumption standards for passenger vehicles (Narayan and Baruah 2024). As in the previous edition of the *International Energy Efficiency Scorecard*, all EU countries had the same data point for this standard's metric based on the ICCT data table. Table 47 shows the results.

Table 47. Scores for fuel economy/emissions standards for passenger vehicles

Country	2030 emissions standards (gCO_2/km)	Score
UK	22	3
Poland	43	2
France	43	2
Germany	43	2
Spain	43	2
Italy	43	2
U.S.	56	1
Australia	58	1
South Korea	65	1
Canada	76	1
Japan	83	1
Mexico	87	1
China	89	1
India	111	1
Saudi Arabia*	122	1
Taiwan*	128–176	1
Indonesia	No relevant standards	0
Russia	No relevant standards	0
South Africa	No relevant standards	0
Thailand	No relevant standards	0
Turkey	No relevant standards	0
UAE	No relevant standards	0
Egypt	No relevant standards	0
Malaysia	No relevant standards	0
Brazil	**No relevant standards**	**0**

*The Saudi Arabia and Taiwan standards converted from km/l to gCO_2/km. Sources: IEA 2024d (Saudi Arabia); ACEEE data request (Taiwan); ICCT 2024 (all other countries).

Fuel economy for light-duty vehicles (3 points)

Fuel efficiency expectations set by fuel economy or emissions standards may not meet fuel consumption of the actual vehicle fleet. As a result, this metric measures the performance of a country's LDV fleet by examining the vehicles' fuel consumption. Even if countries do not have any fuel economy standards, they might have fuel economy or fuel intensity data for their vehicle fleets.

Countries with an average on-road light-duty fuel economy greater than or equal to 42 mpg received the full 3 points, countries with an on-road fuel economy average of 36–41 mpg received 2 points, and those averaging 31–35 mpg received 1 point. We obtained 2022 data from the IEA's Energy End-uses and Efficiency Indicators Database for several countries. For most countries without 2022 data, we obtained data from each country's "fuel economy" page in IEA's *Global Fuel Economy Initiative 2021* report (IEA 2021a). For data from both the IEA database and report, we converted values from lge/100 km and l/100 km to mpg.

Given that the data for this metric are from 2019 and 2022 for most countries, the scores may not accurately reflect fuel economy improvements in the latest on-road vehicle fleet, especially efficiency improvements brought about by an increase in EVs. Although global EV sales share was 15% of all cars, the 2022 data for fuel consumption does not include electricity as a fuel source, making a comparison between countries that scored highly for passenger EV sales and fuel economy difficult (IEA 2025c). One study reports that in Thailand, fuel efficiency brought about by EVs improved the fuel economy of the country's LDV fleet by approximately 18% between 2018 and 2023 (Greigarn, Nanthachatchavankul, and Pattanatananon 2024). Table 48 shows the results.

Table 48. Scores for fuel economy for light-duty vehicles

Country	Average fuel economy (2022, mpg)	Average fuel economy (2022, l/100 km)	Score
Italy	Number hidden	Number hidden	3
Thailand*	43.56	5.4	3
Turkey**	42.77	5.5	3
India**	41.27	5.7	2
France	Number hidden	Number hidden	2
Japan	Number hidden	Number hidden	2
Taiwan**	35.90	6.6	1
UK	Number hidden	Number hidden	1
Malaysia**	33.13	7.1	1
Germany	Number hidden	Number hidden	1
China**	32.67	7.2	1
South Africa**	31.79	7.4	1
Brazil**	31.36	7.5	1
Poland***	Number hidden	Number hidden	1
Mexico**	30.95	7.6	1
Egypt**	30.16	7.8	1
Indonesia**	29.04	8.1	0
Spain	Number hidden	Number hidden	0
Russia**	28.34	8.3	0
Canada	Number hidden	Number hidden	0
South Korea	Number hidden	Number hidden	0
U.S.***	Number hidden	Number hidden	0
Australia	Number hidden	Number hidden	0
Saudi Arabia	No data available	No data available	0
UAE	No data available	No data available	0

Data for 2022 from IEA Energy End-uses and Efficiency Indicators Database (converted from l/100 km to mpg; data not publicly available). *Based on 2023 data, converted from km/l to mpg and l/100 km. **Based on 2019 data. ***Based on 2021 data. Sources: IEA 2021a, 2021b; Taiwan Ministry of Economic Affairs 2024; Greigarn, Nanthachatchavankul, and Pattanatananon 2024.

Fuel economy/emissions standards for heavy-duty trucks (3 points)

Unlike fuel economy and emissions standards for LDVs, standards for heavy-duty trucks are not as commonly regulated. Heavy-duty vehicles (HDVs) are more polluting than LDVs. Trucks and buses contribute to 35% of CO_2 emissions on the road even though they make up less than 8% of all vehicles (IEA 2024f). HDVs also use more fuel and have worse fuel efficiency due to their much heavier vehicle and load weight and demand for greater horsepower. For example, in the United States, the annual fuel use of a heavy-duty class 8 truck is 10,745 gasoline gallon equivalents, far exceeding a car's annual fuel use of 433 gasoline gallon equivalent, and its fuel economy is 5.70 mpg versus 24.40 mpg for cars (AFDC 2024a, 2024b). The regulation of HDVs can thus have large impacts on public health and fuel usage. Here, too, countries can choose to set either fuel efficiency or emissions standards for HDVs and have the regulations increase in stringency over time. Standards set for HDVs such as tractor–trailer trucks can be set in different metrics, such as l100 km, kilometers traveled per liter of fuel (km/l), and grams of carbon dioxide emitted per ton-kilometer (gCO_2/ton-km) or per ton-mile of freight transported (gCO_2/ton-mile).

