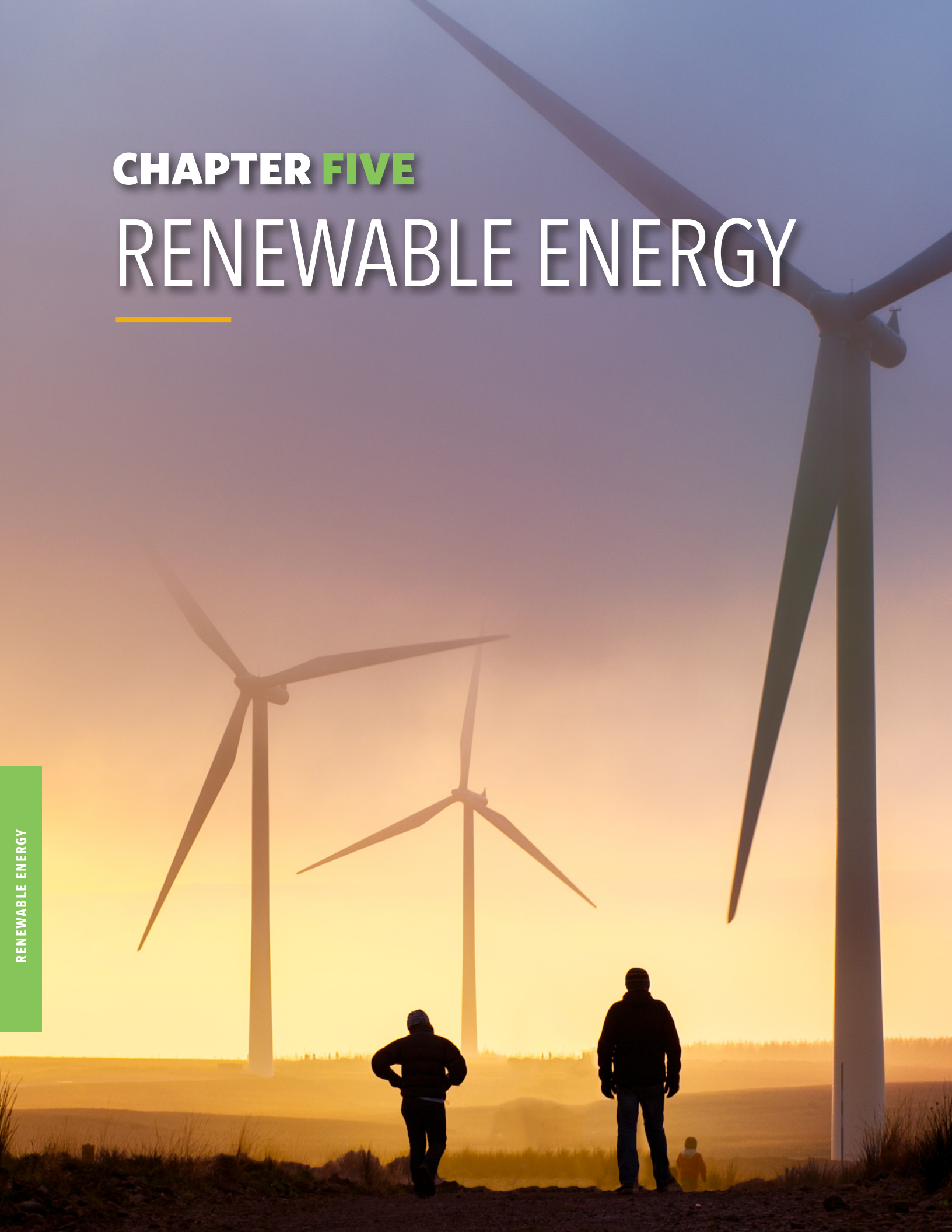


CHAPTER FIVE
RENEWABLE ENERGY

5. RENEWABLE ENERGY

KEY MESSAGES:

- Since 2010 there has been significant progress in developing enabling policy frameworks for renewable energy, with the global average score almost doubling from 29 in 2010 to 50 by 2017.
- Improvements in renewable energy policies are happening in the countries with highest global impact. The majority of the top 20 energy consumers, representing almost 80 percent of the world energy consumption in 2015, have improved their renewable energy regulations markedly during the 2010-2017 period.
- As of 2017, 84 percent of countries had a legal framework in place to support renewable energy deployment, while 95 percent of countries allowed the private sector to own and operate renewable energy projects.
- Grid integration policies for variable renewable energy (VRE) are a challenge with grid codes remaining the slowest area of progress. While more than two thirds of countries have grid codes that clearly specify connection procedures in 2017, only about half of countries have renewable energy-related standards in their grid code. Additionally, only a quarter of countries in 2017 had variability forecasting provisions in their dispatch operations in place.

POLICY DIMENSIONS FOR RENEWABLE ENERGY

The 2018 edition of the RISE renewable energy pillar is based on seven indicators that were used in the 2016 edition of RISE, but with several changes to the questions within each indicator. These seven indicators include: 1. Legal and regulatory framework for renewable energy; 2. Planning for renewable energy expansion; 3. Incentives and regulatory support; 4. Attributes of financial and regulatory incentives; 5. Network connection and use; 6. Counterparty risk; and 7. Carbon pricing and greenhouse gas monitoring, (Appendix A).

The seven indicators broadly start with the easiest to adopt policies and regulatory concepts, before progressing towards the more challenging ones. As such, it is reasonable that as countries begin to develop renewable energy frameworks, their scores for indicators 1, 2 and 3 usually improve faster, before their scores for indicators 4, 5 and 7. Indeed, the headline results for the global average RISE score in 2017 illustrate this.

