

Best practices for nations: Leading countries' efforts to reduce emissions through energy efficiency policies and practices

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Abstract

Many countries have made commitments or set targets to reduce greenhouse gas (GHG) emissions due to the urgency of climate change. Energy efficiency plays a key role in meeting countries' climate goals to reduce overall GHG emissions while also lowering overall energy consumption. Countries that promote investment in energy efficiency and implement supporting policies also reduce air pollution, create jobs, and save money for residents. Analysis from the International Energy Agency shows that energy efficiency has the potential to supply almost half of the necessary GHG reductions to carry out the Paris Agreement's goals by 2040. However, many nations still have a long way to go to decarbonize and incorporate energy efficiency practices into their economies. This paper compares efficiency policies and performance of the top 25 largest energy users in the world, drawing on the findings of ACEEE's 2022 *International Energy Efficiency Scorecard*. We find that some countries are making significantly more progress than others.

Although European countries often fare well due to compliance with robust European Union (EU) legislation on energy efficiency, countries still have much to learn from one another. This paper examines the policies, practices, and performance in leading EU and non-EU countries to provide lessons learned for nations trying to achieve ambitious climate goals. In particular, this paper identifies best practices and initiatives within the buildings, industry, and transportation sector as well as national commitments to energy efficiency.

Introduction

Energy efficiency presents a major opportunity to meet the world's growing demand for energy, while also curbing greenhouse gas (GHG) emissions. The Sixth Assessment Report from the Intergovernmental Panel on Climate Change (IPCC) shows that the planet will outpace 1.5 degrees Celsius of warming if significant actions are not taken to reduce emissions in the following decades (IPCC 2021). The urgency of the report's findings has motivated many countries to set goals, policies, and pledges to meaningfully reduce their carbon footprints. Research from the International Energy Agency (IEA) estimates that energy efficiency has the potential to provide almost half of the required GHG emission reductions to meet the Paris Agreement by 2040 (IEA 2018). Indeed, energy efficiency can lower energy consumption and emissions while also delivering multiple benefits such as lowered utility energy bills for citizens, job creation, and decreased air pollution. As the effects of climate change worsen over time, energy efficiency has the ability to increase the power grid's reliability and help residents stay safe through storms, floods and other climate-changed induced weather events.

Countries can implement energy efficiency policies and practices to reap the many benefits described above while also combating one of society's greatest challenges. Some countries are further along in their efforts than others and can lead by example by continuing to implement ambitious policies and practices in their economies. Nonetheless, there is always room to grow and lessons to be learned. The American Council for an Energy-Efficient Economy's (ACEEE) forthcoming 2022 *International Energy Efficiency Scorecard* (hereafter "the *Scorecard*") ranks 25 of the most energy consumptive countries in the world by examining their energy efficiency policies and performance.

This paper discusses sector-specific best practices and policies in leading countries identified in ACEEE's 2022 *Scorecard*.

Methodology and limitations

The *Scorecard* analyzes the energy efficiency policies and performance of the 25 most energy-consuming countries globally (ACEEE 2022). We identified the top energy consumers in the world by comparing total primary energy consumption (energy within raw fuels that has not been converted or transformed to any other form of energy). Figure 1 displays the countries analyzed in the *Scorecard*, based on total primary energy consumption in kilotonnes of oil equivalent (ktoe).

This is the fifth edition of the *Scorecard* that presents a basic comparison of efficiency in the buildings, industry, and transportation sectors as well as overall national commitments to incentivize energy efficiency. Across all these sectors, 36 metrics are used to rank each country and identify best practices and policies as well as areas for improvement. Both policy and performance-oriented metrics were used to rank countries. Performance-related metrics are quantitative and often measure energy use per unit of activity or service, whereas policy-based metrics can be both qualitative and quantitative. A short description of the metrics is provided under each category in the Results section below. A more detailed description of the metrics, along with the criteria and thresholds used to score countries, can be read in the full report upon its release.

Each country can score a maximum of 100 points, whereby 25 points are available to earn in each category: national efforts, buildings, industry, and transportation. The point allocation is divided 60/40 between policy and performance metrics, partly because performance metrics are influenced by non-energy efficiency related factors such as the local climate or a citizen's ability to buy a personal vehicle. For each metric, at least one country was awarded the highest number of points which opened the possibility for any country to obtain a perfect overall score of 100.

