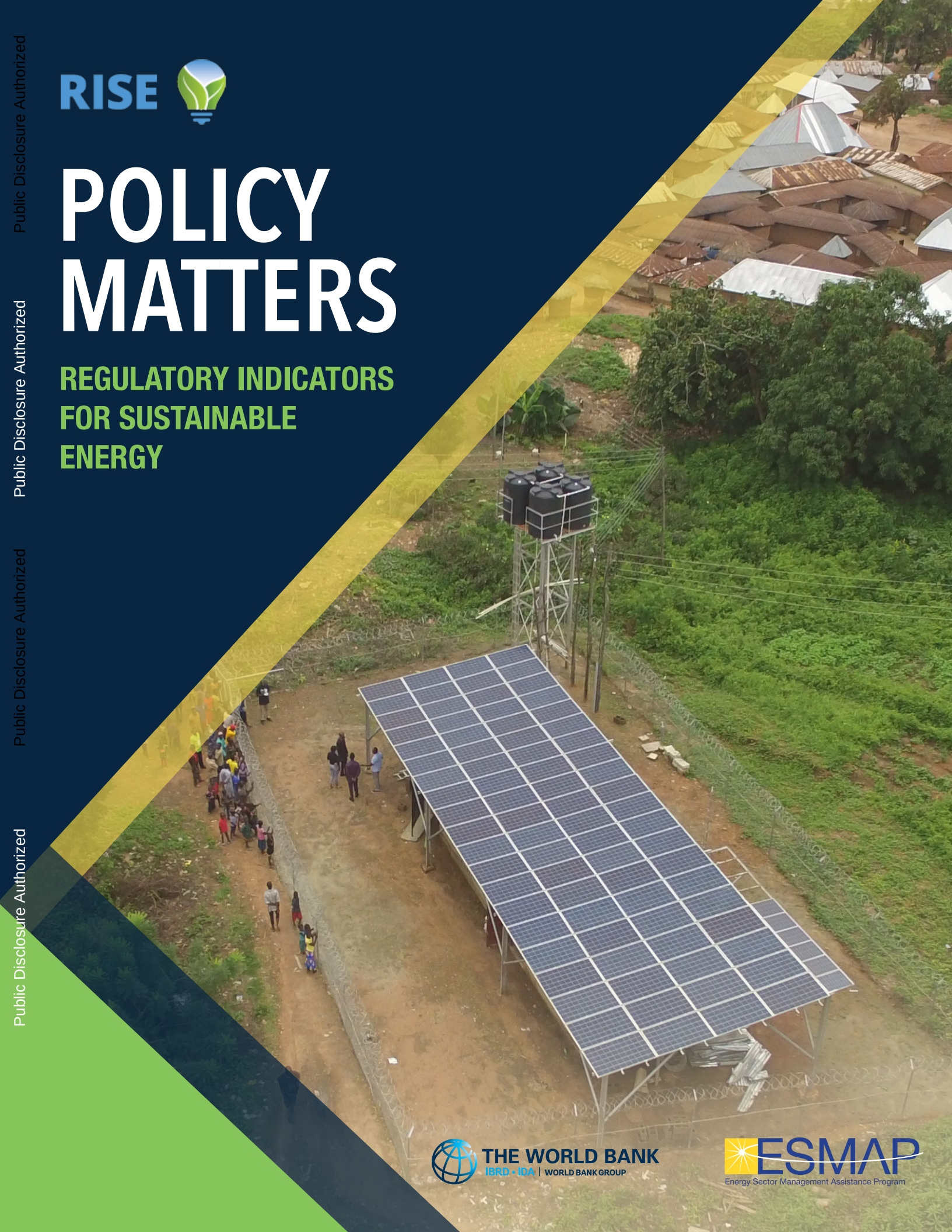
RISE

POLICY MATTERS

REGULATORY INDICATORS FOR SUSTAINABLE ENERGY



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Energy Sector Management Assistance Program

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RISE

POLICY MATTERS

REGULATORY INDICATORS FOR SUSTAINABLE ENERGY

WHAT IS RISE?

RISE–Regulatory Indicators for Sustainable Energy– is a global inventory of policies and regulations that support the achievement of SDG7 – electricity access, clean cooking, energy efficiency, and renewable energy. RISE tracks the regulatory indicators that can be compared across 133 developed and developing economies–from Afghanistan to Zimbabwe–and over time, from 2010 to 2017. As a tool for policymakers, RISE allows them to benchmark their own country's progress against that of peers and identify areas for policy and regulatory reform; as a tool for private investors, it supports their due diligence process for new projects, products, and services.

This second edition of RISE incorporates several improvements, including: policy time trends since 2010; greater emphasis on tracking regulations that support enforcement; broader coverage of the heating and transport sectors in addition to electricity; and a pilot assessment of the policy environment for clean cooking in a dozen major access-deficit countries.

RISE indicators are scored between 0 and 100, and all have equal weight when summed to reach a total score for each of the three areas: universal access, renewable energy, and energy efficiency. Scores are grouped into three categories based on a "traffic light" system: green for the highest third of scores (67 – 100), indicating a relatively mature policy and regulatory environment; yellow for the middle range (34 – 66), indicating that the country has begun to make serious efforts to develop a policy and regulatory framework; and red for the lowest scores (0 – 33), indicating that policy and regulation adoption remains at a very early stage. It is important to bear in mind that these report scores are not meant as endorsements (or disapprovals) for investments. Rather, the RISE scores are intended to measure how close or far a country is from offering an attractive policy and regulatory environment.

The RISE data platform hosts an extraordinary wealth of data on sustainable energy by highlighting global regional and countries trends across sustainable energy policies and making available detailed information on best practices in comparable country and detailing 133 country policy profile: http://rise.esmap.org/.

The data presented in RISE 2018 are current as of December 31, 2017.

ACKNOWLEDGMENTS

The Regulatory Indicators for Sustainable Energy (RISE) report was produced by the Global Energy and Extractives Practice of the World Bank Group. It benefited from the support and guidance of Senior Director Riccardo Puliti and Energy Sector Management Assistance Program (ESMAP) Practice Manager Rohit Khanna.

RISE was managed by a core team led by Vivien Foster and Elisa Portale, and including Daron Bedrosyan, Juliette Besnard, and Tigran Parvanyan. Specifically, the work was coordinated by the following staff and consultants:

- Electricity access: Juliette Besnard, Yi Xu, Sharmila Bellur, and Dana Rysankova.
- Energy efficiency: Daron Bedrosyan, Sarah Moin, and Ivan Jaques.
- Renewable energy: Tigran Parvanyan, Chris Jackson, Sharmila Bellur, and Zuzana Dobrotkova.
- Clean cooking: Sharmila Bellur, Sarah Hillware, Daron Bedrosyan, Yabei Zhang, and Caroline Adongo Ochieng.

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Many World Bank colleagues and external partners provided formal and informal guidance throughout the development of this report.

The following organizations contributed valuable time to review results and provide feedback: CLASP, International Energy Agency (IEA), International Renewable Energy Agency (IRENA), Siemens, SNV (Netherlands Development Organization), Sustainable Energy for All (SEforALL), The Global Alliance For Clean Cookstoves, United Nations Statistics Division (Department of Economic and Social Affairs), UNECE (United Nations Economic Commission for Europe).

RISE is underpinned by individual data collection efforts in each of the 133 countries covered. The full list of those who provided information in each country is posted on the RISE website (Rise.esmap.org). The team would like to particularly recognize the project managers for each of the firms that led data collection across multiple countries: Matt Van Roosmalen and Felipe Berger (Emerging Markets Asia); Sylvana Bohrt and Alexander LaBua (Greenmax Capital Advisors); Michel Layec and Rebecca Lamas (Stantec); Akram Al Mohamadi, Maged Mahmoud, and Rana El-Guindy (Regional Centre for Renewable Energy and Energy Efficiency); and Analía Marsella and Sebastien Raoux (Transcarbon International).

An editorial and design team comprising Marc DeFrancis and Duina Reyes significantly elevated the quality and visual presentation of the final report. The online platform (http://rise.esmap.org/) was developed by Sreejith K.S., Narayanan R., Rony George, and Ram Prasad of PanApps Inc., with communications input and guidance from Nick Keyes, Heather Worley, Nansia Constantinou, Anita Rozowska and Aarthi Sivaraman.

The financial and technical support of the ESMAP is also gratefully acknowledged. ESMAP—a global knowledge and technical assistance program administered by the World Bank—assists low- and middle-income countries to increase their know-how and institutional capacity to achieve environmentally sustainable energy solutions for poverty reduction and economic growth. ESMAP is funded by Australia, Austria, Canada, Denmark, the European Commission, Finland, France, Germany, Iceland, Italy, Japan, Lithuania, Luxemburg, the Netherlands, Norway, the Rockefeller Foundation, Sweden, Switzerland, the United Kingdom, and the World Bank.

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EXECUTIVE SUMMARY

Sustainable energy is at the heart of the global development and climate change agenda. Reaching the targets set by the United Nation's Sustainable Development Goal 7 (SDG7) will require a rapid increase in energy access, renewable energy and the efficient use of existing energy resources. Public debate centers on securing adequate finance to meet these global targets, but evidence demonstrates that policy can often be a prerequisite for mobilizing finance. RISE 2018 demonstrates that progress on sustainable energy outcomes has often been preceded by long-term efforts to strengthen policy and regulatory environments.

Precisely because policy matters, it is important to track how well countries are doing in creating the regulatory environment needed to accelerate achievement of sustainable energy goals. RISE provides such a global scorecard which summarizes countries' regulatory environments. It does so by tracking the adoption of good-practice policies with respect to energy access, energy efficiency, and renewable energy at the country level as of December 2017, scoring them on a scale from 1 to 100, and classifying the strength of a country's policy environment according to a "traffic light" system with green for advanced, yellow for intermediate, and red for early stage.

RISE 2018 shows significant improvement in sustainable energy policies globally: the number of countries with advanced policy frameworks for sustainable energy has more than tripled over the past eight years. In 2010, only 17 countries had advanced as well as (green) scores on their policy environment for sustainable energy, and these were largely confined to the OECD. As of 2017, the number of countries with green scores had risen to 59. Income levels or geography are not a determining factor – strong performers are found in each region and income group. All five countries that have made the largest improvements to their policy environment in recent years are non-OECD economies – Côte d'Ivoire, United Arab Emirates, Rwanda, Jordan, and Egypt, Arab Rep.

A significant share of the global population and global energy consumption are covered by policies for sustainable energy. Although only 25 percent of countries score green for energy efficiency, they account for 66 percent of world energy production. Similarly, while only 26 percent of countries score green for renewable energy, these countries account for 33 percent of world energy consumption. And while only 28 percent of highest access deficit countries score green for energy access, these countries are home to 48 percent of the world's population without access to electricity.

Nevertheless, the world as a whole is only about half way towards the adoption of advanced policy frameworks for sustainable energy. The overall average country score for RISE in 2017 is 58 out of 100, still in the yellow zone, indicating only an intermediate stage of development and plenty of room for improvement in many countries. The same is true whether one looks at policy frameworks for energy access, renewable energy, or energy efficiency.

This slow pace of policy adoption threatens the achievement of the SDG7 goals by 2030 as well as the Paris Agreement climate goals. The global average RISE score has been increasing steadily by more than two percentage points each year since 2010, and under present trends would not reach the green zone before 2025, jeopardizing progress towards the sustainable energy goals for 2030. Nevertheless, when certain policies capture the attention of governments, there can be rapid

uptake or policy leapfrogging. Among the 133 countries surveyed, those that showed most improvement increased their RISE scores by more than four percentage points per year since 2010; this is twice as fast as the global average. For example, the number of countries establishing minimum energy efficiency performance standards for heating and cooling appliances doubled from 2010 to 2017.

Clean energy policies show a strong focus on electricity, but heating and transportation sectors are often overlooked by policymakers. Whereas the renewable share of electricity has been climbing steadily in recent years, there has been relatively little progress in harnessing renewable energy sources for heating and transportation, which together represent 80 percent of global energy use. The difference in outcomes is clearly reflected in the relative evolution of the policy environment for each of these energy uses. Policies for electricity have nearly double the scores for transportation and heating and cooling with respect to renewable energy, and nearly four times the scores for transportation and heating and cooling with respect to energy efficiency. The difference is least pronounced among OECD countries, and most pronounced in South Asia and Sub-Saharan Africa.

In low-access countries, policymakers are increasingly turning their attention to enabling off-grid solutions for electrification. The cost of solar photovoltaic energy has declined dramatically since 2010, prompting a targeted focus for policymakers in low- access countries to create a favorable enabling environment for off-grid electricity. The share of low-access countries adopting measures to support mini-grids and solar home systems has soared from around 15 percent in 2010 to 70 percent in 2017. In fact, as of 2017, over half of these countries received a green score for their policies on solar home systems. Over the same time frame, the enabling environment for grid electrification has remained relatively stagnant and now scores lower than that for off-grid solutions.

There is some evidence that policymakers are beginning to take more notice of the clean cooking agenda, but much remains to be done. Cooking has been the most overlooked area of the sustainable energy agenda, with very little progress being made on clean cooking access globally. A pilot exercise in RISE 2018, covering 12 populous countries that represent more than half the world's population without access to clean cooking, suggests that there has been some evolution of policy frameworks since 2010, particularly in the area of planning. However, there has been relatively little progress on standard-setting for cookstoves or on consumer and producer incentives to stimulate adoption of clean technologies. Moreover, greater attention has been paid to developing the policy environment for improving efficiency of cooking with solid fuels focusing on the climate impacts than to supporting fuel switching focusing on end-user cleanliness and affordability.

Poor creditworthiness of utilities undermines the sustainable energy agenda. Power utilities are among the central actors in the energy sector in most countries, and their financial health is critical for the viability of investments across the sustainable energy agenda. As of 2016, however, only about half of all power utilities met several basic creditworthiness requirements. Moreover, performance on almost all dimensions of creditworthiness has deteriorated since 2012. The situation is particularly acute in low-access countries, where the number of utilities meeting basic creditworthiness criteria has dropped, falling from 63 percent in 2012 to 37 percent in 2016.

Good institutions and enforcement are also necessary elements to achieve sustainable energy results. Adopting good practice policies will not yield results without strong institutions and consistent enforcement. RISE 2018 has incorporated proxy enforcement indicators to provide some sense of the level of attention that countries are giving to enforcement issues.

CHAPTER ONE
INTRODUCTION

1. INTRODUCTION

RISE is built on the premise that policies matter along with good institutions and enforcement. RISE is based on a wealth of empirical evidence which shows that policies and regulations matter when countries are seeking to attract investment and establish a sustainable energy agenda. Therefore, it is relevant to assess the existence of policy and regulation to understand the investment environment for sustainable energy. However, there may be many factors that influence investment decisions, from the existence of good practices, to quality and content of the policies, and their actual enforcement.

RISE provides national policymakers with a tool to benchmark their energy sector framework against regional and global peers' policy and regulations, as well as track their own progress over time. RISE is a systematic platform for comparison, that highlights global and regional trends across sustainable energy policies, and provides detailed information on good practices and successful approaches in comparable countries. By focusing on actions within the ambit of policymakers, RISE can also contribute to domestic policy debates, while providing a global reference point on good practices.

RISE informs private sector actions. RISE is a valuable source of information to private investors and developers of sustainable energy projects, products, and services. It provides investors with a starting point for country-level analysis, as the data presented in the report is supported by documents from government ministries and/or local consultants, and is validated by World Bank country experts. Given this context, RISE can help complement the toolkit that investors and developers use when assessing the investment climate for sustainable energy in a given country.

RISE 2018 has new indicators and additional country profiles. In this 2018 edition of RISE, several important innovations have been added to improve the relevance of the indicators and to align with shifting global trends in sustainable energy *(Figure 1.1)*.