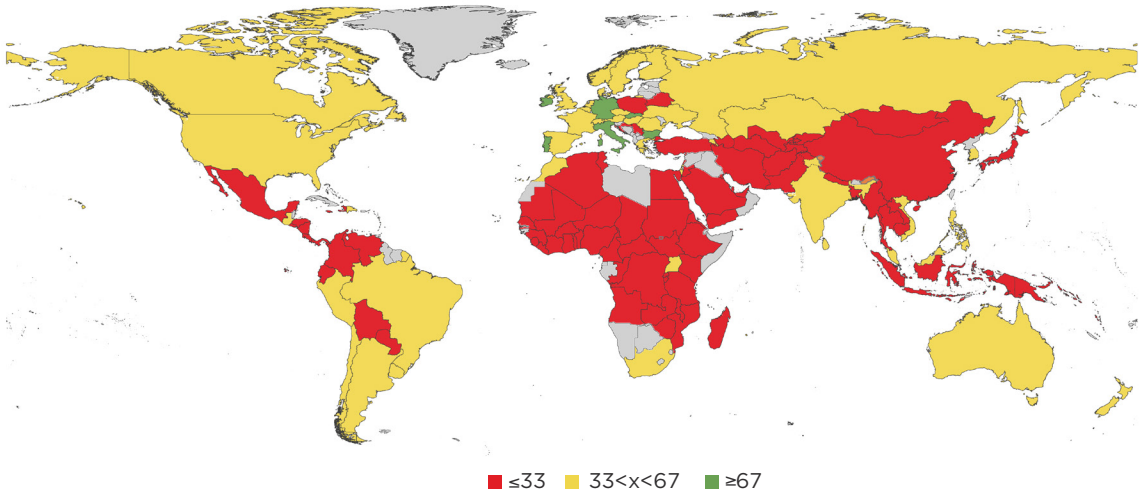
The path towards developing an enabling policy framework for renewable energy can be different for every country. It is possible to find RISE countries with low scores on indicators 2 and 3, but higher scores for indicators 4 and 5 and high levels of renewable investment. Equally, there are countries in RISE with very high scores across several indicators, but which attract relatively little investment. Policies & regulations while an important part of the investment process, are not the only factors that drive deployment of renewables. Investment decisions are a function of many variables, including the renewable resources, availability of financing, utility creditworthiness, country risk in case of international investments, etc. Indeed, one of the opportunities for researchers and users of RISE data is to assess which policies appear to be essential for spurring renewable energy investments and which may not be.

GLOBAL OVERVIEW OF RENEWABLE ENERGY POLICY FRAMEWORK

In 2017, over 70 percent of the RISE countries had already enacted some level of regulations and policies supporting renewable energy (*Figure 5.3*). However, global progress on policy measures that facilitate the actual deployment of renewables has been much slower than progress on planning stage policies to conduct assessments on renewables and set industry-level targets. As a result, many countries are still far from having the most conducive regulatory environment for renewable energy *(Figure 5.1 and Figure 5.2).*

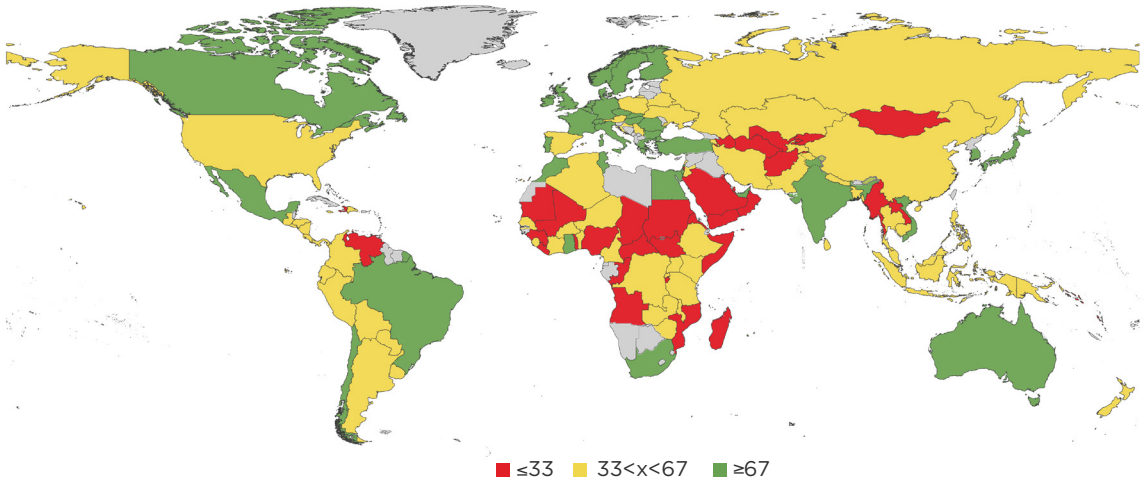
Despite significant global improvements in developing renewable energy legal frameworks, the adoption of regulatory measures has been slow. Legislation to support renew-