Given the differences in truck types and test cycles across countries, we limited scoring for this metric to tractor–trailer trucks and based it on the percentage of fuel efficiency or emissions reductions required by 2030 compared to the standard's baseline year. Countries received the full 3 points for standards that required fuel or emissions reduction of at least 40% by 2030 relative to the standard' s baseline; 2 points for fuel or emissions requiring a reduction of 20–40% by 2030; 1 point for a reduction of 1–19.9% by 2030, and zero points if they did not have a standard in place. If a country did not have any standards for 2030, we used the fuel/emissions standards for the most recent year, that is, whenever the most standards ended. A few countries, including Australia, Brazil, and Russia, set standards for air pollutants, such as carbon monoxide and particulate matter. While emissions standards for air pollutants are important in limiting the negative health and environmental impact of diesel trucks, these standards were not a part of scoring this metric.

The status of fuel/emissions standards for heavy-duty tractor–trailer trucks varied widely among countries that had standards. While the United States and the EU had updated their standards for HDVs since the previous *International Scorecard*, Canada's standards had not been updated for vehicle model years after 2027. Canada nevertheless scored higher than the United States in this metric due to having more stringent standards than those set by the EPA in 2023. Although Taiwan does not have a standard for trucks, its Energy Saving Strategy aims to reduce 21,200 kiloliters of oil equivalent for HDVs between 2023 and 2030 (KLOE) (Taiwan data request, Taiwan Ministry of Economy Affairs). Table 49 shows the results.

Table 49. Scores for fuel economy/emissions standards for heavy-duty tractor trucks

Country	Reduction in fuel consumption or CO_2 emissions by 2030 for trucks (%)	Score
France	43	3
Germany	43	3
Italy	43	3
Poland	43	3
Spain	43	3
Canada	35	2
UK	30	2
China	26	2
U.S.	21	2
Japan	4	1
Australia	No relevant standards	0
Brazil	No relevant standards	0
Egypt	No relevant standards	0
India	No relevant standards	0
Indonesia	No relevant standards	0
Malaysia	No relevant standards	0
Mexico	No relevant standards	0
Russia	No relevant standards	0
Saudi Arabia	No relevant standards	0
South Africa	No relevant standards	0
South Korea	No relevant standards	0
Taiwan	No relevant standards	0
Thailand	No relevant standards	0
Turkey	No relevant standards	0
UAE	No relevant standards	0

Sources: Mulholland 2024 (EU countries); Mao, Ragon, and Rodríguez 2021 (China); UK Department for Transport 2020 (UK); Subramanian et al. 2022 (Canada); Transport Policy 2025 (Japan); ACEEE analysis (US)

Note: In the UK, HDVs, including rigid and tractor trucks, appear to be subject to the 30% by 2030 emissions reduction limits (Hall 2024). In the EU, the 43% target includes all heavy-duty trucks (Mulholland 2024).

Electric vehicle sales share

With road transportation contributing to 74% of transportation emissions, EVs are an important zero-emissions solution to reducing this sector's emissions (IEA 2023c). As countries seek to implement their broader decarbonization goals and deploy clean transportation solutions, light-, medium- and heavy-duty EVs are all gaining market share, although at different paces. In addition to helping reduce emissions, EVs provide both public health benefits by improving air quality and monetary savings by reducing fueling costs and maintenance needs.

Electric light-duty passenger vehicles sales share (3 points)

Light-duty EV sales share of the global car market more than doubled between 2021 and 2024, from 9.3% to 22% (IEA 2024a). We made minor adjustments to the scoring thresholds for this year's *Scorecard*. Countries with a light-duty passenger EV sales share of 20% or more earned 3 points, countries with a 10–20% sales share earned 2 points, and those with a 5–10% EV sales share earned 1 point. Countries with EV sales share below 5% did not receive any points. When collecting data for this metric, we included battery EV and plug-in hybrid EV sales share, as IEA does not disaggregate this data.

Countries with a high share of passenger EV sales rely on various types of policy mechanisms to promote EV sales. Taiwan, for example, provides subsidies to purchase EVs and replace regular vehicles with EVs, as well as tax exemptions to the Commodity Tax and Vehicle License Tax (International Trade Administration 2023; Chia-yi and Hiciano 2024). Regulations requiring either 100% zero-emissions vehicle sales by 2035 (as in the UK) or 100% reduction in emissions from cars by 2035 (the EU-wide emissions target) can also boost EV sales (UK Department for Transport, Office for Zero Emission Vehicles and Anthony Browne 2024; IEA 2023d).

Electric medium- and heavy-duty vehicle sales share (NEW) (2 points)

Although they do not contribute to the majority of on-road transportation emissions, trucks and buses are responsible for 35% of road transport CO_2 emissions—despite being less than 8% of total on-road vehicles (IEA 2024f). This makes electrification of MDHD vehicles, including vans, trucks, and buses, critical. Despite this, MDHD EV sales have seen slower growth than the light-duty side.

This metric is split into points for EV sales share percentage of commercial vans, buses, and commercial trucks. Countries with 15% or more of commercial van sales being electric earned 1 point, and countries with electric commercial van sales of 5–14% earned 0.5 points. Countries with an electric truck sales share >5% earned 1 point, while countries with a 2–4% electric truck share earned 0.5 points. Countries with 50% or more of electric bus sales share earned 1 point, and countries with 10–49% electric bus sales share earned 0.5 points.

Factors such as high upfront EV purchase costs for MDHD vehicles and daily range needs, split across different use cases have made the deployment of MDHD EVs challenging. Many countries offer policy support through purchase subsidies, emissions and sales targets, and grants (IEA 2024e). Overall, electric buses and commercial vans have seen a higher sales share than electric trucks—and in China's case, reached as high as 64% sales share for electric buses. For truck and van applications, Brazil, Japan, South Africa, and Taiwan have yet to see sales share reach 1%. Countries such as the UK that have ambitious electric HDVs sales targets by 2040 will need to ramp up MDHD EV sales to achieve their goals. Table 50 shows the results.