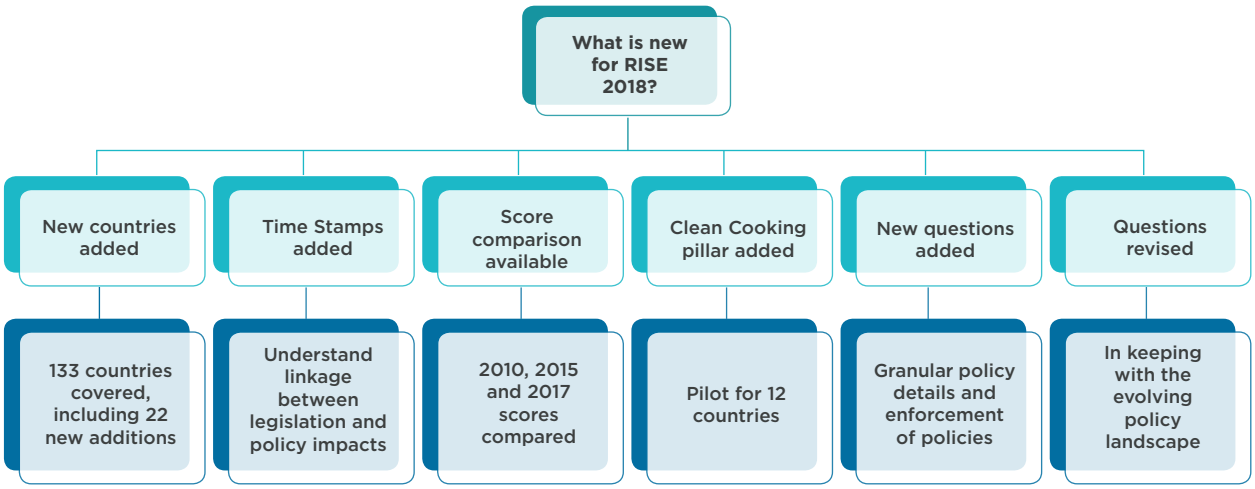
RISE 2018 has the following new features:

1. **Considerable increase in the number of countries,** from 111 in RISE 2016 to 133 in RISE 2018. The number of countries has been expanded in RISE 2018 to cover 97 percent of the global population. Further expansion will be considered for the future editions of RISE to include all European countries and small island states.

2. **Refinement of indicators and sub-indicators,** to incorporate key innovations relating to assessment of implementation effectiveness and regulatory enforcement process; uptake of off-grid electricity access technologies and how this impacts rural electrification strategies; renewable energy and energy efficiency solutions in the transport, heating and cooling sectors; the assessment of implementation effectiveness and the regulatory enforcement process, and gender considerations in policies *(Figure 1.2)*.

3. **Convenient addition of a time stamp on policies that enable trend analysis for the period 2010-2017.** RISE allows users to discern the historical adoption of policies covered in this edition dating back to 2010 to track progress in policy adoption over time. This "time stamp" element of RISE provides a valuable means for policymakers, researchers, and private sector actors to monitor progress in specific countries and analyze potential causal or corollary relationships between reforms and results.[1]

FIGURE 1.1 INNOVATIONS IN RISE 2018



Source: World Bank RISE 2018

FIGURE 1.2 RISE INDICATORS PER PILLAR

	Policies and Regulations			
Electricity Access	• Existence and implementation of electrification plan • Scope of electrification plan	• Grid electrification • Mini grids • Standalone systems	• Affordability of electricity • Utility transparency and monitoring	• Utility creditworthiness
Clean cooking	• Planning	• Scope of planning	• Standards and labelling	• Incentives and attributes
Renewable Energy	• Legal framework for renewable energy • Incentives & regulatory support for renewable energy	• Network connection and use • Carbon pricing and monitoring	• Planning for renewable energy expansion • Attributes of financial and regulatory incentives	• Counterparty risk
Energy Efficiency	• National energy efficiency planning • Types of electricity rate structures • Mandates & incentives: utilities • Energy labeling system	• Energy efficiency entities • Mandates & incentives: large consumers • Financing mechanisms for energy efficiency	• Building energy codes • Information provided to electricity consumers • Mandates & incentives: public entities	• Minimum energy performance standards • Carbon pricing and monitoring • Transport energy efficiency

Source: World Bank RISE 2018

FIGURE 1.3 TRAFFIC LIGHT SYSTEM USED TO ASSESS THE RISE POLICY ENVIRONMENT

Green	**Green zone:** scores between 67 and 100. Most elements of a strong policy framework to support sustainable energy are in place
Yellow	**Yellow zone:** scores between 34 and 66. Significant opportunities exist to strengthen the policy framework.
Red	**Red zone:** scores 33 or lower. Few or no elements of a supportive policy framework have been enacted.

4. **Innovative pilot of indicators for clean cooking solutions**, covering 12 countries that account for over 55 percent of the global clean cooking access deficit.

The scoring methodology for RISE 2018 has not changed. All indicators are scored between 0 and 100 and have equal weights to reach a total score for each pillar. Pillar and indicator scores are grouped into three categories based on a "traffic light" system *(Figure 1.3).*

RISE pillars are related but remain independent. The pillar indicators were created by different subject matter experts, and while an attempt was made to make all three pillars equally rigorous, there are nuanced differences. Therefore, the results across pillars are not directly comparable. Moreover, as markets mature, policies need to adjust, and this is reflected in changes to the questions asked in every new edition of RISE.

The sustainable energy market is dynamic, and so is RISE. As energy technologies develop and mature, policymakers are constantly tasked with developing new policies to support their deployment, drive investment, and achieve both national and international climate goals. In this regard, RISE must adapt its indicators and focus with each new edition to stay relevant, while recognizing that it can only ever show a snapshot in time.

Feedback from users is important. Since the release of the first RISE report, feedback gathered from various RISE users—from the public sector, private sector, civil society, and academia—has been instrumental in ensuring ongoing improvement of indicators to maintain relevance and consistency with best practices. RISE continues to engage with its users to find new approaches and methods to improve its accuracy and relevance to interested stakeholders. The next edition of RISE will aim to include a section on country readiness to embrace disruptive energy technology, such as battery storage, to enhance human capital, and to include additional indicators on policy adoption.

Measuring the enforcement of policies remains challenging. The RISE library is intended to provide an objective overview of the legislation, policies, and strategies that have been developed and made available by governments. RISE 2018 has added several layers of questions to try and capture the enforceability of existing policy regulations across the three pillars. However, existence of regulations do not necessarily reflect actual enforcement. Accordingly, this remains an ongoing area of research and refinement within RISE.

The RISE score is not an endorsement for investment. RISE is intended to measure how far a country is from offering an attractive policy environment, and not how much investment is likely to be deployed within the country under its current policy environment. Investment in sustainable energy is heavily influenced by factors well beyond what can be governed by energy sector policies, namely the establishment of strong institutions, access to credible data, appropriate financing mechanisms and a robust private sector. RISE scores should not be interpreted as a comprehensive evaluation of whether a country is attractive for

investment. Moreover, RISE scores should not be viewed as a predictor or indicator of SDG7 results. Nevertheless, RISE helps explain trends in sustainable energy investment and outcomes to some extent. RISE scores can be analyzed at a more granular level to fully understand its components, which can then be used to inform decisions.

Richness of RISE data allows for different analytical frameworks. The RISE report employs a specific methodology to calculate scores of a country's policies framework. By employing different weighting, grouping of questions, or question types and time frames, contrasting conclusions can be derived. It is also worth acknowledging that the degree of complexity and technical sophistication needed to adopt certain policies in one pillar of RISE may not be comparable to that for other pillars. While RISE has worked with external advisory groups, comprising well-respected organizations across the four core pillars, to develop the analytical approach presented in this report, there are other approaches possible. In this regard, the availability of the RISE data library online provides a resource for researchers to experiment with other methodological approaches.

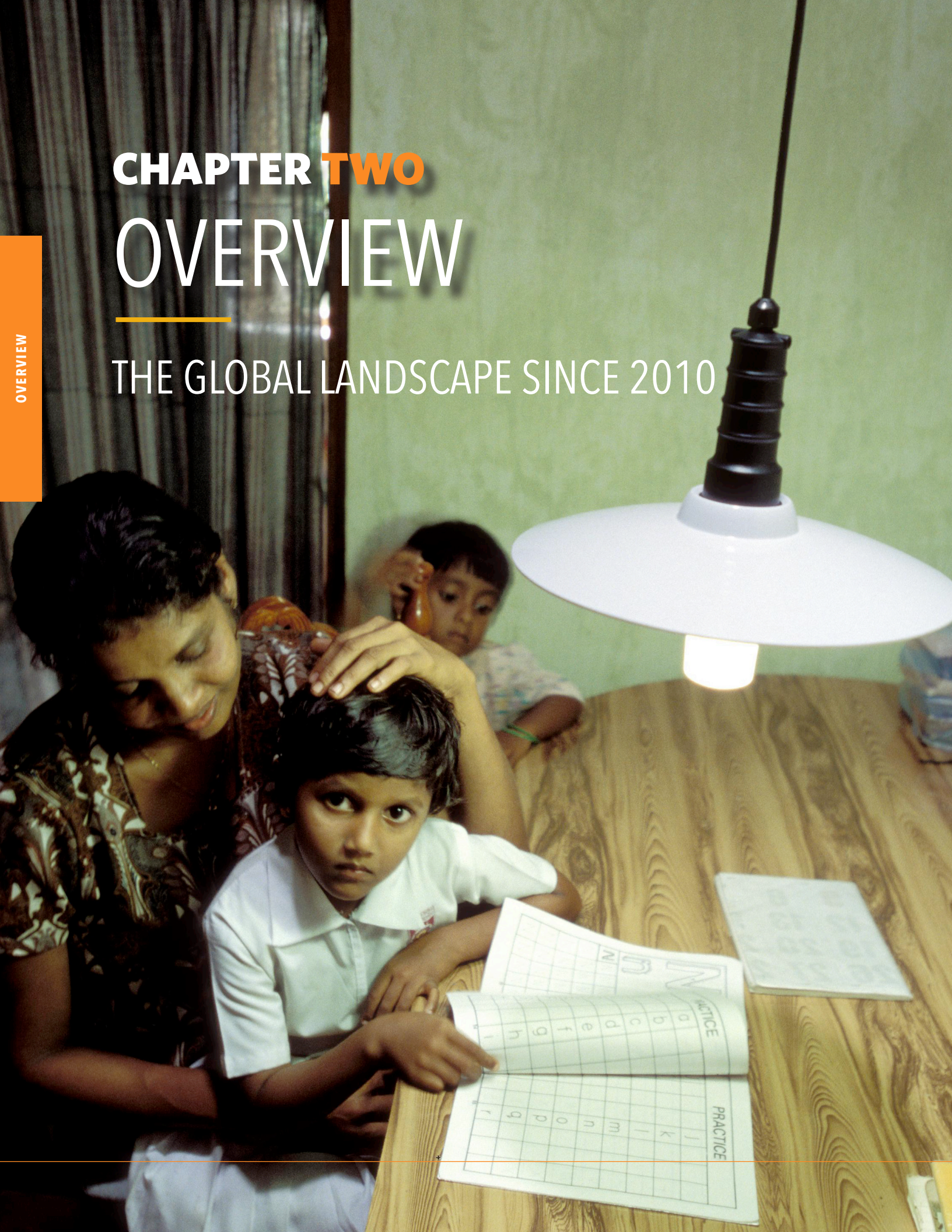
The RISE website has an extraordinary wealth of data on sustainable energy. While the report highlights overarching global, regional and pillar-specific trends, the RISE website contains all the raw data disaggregated at the question level. It allows users to search for specific information and download data for their own analysis. The website also allows users to view and download overall data for each pillar, and country profiles with numerical scores by pillars. The most useful feature is the comprehensive library with all the supporting documents from government ministries and/or local consultants that has been validated by World Bank country experts. The details of the indicators are made available in indicator pages, where users can look up the description of each indicator, the list of questions, and the scoring distribution.

ENDNOTES

[1] Note that the normative RISE 2015 score in this report based on time stamps is different from the RISE 2015 score in the previous edition of RISE. Since the publication of the previous edition of RISE in 2016, the RISE methodology has evolved to include new questions, resulting in revised scores for RISE 2015.

CHAPTER TWO
OVERVIEW

THE GLOBAL LANDSCAPE SINCE 2010

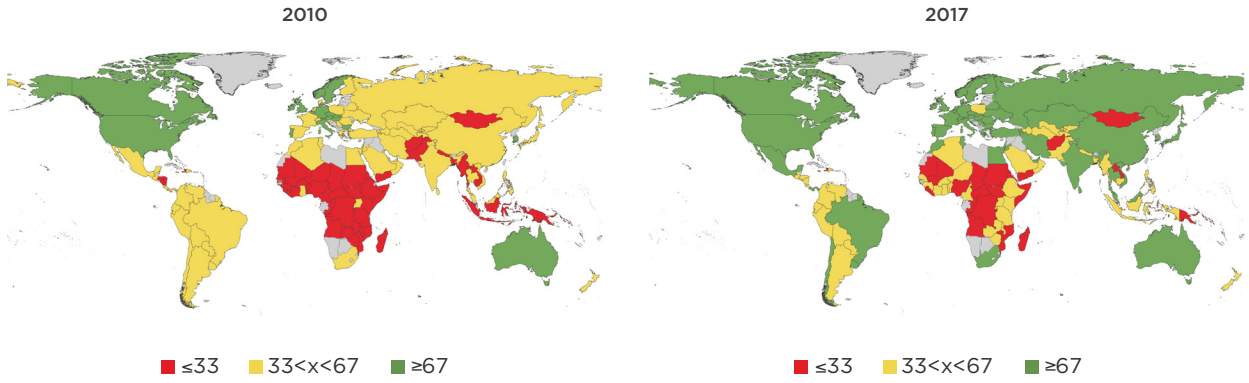


2. OVERVIEW:
THE GLOBAL LANDSCAPE SINCE 2010

KEY MESSAGES:

- Since 2010, the number of countries adopting advanced policy frameworks in support of sustainable energy has more than tripled (from 17 to 59). Despite variations in performance by region and income group, there are strong performers in every region and in every income group.
- Among the countries that have made the greatest progress on sustainable energy, there have also been significant improvements in the enabling environment, indicating that policy matters.
- Many of the world's largest countries have been proactive in improving their regulatory environment. This means that about two thirds of global energy consumption takes place in countries covered by advanced policy frameworks for energy efficiency, while almost half the global population without access to electricity lives in countries with advanced policy frameworks for energy access.
- Nevertheless, as of 2017, the world as a whole is still little more than half way towards the adoption of supportive policies for sustainable energy. At the current pace of improvement, the average global RISE score would not reach the green zone (or advanced stage) until 2025, jeopardizing the achievement of the SDG 7 targets by 2030 as well as the Paris Climate Goals.
- While the world as a whole has only been able to improve its RISE score by two points per year, the most proactive countries have increased their scores by more than four points per year.
- Concerns about climate change have lent considerable momentum to the adoption of clean energy policies, with an evident surge in the uptake of targets for renewable energy and energy efficiency in the run-up to the 2015 Paris Climate Accord.
- Yet, outside of the OECD, policies to support renewable energy and energy efficiency primarily target the electricity sector, overlooking the fact that 80 percent of energy consumption is in the heating and transportation sectors.
- In the cooking sector, there is some evidence that policymakers are beginning to take more notice of the clean cooking agenda, but significant room for improvement remains, specifically with regards to institutional capacity, scope of planning, and financial incentives.
- Policies alone cannot deliver results unless they are complemented by institutional capacity for effective enforcement. While efforts on enforcement have been improving, they continue to lag behind compared to adoption of regulations "on paper".
- The financial health of power utilities is also a key enabler of investment in sustainable energy. Yet only half of utility companies were deemed creditworthy in 2016, and average financial performance has even deteriorated relative to 2012.

FIGURE 2.1 GLOBAL OVERVIEW OF RISE SCORES, 2010 VS. 2017



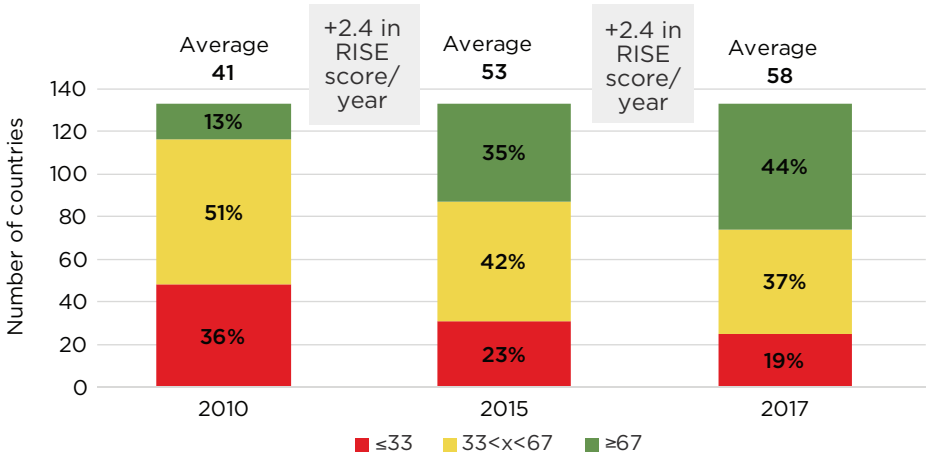
Source: World Bank RISE 2018

GLOBAL RISE SCORE: IMPROVEMENT IN SUSTAINABLE ENERGY POLICY IN 2010-2017

Since 2010, there has been a substantial increase in the number of countries adopting advanced policy frameworks in support of sustainable energy. As recently as 2010, just a handful of 17 countries – almost all of them OECD members – had developed advanced policy frameworks in support of sustainable energy (shaded in green in *Figure 2.1)*. By 2017, 59 countries had developed advanced policy frameworks, including many emerging and developing countries spread across all continents *(shaded green in Figure 2.1)*. Prominent examples include Brazil, China, Mexico, Morocco, Russia and South Africa.