FIGURE 5.1 MAP: RISE RENEWABLE ENERGY SCORES IN 2010



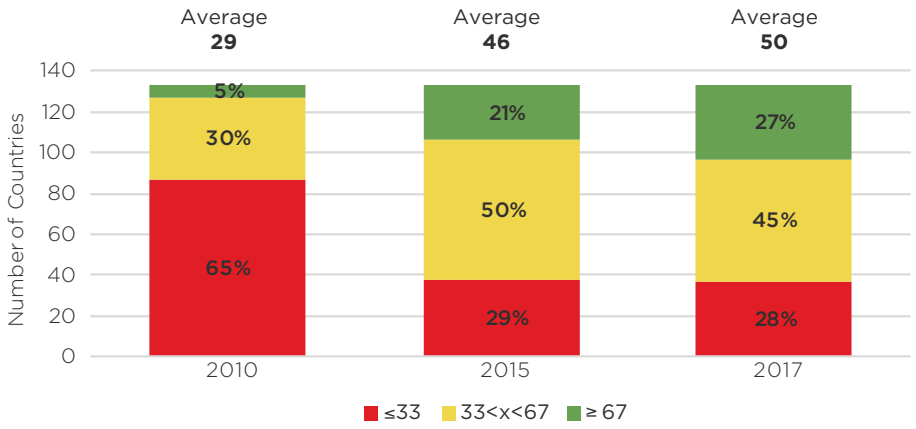
Source: World Bank RISE 2018

FIGURE 5.2 MAP: RISE RENEWABLE ENERGY SCORES IN 2017



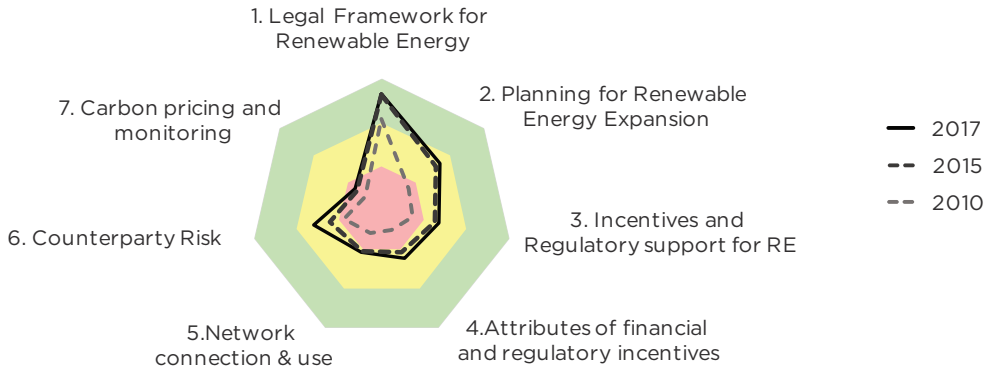
Source: World Bank RISE 2018

FIGURE 5.3 DISTRIBUTION OF RISE RENEWABLE ENERGY SCORES, 2010, 2015, AND 2017



Source: World Bank RISE 2018

FIGURE 5.4 RENEWABLE ENERGY PROGRESS BY INDICATOR



Source: World Bank RISE 2018

able energy deployment has been widely adopted, with 84 percent of countries having some form of legal framework for renewable energy in place *(Figure 5.4.)*. But this has not necessarily translated into practical policies and regulatory support that would help faster and easier deployment of renewables on the ground.

Counterparty Risk indicator score for RISE countries has improved significantly since 2010. This is an aggregate indicator assessing among others the provision of payment guarantees to generators, availability of public financial and annual reports, etc. This is important, because improvements in this score result in decreased off-takers' risks, thus increasing the bankability of projects for developers that are investing in new grid-connected renewable energy projects. Carbon pricing and monitoring is the only indicator affecting the renewable energy score where the global average is still in the red score range (27).

REGIONAL AND COUNTRY OVERVIEW OF RENEWABLE ENERGY POLICY

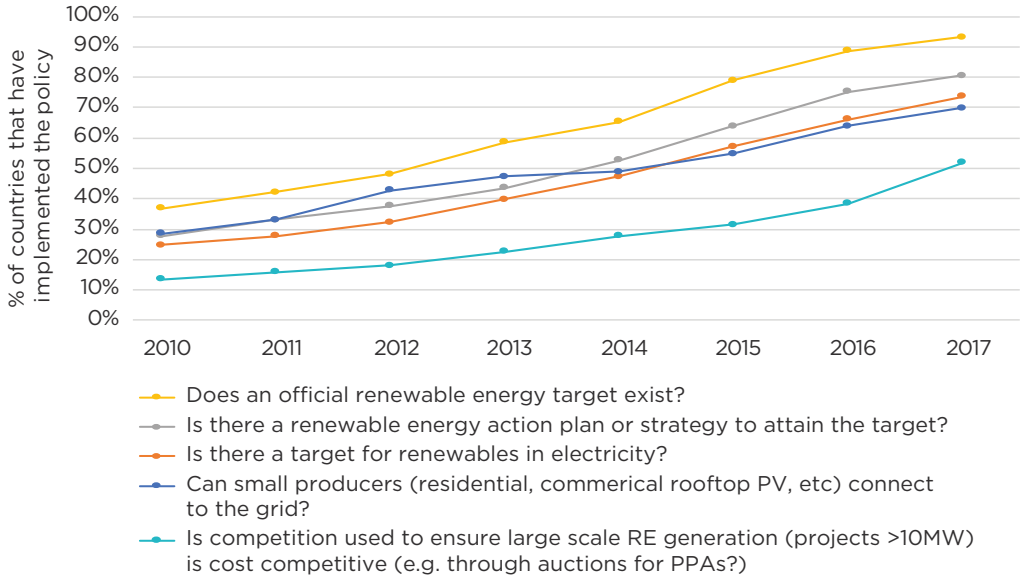
The fastest-growing policy measure since 2010 was the creation of renewable energy targets, which was partly driven by European Union regulations and the build-up to the Paris Climate Accords. However, many of

these high-level targets have lacked enabling policies to support them. While 74 percent of countries had a target for renewables in the power sector by 2017 (*Figure 5.5*), only 47 percent and 41 percent provided prioritized grid access for renewables and included renewable energy in their power generation planning, respectively.

The region of Europe and Central Asia is significantly ahead of the other regions in its RISE renewable energy score. This has been driven by strong performances from Bulgaria, Hungary, and Turkey. In 2017, countries in Europe & Central Asia represented 13 percent of all the countries in the green zone globally, and together with the OECD high-income countries they represented 60 percent of all countries in the green zone (*Figure 5.6* and *Figure 5.7*).

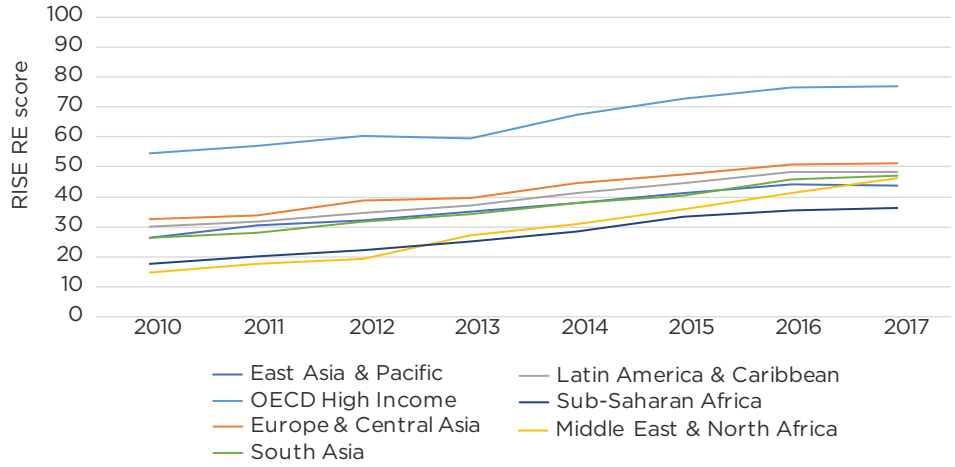
While high-income countries are leading the overall effort in renewable energy frameworks, attaining a certain income level is