Table 50. Scores for electric vehicle sales share

Country	Passenger EV sales share (2024)[1]	Score	Commercial van EV market sales share (2024)[2]	Score	Commercial trucks EV market sales share (2024)[3]	Score	Buses EV market sales share (2024)[4]	Score	EV total score
China	48.00%	3	33.00%	1	4.40%	0.5	64.00%	1	5.5
France	24.00%	3	6.50%	0.5	3.20%	0.5	11.00%	0.5	4.5
UK	28.00%	3	6.60%	0.5	3.60%	0.5	23.00%	0.5	4.5
Germany	19.00%	2	4.90%	0	3.90%	0.5	16.00%	0.5	3
Canada	17.00%	2	7.00%	0.5	1.20%	0	5.90%	0	2.5
Spain	11.00%	2	2.70%	0	1.20%	0	15.00%	0.5	2.5
Taiwan	10.10%	2	0.17%	0	0.88%	0	40.00%*	0.5	2.5
Australia	13.00%	2	2.33%*	0	No data available	0	No data available	0	2
South Korea	9.20%	1	12.00%	0.5	3.87%	0.5	6.50%	0	2
Thailand	13.00%	2	No data available	0	No data available	0	No data available	0	2
Turkey	11.00%	2	0.20%	0	No data available	0	0.01%	0	2
UAE	13.00%*	2	No data available	0	No data available	0	No data available	0	2
Italy	7.90%	1	2.20%	0	0.58%*	0	18.00%	0.5	1.5
Brazil	6.40%	1	0.41%	0	0.56%*	0	0.50%*	0	1
Indonesia	7.30%	1	No data available	0	0.00%	0	No data available	0	1
Poland	5.70%	1	2.50%	0	0.35%*	0	8.40%	0	1
U.S.	10.00%	1	4.60%	0	0.10%*	0	2.80%	0	1
Egypt	No data available	0	No data available	0	No data available	0	No data available	0	0
India	2.10%	0	1.10%	0	0.08%*	0	5.70%	0	0
Japan	2.80%	0	0.85%	0	0.34%	0	1.10%*	0	0
Malaysia	3.60%	0	1.10%	0	0.00%	0	No data available	0	0
Mexico	2.20%	0	No data available	0	No data available	0	No data available	0	0
Russia	2.90%	0	No data available	0	No data available	0	No data available	0	0
South Africa	0.61%	0	0.25%	0	0.89%	0	0.34%	0	0
Saudi Arabia	No data available	0	No data available	0	No data available	0	No data available	0	0

*Based on 2023 data. Sources: [1]ACEEE data request (Taiwan); IEA 2024e (UAE), 2024c (all other countries). [2]Australian Automobile Association 2024 (Australia); IEA 2025c (all other countries). [3]IEA 2024f (United States); ACEEE data request (India, Poland, South Korea); IEA 2025c (all other countries). [4]IEA 2025c (all other countries).

Vehicle miles traveled per capita (3 points)

Understanding the VMT (or VKT) is another way to assess the travel demand for personal vehicles in a country. The VMT per capita metric can provide an estimate of the individual travel demand in a country by dividing the country's total travel demand for passenger cars for a year by the country's population for that year. Vehicle electrification and fuel/emissions standards alone are not sufficient to reduce the energy usage of the transportation sector; reducing individual VMT from cars can also reduce fuel consumption.

Countries that heavily rely on cars tend to have higher VMT per capita values compared to countries where personal vehicles are less common. However, many factors can impact VMT in a country, from cultural norms around car usage to a lack of infrastructure, the availability of alternative transportation modes, and people not having the economic means to obtain a car. In some countries where car ownership is not as attainable, two wheelers (such as motorcycles) can be common, displacing the energy use to another mode. Some countries with older cities might also score better in this metric due to the development of cities and towns in a pre-car society. However, because passenger cars are still the most common vehicle across all the countries, this metric assessed only VMT per capita from cars.

Scoring was the same as the previous *Scorecard*. Countries with an average VMT per capita of no more than 500 received 3 points; 501–1,000 received 2.5 points; 1,001–2,000 received 2 points; 2,001–3,500 received 1.5 points; 3,501–5,000 received 1 point; and 5,001–6,000 received 0.5 points. Table 51 below shows country data in both VMT and VKT.

Table 51. Scores for vehicle miles/kilometers traveled per capita

Country	VMT per capita (2023)	VKT per capita (2023)	Score
India	180	289	3
Indonesia	451	726	3
Egypt*	657	1,058	2.5
Turkey**	Number hidden	Number hidden	2.5
South Africa*	817	1,316	2.5
China	1,002	1,612	2
Brazil	1,413	2,274	2
Thailand	1,527	2,457	2
Russia*	1,625	2,616	2
Taiwan	2,215	3,565	1.5
Japan	2,359	3,797	1.5
Spain	2,655	4,273	1.5
South Korea	3,039	4,891	1.5
Poland	3,572	5,749	1
UK	3,677	5,917	1
Australia	4,063	6,539	1
France**	Number hidden	Number hidden	1
Germany**	Number hidden	Number hidden	1
Canada**	Number hidden	Number hidden	1
Saudi Arabia*	4,731	7,613	1
Italy**	Number hidden	Number hidden	1
UAE*	4,978	8,011	1
Mexico	6,019	9,687	0
U.S.	8,596	13,835	0
Malaysia	No data available	No data available	0

*Based on 2019 data. **Based on 2022 data, as calculated from IEA Energy End-uses and Efficiency Indicators Database (not publicly available). Sources: Eurostat 2025; FHWA 2025; IEA 2025b; Sen, Teter, and Miller 2025; ACEEE data requests (Australia, Japan, Poland, South Korea, and Taiwan); ACEEE country research.