The pace of improvement has been consistent since 2010. The global average score on the RISE index has improved by over two points each year between 2010 and 2017. During this period, the global average score increased from 41 to 58, indicating an intermediate (yellow) stage of policy development overall *(Figure 2.2)*. Nevertheless, individual

FIGURE 2.2 OVERALL PROGRESS ON GLOBAL SUSTAINABLE ENERGY REGULATION, 2010-2017



NOTE: The chart shows RISE scores for all 133 countries, including non-access deficit countries that are automatically assigned a score of 100 for Electricity Access.
Source: World Bank RISE 2018

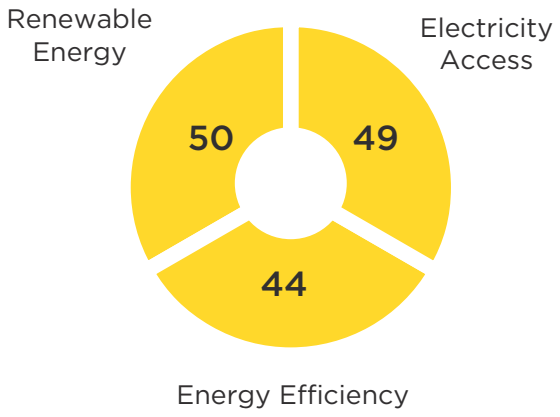
countries are at very diverse stages. The share of countries with advanced (green) policy frameworks rose from 13 to 44 percent, while the share of countries with undeveloped (red) policy frameworks fell from 36 to 19 percent *(Figure 2.2)*. Nonetheless, this means that one in five countries – mainly located in Sub-Saharan Africa – remain at the early stages of building a sound policy environment.

If the world continues to improve at the pace achieved between 2010 and 2017, the average global RISE score would not reach the green zone until 2025. This rate of progress is worrisome given that major global commitments on sustainable energy have been made for 2030 under SDG7 and the Paris Climate Accords. Policies are often a prerequisite for other actions to follow; if the full suite of policy measures is not in place until 2025, this will leave little time to make progress toward global targets by 2030. Furthermore, given the rapid rate of technological progress in sustainable energy, the policy environment cannot remain static. It is highly likely that additional policies beyond those considered here will need to be put in place to cover emerging areas such as battery storage, digitalization of networks, and other innovations. This means that the challenge for policy makers will only increase over time.

Across all dimensions of sustainable energy, average global scores suggest there is considerable scope to improve policy and regulatory framework. The overall RISE score reflects performance on three dimensions of sustainable energy: energy access; renewable energy; and energy efficiency. As of 2017, the global average score did not exceed 50 in any of these areas, indicating an intermediate (yellow) level of performance in all cases *(Figure 2.3)*[2] .

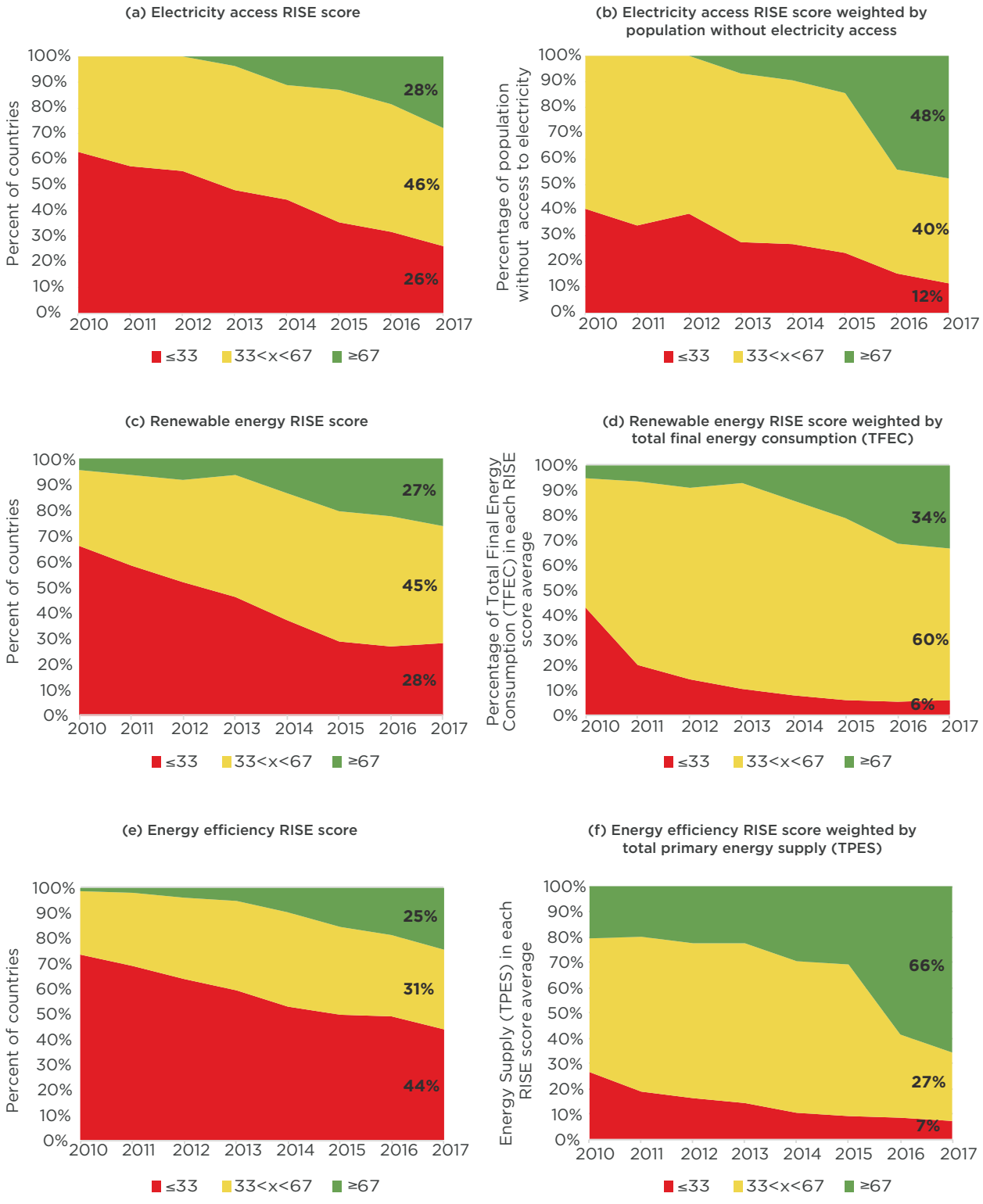
High impact countries have been developing more comprehensive policies and regulations. When it comes to electrification, only 28 percent of access-deficit countries have achieved advanced (green) policy frameworks, but overall these countries represent 48 percent of the unserved population globally (compare *Figures 2.4(a,b)*). This is due in large measure to the adoption of strong policies to support electrification in India, which with 205 million people still lacking access to electricity in 2016, is by far the largest access-deficit country. Turning to renewable energy, 27 percent of countries have advanced (green) policy frameworks for renewable energy, representing 34 percent of the total final energy consumption (TFEC) (compare *Figures 2.4(c,d)*. Among those are countries

FIGURE 2.3 RISE AVERAGE SCORES BY PILLAR, 2017



Note: RISE Electricity Access pillar score on this chart doesn't include countries that have achieved universal access. The Electricity Access score of 49 on this chart is calculated for the countries with access deficit only, resulting in the global RISE score of 48. The overall unweighted score for Electricity Access for all 133 countries, including non-access deficit countries that are automatically assigned a score of 100 is 80, resulting in the global RISE score of 58, as shown on Figure 2.2.
Source: World Bank RISE 2018

FIGURE 2.4 DISTRIBUTION OF RISE SCORES BY PILLAR BETWEEN 2010 AND 2017

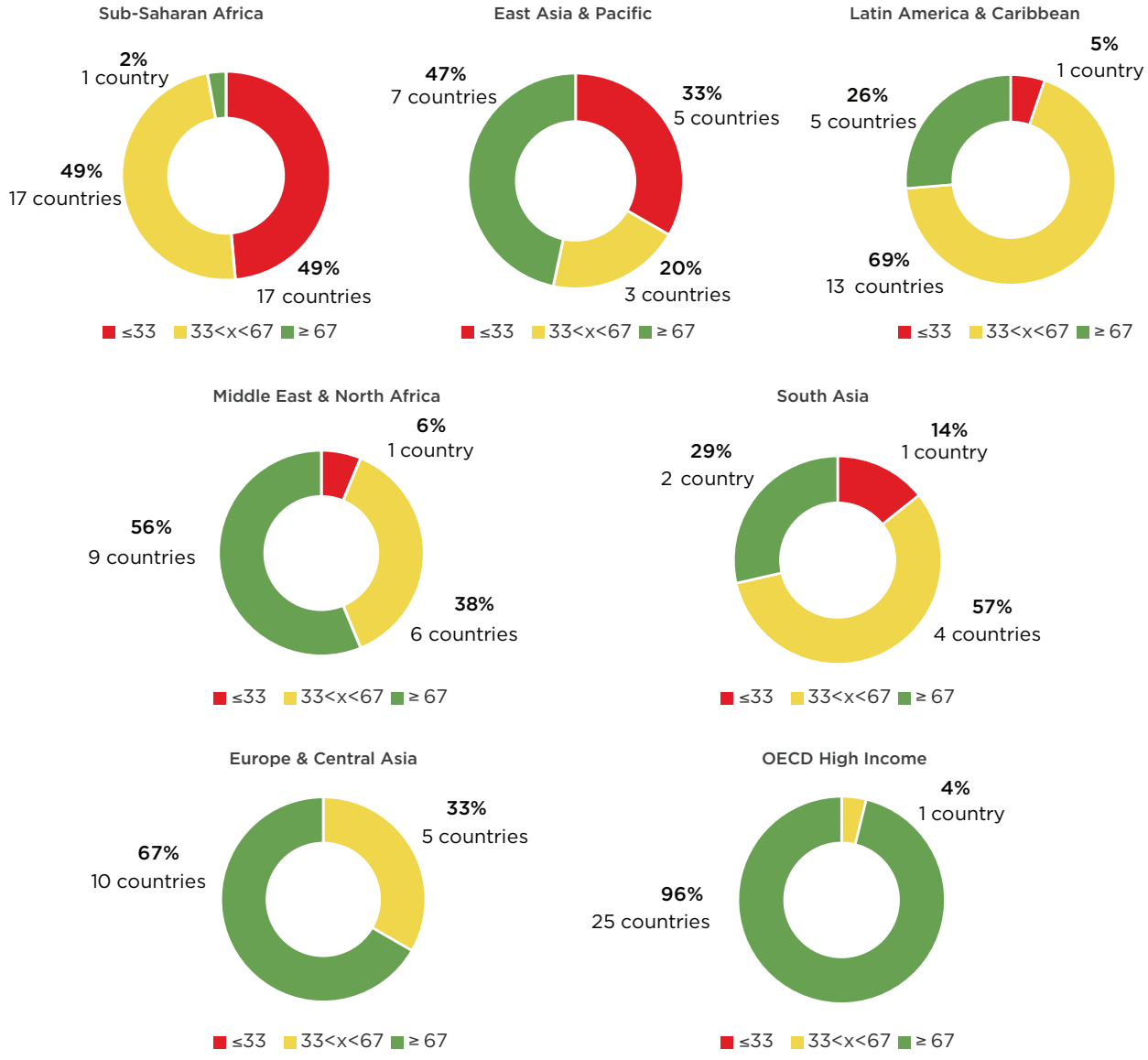


Source: World Bank RISE 2018

with higher TFEC, such as Germany, United Kingdom and Brazil, as well as those with significantly lower TFEC, such as Switzerland, Greece and Denmark. Regarding energy efficiency, while only 25 percent of countries have avanced (green) policy frameworks, they represent 66 percent of total primary energy supply (TPES) (compare *Figures 2.4(e,f)*). This reflects the fact that the world's two largest energy users – China and the United States – score in the green zone for energy efficiency.

While there is a wide variation in performance across geographic regions, all country groupings have made consistent progress. At the regional level, OECD countries have led the effort in building up robust policy and regulation frameworks for sustainable energy, and almost all of them have achieved advanced (green) policy frameworks (*Figure 2.5*). At the other extreme, in Sub-Saharan Africa around half of all countries have undeveloped (red) policy frameworks (*Figure 2.5*). Nevertheless, all regions have shown sustained performance

FIGURE 2.5 DISTRIBUTION OF RISE SCORES BY REGION, 2017

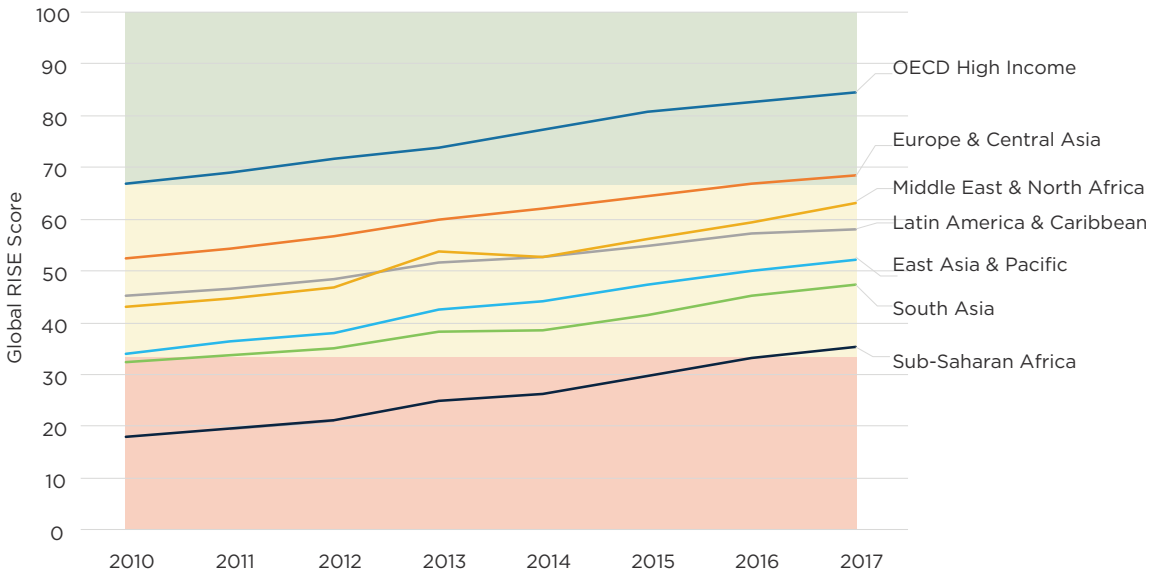


Source: World Bank, RISE 2018

improvements over time (*Figure 2.6*). It is striking that the Middle East and North Africa region, which had been performing about the same as Latin America & Caribbean in 2010, has subsequently accelerated adoption of policy measures and is approaching the level of policy frameworks found in Europe & Central Asia (*Figure 2.6*). Similarly, while the East Asia & Pacific region performed no better than South Asia in 2010, its adoption of sustainable energy policies has subsequently accelerated, moving it closer to the performance of the Latin America & Caribbean region *(Figure 2.6)*.