FIGURE 5.5 PERCENTAGE OF COUNTRIES WITH TOP FIVE FASTEST-MOVING POLICIES FOR RENEWABLE ENERGY, 2010 – 2017



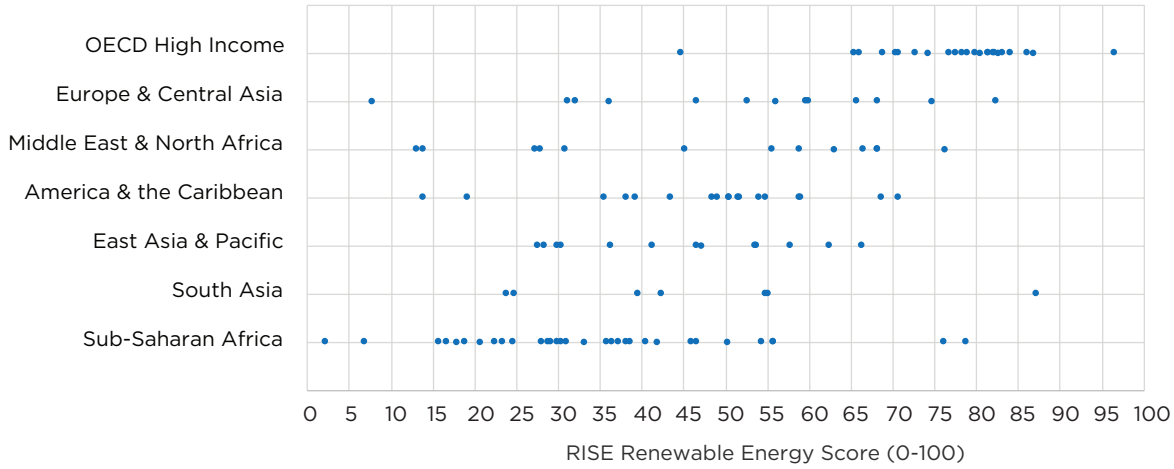
Source: World Bank RISE 2018

FIGURE 5.6 EVOLUTION OF RENEWABLE ENERGY SCORES BY REGION, 2010-2017



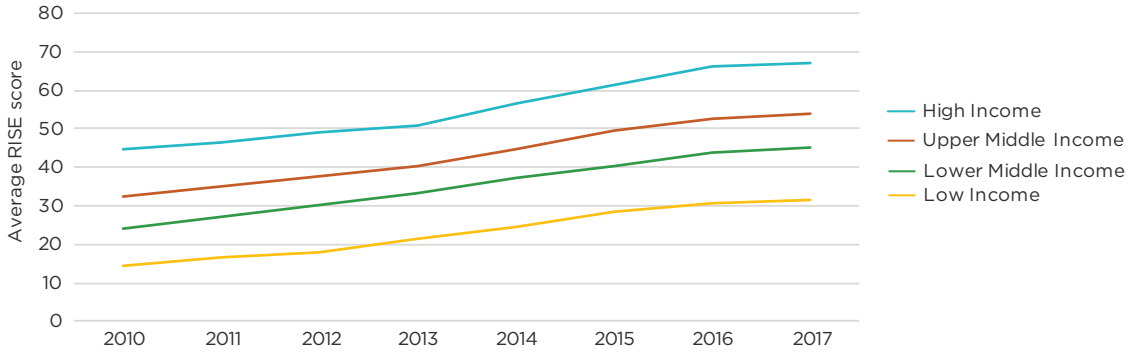
Source: World Bank RISE 2018

FIGURE 5.7 RENEWABLE ENERGY SCORES BY REGION, 2017



Source: World Bank RISE 2018

FIGURE 5.8 AVERAGE RISE RENEWABLE ENERGY SCORE BY COUNTRY INCOME GROUP, 2010 - 2017

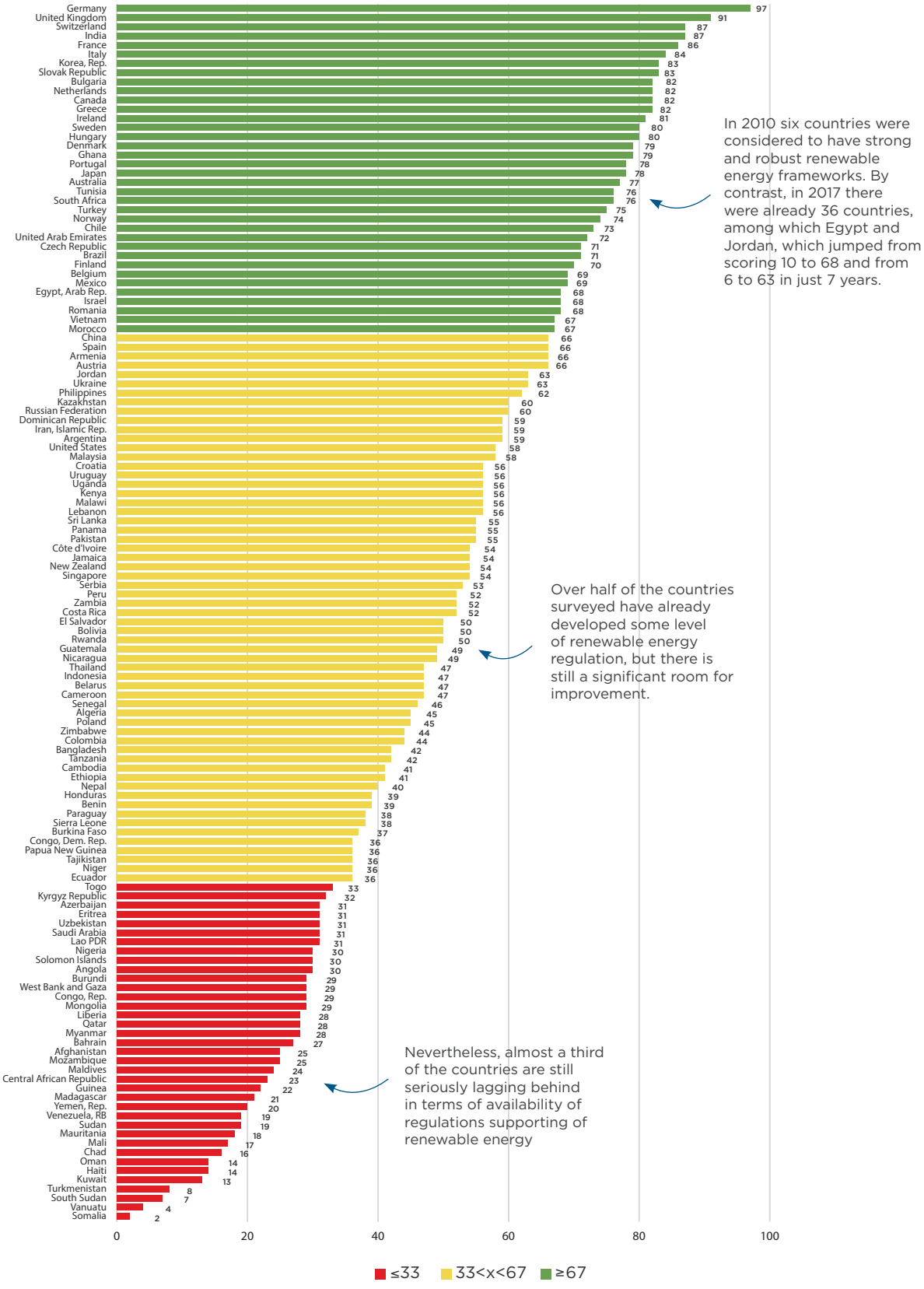


Source: World Bank RISE 2018

not a pre-requisite to achieving a well developed framework. Indeed several lower income countries are notable for having strong renewable energy policy frameworks despite modest levels of national income e.g. Ghana, Tunisia and India. Only the high-income group achieved an average score in the green zone (≥ 67) by 2017, and only the low-income group remained in red zone (<33) according to their average RISE renewable energy scores (*Figure* 5.8). Nevertheless, among all countries scoring in the green zone, there are some lower middle-income countries and many countries from the low-income group showing considerable improvement since 2010, such as Uganda, Malawi and Rwanda. At the same time, one third of high income countries are still in the yellow and red zone.