Investment in rail transit versus road infrastructure (2 points)

National investment in public transit infrastructure such as passenger railways, buses, and light rail (metro, commuter rail) demonstrates how well-funded low-carbon emission modes of transportation are in a country. Since personal vehicle ownership costs can be expensive, rail transit infrastructure investment can also be indicative of a country's dedication to providing more affordable means of transportation to its citizens and improving transportation accessibility for all. This metric assesses the ratio of infrastructure investment spending in a country's railways to its spending on road infrastructure such as highways.

Countries with a ratio of at least 1 for their rail-to-road spending received the full 2 points, countries with a ratio of at least 0.5 received 1 point, and those with a ratio of at least 0.15 received 0.5 points. Ideally, this metric would measure the ratio of infrastructure investment spending in all modes of public transit, but the lack of data makes the assessment challenging. As a result, this metric is limited to investment in railways, for which data are more available across countries. We obtained data from the Organisation for Economic Co-operation and Development's (OECD) data explorer metric, Transport infrastructure investment and maintenance spending, for most countries (OECD 2025b).

Table 52 shows the ratio of country-wise spending on rail to road. Italy, France, and the UK are the only countries to receive full points for this metric. Railway infrastructure spending in most countries does not achieve a 1:1 parity with spending on roads. It is worth noting that that in some countries, such as Canada, subnational, and/or local governments may be responsible for investment in infrastructure, which this metric does not capture (Government of Canada 2011).

Table 52. Scores for investment in rail transit versus road infrastructure

Country	Ratio of investment in rail versus roads (2022)	Score
Italy	1.74	2
UK	1.73	2
France	1.07	2
India*	0.93	1
South Korea*	0.88	1
Russia	0.76	1
Egypt*	0.73	1
Taiwan*	0.68	1
Germany	0.62	1
Spain	0.53	1
Turkey	0.48	0.5
Australia	0.48	0.5
Japan	0.47	0.5
Poland	0.28	0.5
Mexico	0.22	0.5
Canada	0.18	0.5
China	0.14	0

Country	Ratio of investment in rail versus roads (2022)	Score
U.S.	0.09	0
UAE	No data available	0
Thailand	No data available	0
South Africa	No data available	0
Saudi Arabia	No data available	0
Malaysia	Incomplete data	0
Indonesia	No data available	0
Brazil	No data available	0

*Based on data from years other than 2022: Egypt (2020 data from the 2022 International Scorecard); Taiwan (2023 data); India and South Korea (2024 data). Sources: ACEEE data request (India, South Korea, and Taiwan); OECD 2025b (all other countries).

Use of public transit (2 points)

Public transit usage indicates whether people in a country use low-carbon modes of transportation. Public transit modes can also be more affordable for people. Countries with 60% of passenger-km (pkm) travel by public transit received the full 2 points, countries with at least 20% of travel by public transit received 1 point, and countries with at least 10% of travel by public transit received 0.5 points. For most countries, data for this metric came from either the IEA's Energy Efficiency Database (accessed through IEA; the data are not public) or the European Commission's 2024 Statistical Pocketbook of EU transport data (publicly available). We calculated scores for this metric by dividing the sum of pkm traveled by public transit modes, rail, and bus by total land-based pkm in a country. Motorcycle-related pkm was excluded from the land-based pkm total because such data are inconsistently available across countries. Table 53 details the proportion of land-based travel in a country that occurs via public transit and the resulting score.

Table 53. Scores for use of public transit

Country	Share of passenger km (%) by public transit modes (2022)	Score
China	80.7	2
Japan*	34.9	1
Turkey	Number hidden**	1
Brazil*	Number hidden**	1
Poland	22.6	1
South Korea	22.4	1
Italy	19.0	0.5
Spain	17.4	0.5
France	17	0.5
Taiwan*	16.8	0.5
Germany	15.1	0.5
Mexico*	13.3	0.5
UK	12.0	0.5
Australia	10.9	0.5

Country	Share of passenger km (%) by public transit modes (2022)	Score
U.S.	8.8	0
Canada	Number hidden**	0
India*	6.3	0
Egypt	No data available	0
Indonesia	No data available	0
Malaysia	No data available	0
Russia	No data available	0
Saudi Arabia	No data available	0
South Africa	No data available	0
Thailand	No data available	0
UAE	No data available	0

*Based on data from years other than 2022: India and Mexico (2019 data), Brazil (2021 data), Japan and Taiwan (2023 data). **Brazil, Canada, and Turkey data from IEA Energy End-uses and Efficiency Indicators Database (not publicly available). Sources: IEA 2025b; ACEEE data request (Australia, China, India, Japan, South Korea, and Taiwan); European Union 2024 (France, Germany, Italy, Poland, the UK, and the United States).

Generally, countries with a high VMT per capita might see lower public transit use. As with the VMT metric, this metric may not accurately reflect all the nuances that impact public transit use, including reliance on motorcycles. Interestingly, a ratio of more than 1 in rail-to-road infrastructure spending metric does not associate with higher public transit usage; for example, in Italy and France, public transit pkm hovers at 17–19%. In contrast, Japan has less than a 0.5 ratio of rail-to-road infrastructure spending, yet its public rail system appears to be well utilized, with 31% of the country's pkm occurring via rail. One reason for this could be that people might be utilizing long-distance passenger rail more than commuter rail, so governments might be investing more in long-distance passenger rail. A breakdown of Italy and France's railway pkms (between metro/tram pkm and railway pkm) shows that the majority of the pkm is from railways as opposed to localized options such as metros (EU 2024).