The methodology used for the *Scorecard* is just one way to compare energy use and progress on efficiency and climate efforts for countries. Many conditions affect energy use and overall emissions such as physical factors (geography, climate, natural resource availability), economic structures, and population density or demographics. However, the *Scorecard's* methodology largely refrains from adjusting the raw data in an effort to provide a general and basic overview of energy use and policies. The *Scorecard's* data collection efforts comprised of online data gathering from internationally recognized sources such as the International Energy Agency, the World Bank, and the International Council on Clean Transportation. Country-specific data requests were also circulated to subject matter experts to ensure that the *Scorecard* had updated and accurate information. However, consistent and comprehensive data on the chosen countries were hard to come by. Not all countries track the same information or make it available to the public. These issues play a role in which metrics were included in the *Scorecard*.

This paper presents results from the leading European Union (EU) and non-EU countries in each category and highlights best practices and policies that other nations can emulate.

Results

Figure 2 displays results for the top ten countries ranked in the *Scorecard*. European countries dominated the results because they are taking the most action on energy efficiency and decarbonization particularly in the buildings sector. Even among leading countries, the results are a patchwork of scores across categories, indicating that each country has significant potential to learn from one another. The subsequent sections provide a snapshot of results for the leading nations in each category and discuss policies and practices that can be replicated in other countries.

NATIONAL EFFORTS

We used nine metrics to assess countries on their overall energy efficiency performance and national policies across all sectors. We calculated the change in energy intensity over a five-year period for each country and evaluated national investments in general efficiency programs as well as total spending on research, development, and demonstration (RD&D) technologies for energy efficiency. Countries were also scored on tax incentives and loan programs geared towards the private sector and national energy saving goals and GHG targets. We also evaluated the overall revenues of energy service companies (ESCOs) and thermal power plant efficiencies. Countries could also receive points through water efficiency efforts and overall data availability.

European countries such as the Netherlands, Germany, and France led the national efforts section, whereas Japan and Taiwan were among the top scoring non-European countries. The average score for all the evaluated countries in this section was 12 points. As can be seen in Table 1, each of the leading countries scored well above the average but no single country achieved the maximum number of points for the section, signifying that high scoring countries still have much to learn from each other.

The Netherlands

The Netherlands earned the top spot in this section by scoring highly on energy use intensity, energy efficiency spending on RD&D, tax credits and loan programs, and ESCO market size. The country decreased energy intensity by almost 13 % in 2018 compared to 2013 and invested around \$4.4 per person in 2018 for energy efficiency RD&D. The Dutch government's ambitious 2019 Climate Act directs the country to reduce GHG emissions 49 % by 2030 and 95 % by 2050 with respect to 1990 levels. The 2019 Climate Agreement, a requirement under the Climate Act, sets out pathways with specific measures to achieve the GHG goals put forth in the Climate Act (Government of Netherlands 2022). The approaches identified in the Climate Agreement acknowledge energy efficiency as an essential tool to meeting the country's GHG goals. Measures include increasing the share of zero-emission vehicles and increasing building efficiency and electrification for heating. Similar to Germany, the EU's Energy Efficiency Directive guides Dutch energy efficiency policy and goals. The Dutch National Energy and Climate Plan (NECP) establishes measures to achieve the EU's energy efficiency goal of 32.5 % by 2030. Policies, measures, and programs included in the NECP focus on energy efficiency in the built environment and energy savings requirements for the industrial sector.