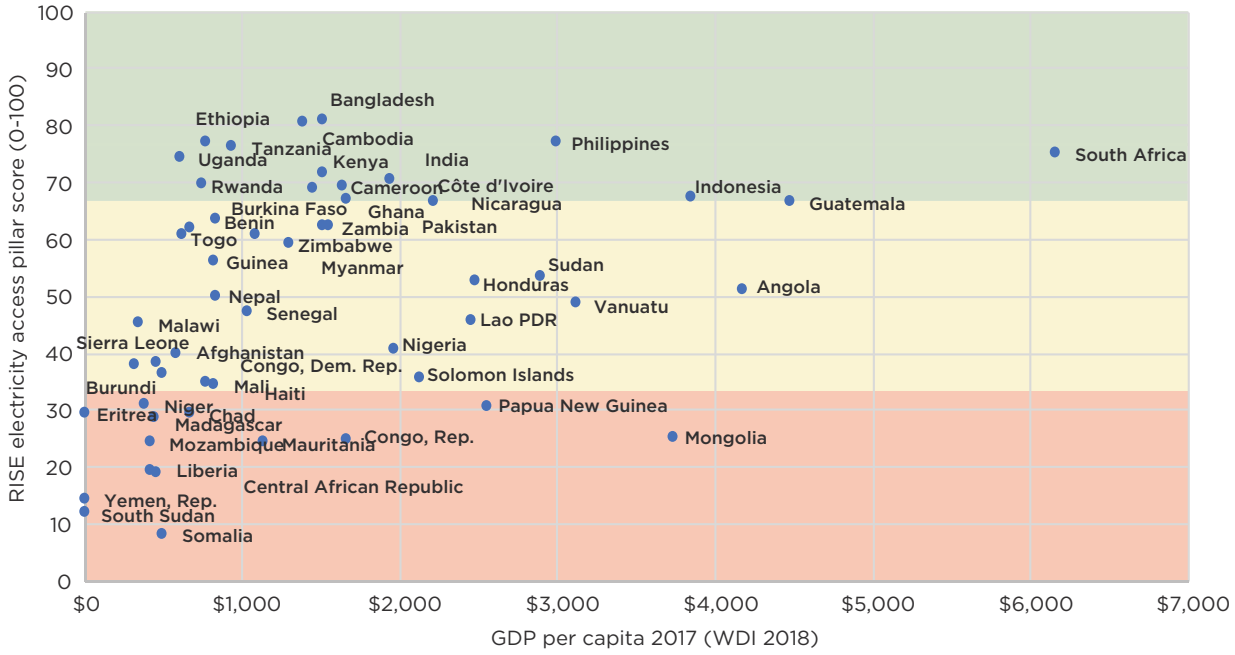
While higher RISE scores are broadly associated with higher income levels, there are several examples of lower income countries that are doing relatively well with their policy environments. Whether one considers electricity access *(Figure 2.7)*, renewable energy *(Figure 2.8)* or energy efficiency *(Figure 2.9),* there is a concentration of lower income countries with undeveloped (red) policy frameworks, and higher income countries with more advanced (green) policy frameworks. Nevertheless, this does not tell the whole story. In the case of energy access, countries such as Ethiopia, Rwanda, Tanzania and Uganda all with GDP per capita below USD $1,000 achieve a green rating for their policy environment *(Figure 2.7)*. For renewable energy *(Figure 2.8)* and energy efficiency *(Figure 2.9)*, there are almost no countries above USD $20,000 per capita GDP scoring in the red zone (with the exception of most of Gulf States), and comparatively few falling in the yellow zone (such as New Zealand). At the other end of the spectrum, there is a wide variation in the maturity of the policy framework for clean energy across the lower income countries. Many developing countries, such as Côte d'Ivoire, Kenya and Nepal are in the yellow zone for renewable energy, while Ghana is in the green zone (*Figure 2.8*). Similarly, for energy efficiency, many developing

FIGURE 2.6 EVOLUTION OF RISE SCORES BY REGION BETWEEN 2010 - 2017



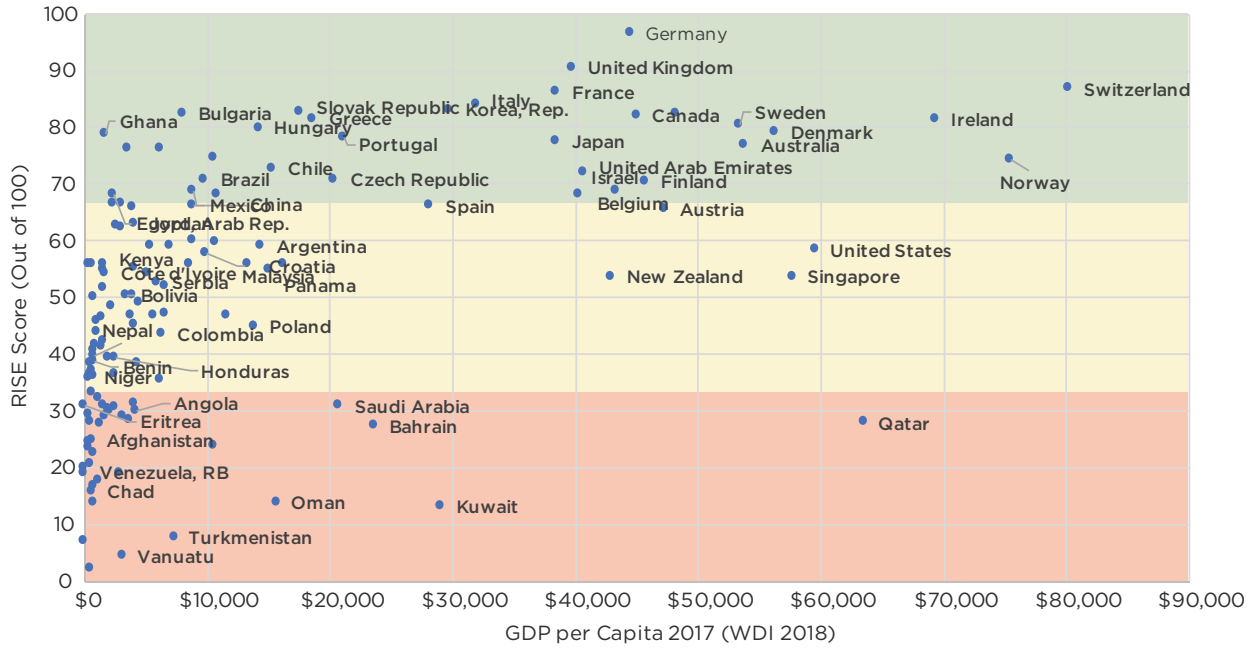
Source: World Bank, RISE 2018

FIGURE 2.7 RISE ELECTRICITY ACCESS SCORE AGAINST GDP PER CAPITA, 2017



Source: World Bank, RISE 2018; World Development Indicators, 2018

FIGURE 2.8 RISE RENEWABLE ENERGY SCORE AGAINST GDP PER CAPITA, 2017

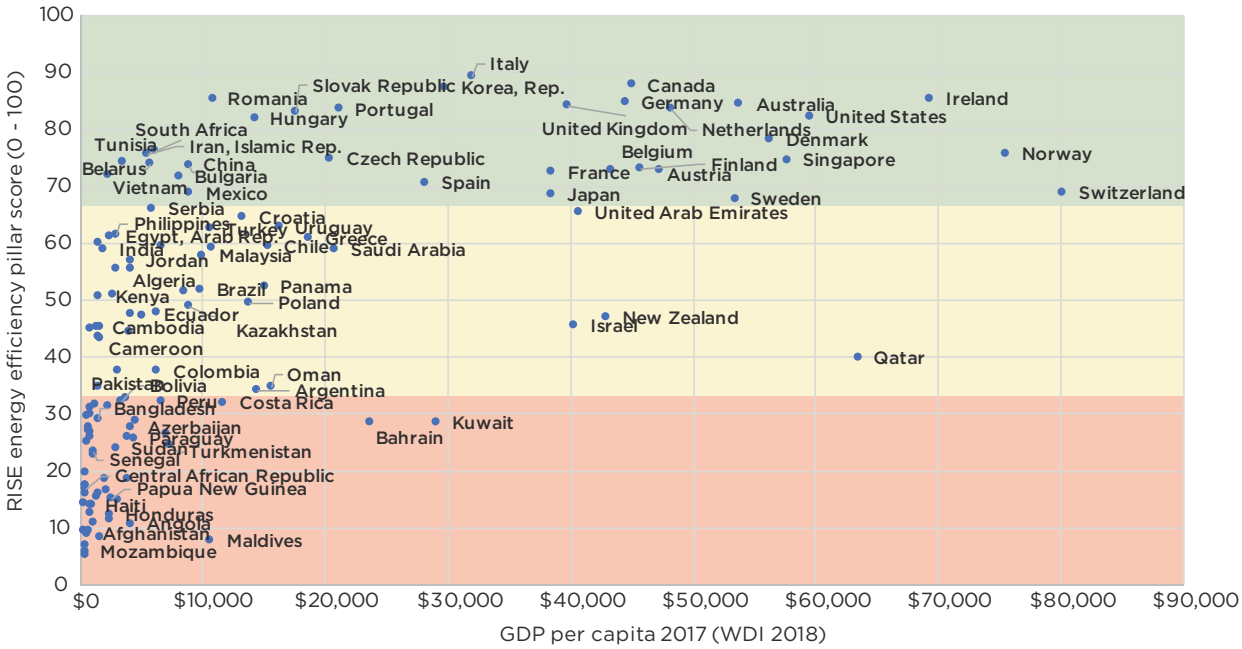


Source: World Bank, RISE 2018; World Development Indicators, 2018

countries such as Cambodia, Cameroon, Kenya, and India are in the yellow zone, while Vietnam falls is the green zone (*Figure 2.9*).

Every region has at least one RISE top performer in the green zone, while each region shows strengths in different areas *(Table 2.1)*. A look at the top three RISE performers serves to underscore that there are advanced countries in every region. OECD countries and those located in Europe & Central Asia tend to score well both on renewable energy and energy efficiency, whereas other regions are more likely to emphasize one aspect over the other. In the East Asia & Pacific and Middle East & North Africa regions, the top performers show strong development of energy efficiency policies. For example, Tunisia performs particularly well in energy efficiency planning and incentives and mandates for the public and industrial sectors, and Singapore performs exceptionally well in energy labeling schemes and financing mechanisms for energy efficiency. Turning to Sub-Saharan Africa, South Africa stands out as being relative advanced on all

FIGURE 2.9 RISE ENERGY EFFICIENCY SCORE AGAINST GDP PER CAPITA, 2017

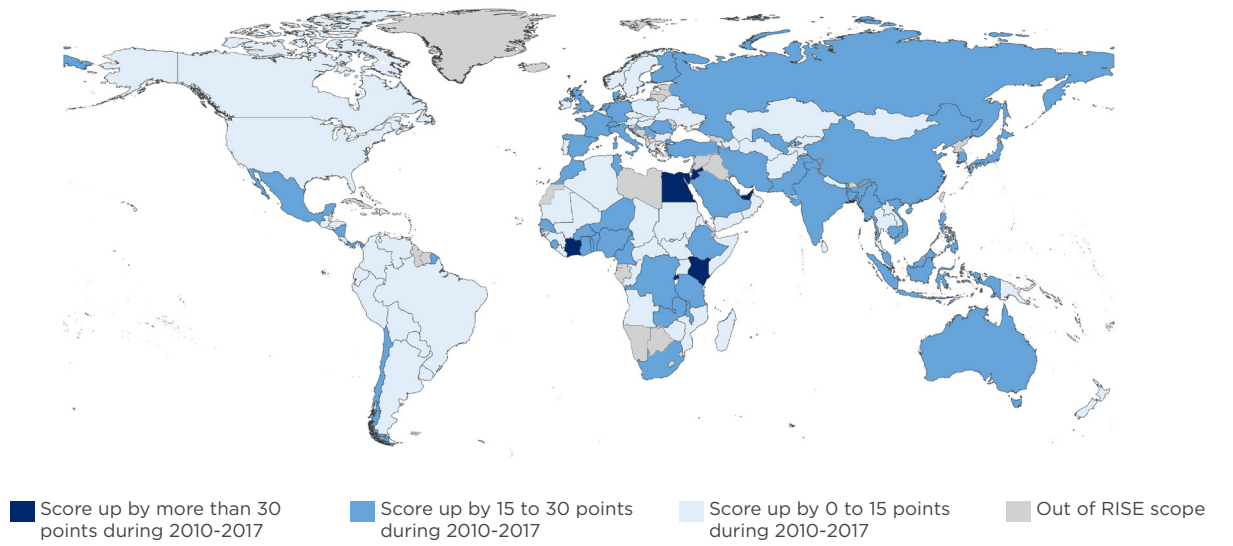


Source: World Bank, RISE 2018; World Development Indicators, 2018

TABLE 2.1 TOP 3 PERFORMERS ON RISE IN EACH REGION, 2017

East Asia & Pacific	Europe & Central Asia	Latin America & Caribbean	Middle East & North Africa
Singapore ●	Bulgaria ●	Mexico ●	Iran ●
China ●	Romania ●	Brazil ●	Tunisia ●
Vietnam ●	Turkey ●	Uruguay ●	United Arab Emirates ●
OECD High Income	**South Asia**	**Sub-Saharan Africa**	
Germany ●	Sri Lanka ●	South Africa ●	
United Kingdom ●	India ●	Ghana ●	
Italy ●	Bangladesh ●	Kenya ●	

FIGURE 2.10 EVOLUTION OF RISE GLOBAL SCORES BETWEEN 2010 AND 2017



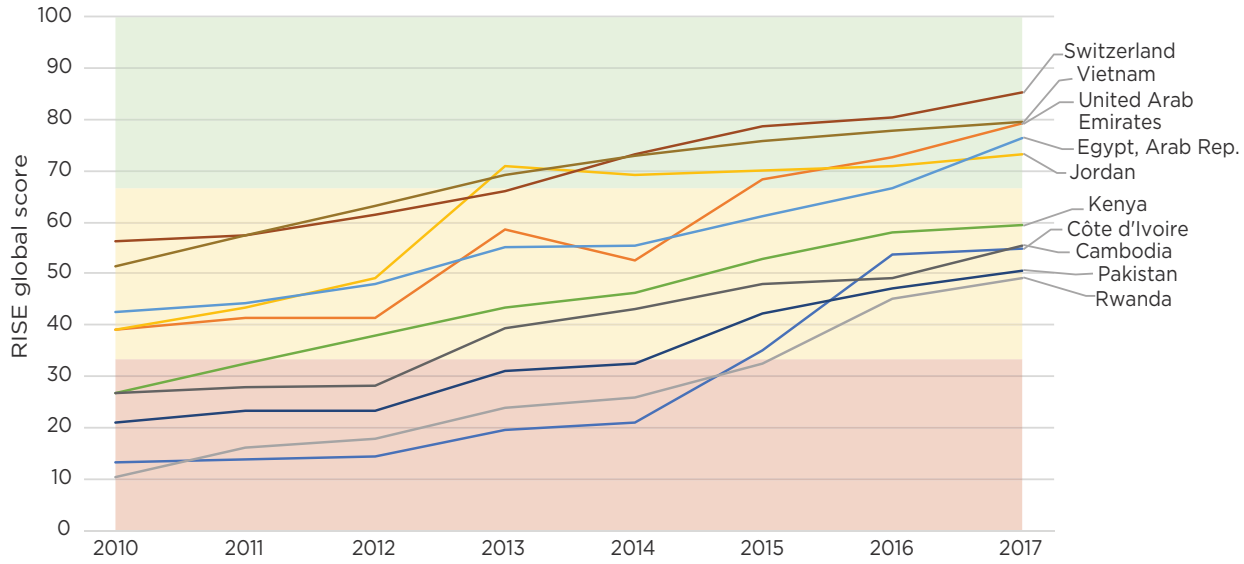
Source: World Bank RISE 2018

three aspects of sustainable energy. By contrast, countries such as Bangladesh, Ghana, India, and Kenya have concentrated their efforts on policy frameworks for electricity access, even as they begin to catch-up on renewable energy and energy efficiency.

While almost all countries increased their RISE score between 2010 and 2017, some moved much faster than others *(Figure 2.11).* A handful of fast moving countries were able to increase their RISE scores by more than four points per year on average from 2010 to 2017.

Of the world's top ten improvers in RISE since 2010, half are electricity access-deficit countries, with three located in Sub-Saharan Africa. The ten countries with the largest improvements in RISE scores since 2010 divide into two groups *(Figure 2.11).* A first group

FIGURE 2.11 TOP TEN COUNTRIES WITH FASTEST-IMPROVING RISE SCORES BETWEEN 2010 AND 2017



Source: World Bank RISE 2018

BOX 2.1 TOP IMPROVER

Overall, since 2010, Côte d'Ivoire has made the fastest progress on sustainable energy policies according to the RISE index. In electricity access, the country achieved an important milestone in approving its Rural Electrification Plan, followed by the development of a framework for grid connection and mini grids in 2016. In renewable energy, 2013 marked an inflection point for the country as a legal framework for renewable energy was introduced and a renewable energy auction for small hydro and solar energy projects was held. By 2017 it had considerably improved its basic regulatory framework and the attributes of financial and regulatory incentives. In energy efficiency, the country's National Action Plan was developed with the assistance of the ECOWAS Center for Renewable Energy and Energy Efficiency (ECREEE) and was adopted in 2016. The effective and full implementation of the plan will save and/or release more than 50 megawatts of power each year over the period 2016–2030.