What is considered as "public" transit might also differ among countries. While we do not consider taxis in this metric, in South Africa, the private minibus industry is considered to be a part of the public transport system. Minibus taxis are used as an important mode of transport, with approximately 26% of people using it to get to work (van Dalsen 2018).

Walking and cycling policies (1 point) (NEW)

To encourage transportation via nonmotorized modes, countries can promote walking and cycling to citizens. Encouraging walking and cycling as alternative transportation modes where possible can reduce CO_2 emissions, energy use, and local air pollution; promote a healthier lifestyle; and improve accessibility of destinations for people without personal vehicles. The development of a cohesive policy, plan, or strategy for walking and/or cycling can thus be instrumental in setting the stage for how these active transportation modes will be implemented at a national level. Ultimately, the realization of walking and/or cycling policies can complement reduction in personal VMT and play into broader clean transportation goals.

For this metric, we reviewed the scored countries based on whether they have a national policy, plan, or strategy specific to walking and cycling. Countries with both walking and cycling policies received 1 point, countries that have either a national walking or a biking policy received 0.5 points, and countries with neither received 0 points.

Table 54 shows whether a country has a walking and/or cycling policy, along with the policy/plan/strategy name. Most countries had both walking and cycling plans or at least one of them. Many countries had a combined active transportation plan that listed both walking and cycling policies and plans. One limitation of this metric is that some countries may have a walking or cycling policy at the state or local level that is not reflected in the scoring. For example, the United States did not get points for a national cycling policy/plan, yet 36 states have a statewide bike plan (League of American Bicyclists 2024).

Table 54. Scores for walking and cycling policies

Country	National walking policy/strategy	National cycling policy/strategy	Policy/strategy name	Score
Brazil	Yes	Yes	National Urban Mobility Policy (Law 12.587)	1
Canada	Yes	Yes	National Active Transportation Strategy 2021–2026	1
France	Yes	Yes	Data request; Cycling and Walking Plan 2023–2027	1
Germany	Yes	Yes	Data request; Fußverkehrsstrategie and National Cycling Plan 3.0	1
India	Yes	Yes	National Urban Transport Policy	1
Indonesia	Yes	Yes	National Vision for Non-Motorized Transport	1
Japan	Yes	Yes	Urban Walkability Promotion Project and Second Bicycle Promotion Plan	1
Malaysia	Yes	Yes	National Strategic Action Plan for Active Living 2016–2025	1
Mexico	Yes	Yes	National Strategy of Mobility and Road Safety	1
South Africa	Yes	Yes	Plan names not found, but information was confirmed by two documents	1
South Korea	Yes	Yes	Data request; First National Basic Plan for Pedestrian Safety and Convenience Promotion, and National Basic Plan for Bicycle Policy	1
Spain	Yes	Yes	Data request; Order TMA/892/2021 and State Bicycle Strategy	1
Taiwan	Yes	Yes	Data request; Pedestrian Safety Improvement Plan for Sustainability, and 2024–2027 Bicycle Network Planning and Subsequent Promotion of the Second Round-Island Route	1
UK	Yes (England)	Yes (England)	Second cycling and walking investment strategy (CWIS2)	1
Egypt	None (outdated policy)	Yes	A bicycle for every citizen	0.5

Country	National walking policy/strategy	National cycling policy/strategy	Policy/strategy name	Score
Italy	None found	Yes	General Plan for Urban and Extra-urban Cycling Mobility 2022–2024	0.5
Saudi Arabia	Yes	None found	Walk 30 initiative v.5 in 2023	0.5
U.S.	Yes	None found	USDOT Pedestrian Safety Action Plan	0.5
Australia	None (outdated policy)	None (outdated policy)	N/A	0
China	None found	None found	N/A	0
Poland	None found	None found	N/A	0
Russia	None found	None found	N/A	0
Thailand	None found	None found	N/A	0
Turkey	None found	In-progress	N/A	0
UAE	None found	None found	N/A	0

Sources: ACEEE country research; ACEEE data requests (France, Germany, Japan, Spain, Taiwan); and PATH 2023a, 2023b, 2024.

Freight transport modal share (1 point) (NEW)

Freight transportation refers to the transport of goods through modes such as rail, road, air, shipping, and in some cases even pipelines (for oil products). The efficiency and energy consumption of different modes vary, with road-based freight transportation contributing to the majority (65%) of global freight CO_2 emissions (Greene 2023). Therefore, a country's use of non-road freight modes can be indicative of the environmental sustainability of its shipping and logistical operations. While countries should generally strive to use nonenergy-intensive modes that do not rely on road transportation, factors such as geography and infrastructure can make it difficult for countries to find alternative freight modes.

Countries with a non-road freight mode (i.e., rail and waterways) share of more than 50% received 1 point; countries with a non-road freight share of 20–49% received 0.5 points. Countries where non-road modes made up less than 20% of the freight mode share received no points. We calculated scores for this metric by summing the ton-kilometers or ton-miles of goods transported by different non-road modes and dividing it by the total ton-kilometers/ton-miles transported by all modes in a country (excluding aviation and pipelines). For most countries, 2022 data were obtained from the OECD (OECD 2024). Table 55 shows the share of freight moved by non-road modes in different countries.

Table 55. Scores for freight transport modal share

Country	Non-road freight modal share (2022)	Score
Russia*	91%	1
China	68%	1
Canada*	65%	1
Australia	66%	1
U.S.	49%	0.5
Germany	38%	0.5
Brazil*	Number hidden	0.5
Mexico	25%	0.5
France	20%	0.5

Country	Non-road freight modal share (2022)	Score
Thailand*	20%	0.5
UK	19%	0
Italy	14%	0
Poland	13%	0
Japan	7%	0
South Korea*	5%	0
Turkey	5%	0
Spain	4%	0
Taiwan*	1%	0
Egypt	No data available	0
India	No data available	0
Indonesia	No data available	0
Malaysia	No data available	0
Saudi Arabia	No data available	0
South Africa	No data available	0
UAE	No data available	0

*Based on data for years other than 2022: Thailand (2019 data); Russia (2020 data); Brazil, Canada, and South Korea (2021 data); and Taiwan (2023 data). Sources: IEA 2025b (Brazil); BTS 2024 (US); ACEEE data request (Canada, Taiwan); UK Department for Transport 2023 (UK); Hengsadeekul et al. 2024 (Thailand); OECD 2024 (all other countries).