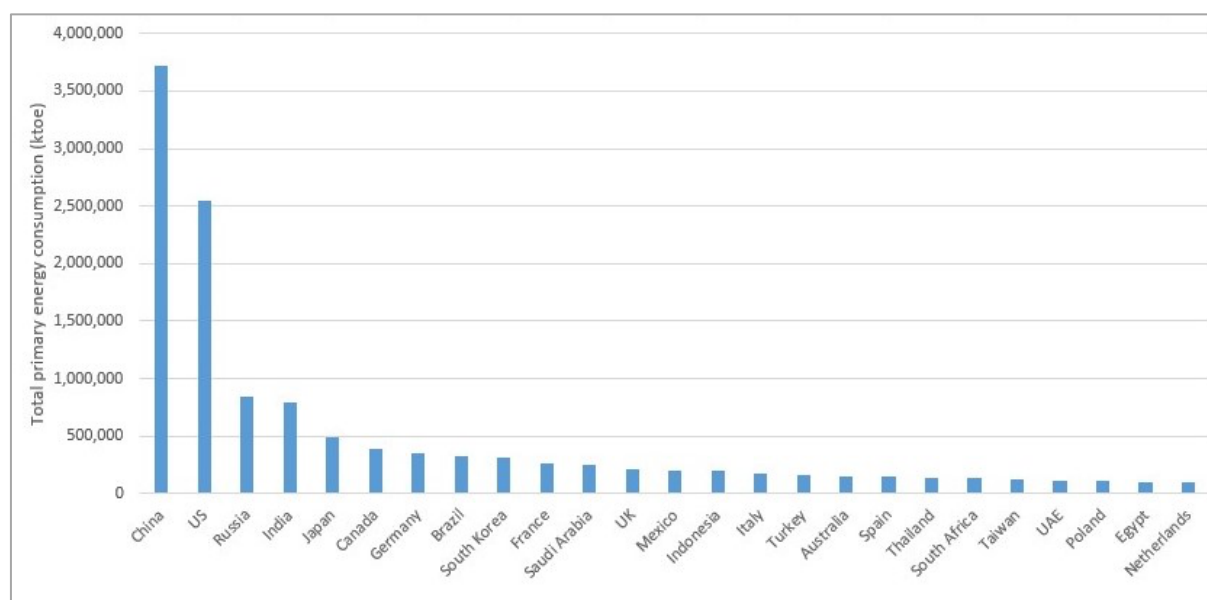


Figure 1. Total primary energy consumption of the top 25 countries (ktoe). Data are for 2018. Source: EIA 2021.

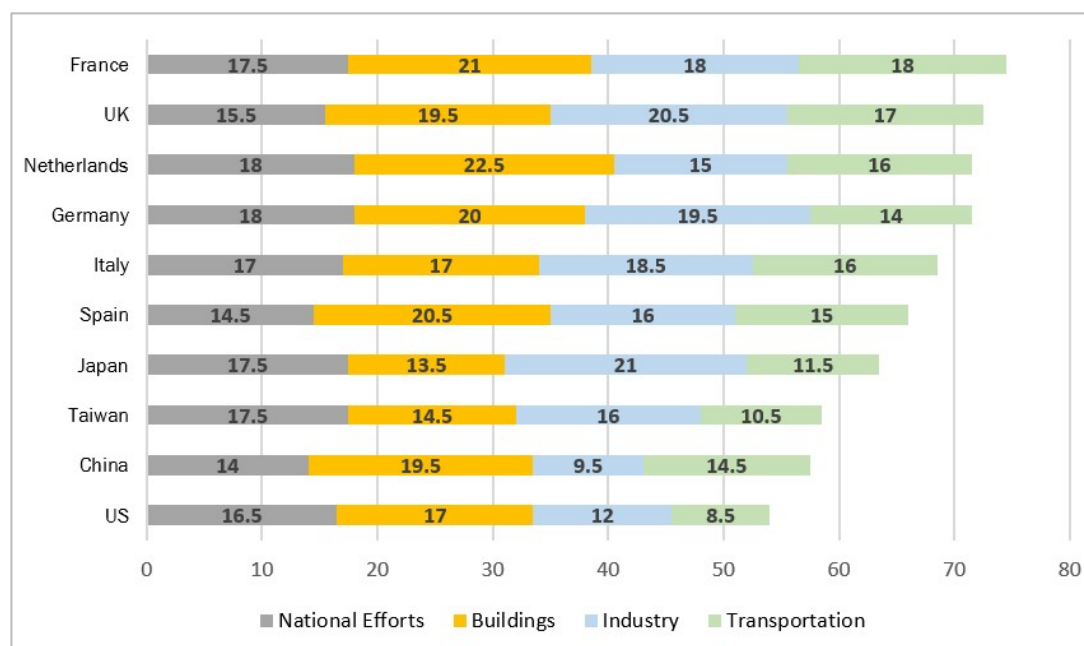


Figure 2. Overall scores and rankings for the top 10 countries in the 2022 International Energy Efficiency Scorecard.