(comprising Egypt, Jordan, Switzerland, United Arab Emirates, and Vietnam) are middle- to high-income countries that began in the yellow zone in 2010 and have subsequently all progressed to green. The preponderance of countries from the Middle East and North Africa in this group reflects the general rapid acceleration of progress across this region. A second group (comprising Cambodia, Côte d'Ivoire, Kenya, Pakistan, and Rwanda) are remarkable for all being relatively low-income, access-deficit countries that have started developing policy frameworks almost from scratch (red) and had reached an intermediate stage (yellow) by 2017.

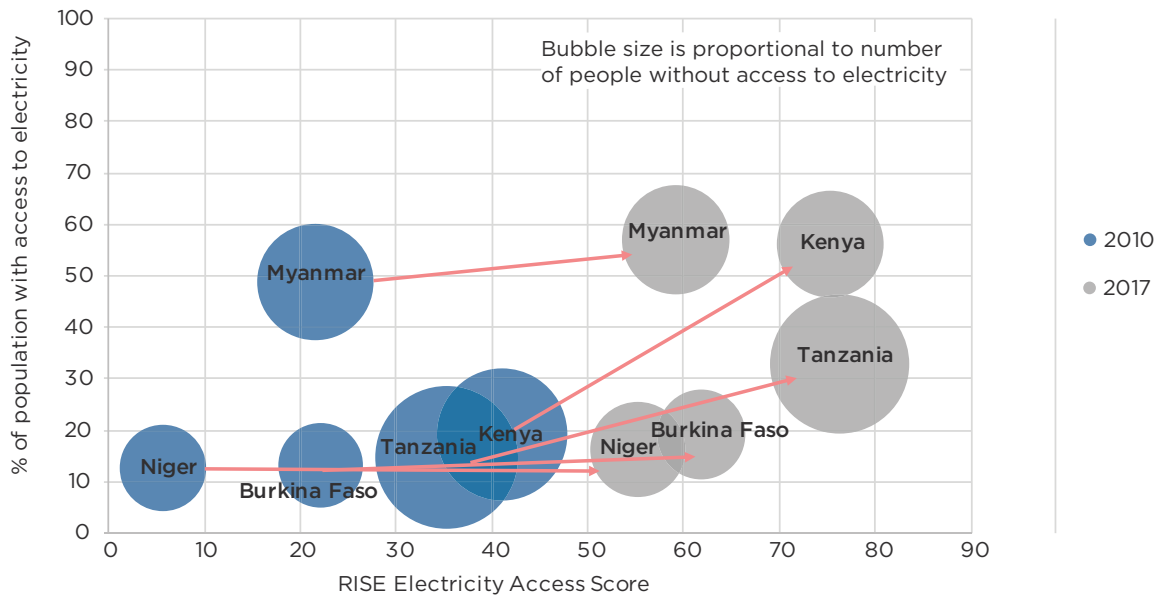
POLICY MATTERS: STRONGER PERFORMERS ON SUSTAINABLE ENERGY ALSO SHOW IMPROVING RISE SCORES

Access-deficit countries that have increased their electricity access rates the most since 2010 have shown a noticeable the improvement in electricity access policies. These countries have increased their adoption of electricity access policies, which in turn has helped shift the needle at the global level.[3] The five countries that saw the highest increases in their access rates since 2010 – Burkina Faso, Kenya, Myanmar, Niger, Tanzania – all made progress in their policy and regulatory frameworks for electricity access raising their scores to the range of 60-80 by 2017 *(Figure 2.12).* Kenya, in particular, stands out for its accelerated progress in electrification underpinned by rapid adoption of supporting policy measures, following the paradigm shift contained in the country's National Electrification Program.

The largest energy consuming countries have increased their share of modern renewable energy in their total final energy consumption (TFEC), and have also significantly improved their renewable energy policies. A majority of the 20 largest energy-consuming (high-impact) countries improved their RISE renewable energy scores during the 2010-2017 period. The five countries that achieved the largest increase in their share of modern renewable energy in TFEC were China, Germany, Italy, Spain, and the United Kingdom. All these countries also made substantial improvements in their RISE scores for renewable energy and reached scores in the 60-90 range by 2017, indicating improved policies and regulations supporting renewable deployment. *(Figure 2.13).*

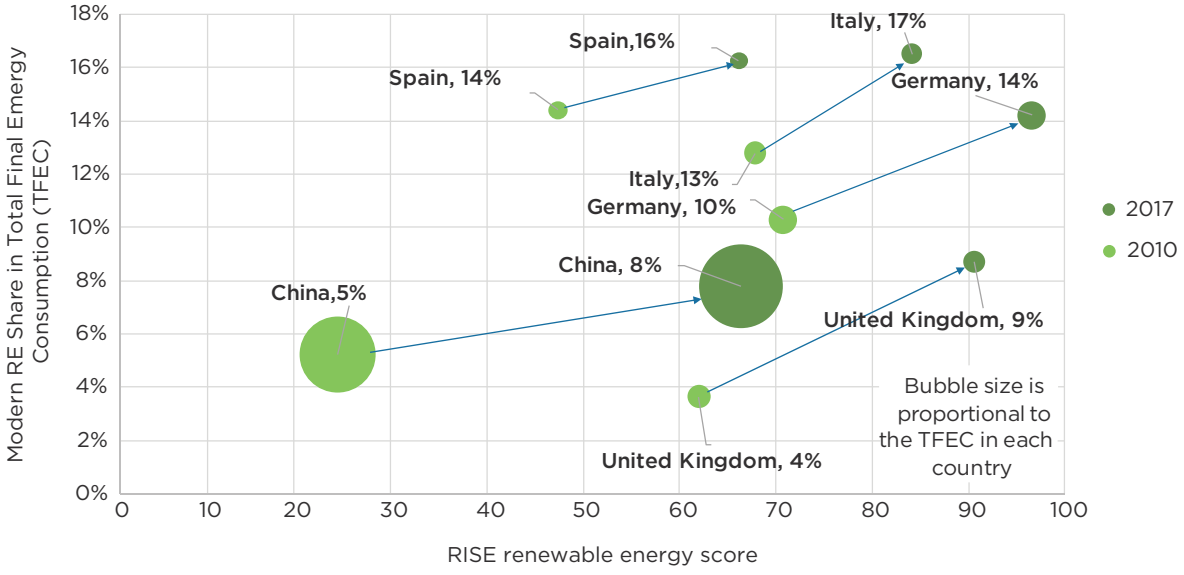
The world's largest energy supply countries that have improved their energy productivity have also significantly improved their policy and regulation on energy efficiency.[4] Among the world's largest energy-supply countries, Canada, China, Indonesia, Japan, and South Africa have improved energy productivity the

FIGURE 2.12 PROGRESS IN RISE SCORE FOR ACCESS TO ELECTRICITY FOR THE FIVE COUNTRIES WHICH HAVE IMPROVED THEIR ACCESS RATE THE MOST, 2010-2017



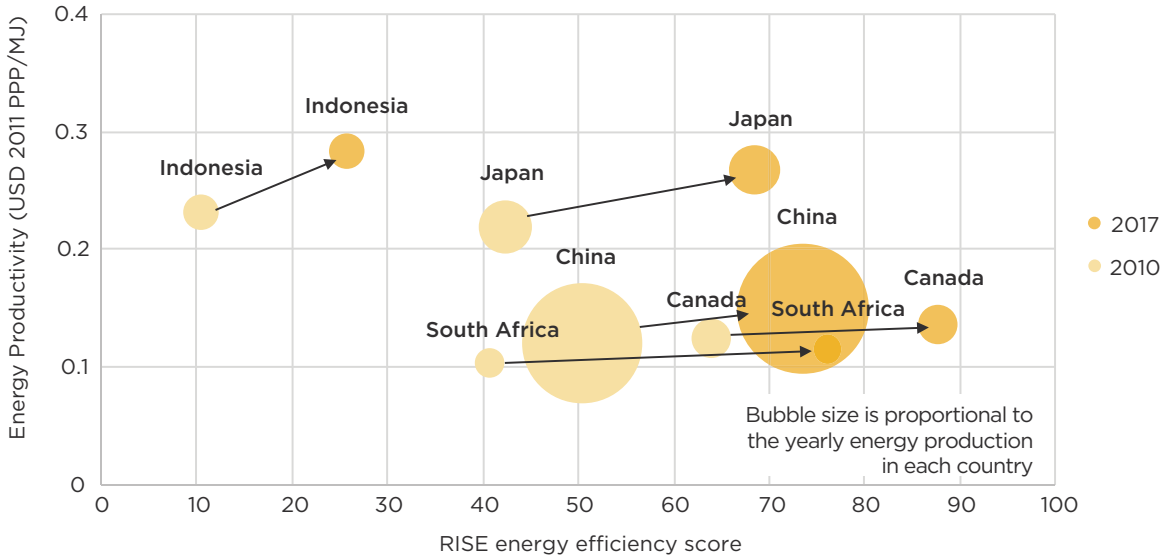
Note: 2016 electrification data was used from the Tracking SDG7 report.
Source: World Bank, RISE 2018, World Bank Tracking SDG7 the Energy Progress report 2018

FIGURE 2.13 PROGRESS IN RISE SCORE FOR RENEWABLE ENERGY FOR THE FIVE COUNTRIES WHICH HAVE IMPROVED THE MOST THEIR SHARE OF MODERN RENEWABLE ENERGY IN TFEC, 2010-2017



Note: 2015 TFEC data was used from the Tracking SDG7 report.
Source: World Bank, RISE 2018, IEA, IRENA, UNSD Tracking SDG7: The Energy Progress Report 2018

FIGURE 2.14 PROGRESS IN RISE SCORE FOR ENERGY EFFICIENCY FOR THE FIVE COUNTRIES WHICH HAVE IMPROVED ENERGY PRODUCTIVITY THE MOST, 2010-2017



Note: 2015 TPES data was used from the Tracking SDG7 report.
Source: World Bank, RISE 2018, IEA, UNSD Tracking SDG7: The Energy Progress Report 2018

most since 2010 *(Figure 2.14)*. All five countries have adopted best-practice policy measures for energy efficiency, resulting in high improvement in RISE scores since 2010. The biggest energy productivity improvements are in China and Indonesia, where policies like efficiency mandates for the largest industrial consumers have been instituted.

GOOD INSTITUTIONS AND ENFORCEMENT ARE ALSO NECESSARY TO ACHIEVE SUSTAINABLE ENERGY RESULTS

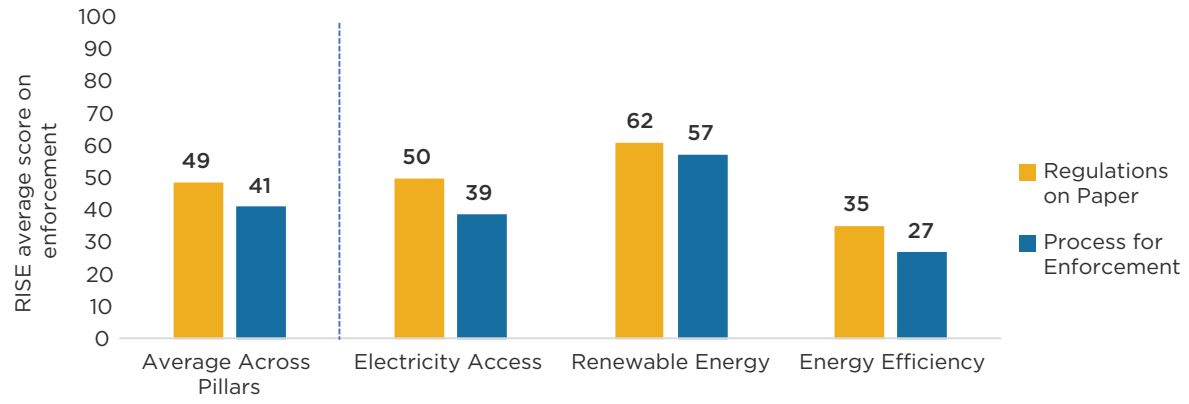
Good policies will not yield results without consistent enforcement. Reforms are widely adopted on paper, but often they do not have sufficient enforcement mechanisms to ensure proper implementation and compliance. For example, building codes for energy use might be adopted, but without a proper enforcement body, mandated to test and verify adherence to the codes, the intended energy efficiency improvements would not be achieved in practice. RISE focuses on collecting objective evidence that a particular policy is in place, but the methodology does not allow field verification of whether policies are being enforced among relevant stakeholders. Nevertheless, RISE includes certain features of the regulatory environment that provide a proxy for the level of effort that a country is dedicating to enforcement. For example, a given standard is more likely to be enforced if there is not only a process in place for reporting compliance information to an established authority, but also a verification system for auditing reported information as well as an incentive framework entailing penalties for non-compliance or inaccurate reporting. A verification system provides prima facie evidence of an intention to enforce, even though enforcement cannot be guaranteed unless this system is effectively implemented. Several additional proxy enforcement indicators of this kind have been incorporated into RISE and provide a measure of the level of attention that countries are giving to enforcement issues (for a full discussion of methodology see Appendix A).

Overall, countries are significantly more advanced on paper regulations than they are on measures to support enforcement (*Figure 2.15)*. Comparing RISE scores for regulations on paper (such as laws and regulation) with scores for measures orientated towards

enforcement, gives a sense of the extent of this discrepancy. In every area of sustainable energy, enforcement measures lag-behind paper regulations. Overall, countries score on average around 49 for paper regulations and 41 for corresponding enforcement measures. The gap between regulations on paper and enforcement measures is widest for energy access and narrowest for renewable energy.

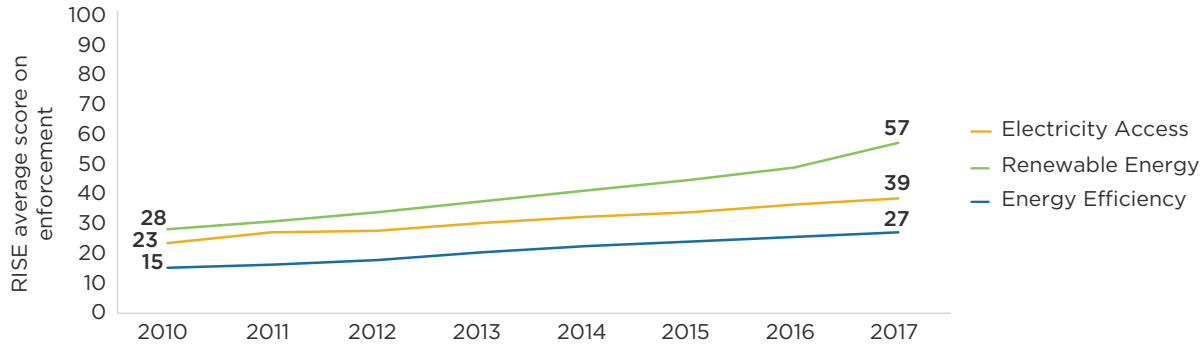
Nevertheless, countries have made significant progress with enforcement measures over time. Enforcement measures have increased substantially since 2010 across all three pillars *(Figure 2.16)*. In the case of renewable energy, the average score for enforcement measures more than doubled since 2010. By contrast, progress with enforcement measures for energy efficiency policies was considerably slower and lags a long way behind. Tracking and enforcing energy efficiency is quite complex since most efficiency measures are typically driven by energy savings which involve hypothetical baseline calculations. The enforcement process of measuring utility energy efficiency requirements with third party validation was the least adopted mechanism among all surveyed countries worldwide. For energy access, the least enforced process relates to tracking and reporting grid reliability standards as part of electrification planning. For renewable energy, the least enforced was the process for providing compensation to renewable energy projects when generation is lost due to curtailment after project commissioning.