Smart freight initiatives (1 point)

Smart freight initiatives are mandatory or voluntary programs that provide guidance for companies that move freight; the goal is to improve the efficiency and sustainability of their fleets and freight services. These initiatives can provide a framework for emissions reduction planning and reporting for freight-related emissions across different subsectors (road, rail, maritime, aviation). Freight-related emissions can be measured through tools such as the SmartWay Online Truck tool (U.S. EPA 2025). Strategies to improve freight efficiency and reduce emissions include having companies co-load goods to reduce empty space in trucks, route optimization, and load optimization (U.S. EPA 2023). Countries with either a voluntary or mandatory national smart freight initiative received 1 point for this metric.

Only 11 of the 25 countries had a national smart freight initiative. Several countries offered their smart freight initiatives under the same parent program; for example, SmartWay is available in both the United States and Canada, and Lean and Green has been adopted in Germany and Italy.

Although we scored countries only for their smart freight initiatives, a few countries that did not receive points for this metric are nevertheless pushing for freight sustainability though national freight programs and sustainable freight strategies; examples here include Spain's Goods 30 Initiative and India's Electric Freight Accelerator for Sustainable Transport (e-FAST) India platform (Government of Spain 2022; e-FAST India 2022). Table 56 shows the results.

Table 56. Scores for smart freight initiatives

Country	Name of program	Score
Brazil	Brazilian Green Logistics Program	1
Canada	Smart Way	1

Country	Name of program	Score
China	Green Freight Initiative	1
France	Objectif CO_2	1
Germany	Lean and Green	1
Indonesia	Smart Port	1
Italy	Lean and Green	1
Japan	Green Logistics Partnership	1
Mexico	Transporte Limpio	1
South Korea	Green & Smart Transportation Partnership	1
Taiwan	Energy Saving and ESG Consultation Program for Commercial Fleet	1
UK	Logistics Emissions Reduction Scheme	1
U.S.	EPA Smart Way	1
Malaysia	None found	0
Australia	None found	0
India	None found	0
Poland	None found	0
Russia	None found	0
Saudi Arabia	None found	0
South Africa	None found	0
Spain	None found	0
Thailand	None found	0
Turkey	None found	0
UAE	None found	0
Egypt	None found	0

Sources: Façanha, Delgado, and Yang, 2018 (China); ACEEE data request (Taiwan); ACEEE country research (all other countries)

Transportation best practices

EV deployment in China: This year, China led the way in electric car and bus deployment, scoring 5.5 of the 6 available points. As a result, China made it back in the top five countries in this year's transportation chapter. EV adoption in China outpaces the rest of the world by several magnitudes. The country is home to the majority of all electric cars, trucks, and buses in the world. Although China's purchase incentives for EVs (classified as "New Energy Vehicles," or NEVs) ended in 2022, environmental and transport policies, subsidies at the national level, and a strong domestic car manufacturing presence were nevertheless instrumental in promoting the uptake of electric MDHDs (Jin 2023; Jin and Chu 2023; IEA 2024e). Although it is phasing down purchase subsidies, China does have a few regulations that remain critical in facilitating purchases, including tax exemptions for NEVs, EV pilots, and NEV mandates (Jin 2023). National policies, incentives, and subsidies can go a long way toward providing the necessary market signal to promote EV uptake.

Stringent HDV emissions standards in the EU: While setting emissions standards can be time consuming, setting new standards or improving previous standards (as in the EU), demonstrates a commitment to eliminating pollution from some of the most polluting vehicles on the road. In 2024, the EU revised its CO_2 emissions standards for HDVs to make them even more stringent (Mulholland 2024). More than half of this year's *Scorecard* countries lack a fuel or GHG emissions standard for HDVs, yet France, Italy, Germany, Poland, and Spain (all EU countries) lead the way in having some of the most stringent standards to reduce emissions from heavily polluting vehicles. The revised standards require a 43% reduction in CO_2 emissions by 2030, up from 30% by 2030 as required by the original standards. The revised standards also added several new classes of HDVs that are now regulated just as strictly.

Conclusion

The *2025 International Energy Efficiency Scorecard* evaluates energy efficiency policies, programs, and performance among the 25 highest energy-consuming countries. Countries earned points based on their national energy efficiency efforts as well as progress in the buildings, industry, and transportation sectors. For the second edition in a row, France earned first place. Germany, the United Kingdom, Italy, Spain, and China rounded out the top five, with Spain and China tying for fifth place.