Table 1. National efforts scores for leading EU and non-EU countries.

| Metric | Max. points | Netherlands | Germany | France | Japan | Taiwan |
|--|-------------|-------------|-----------|-------------|-------------|-------------|
| TOTAL | 25 | 18 | 18 | 17.5 | 17.5 | 17.5 |
| Change in energy intensity (2013 – 2018) | 6 | 5 | 4 | 5 | 5 | 5 |
| Energy efficiency spending | 5 | 2 | 4 | 3 | 1 | 1 |
| Energy efficiency RD&D spending | 2 | 2 | 1 | 1.5 | 2 | 1 |
| Energy savings and climate goals | 3 | 2 | 3 | 3 | 3 | 2 |
| Tax incentives and loan programs | 2 | 2 | 2 | 2 | 2 | 2 |
| Efficiency of thermal power plants | 3 | 2.5 | 1.5 | 1 | 3 | 3 |
| Size of the ESCO market | 2 | 1.5 | 1.5 | 1 | 0.5 | 1.5 |
| Water efficiency policy | 1 | 0.5 | 0 | 0 | 0 | 1 |
| Data availability | 1 | 0.5 | 1 | 1 | 1 | 1 |

Germany

Germany has emerged as a global leader in advancing energy efficiency with strong national policies and targets. In coordination with the European Union's Energy Efficiency Directive to target a 32.5 % reduction in primary and final energy consumption by 2030 and a national 50 % reduction target in primary energy use by 2050, Germany adopted the Energy Efficiency Strategy 2050. The country also released a second National Action Plan on Energy Efficiency (NAPE 2.0) which identifies a variety of focus areas in which action can be taken to improve sector-wide energy efficiency, including:

- Tax incentives to refurbish the national building stock and decarbonization of heating and cooling infrastructure
- Increased government funding for energy efficiency in the industrial sector through efficient technologies and reducing process heat
- Upgrading energy efficiency measures in the transportation sector.

Taiwan

Taiwan has made strides towards national efforts by reducing energy intensity 12 % between 2013 and 2018 by providing tax incentives for high efficiency appliances to the residential and commercial sector, and by adopting water conservation policies and efficiency programs. Under the Greenhouse Gas Reduction and Management Act, Taiwan's three-phased approach ultimately aims to reduce GHG emissions 50 % by 2050 relative to 2005 levels (Grantham Research Institute on Climate Change and the Environment 2022). The Greenhouse Gas Reduction and Management Act requires the development of a National Action Plan for Climate Change, which lists energy efficiency as a climate mitigation strategy (Environmental Protection Administration 2017). The Plan also emphasizes efficiency of vehicle and transportation systems, and it implements energy efficiency and carbon reduction measures for buildings.

BUILDINGS

In the buildings section, countries were evaluated on eight metrics that capture a variety of best-practice policies such as building energy codes, appliance standards and labelling, building retrofit policies and benchmarking/rating and disclosure. Countries were also awarded points for performance-related metrics such as lowering energy use intensity in residential and commercial buildings.

The average score for the buildings section (14.5 points) was higher than in any other section, implying that countries have made more progress on policies and practices than in the industrial or transportation sectors. As in the national efforts section, the Netherlands came in first place and was followed closely by France. Table 2 lists scores for the top six countries. EU member states did well, in large part due to their compliance with EU mandates such as the Energy Performance Building Directive. China was the only non-European country on the list and scored well for possessing appliance standards and labelling programs as well as policies to curtail energy use in buildings.