FIGURE 2.15 REGULATIONS ON PAPER VERSUS ENFORCEMENT MEASURES FOR RISE SCORES GLOBALLY, 2017



Source: World Bank, RISE 2018

FIGURE 2.16 EVOLUTION OF ENFORCEMENT PROCESSES FOR ALL THREE PILLARS, 2010-2017



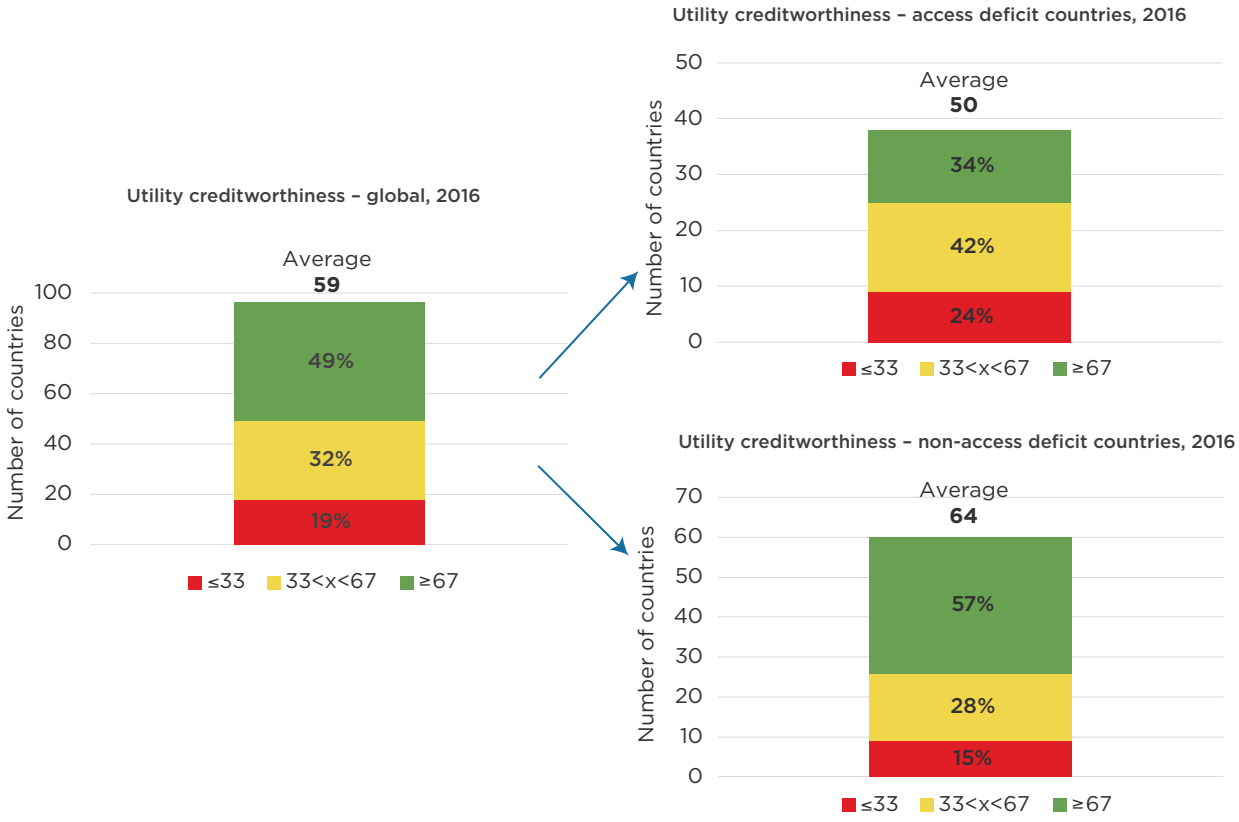
Source: World Bank, RISE 2018

WEAK CREDITWORTHINESS UNDERMINES THE ABILITY TO FINANCE SUSTAINABLE ENERGY SCALE-UP

Without creditworthy utilities, it will prove difficult to raise finance for the sustainable energy agenda. Progress on the sustainable energy agenda depends not only on policies and effective institutional enforcement, but also on the ability to attract financing for sustainable energy investments. Utilities are usually the central actor in any power sector and play a crucial role in the development of energy access, renewable energy and energy efficiency. Financially healthy and creditworthy utilities have better capacity to invest from their own resources and from borrowings, enabling them to expand the number of connections and provide better services to existing consumers. Utilities are often also the main purchasers of renewable energy, and one of the main deterrents for investors is the risk that a financially weak utility may not be able to follow through on its contractual obligations to pay for its power purchases in a timely fashion. Utilities also play a central role in energy efficiency, by implementing programs that yield significant energy savings.

Only half of utility companies in RISE countries were deemed creditworthy in 2017.[5] Utility creditworthiness, was measured using financial ratios emanating from a distribution company's financial statements (balance sheet, cash flow statement, and income statement), in about three quarters of countries for which such financial statements were publicly available. There was a higher concentration of creditworthy utilities in countries that have already achieved universal access to electricity (non-access-deficit countries) (57 percent), compared to countries that are working toward universal access (access-deficit countries) (34 percent) (*Figure 2.17*).[6]

FIGURE 2.17 RISE SCORE FOR UTILITY CREDITWORTHINESS, GLOBAL VS. ACCESS-DEFICIT COUNTRIES VS. NON-ACCESS-DEFICIT COUNTRIES, 2016



Source: World Bank, RISE 2018

Utility creditworthiness has declined since 2012, with sharper declines in access-deficit countries than in other countries[7] *(Figure 2.18)*. Utilities that become creditworthy do not necessarily stay creditworthy, as utility finances are not always on an improving trend. Factors like the changing fuel costs and exchange rates, as well as the magnitude of capital investment programs and associated financing costs can cause utilities to fall in and out of creditworthiness over time. Remarkably, utility creditworthiness declined on average from 2012 to 2016 *(Figure 2.18)*, although some individual utilities became more creditworthy

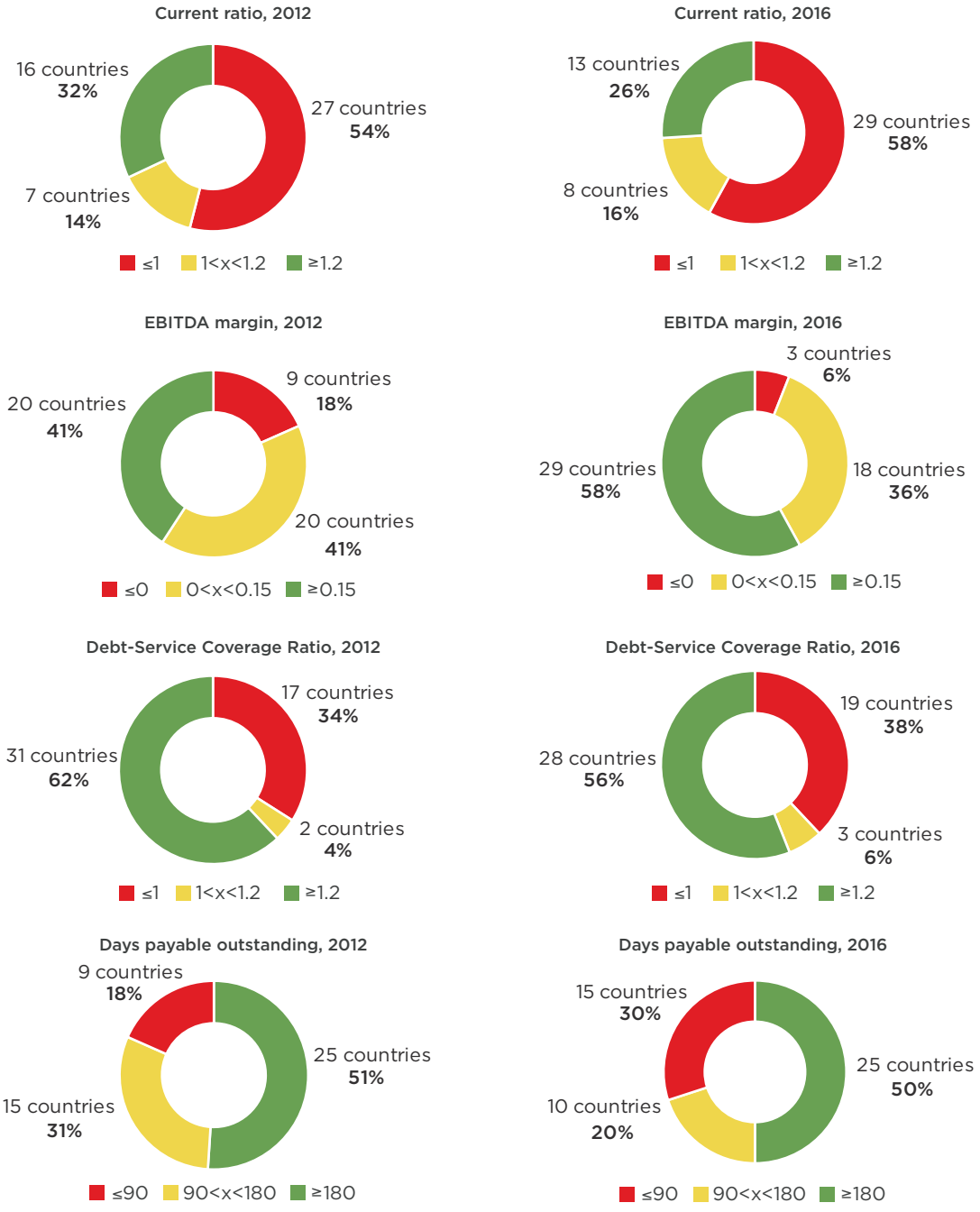
FIGURE 2.18 CREDITWORTHINESS RATIOS FOR ACCESS-DEFICIT AND NON-ACCESS DEFICIT COUNTRIES, 2012 AND 2016

Source: World Bank, RISE 2018

during this period (rising above the diagonal line) even as others became less creditworthy (falling below the diagonal line). This shifting pattern can be observed in both access-deficit *(Figure 2.18(a))* and non-access-deficit *(Figure 2.18(b))* countries, but the tendency for utilities to become less creditworthy was more pronounced in access-deficit countries.

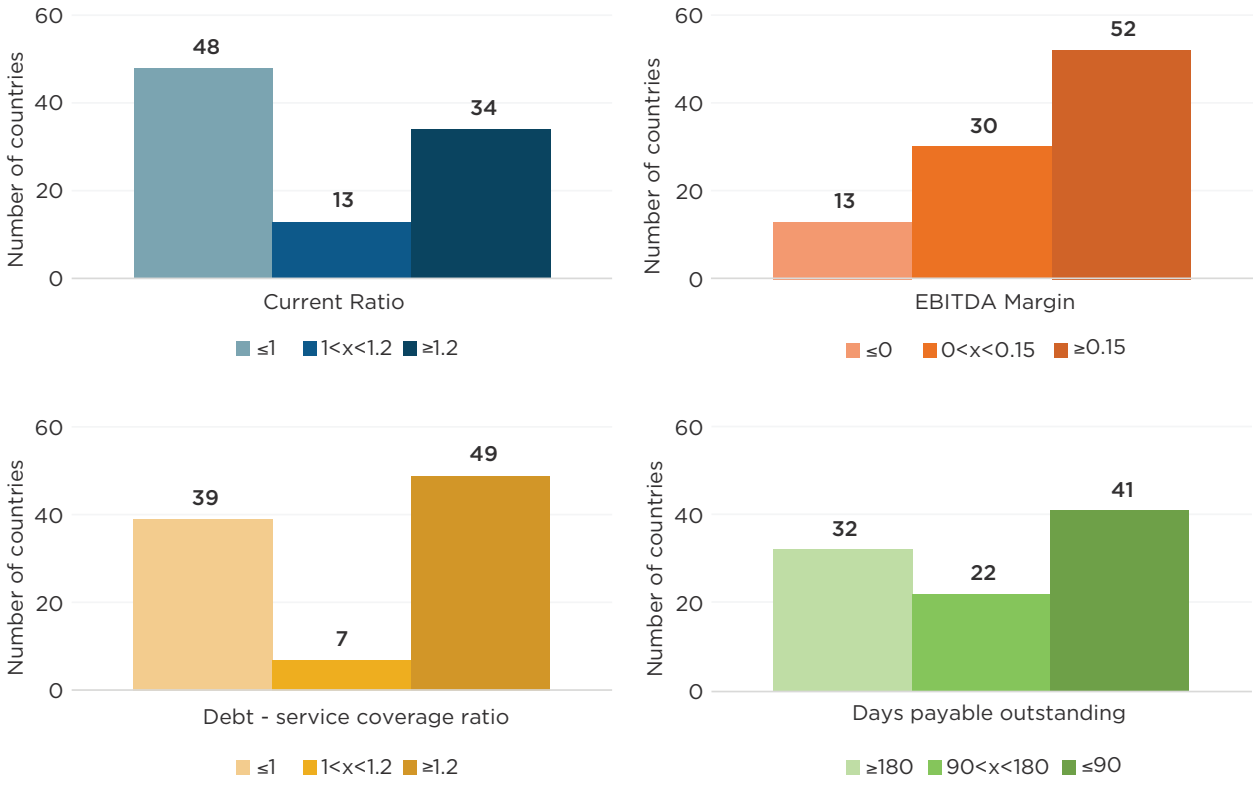
Not all creditworthiness indicators deteriorated to the same extent. The RISE creditworthiness score is based on a composite of four financial indicators. Examining these indicators individually helps to identify the nature of the financial problems faced by utilities (*Figure 2.19*). Between 2012 and 2016, there was an overall improvement in the EBITDA

FIGURE 2.19 DISTRIBUTION OF COUNTRIES BASED ON FOUR TYPES OF UTILITY CREDITWORTHINESS RATIOS, 2012 AND 2016



Source: World Bank RISE 2018

FIGURE 2.20 DISTRIBUTION OF UTILITY CREDITWORTHINESS RATIOS, 2016



Source: World Bank RISE 2018

margin, although all the other creditworthiness indicators deteriorated, in particular days payable outstanding.

Utilities are having difficulty honoring their debts to vendors. Further insight can be gained by examining the distribution of scores for different creditworthiness indicators *(Figure 2.20)*. A strong majority of countries show reasonable EBITDA margins. However, performance on the current ratio and debt service coverage ratio show a sharp divide between one large group that performs relatively well and a second group that performs quite poorly. A large majority of utilities report days payable outstanding in excess of the 90 day norm, indicating that one of the most challenging areas is honoring debts to vendors.

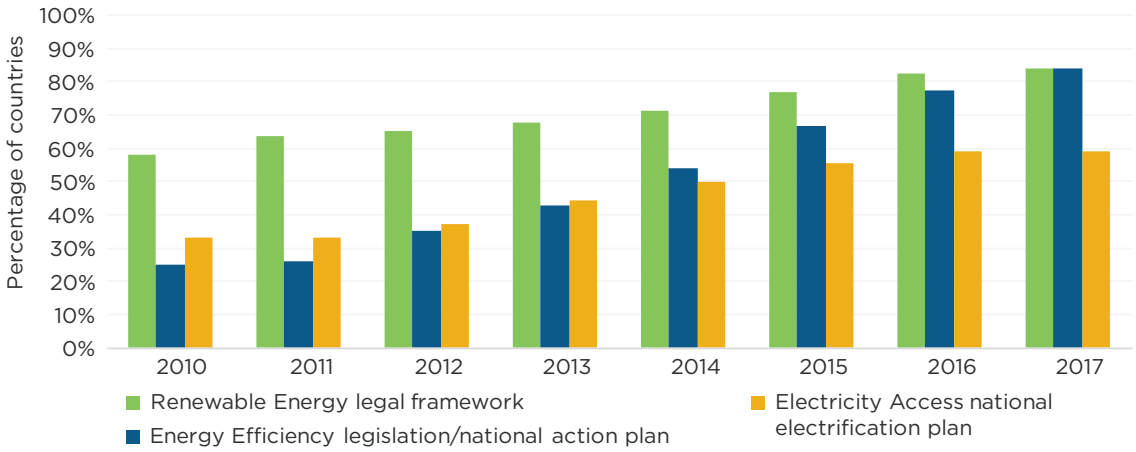
MOMENTUM BEHIND THE UPTAKE OF CLEAN ENERGY POLICIES IS PARTICULARLY STRONG

With respect to clean energy strategy, policymakers in most countries tended to move first on developing a legal framework for renewable energy, while action on energy efficiency came later. As of 2010, around 60 percent of countries already had a legal framework for renewable energy whereas only some 20 percent had an equivalent legal framework for energy efficiency. This gap has narrowed over time, such that by 2017, around 80 percent of countries had targets both for renewable energy and for energy efficiency *(Figure 2.21)*. This catch-up has been driven largely by countries in Asia, where rapid growth in energy demand has spurred policy makers to take stronger measures on energy efficiency.

Even among access-deficit countries, the development of a framework for renewable energy has tended to precede the adoption of an electrification master plan. As of 2017, almost 60 percent of access-deficit countries had an officially approved national electrification plan, while 76 percent had a legal framework for renewable energy in place. While a small number of access-deficit countries have started to engage energy efficiency policies (Cambodia, Cameroon, Côte d'Ivoire, India, Kenya, Philippines, and South Africa).