The development of regulations and policies to support the deployment of renewable energy has been making steady progress. The number of countries achieving a green zone score has increased from 6 in 2010 to 35 in 2017. Within seven years, the number of countries scoring in the red zone with few or no meaningful renewable energy policies has declined from 88 to 37. The global renewable energy score, however, still suggests significant room for improvement (*Figure 5.9*).

FIGURE 5.9 RISE RENEWABLE ENERGY SCORE, BY COUNTRY, 2017

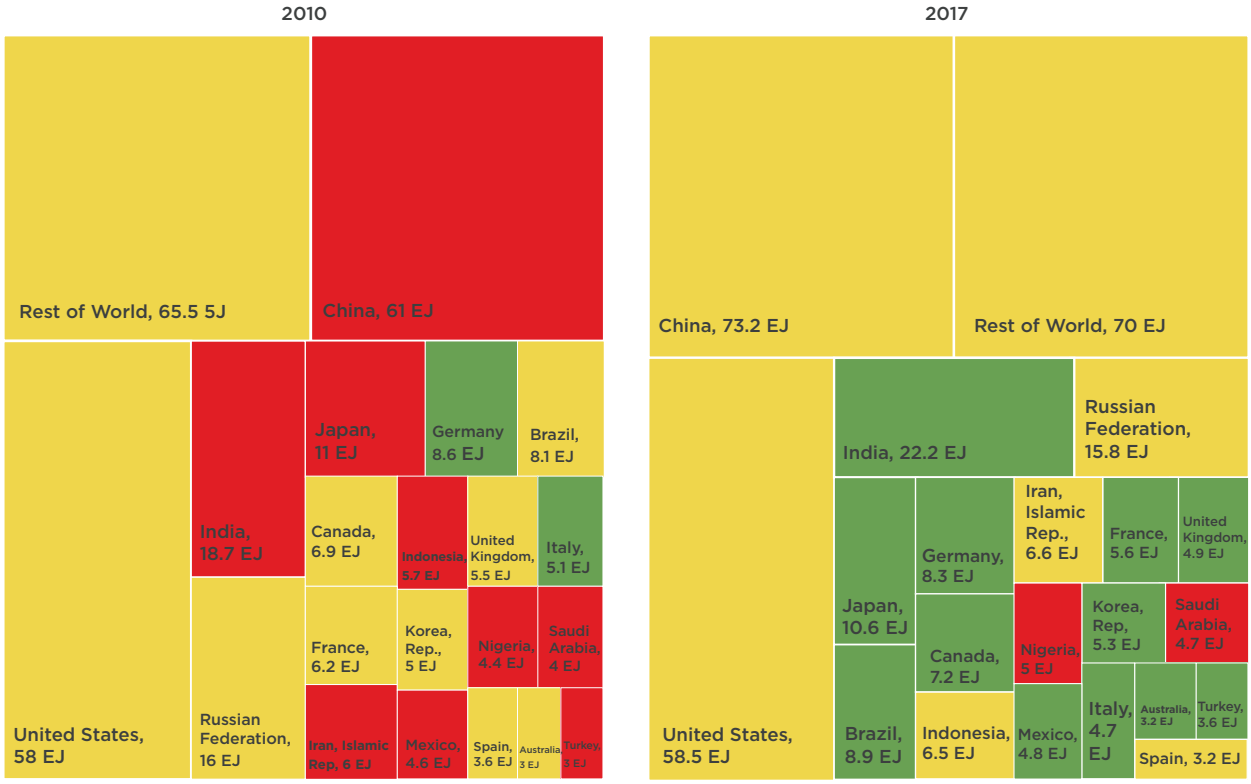


Source: World Bank RISE 2018

A majority of the top twenty energy consuming countries, representing almost 80 percent of the world's energy consumption, has been improving their renewable energy regulations significantly. *Figure 5.10* depicts the RISE renewable energy scores for the top 20 largest energy consumers in 2010 and 2017, measured by total final energy consumption (TFEC) from the Tracking SDG report data. Notably, China drastically improved its RISE renewable energy score, going from 25 in 2010 to 66 in 2017.