The Netherlands

The Netherlands has comprehensive energy codes for both residential and commercial buildings that earn it full points in the building code metric. In January 2021, the country began requiring new construction buildings to meet "Almost Energy Neutral" criteria. These requirements are akin to zero-energy requirements in which buildings produce at least as much energy as they consume (National Law Review 2021). The country has adopted the European Union's appliance standards that cover 42 products and require appliance labels for 25 products. In 2018, the Netherlands introduced building performance requirements for office buildings that go into effect in 2023 (European Commission 2018). The country also requires both residential and commercial buildings to receive building performance certificates that rate the energy efficiency on an A–G scale ("A" indicating a high efficiency rating and "G" indicating a low efficiency rating) (European Commission 2018). All these programs demonstrate that the Netherlands is committed to improving the performance of both existing and new buildings in the country.

France

France's National Low-Carbon Strategy requires the country's building sector to reduce GHG emissions 49 % by 2030 relative to 2015 (Ministère de la Transition Ecologique 2020). The Strategy also provides guidelines for the buildings sector to move towards zero carbon energy consumption for new and existing buildings, renovate existing residential and tertiary buildings, amp up the energy and carbon performance requirements in the regulatory sphere, and improve equipment related energy efficiency. The newly adopted Environmental Regulations (RE2020) also aim to improve the carbon impact of buildings through low carbon construction and materials, increase use of low carbon energy sources, and create adaptive buildings that can withstand the effects of climate change.

In the *Scorecard*, France received high scores for possessing national mandatory energy codes for residential and commercial buildings covering six technical areas within the building shell and building systems. Similar to the Netherlands, France has adopted mandatory appliance and equipment labelling for 25 products in accordance with the European Union's standard. France was also awarded full points in the building retrofit policies metric for mandatory national codes applying to residential and commercial building renovations. According to IEA's assessment of energy efficiency policies in France (IEA 2021a), the nation continues to target the existing building stock through

- Revised energy performance certificates or DPEs (Diagnostic for Performance of Energy) and Low Consumption Building Renovation labelling efforts
- Mandatory energy audits before selling or leasing property in order to demonstrate potential energy costs for prospective owners
- A minimum energy performance standard of 450 kWh/m²/year to meet the definition of "decent housing" in the country.

China

China scored the highest on energy use intensity in residential buildings compared to other leading countries in the buildings category. China did just as well as others on energy use intensity in commercial buildings and scored well for comprehensive building energy codes and policies relating to appliance and equipment efficiency. The country has many policies in place to encourage energy efficient buildings, primarily developed by the Ministry of Housing and Urban Rural Development (MOHURD). In 2019, the MOHURD released the Nearly Zero Energy Building Energy Efficiency Standard to provide technical standards and recommended design elements and approaches for near zero energy performance in new residential and commercial buildings. The Green Building Evaluation Label (the “three-star” label) is a certification system that rates buildings on energy efficiency, water efficiency, sustainable materials, and other features. China recently revised the requirements to make them more stringent (Zhou et al. 2020). In order to target reductions in GHG emissions in the country’s building stock, the MOHURD released the National Standard for Building Carbon Emission Calculation. The policy presents a standardized approach to calculate carbon emissions for every stage of a buildings lifecycle such as the production and transportation of materials, construction and operation, and demolition phases (IEA 2021b).

INDUSTRY

Energy efficiency policy and performance in the industrial sector was evaluated using ten metrics. The *Scorecard* assessed methods and actions to improve industrial energy intensity through voluntary agreements with manufacturers, federal mandates for energy managers in industrial facilities, laws or regulations requiring energy audits, and overall investment in R&D. Countries were also scored on policies to encourage combined heat and power (CHP) as well as its percentage in total installed electric power capacity. We also examined countries with policies to encourage energy management systems such as ISO 50001 certified facilities and the existence of minimum efficiency standards for electric motors. Lastly, countries earned points for lowering their agricultural energy intensity.

The average in this section was approximately 12 points and was the only category to be led by a non-EU country. Japan ranked first by reducing energy intensity in the sector and by implementing voluntary and mandatory measures to encourage energy efficiency in industrial plants. Other high-ranking countries, as seen in Table 3, exhibited lower industrial energy intensity and had voluntary agreements with manufacturing companies, mandatory energy audits, and comprehensive efficiency standards for motors.