The *Scorecard* aims to recognize countries that have passed ambitious policies and achieved significant results in improving their energy efficiency. However, all countries can certainly do more to decarbonize their economies and bring energy efficiency benefits to their people. Based on our findings, we recommend the following actions for national policymakers:

- **Reduce energy intensity nationally and across specific sectors.** As countries continue growing their economies, minimizing energy intensity is vital to ensuring that economic development complements climate action.
    - National energy intensity is measured as a country's total energy consumption over its national GDP. A national energy intensity goal can complement broader energy savings goals to achieve deep GHG emissions reductions. **China** and **South Korea** are the only countries that have national targets for reducing both energy consumption and energy intensity.
    - Buildings are another promising avenue for reducing energy intensity, especially because the building sector is responsible for one-third of global energy consumption. For residential buildings, energy intensity can be measured as energy use per residential floor area or as energy use per capita. For commercial buildings, energy intensity can be measured as energy use per commercial floor area or as energy use per GDP. In **Brazil** and **Mexico,** both residential and commercial buildings have reported notably low EUI.
    - Agriculture is one of the most important yet energy-intensive industries. Agricultural energy intensity is measured as energy use per GDP. Several Asian countries (**China, India, Indonesia, Malaysia**, and **Thailand**) as well as **Saudi Arabia** have reported low energy intensity from agriculture. Many of these countries primarily grow low-energy input crops and practice precision agriculture, resulting in lower energy consumption.
- **Require energy codes for buildings and energy performance standards for appliances.** Buildings contribute a significant portion of global energy consumption and GHG emissions; countries that have adopted retrofit policies for existing buildings and stringent codes for new buildings demonstrate a commitment to reducing energy waste from buildings. Requiring minimum efficiency standards for appliances also contributes to lower energy consumption from buildings and help consumers save money on utility bills.
    - **France, Germany, Italy**, and the **United Kingdom** are the only countries with building codes that require energy-efficient renovations for existing buildings and offer financial incentives to encourage retrofits.
    - Eight countries (**Australia**, **France, Germany, Japan, Saudi Arabia**, **South Africa, the United Kingdom,** and the **United States**) have adopted residential and commercial codes that fully address building shell elements (e.g., wall and ceiling insulation, u-factor and solar heat gain coefficient for windows, air sealing) and energy services (e.g., efficient lighting, efficient heating and cooling, efficient water heating).

  - **China** requires MEPS for appliances across five different end uses (space heating, space cooling, water heating, refrigeration, and lighting). It also requires efficiency labels for 41 different appliance groups.

- **Invest in programs, research, and infrastructure that promote energy efficiency.** Ensuring global access to affordable and sustainable energy will require greater levels of investment in energy efficiency programs, R&D, and infrastructure that supports low-carbon transportation.
  - The **Spanish** national government has pledged to invest €86 billion (US$94 billion) in energy efficiency between 2021 and 2030. This equates to roughly €9.6 million (US$10.5 million) in energy efficiency spending per year, or about US$216.38 per person.
  - **Spain** also runs two programs (Program PREE and Programa PREE 5000) for retrofitting buildings.
  - **Canada** invested US$15.35 in energy efficiency R&D per capita in 2023, the highest of any country.
  - The **United States** invested the most in industrial R&D, with investment levels representing 20.45% of industrial GDP in 2024.
  - **Italy, France,** and the **United Kingdom** are the only countries that invested more in rail transit versus road infrastructure, demonstrating a commitment to more affordable and sustainable transportation.
- **Prioritize transportation efficiency, especially through public transit and active transportation.** Public transit, walking, and bicycling are lower-cost and lower-carbon modes of travel compared to private vehicle use. They also support public health through reduced air pollution and increased physical activity.
  - VMT and VKT are effective metrics for measuring a country's dependence on personal vehicle travel. Nearly every country could work to significantly reduce national VMT or VKT. **India** and **Indonesia** are the only countries that reported annual VMT less than 500 VMT (805 VKT) per capita.
  - **China** is by far the leader in public transit use, attributing 80.7% of land-based passenger-kilometer (p-km) travel to public transit in 2022. **Japan** reported the second-highest usage, with 34.9% of p-km travel from public transit in 2022.
  - Just over half of the evaluated countries (13) have passed policies, plans, or strategies to encourage both walking and bicycling.
- **Encourage energy demand reduction and behavioral changes to further cut energy consumption.** Despite the importance of minimizing energy intensity, doing so will not be sufficient to singlehandedly help countries reach their net-zero emissions targets. Reducing peak demand for energy can help countries improve the resilience and reliability of their electrical systems. Behavioral changes can complement these goals as civilians and businesses adapt their lifestyles to save energy.
  - Although this *Scorecard* did not evaluate **the Netherlands**, the country was a success story in slashing its energy consumption through behavioral changes. In response to rising energy prices, Dutch households lowered their thermostats while greenhouse farmers limited their typical production levels to save energy. These changes were beneficial in reducing national energy consumption.

- A future edition of the *International Energy Efficiency Scorecard* can study countries' implementation of demand response measures and initiatives to encourage energy-saving behavior.

Overall, the *Scorecard* shows notable efforts by many countries, particularly the leaders, to advance energy efficiency. Still, all countries can improve their performance. We plan to track efforts to further improve energy efficiency in future *Scorecard* editions.

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Appendix A. Energy intensity

Industry

We developed an energy intensity metric to compare broad industrial efficiency between countries. Our first step was to determine a raw energy intensity of industry using total energy consumed and total industrial GDP by country. These data are available for all countries. It would be ideal to evaluate energy intensity as energy consumed per dollar of value added in each industrial subsector, rather than total GDP. However, recent information of that type is extremely limited and is available only for a few countries.

Raw energy intensities, however, are inadequate for making meaningful comparisons between countries. The composition and energy mix of industries vary widely, and countries should not be penalized for the natural resources within their borders or for existing legacy industries. For example, based on the most recent available data, the United States' energy consumption was highest in chemicals and pharmaceuticals, while China's was highest in nonmetallic minerals. For several countries, the only reported data are in non-specified manufacturing. To better compare energy intensities and account for these differences, we developed a weighting factor to normalize raw energy intensities using a methodology similar to one used in previous *Scorecard* editions, despite data differences. In addition, we found a new variable—value added per total energy consumed by industry—to account for missing data points from non-IEA data reporting countries (which is new for this edition of the *Scorecard*). We added the new variable to our weighted intensities to find the final energy intensity that was scored. Although rankings can be compared to previous *Scorecards*, the total numerical scores are not comparable due to new methodologies and data availability. Table A1 shows the methodology we used to determine our rankings.