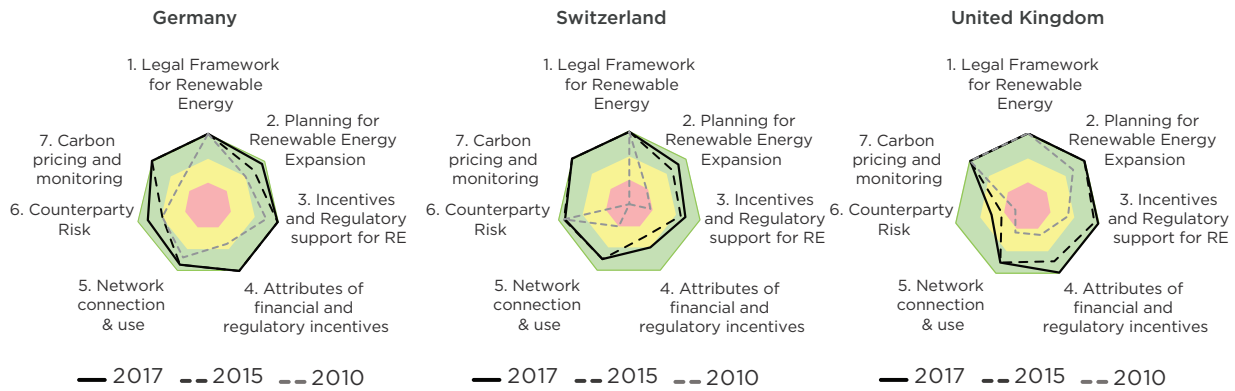
The strongest renewable energy performers as of 2017 were Germany, Switzerland, and the United Kingdom (UK) (*Figure 5.11*). In Ger-

FIGURE 5.10 RISE RENEWABLE ENERGY SCORES FOR THE 20 LARGEST ENERGY-CONSUMING COUNTRIES, RELATIVE TO THEIR TOTAL ENERGY CONSUMPTION, 2010 AND 2017



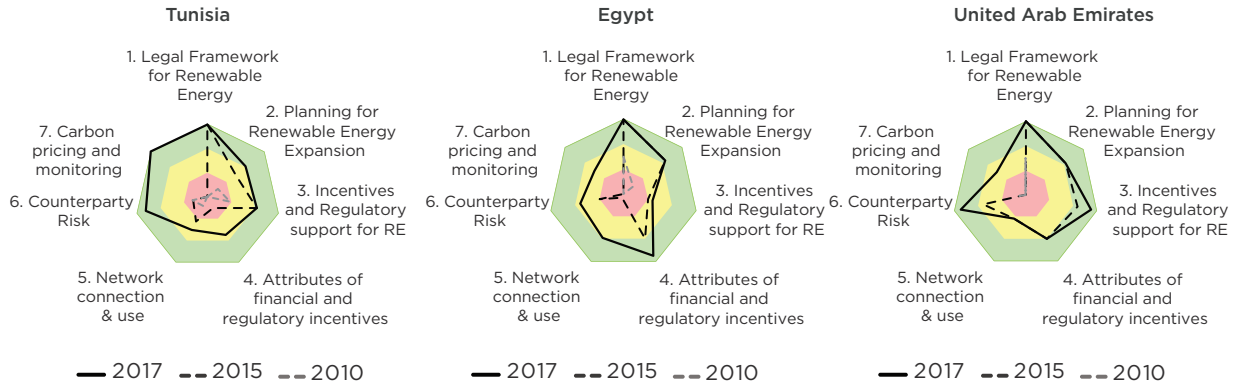
Note: The TFEC used for 2010 and 2017 was sourced from the *Tracking SDG 7* 2018 report. For the year 2010, data was drawn from 2010 TFEC and for 2017 it was drawn from the 2015 TFEC.

FIGURE 5.11 PROGRESS OF INDICATORS FOR THE TOP THREE PERFORMERS IN RENEWABLE ENERGY PILLAR, 2010-2017



Source: World Bank RISE 2018

FIGURE 5.12 PROGRESS OF INDICATORS FOR THE TOP THREE FAST MOVERS IN THE RENEWABLE ENERGY PILLAR, 2010-2017



Source: World Bank RISE 2018

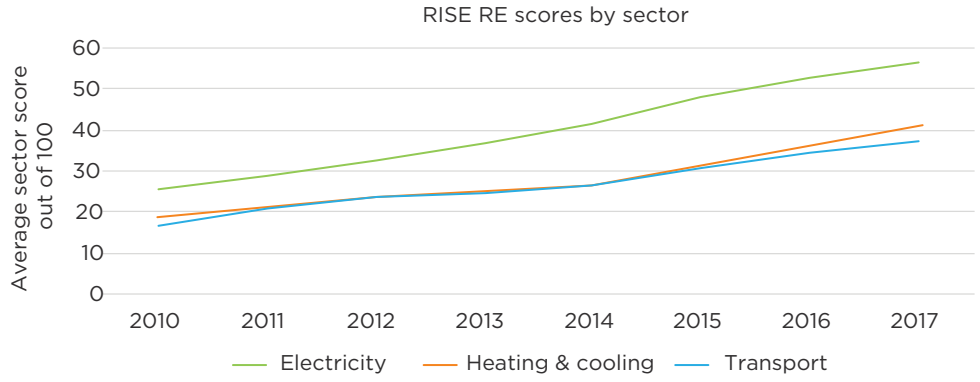
many and Switzerland, improvements in carbon pricing and greenhouse gas monitoring were among the biggest areas of improvement. Progress in financial and the regulatory incentives for renewable energy deployments was common among all three countries. Both the UK and Germany also saw improvements in their counterparty risk indicator since 2010.

The three fastest improvers in the renewable energy regulatory framework between 2010 and 2017 were Egypt, Tunisia, and United Arab Emirates. The fastest area of growth was in the legal framework for renewable energy, which includes private-sector ownership of renewables and a legal framework to support renewables *(Figure 5.12)*. By the end of 2017, all three of these countries had legislation in place that allowed private-sector ownership of renewable energy and had a legal framework for renewable energy. However, all three countries have been slow to develop policies that support network connections and use by third parties, and policies that promote renewable energy outside of the electricity sector.