Table 2. Building sector scores for leading EU and non-EU countries.

| Metric | Max. points | Netherlands | France | Spain | Germany | United Kingdom | China |
|---|-------------|-------------|-----------|-------------|-----------|----------------|-------------|
| TOTAL | 25 | 22.5 | 21 | 20.5 | 20 | 19.5 | 19.5 |
| Residential building codes | 3 | 3 | 3 | 3 | 3 | 3 | 2.5 |
| Commercial building codes | 3 | 3 | 3 | 3 | 3 | 3 | 3 |
| Appliance and equipment standards | 5 | 4 | 4 | 4 | 4 | 2.5 | 4.5 |
| Appliance and equipment labelling | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Building retrofit policies | 4 | 4 | 4 | 3 | 3 | 4 | 2 |
| Building rating and disclosure | 2 | 2 | 2 | 2 | 2 | 2 | 1 |
| Energy intensity in residential buildings | 3 | 2 | 1 | 1.5 | 1 | 1 | 2.5 |
| Energy intensity in commercial buildings | 3 | 2.5 | 2 | 2 | 2 | 2 | 2 |

Table 3. Industry sector scores for leading EU and non-EU countries.

| Metric | Max. points | Japan | United Kingdom | Germany | Italy | France |
|--|-------------|-----------|----------------|-------------|-------------|-----------|
| TOTAL | 25 | 21 | 20.5 | 19.5 | 18.5 | 18 |
| Energy intensity of the industrial sector | 6 | 6 | 6 | 4 | 4 | 4 |
| Voluntary energy performance agreements with manufacturers | 4 | 4 | 4 | 4 | 4 | 4 |
| Mandate for plant energy managers | 2 | 2 | 0 | 0 | 2 | 0 |
| Mandatory energy audits | 2 | 2 | 2 | 2 | 2 | 2 |
| Policy to encourage energy management | 3 | 1 | 3 | 3 | 1 | 3 |
| CHP share in total installed capacity | 1 | 0 | 0.5 | 0.5 | 0.5 | 0 |
| Policy to encourage CHP | 1 | 1 | 0.5 | 1 | 0.5 | 0.5 |
| Minimum efficiency standards for electric motors | 2 | 2 | 2 | 2 | 2 | 2 |
| Investment in manufacturing R&D | 2 | 1.5 | 1.5 | 2 | 1 | 2 |
| Agriculture energy intensity | 2 | 1.5 | 1 | 1 | 1.5 | 0.5 |

Japan

Japan has made great progress on fostering energy efficiency in the last several years. The country's 2018 5th Strategic Plan lays out measures and a framework to achieve energy savings in all sectors by 2030. The Japanese government envisions approximately 21 % of all energy savings to materialize in the industrial sector through robust energy management in factories, industry sub-sector commitments to decarbonization, and high-efficiency appliances in facilities. The Energy Efficiency Act requires Japan's large energy users (at least 1,500 kilolitres in oil equivalent) to enact energy management systems, record annual energy consumption, and create energy efficiency plans. This policy also has a non-binding system in place to benchmark highly efficient corporations in the same sub-sector. Japanese companies in the industrial sector have also voluntarily signed up to improve energy efficiency and reduce emissions as part of Keidanren's (the Japan Business Federation) Low-Carbon Society Initiative (IEA 2021c).

United Kingdom (UK)

The UK has plans to develop a net-zero carbon industrial cluster by 2040. Industrial clusters are hubs of localized, large energy-using manufacturing facilities that are important parts of both local and national economies. Backed through public investment through the Industrial Strategy Challenge Fund, the UK is planning to position its industrial clusters as areas for large-scale investment in energy efficiency and demand drivers for low carbon products and technologies. The UK's six largest industrial clusters by emissions are responsible for over 33 megatons of CO₂. Mitigating and minimizing those emissions through new energy efficiency measures, among other policies, will help the UK on its way to decarbonizing industry, and serve as a primary example for other countries that have the potential to employ an industrial cluster approach to reduce emissions.