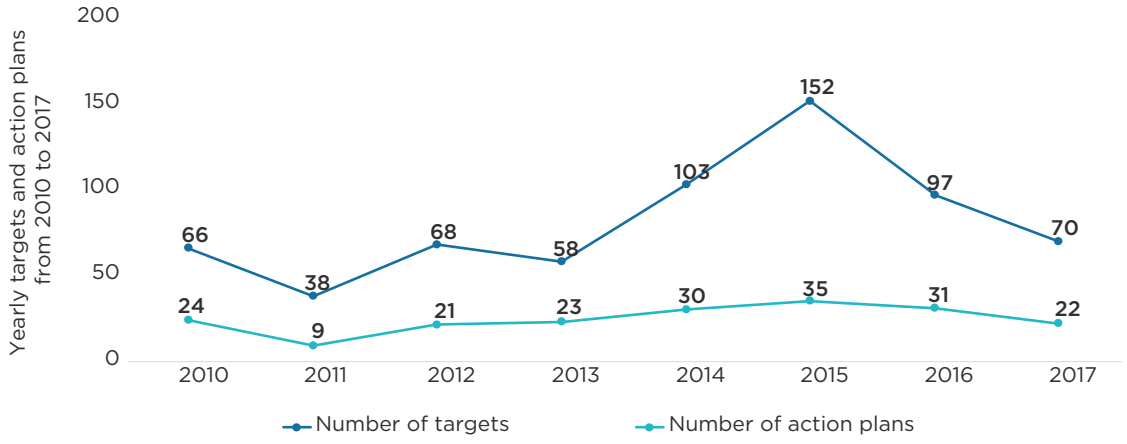
International agreements have been an important driving force behind the uptake of policy targets for clean energy. International climate talks culminating in the 2015 Paris Climate Accord and Nationally Determined Contributions, along with SDG 7, covering renewable energy, energy efficiency, and energy access, have helped to focus policy makers' attention on the sustainable energy agenda. The response is evident in the surging number of national renewable and energy efficiency targets set annually, which more than doubled in the lead-up to Paris and subsided thereafter *(Figure 2.22)*. This was also accompanied by an increase in the adoption of country level action plans, although the response was nowhere near as strong as can be seen for target-setting.

FIGURE 2.21 PERCENTAGE OF COUNTRIES WITH PLANS FOR ELECTRICITY ACCESS*, RENEWABLE ENERGY, AND ENERGY EFFICIENCY, 2010–2017



*In the case of electricity access, the percentage is out of 54 access deficit countries.
Source: World Bank, RISE 2018

FIGURE 2.22 RENEWABLE ENERGY AND ENERGY EFFICIENCY TARGETS AND ACTION PLANS ADDED ANNUALLY BEFORE AND AFTER THE PARIS CLIMATE ACCORDS, 2010–2017



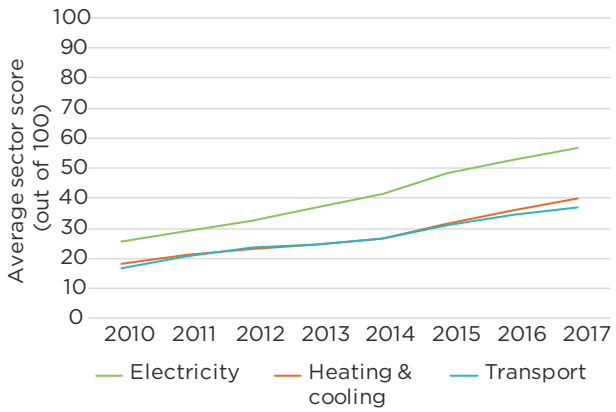
Source: World Bank RISE 2018

CLEAN ENERGY POLICIES REMAIN TOO NARROWLY FOCUSED ON THE ELECTRICITY SECTOR

Electricity remains the dominant focus for policy efforts on renewable energy and energy efficiency. Energy consumption encompasses three main areas: electricity; transportation; and heating and cooling. Of these, electricity represents only about 20 percent, while the remainder is divided between transportation (around 50 percent) and heating and cooling (around 30 percent). As shown in the Tracking SDG7 report, the renewable energy share for electricity has climbed significantly in recent years, while the renewable energy share for transportation remains very low and the share for heating has even fallen. Progress on energy efficiency in the transportation sector has also been relatively slow. The RISE results show different levels of policy effort across these end-use sectors. In the case of renewable energy, countries score much higher on policy measures to promote renewable electricity (close to 60) than on policy measures to promote renewable transportation and heating and cooling sector (at around 40) (*Figure 2.23*), and the difference has been increasing over time. In the case of energy efficiency, countries score much higher on policies to promote energy efficiency in the electricity sector (close to 80) than on measures to promote energy efficiency in transportation (little more than 20). Nevertheless, the policy scores for renewable energy and energy efficiency in the heating and cooling have almost doubled since 2010 (*Figure 2.23*). Where little progress has been made is on policies to promote energy efficiency in transportation.

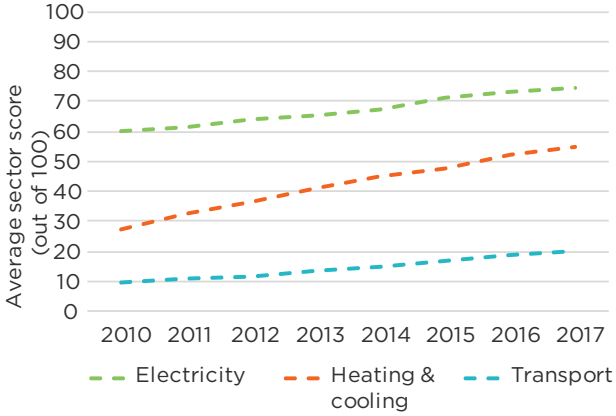
Nevertheless, there is wide variation in policy prioritization of end-use sectors across different geographical regions. Most notably, among OECD countries there is no difference in the renewable energy policy scores according to end-use sector (*Figure 2.25(a)*). Indeed, countries such as Australia, Germany, Ireland, Italy, and the United States have targets in place for all three sectors. The promotion of renewable energy use in the transportation sector has received very little attention in South Asia, Sub-Saharan Africa and the Middle East and North Africa. By contrast, Latin America and the Caribbean has made significant efforts to promote renewable energy use in transportation but has paid little attention to the heating and cooling sector. When it comes to energy efficiency, there is a more consistent pattern across all regions with policies for the electricity sector significantly ahead of heat-

FIGURE 2.23 RISE RENEWABLE ENERGY SCORES BY SECTOR, 2010 – 2017



Source: World Bank RISE 2018, WDI 2018

FIGURE 2.24 RISE ENERGY EFFICIENCY SCORES BY SECTOR, 2010 – 2017

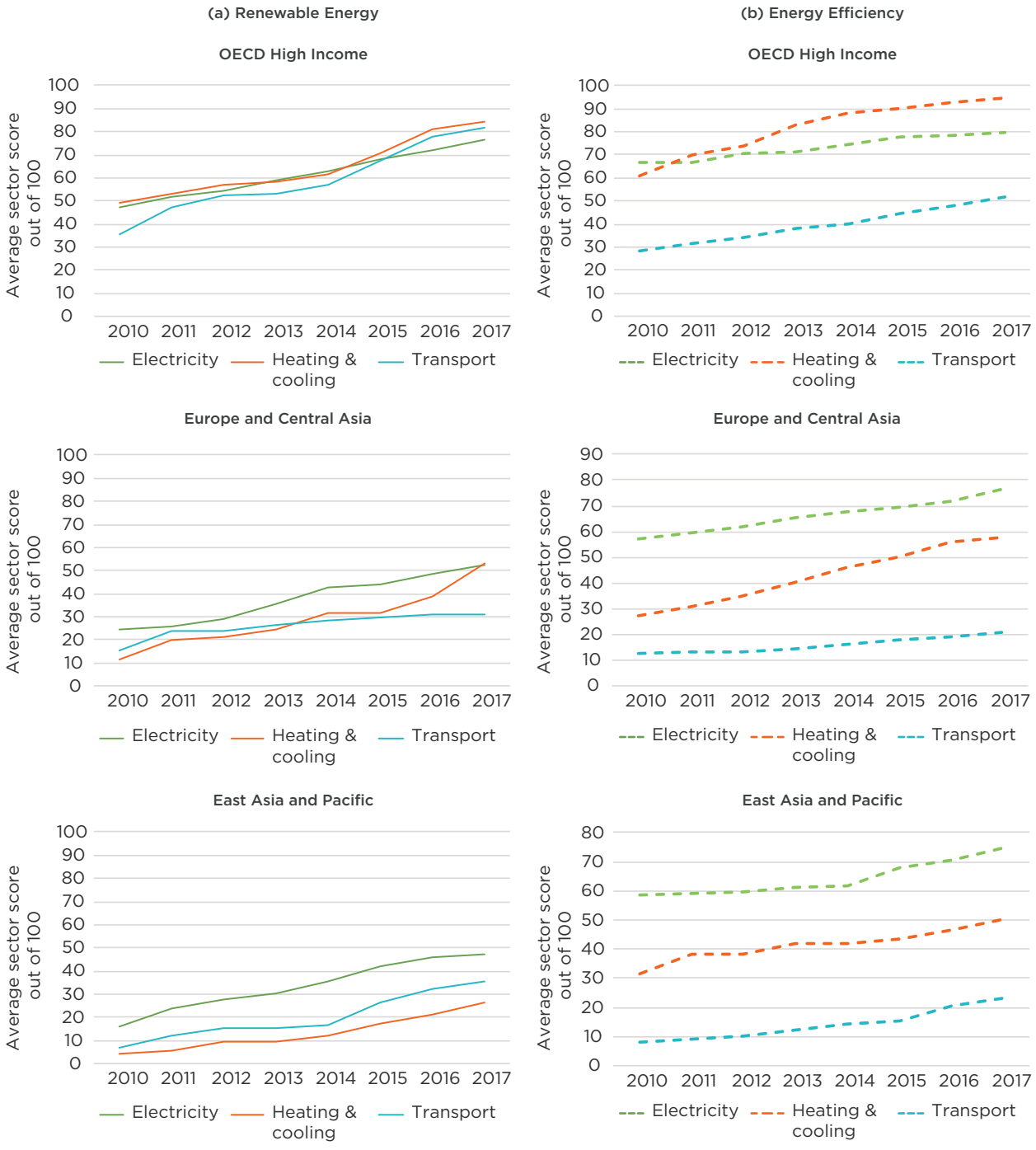


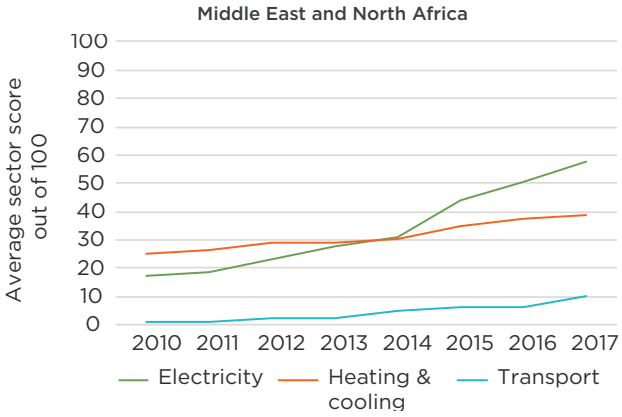
Source: World Bank RISE 2018, WDI 2018

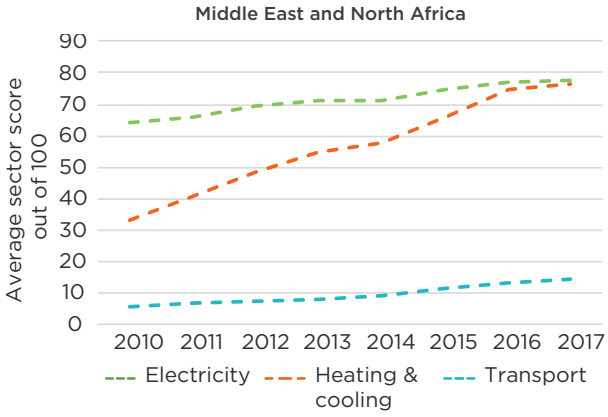
ing and cooling, which in turn is significantly ahead of transportation (*Figure 2.25(b)*). Only in OECD countries, the Middle East and North Africa, and Latin America and the Caribbean, the level of policy attention to energy efficiency in heating and cooling comes close to that for electricity.

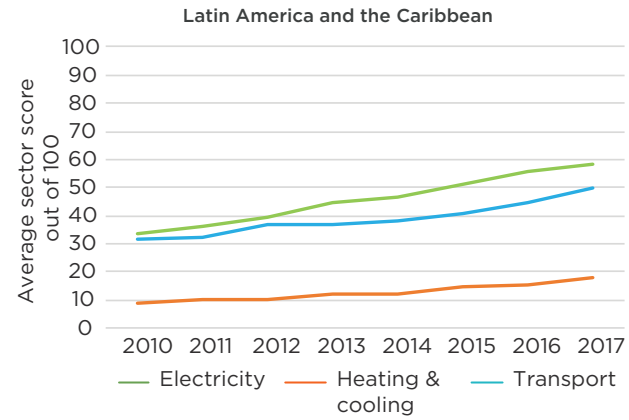
There is some evidence that policymakers are beginning to take more notice of the clean cooking agenda, but significant room for improvement remains. According to the Tracking SDG7 report, progress towards universal access to clean cooking has been particularly slow with 3 billion people living without ac-

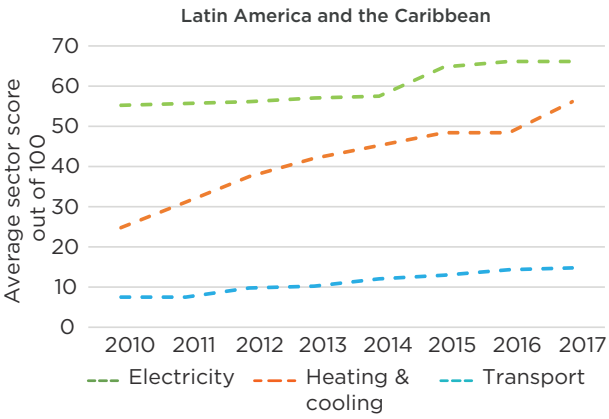
FIGURE 2.25 RENEWABLE ENERGY AND ENERGY EFFICIENCY SCORES BY SECTORS AND REGIONS, 2010-2017