RENEWABLE ENERGY POLICY, BY SECTOR

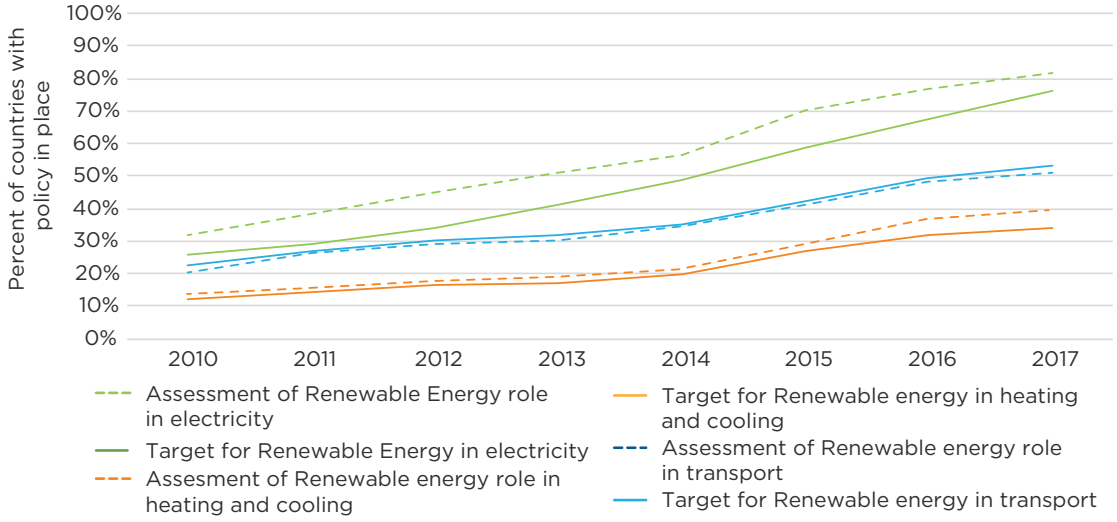
Globally, policymakers' focus remains heavily concentrated on supporting renewable energy in the electricity sector, privileging it above the transport and heating and cooling sectors. This is a particular concern given that electricity accounts for only around 20 percent of total final energy consumption, while

FIGURE 5.13 GLOBAL AVERAGE RENEWABLE ENERGY SCORES BY SECTOR, 2010-2017



Source: World Bank RISE 2018

FIGURE 5.14 PERCENTAGE OF COUNTRIES WITH ASSESSMENTS AND TARGETS FOR RENEWABLE ENERGY IN ELECTRICITY, HEATING AND COOLING, AND TRANSPORT SECTORS, 2010-2017

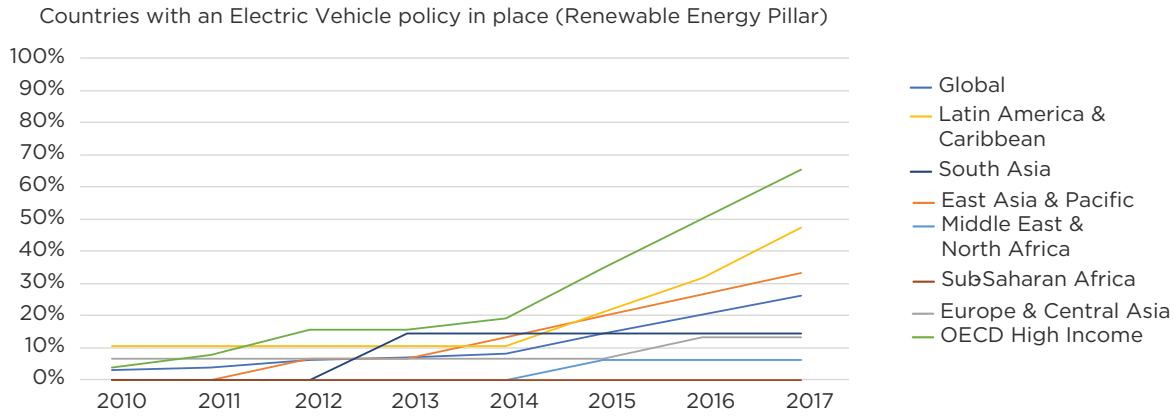


Source: World Bank RISE 2018

heating, cooling, and transport represent the remaining 80 percent. 53 percent of countries have a target for deployment of renewable energy in transport sector, driven mainly by biofuels mandates, as opposed to only 34 percent of countries having renewable energy targets in heating and cooling sector, dominated mainly by European Union countries following EU's Renewable Energy Directive.

Promotion of electric vehicles is a priority in 37 countries globally in 2017, compared to only 5 countries in 2010. One area that has gained significant attention in recent years has been the promotion of electric vehicles *Figure 5.15* illustrates the increasing popularity of measures to promote electric vehicle usage in OECD high-income countries and in the East Asia & Pacific and Latin America regions. Globally, over a quarter of countries now have some form of incentive to encourage electric vehicle use and/or the deployment of electric vehicles.

FIGURE 5.15 PERCENTAGE OF COUNTRIES WITH TARGETS FOR ELECTRIC AND HYBRID VEHICLE DEPLOYMENT, BY REGION, 2010 - 2017

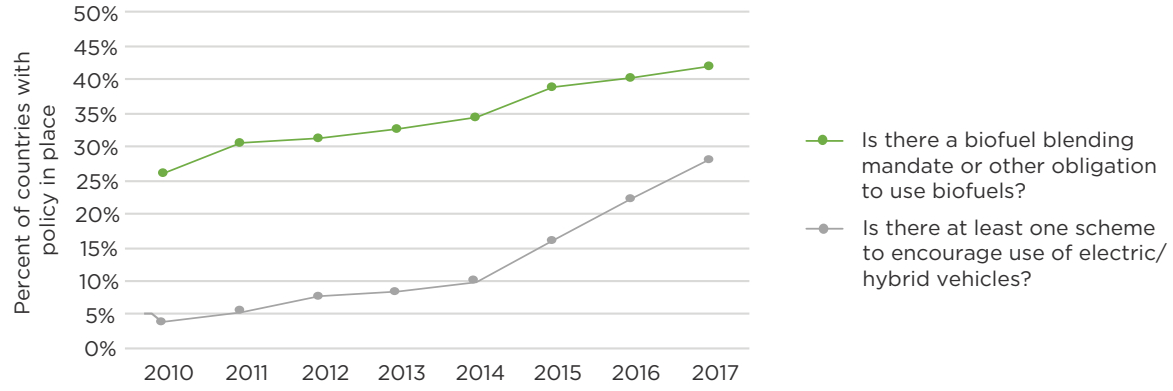


Source: World Bank RISE 2018

Policies that support the uptake of electric vehicles are quickly catching up with those for biofuels (*Figure 5.16*). This is in line with the rapid global growth in the electric vehicle fleet, which rose to 3 million cars at the end of 2017 from just 500,000 in 2013.