Table A1. Methodology for determining country rankings

Variable	Meaning and use
RCI	Energy consumed in each industry grouping (per country)/total consumed by all 25 countries in that same grouping
ICI	RCI*US energy value added for that grouping—one each per grouping per country
ICS	Sum of 12 ICI groups for each country (one value per country)
RC	ICS for each country/ICS average for all countries (one value per country)
IW	Raw energy intensity (total energy consumed/total industrial GDP)*RC
RV	Raw value added: total industrial energy consumed/manufacturing value added
IF	Scored energy intensity. IW+RV

Step 1. Energy intensities of industry groupings

To calculate the relative intensity factors needed to normalize comparable figures, we needed energy intensities of consistent industry groupings for each country. Ideally, we would have found these with value added, but value-added data are still not consistently available. Energy consumption data were available for previous *Scorecards*, but due to changes in IEA data collection, much of this information is no longer collected or reported in the Sankey diagrams presented in prior editions. We utilized the IEA's Energy and Emissions per Value Added Database for data, but this information is not available for several prominent countries, including China and India. To compensate for these missing data, we assumed that the percentage growth of total industrial energy consumption was consistent across industry groupings. For example, if a country's total industrial energy consumption grew 5% from the 2022 *Scorecard*, we assumed that all subsectors grew by the same factor (and proportions of total energy consumed remained the same). New data availability also meant that we had to use new industry groupings by International Standard Industrial Classification (ISIC) of All Economic Activities. The new groupings are as follows: food and tobacco products, textiles and leather manufacturing, wood and wood products, paper, pulp and printing, chemical and pharmaceutical products, nonmetallic minerals, cement, basic metals, machinery, transport equipment, coke and refined petroleum products, other manufacturing, and non-specified manufacturing.

First, we calculated the energy consumed in each industry grouping in each country as a share of total energy consumed in that grouping in all 25 countries (RCI):

> RCI = Energy consumed by a country in a particular industry grouping/Total energy consumed by all 25 countries in that industry grouping.

We then multiplied each grouping's share of energy consumption (RCI) by the corresponding U.S. industry intensity of that grouping value added. This let us derive energy intensities for all 12 ISIC categories of industries in each of the 25 countries analyzed:

> Derived energy intensity of each industry grouping per country (ICI) = RCI * Corresponding group's energy intensity (value added) in the United States.

The value added for U.S. industry ISIC groups was available in IEA's Energy and Emissions per Value Added Database.

Step 2. Relative intensity factors

Our next step was to normalize the derived energy intensities of each group and country to allow for comparison. To do this, we summed the derived intensities of the 12 ISIC categories in each country, found the average of the sums between all 25 countries, and used the average to normalize the sums:

> ICS for each country = Sum of ICI of 12 industry groupings for each country
>
> Relative intensity factor for each country (Rc) = ICS of country/Average ICS of all countries

We then multiplied each country's raw energy intensity (calculated in step 1) by the corresponding relative intensity factors to find a weighted energy intensity. Finally, we added a raw value-added measure, which we found by dividing energy consumed by total industry by total value added.

> Weighted energy intensity IW = Raw energy intensity x Rc (relative intensity factor)
>
> Scoring energy intensity IF = IW + Rv (Raw value added/Energy consumed)

Table A2 shows the final scoring energy intensities (IF), the weighted intensities (IW), and the relative intensities (Rc) for each country.

Table A2. Energy intensities by country

Country	Weighted intensity (IW)	Relative intensities (Rc)	Final scoring energy intensities (IF) (kBtu/2023$)
UK	2.20745863	1.506993	5.153834
Germany	2.7554016	1.321111	5.28482
Italy	2.8184902	1.271176	5.603361
France	2.7266896	1.315085	6.326164
Japan	2.9582375	0.870915	6.606985
Taiwan	3.28258155	0.776	7.526074
South Korea	3.89231359	0.84815	8.424856
U.S.	3.96195104	1.517119	8.426533
Malaysia	0.42712206	0.312195	8.83441
Spain	5.26262767	1.747375	9.266522
Poland	5.6953937	1.834838	10.10501
Turkey	4.17575436	0.900302	10.23595
Australia	1.47237175	0.782556	11.19121
Saudi Arabia	1.00785432	0.312195	11.26806
China	2.358771	0.509892	11.97386
Egypt	1.5381832	0.312195	12.15297
Mexico	8.8318039	1.048259	12.36907
Indonesia	2.20548297	0.448037	12.80614
Thailand	3.71853176	0.503439	13.4734
Brazil	7.06410639	1.007845	18.78814
UAE	1.54315185	0.312195	23.28215
South Africa	5.81087034	0.617322	23.67475
India	4.38728721	0.362365	27.79189
Russia	4.93091013	0.509117	28.74405
Canada	17.7674984	4.053323	30.11221

Appendix B. Heating and cooling degree days for appliance standards scoring

Table B1 shows the heating and cooling degree days (HDDs and CDDs) we used to determine which scoring rubric was applied to each country in the buildings chapter.

Table B1. Heating and cooling degree days for *Scorecard* countries

Country	HDD	CDD
Australia	828	839
Brazil	118	2,015
Canada	4,493	171
China	2,158	1,046
Egypt	400	1,836
France	2,478	241
Germany	3,252	122
India	80	3,120
Indonesia	0	3,545
Italy	1,838	600
Japan	1,901	896
Mexico	364	1,560
Malaysia	0	3,411
Poland	3,719	100
Russia	5,235	197
Saudi Arabia	311	3,136
South Africa	630	824
South Korea	2,480	744
Spain	1,431	702
Taiwan	231	2,132
Thailand	1	3,567
Turkey	2,048	641
UAE	4	3,294
UK	2,810	66
U.S.	2,159	882