Germany

Germany and several other countries in the European Union have robust policies in place to ensure that energy audits and management are maximized in order to better pursue industrial energy efficiency. These policies serve as the bedrock of EU industrial efficiency policy. However, Germany has emerged as a leader in the space, even among other countries in the EU. Germany has an industrial electricity tax, set at EUR20.5/MWh. Since 2012, large energy users in Germany have been eligible to apply for a 90 % reduction of this tax liability if they can prove that they have implemented an energy management system certified to ISO 50001 or the German national standard (DIN EN 160001). As of 2014, it was estimated that around 25,000 firms were eligible to receive tax exemptions, which if claimed would total EUR 2.3 billion (IEA 2017). The success of the program in furthering the penetration of energy management into the industrial sector is also demonstrated by the fact that over 6V % of German industrial facilities were ISO 50001 certified in 2020 (UNIDO 2021).

Italy

Industrial energy efficiency measures can be capital intensive, which is a significant barrier to overcome in furthering industrial decarbonization. The incentive and research and development (R&D) policies of Italy and some other EU member

states serve as prime examples of how government programs can mitigate such barriers. Italy's Nuova Sabatini subsidy seeks to increase the competitiveness and energy efficiency of Italian manufacturing by improving access to new, more efficient and less carbon intensive machinery and industrial equipment for small and medium enterprises. The recently updated Stability Law also supports efficiency improvements in industry by offering tax credits for companies investing in industrial R&D, including experimental development and the production and testing of emerging technologies (Malinauskaitė et al. 2018).

TRANSPORTATION

The transportation section looked at nine metrics encompassing passenger and freight transport. We evaluated the average fuel economy of light-duty vehicles as well as annual vehicle miles travelled per person. Countries were scored on fuel economy standards for light-duty vehicles and the share of new vehicle sales that are fully electric. The *Scorecard* also determined each country's spending on rail transit versus roads and calculated the percentage of passenger kilometres taken by public transportation systems. Policies and performance relating to freight were evaluated through the presence of smart freight programs, fuel economy standards for heavy-duty vehicles, and ton-kilometres of freight good moved per unit of GDP.

France emerged as a leader in the transportation category, earning 18 out of 25 points. The United Kingdom came in second, while other European countries grabbed the top spots. China was the highest scoring non-European country, with a modest score of 14.5 points. Countries have a long road ahead of them to achieve meaningful progress on transportation related performance and policies. Scores for heavy-duty vehicle efficiency standards were low, even among leaders. Table 4 shows that countries fared worse in vehicle miles travelled per capita, demonstrating that personal passenger vehicles, instead of lower-carbon transit options, are still central to transportation systems in evaluated countries.

France

France took first place this year in the transportation section with a score of 18 points. The National Low-Carbon Strategy for Climate has spurred much of France's progress on transportation energy efficiency. The strategy outlines a path toward a 29 % reduction in transportation-sector greenhouse gases by 2028 from 2013 levels. To achieve this aggressive goal, France has developed a comprehensive approach that includes increasing the overall efficiency of vehicles by adhering to the EU passenger vehicle standards while encouraging the purchase of more-efficient vehicles through a bonus/malus program, curbing the demand for mobility services (e.g., by improving land use planning), promoting more-efficient transportation alternatives, and encouraging mode shift for freight travel.

As a result, France has made its way to the top of the 2022 transportation rankings. France was among the top five countries for on-road fuel economy in 2017 with an average mpg of 44.8 (5.3 litres/100 km). France participates in the EU's ambitious emissions reduction target for new vehicles, which has helped increase on-road fuel efficiency. On the transportation system efficiency side, France spends approximately 3 % more on rail development and maintenance than it does on

roads, indicating an effort to ensure that rail is a reliable option for both passenger and freight movement.

United Kingdom (UK)

The UK ranked second in the transportation category by scoring the maximum number of points across many metrics. Stringent fuel economy standards for passenger vehicles and a well performing average fuel economy (5.8 liters/100 km) for the country contributed to high scores. The UK also invests highly in rail transit EVs make up around 11 % of new vehicle shares in the UK, in large part due to incentives such as the Plug-In Car Grant and low emission vehicle policies that commit to ending sales of petrol and diesel vehicles by 2030 and ensure that all new vehicles and vans have zero emissions by 2035 (Department for Transport 2021). The UK government also plans to implement a Zero Emission Vehicle (ZEV) mandate starting in 2024 which will require a minimum percentage of ZEVs to be sold by vehicle manufacturers (Pickett et al. 2021). The country has also taken initiatives to combat energy consumption and emissions for freight transport, resulting in low freight transport per unit of economic activity. Smart freight initiatives such as the Logistics Carbon Reduction Scheme have also encouraged companies to improve the efficiency of freight vehicles. Lastly, data show that the country has invested

more in passenger rail transit as compared to road maintenance and construction, demonstrating its dedication to low-carbon modes of transportation.