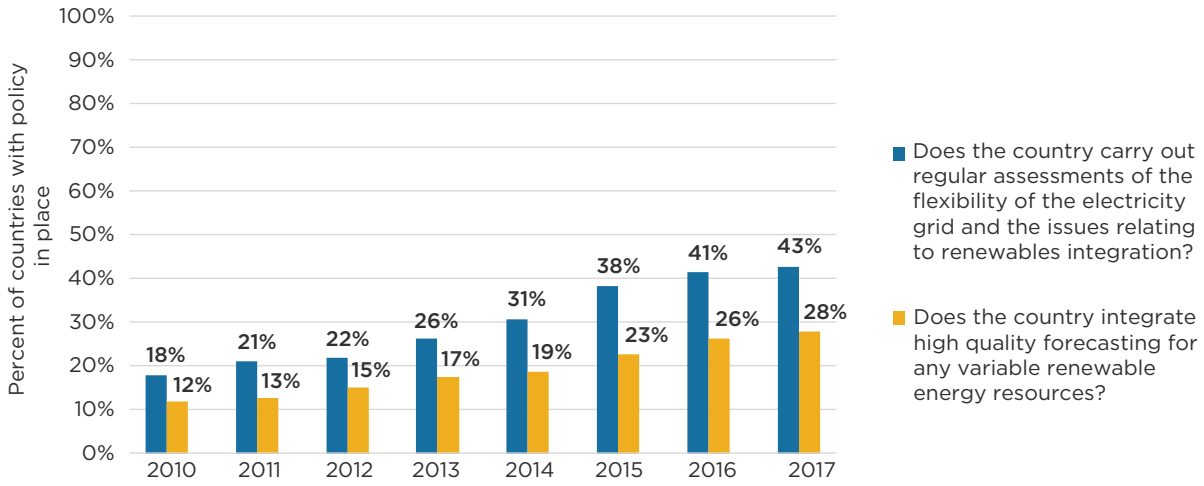
Only 26 percent of countries integrate high-quality forecasting and grid-flexibility assessment for variable renewable energy. *Figure 5.17* shows the progress of countries over the 2010–2017 period in adopting policies targeted at integrating variable renewable energy into the power system. Renewable energy investors and developers need to be able to rely on clearly formulated grid codes that consider the particular qualities of different renewable energy technologies. More attention should be given to improving

FIGURE 5.16 POLICY SUPPORT (PERCENTAGE OF COUNTRIES) FOR BIOFUEL VS ELECTRIC AND HYBRID VEHICLE DEPLOYMENT, 2010-2017



Source: World Bank RISE 2018

FIGURE 5.17 POLICY SUPPORT FOR ELECTRIC GRID FLEXIBILITY AND VARIABLE RENEWABLE ENERGY FORECASTING, 2010 - 2017

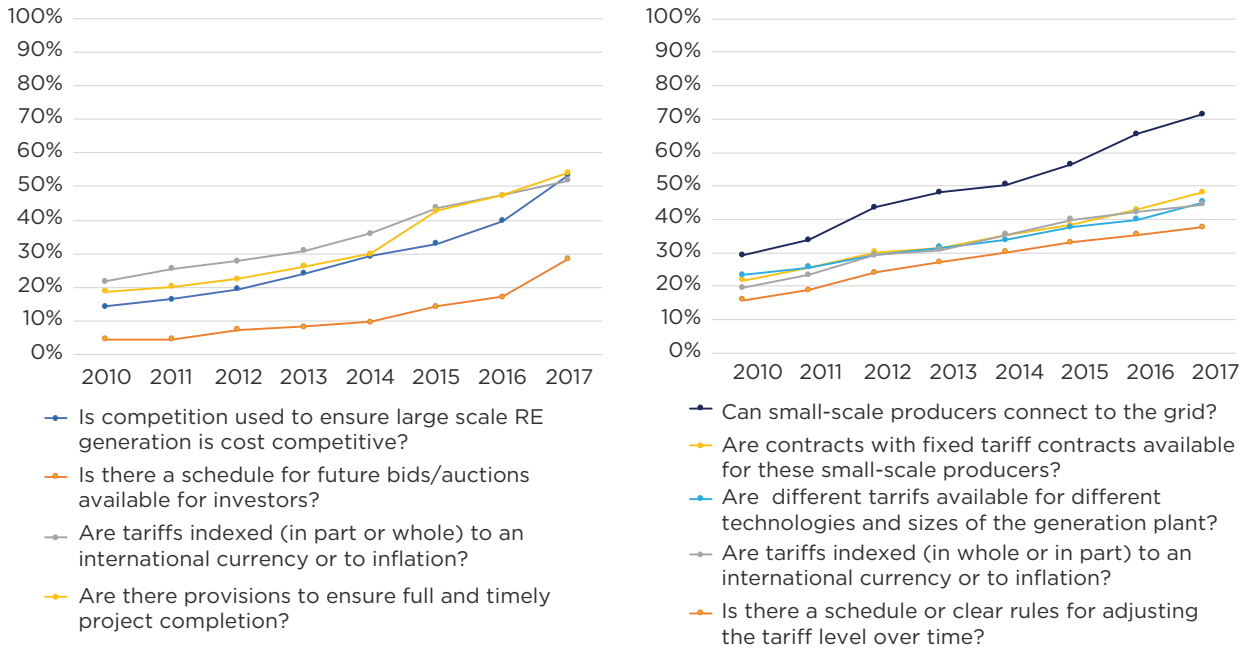


Source: World Bank RISE 2018

transparency around grid connection procedures, the allocation of grid-connection costs, and the costs incurred from ancillary services, to drive more consistent renewable energy deployment.

The policy framework for utility-scale renewable energy projects is more developed than that for small-scale producers. As shown in *Figure 5.18*, the use of competitions/auctions as a mechanism to ensure large-scale renewable energy deployment has grown from 11 percent to 53 percent of countries, while small scale producers are guaranteed a fixed tariff in 48 percent of countries at the end of 2017. Countries are also rapidly establishing schedules for future renewable energy bids/auctions, with 29 percent of those providing public schedules for the upcoming auctions as of 2017. Bid provisions have also been adopted widely, suggesting that their increase has been tied to this growth in the use of auctions.

FIGURE 5.18 POLICY SUPPORT (PERCENTAGE OF COUNTRIES) FOR DEPLOYMENT OF RENEWABLE ENERGY IN THE ELECTRICITY SECTOR, 2010 - 2017



Source: World Bank RISE 2018