The Netherlands

The Netherlands placed fourth in the transportation section of the *Scorecard*, with a score of 16. The country participates in the European Union's mandatory emissions-reduction targets for new cars, which require cars registered within the EU to meet a standard of 95 grams of CO₂ per km by 2021. As a result, the fleet mpg average of passenger vehicles on the road in 2017 was among the highest at 43.56 mpg (5.4 liters/100 km). The Netherlands also leads the pack when it comes to the proportion of new vehicle sales that are EVs. A whopping 25 % of new vehicles sold are electric, 12 percentage points higher than the country that takes second spot for this metric, Germany. As a comparison, battery operated vehicles account for just 2 % of total market share in the United States. The Netherlands is targeting a fully carbon-free vehicle fleet, including hydrogen fuel cell electric vehicles, by 2030. There are also plans to increase the share of zero-emission public transport options by 2025. These goals are supported through financial incentives such as reduced tax for company vehicles that are not diesel or gasoline and lower annual road tax and registration tax for

Table 3. Industry sector scores for leading EU and non-EU countries.

| Metric | Max. points | France | United Kingdom | Italy | Netherlands | Spain | China |
|--|-------------|-----------|----------------|-----------|-------------|-----------|-------------|
| TOTAL | 25 | 18 | 17 | 16 | 16 | 15 | 14.5 |
| Fuel economy standards for light-duty vehicles | 4 | 4 | 4 | 4 | 4 | 4 | 3 |
| Fuel economy of light-duty vehicles | 3 | 3 | 3 | 3 | 3 | 3 | 1 |
| Electric vehicle sales share | 3 | 2 | 2 | 1 | 3 | 1 | 1 |
| Fuel economy standards for heavy-duty tractor trucks | 3 | 1 | 0 | 1 | 1 | 1 | 2 |
| Vehicle miles traveled per capita | 3 | 1 | 1 | 1 | 1.5 | 1.5 | 2.5 |
| Freight transport per unit of economic activity | 2 | 1.5 | 2 | 1.5 | 1.5 | 1 | 0 |
| Smart freight initiatives | 1 | 1 | 1 | 1 | 1 | 0 | 1 |
| Investment in rail transit vs. roads | 3 | 3 | 3 | 2 | 0 | 2 | 1 |
| Use of public transit | 3 | 1.5 | 1 | 1.5 | 1 | 1.5 | 3 |

Table 4. Transportation sector scores for leading EU and non-EU countries.

| Metric | Max. points | France | United Kingdom | Italy | Netherlands | Spain | China |
|--|-------------|-----------|----------------|-----------|-------------|-----------|-------------|
| TOTAL | 25 | 18 | 17 | 16 | 16 | 15 | 14.5 |
| Fuel economy standards for light-duty vehicles | 4 | 4 | 4 | 4 | 4 | 4 | 3 |
| Fuel economy of light-duty vehicles | 3 | 3 | 3 | 3 | 3 | 3 | 1 |
| Electric vehicle sales share | 3 | 2 | 2 | 1 | 3 | 1 | 1 |
| Fuel economy standards for heavy-duty tractor trucks | 3 | 1 | 0 | 1 | 1 | 1 | 2 |
| Vehicle miles traveled per capita | 3 | 1 | 1 | 1 | 1.5 | 1.5 | 2.5 |
| Freight transport per unit of economic activity | 2 | 1.5 | 2 | 1.5 | 1.5 | 1 | 0 |
| Smart freight initiatives | 1 | 1 | 1 | 1 | 1 | 0 | 1 |
| Investment in rail transit vs. roads | 3 | 3 | 3 | 2 | 0 | 2 | 1 |
| Use of public transit | 3 | 1.5 | 1 | 1.5 | 1 | 1.5 | 3 |

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