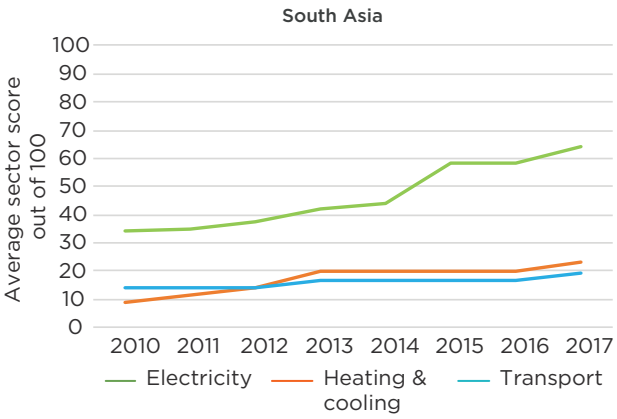


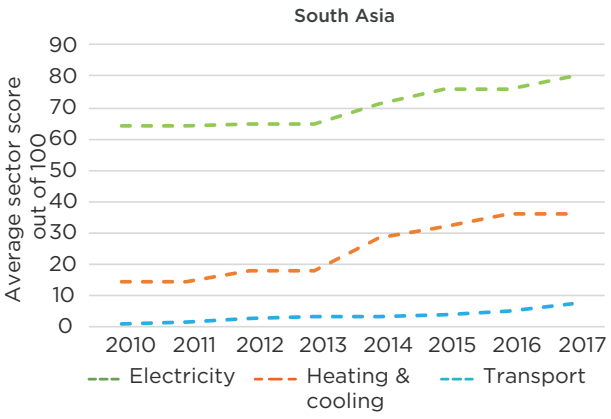


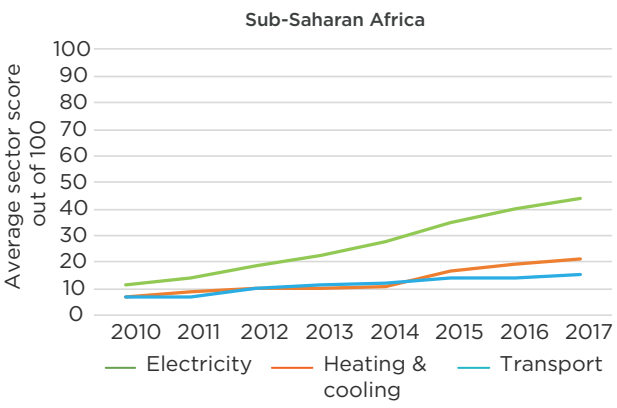


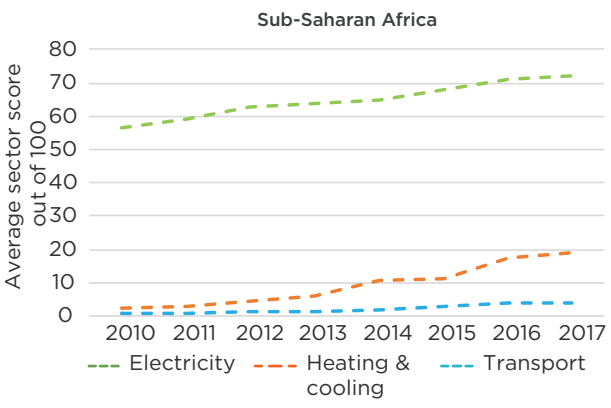








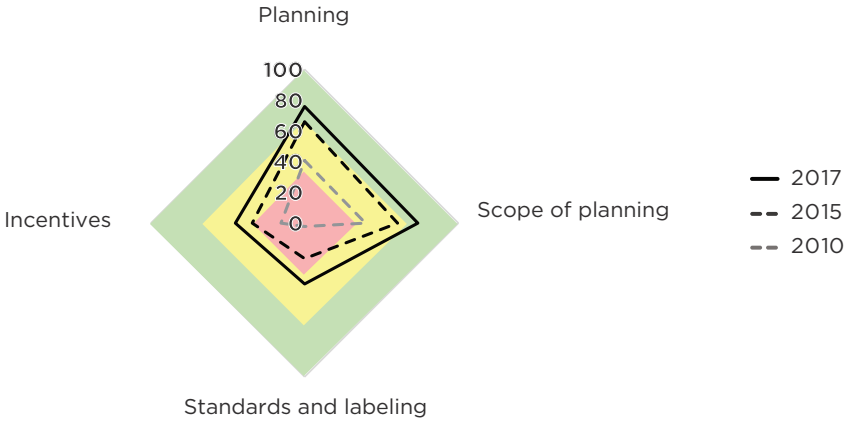




Source: World Bank, RISE 2018

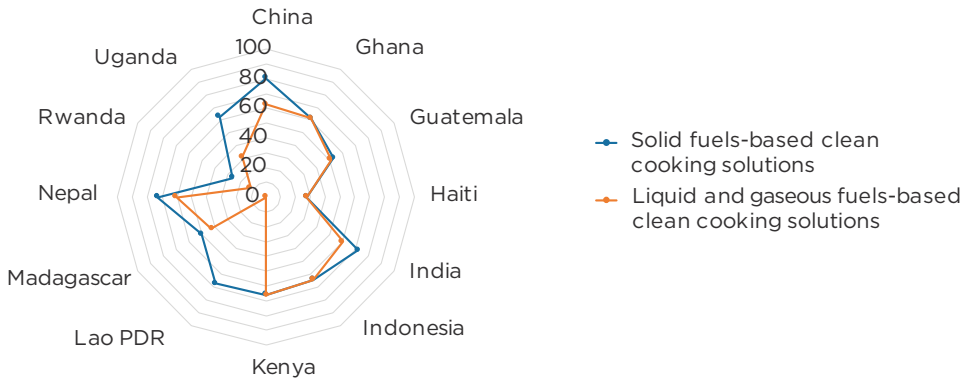
cess in 2016. As part of RISE 2018, a new index for the policy environment on clean cooking was piloted in 12 countries across all regions which together constitute over 55 percent of the global deficit for access to clean cooking. The results show that there has been significant progress since 2010 in establishing planning frameworks for clean cooking, but the development of incentives for the adoption of clean cooking, as well as standards and labeling of cookstoves still lag far behind (*Figure 2.26*). In most of the RISE pilot countries, the policy emphasis has been geared towards solutions that are solid-fuels-based and more fuel-efficient but not necessarily 'clean,' as opposed to electric-powered or liquid and gaseous-fuel-based cooking solutions, which are often the cleanest options *(Figure 2.27)*[8]. While countries work toward shifting to cleaner cooking solutions, it is important to have policies that set minimum emissions and efficiency requirements based on the country context and encourage consumer adoption of cooking solutions as clean as possible at the point of use.

FIGURE 2.26 PROGRESS IN CLEAN COOKING POLICY FRAMEWORK FOR PILOT COUNTRIES, BY INDICATOR, 2010 – 2017



Source: World Bank, RISE 2018

FIGURE 2.27 SOLID-FUEL-BASED VS. LIQUID AND GASEOUS-FUEL-BASED CLEAN COOKING SOLUTIONS POLICY, BY COUNTRY, 2017



Source: World Bank, RISE 2018

ENDNOTES

[2] Figure 2.3 includes 133 countries surveyed for renewable energy and energy efficiency pillars and 54 access- deficit countries surveyed for electricity access. Electricity access policies were assessed in countries where less than 90% of the population or more than 5 million people lack access to electricity.

[3] Data on access deficits is derived from IEA, IRENA, UNSD, World Bank, and WHO, Tracking SDG7: The Energy Progress Report, 2018 (https://trackingsdg7.esmap.org/data/files/download-documents/tracking_sdg7-the_energy_progress_report_full_report.pdf).

[4] Energy productivity is defined as the ratio of GDP output divided by energy production (measured by total primary energy supply). Energy productivity is the inverse of energy intensity, the metric used to track energy efficiency for SDG 7.3.

[5] Based on data available for 96 countries in 2016.

[6] In Figure 2.27, as of December 31, 2017, audited and published utility financial data was available only for 2016, so the utility creditworthiness analysis pertains to 2016, and not 2017 as elsewhere in this report.

[7] For 50 countries, both access deficit and non-access deficit, where data is available for 2012, 2014 and 2016.

[8] Liquid and gaseous fuels included in this distinction are biogas, ethanol, LPG, and natural gas including piper natural gas (PNG).

CHAPTER THREE
ELECTRICITY ACCESS

3. ELECTRICITY ACCESS

KEY MESSAGES

- The global picture for electricity access policies has been steadily improving. In 2010, the majority of countries lacked supportive policies and regulations for expanding electricity access (red zone), and none was in the green zone. As of 2017, a quarter of access-deficit countries adopted comprehensive policies and regulations (green zone), and another half has at least some key elements of supportive policy and regulatory framework (yellow zone).
- Significant progress was registered in all four access-deficit regions, including Sub-Saharan Africa. Nine Sub-Saharan African countries are among the top performers (green zone). However, the progress across countries is uneven. It is in particular concerning that the least electrified countries and fragile/conflict-affected countries have registered least progress.
- National electrification planning has been the main focus among countries, demonstrating that it is an essential first step in building an enabling framework for electricity access expansion. The quality and inclusiveness of these plans, however, vary.
- Access deficit countries are exploring new off-grid electrification opportunities, which have opened up in recent years thanks to various renewable energy and battery storage technologies and business model innovations. The policy and regulatory framework for off-grid access solutions, such as mini grids and standalone systems, is now scored higher than the framework for grid electrification.
- Further improvements in the grid expansion framework are needed, in particular in the areas of consumer connection financing, performance standards, and monitoring systems.
- Most access-deficit countries are still facing challenges of providing affordable electricity with the need to keep the utilities transparent and financially robust. A few countries, however, have registered positive improvements in both areas.
- As countries incorporate the right policies and regulations on paper, it is imperative to ensure that these policies and regulations are properly implemented, monitored and regularly enforced.

POLICY DIMENSIONS FOR ELECTRICITY ACCESS

The 2018 edition of the RISE electricity access pillar continues with the eight indicators that were used in the 2016 edition of RISE, but with several changes to the questions within each indicator. These eight indicators include: 1. Electrification planning; 2. Scope of electrification planning; 3. Grid electrification framework; 4. Framework for mini grids; 5. Framework for standalone systems; 6. Consumer affordability; 7. Utility transparency and monitoring; and 8. Utility creditworthiness.

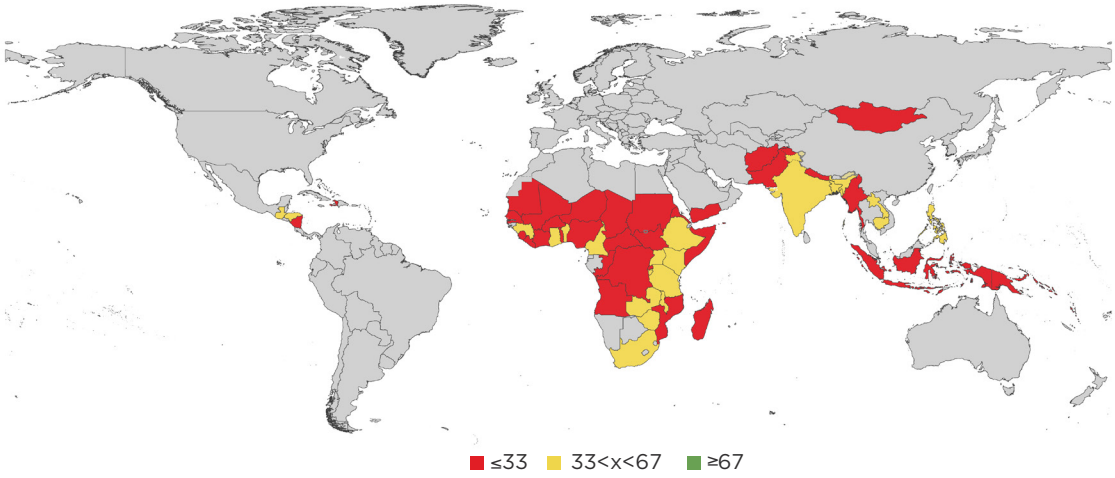
Based on discussions with sector experts from international organizations, development banks, academia, and private sector stakeholders, the eight indicators are the recommended policy dimensions to consider when a country seeks to accelerate its electrification. These indicators range from national electrification planning, to policy framework for various electrification technologies, and policies that enable consumer affordability of electricity and evaluate utility performance.

The path towards developing an enabling policy framework for electricity access is different for every country. For example, countries could follow the traditional approach, which is to develop, approve and implement a national electrification plan before developing framework for various technologies. However, with the rapid development of off-grid technologies in recent years, many countries prefer development of policies that enable them to take advantage of adopting mini grids and standalone systems. Indeed, one of the opportunities for researchers and users of RISE data is to assess which policies are the most effective in moving the needle on electricity access.

GLOBAL OVERVIEW OF ELECTRICITY ACCESS POLICY FRAMEWORK

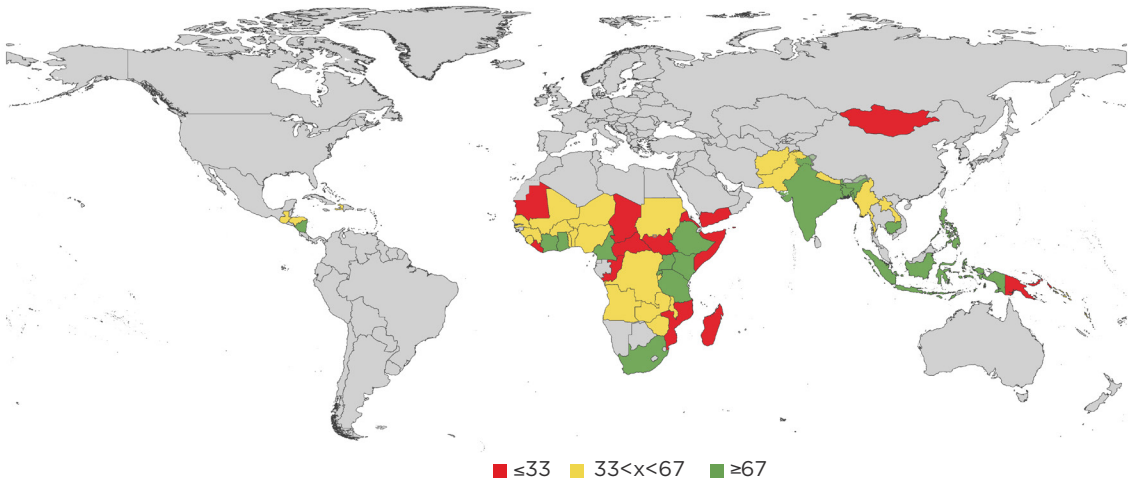
Overall, access-deficit countries have made good progress on electricity access policies since 2010, but significant room for improvement remains in many policy and regulatory aspects. Between 2010 and 2017, there was consistent improvement in electricity policy and regulations in all access-deficit countries assessed by RISE (*Figure 3.3*).[9] Overall, three-quarters of access-deficit countries established some key policy or regulation required to expand access to electricity (green and yellow zone). More than one-third of the countries, mainly located in Sub-Saharan Africa, have initiated the transition from having an insufficient regulatory framework for electricity access in 2010 (*Figure 3.1*) to the adoption of at least some necessary policy attributes by 2017, with more than a quarter of the countries now having a comprehensive policy and regulatory framework (green zone) (*Figure 3.2).* The positive trends in policy and regulatory adoption have been accompanied by the increasing pace of electrification in recent years,

FIGURE 3.1 MAP: RISE ELECTRICITY ACCESS SCORES BY COUNTRY, 2010



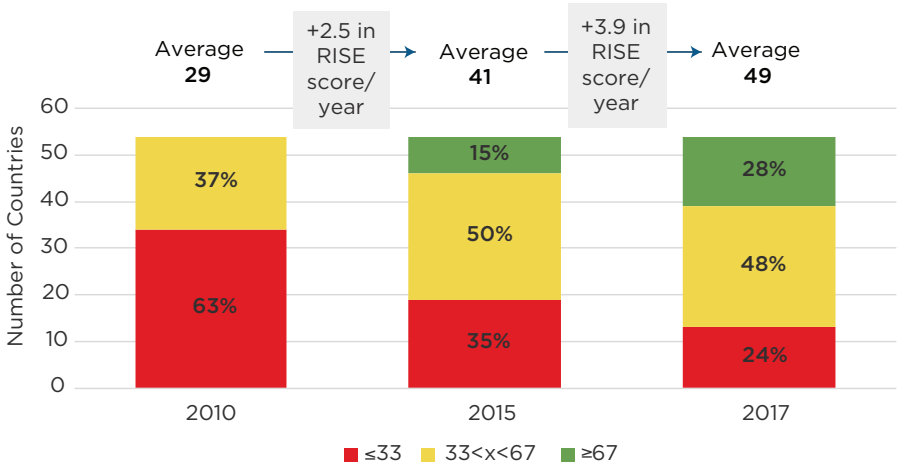
Source: World Bank RISE 2018

FIGURE 3.2 MAP: RISE ELECTRICITY ACCESS SCORES BY COUNTRY, 2017



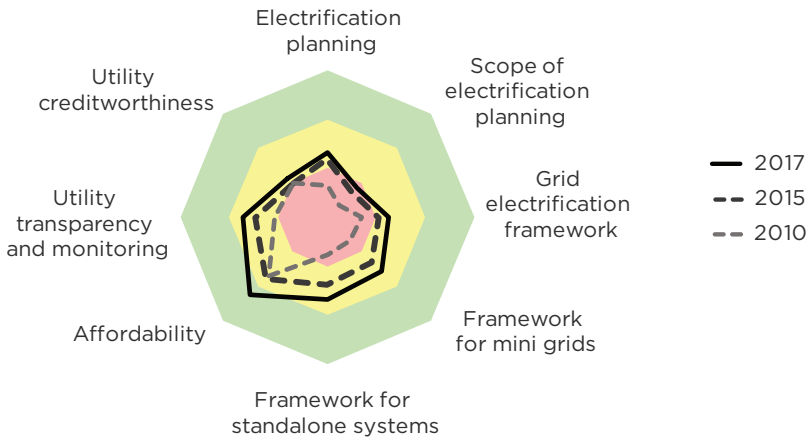
Source: World Bank RISE 2018

FIGURE 3.3 DISTRIBUTION OF RISE ENERGY ACCESS SCORES, 2010, 2015, AND 2017



Source: World Bank RISE 2018

FIGURE 3.4 GLOBAL PROGRESS ON ACCESS TO ELECTRICITY BY INDICATOR, 2010, 2015 AND 2017



Source: World Bank RISE 2018

as highlighted in the report, Tracking SDG7: The Energy Progress Report 2018[10] (referred to hereafter as the *Tracking SDG 7* report).

While this progress is promising, it is also quite heterogenous, with RISE scores ranging from 81 in Bangladesh to less than 10 in Somalia *(Figure 3.2).* Globally, more than a quarter of access-deficit countries score in the green zone, while the vast majority of countries have made moderate efforts with mixed outcomes.

The most well-established policy and regulatory measures are those covering electrification planning, followed by the frameworks for mini grids and standalone systems and utility transparency *(Figure 3.4).* Planning is crucial to meet the challenge of access to electricity but a plan, in itself, is not sufficient. Plans need to fit country contexts and ensure commercial viability of distribution networks. They need to cover the specific needs of the population lacking electricity. Policymakers should target both on-grid and off-grid solutions (such as mini grids and standalone home systems) in a systematic way that considers the needs of urban and rural populations. Further, the financial sustainability of power com-

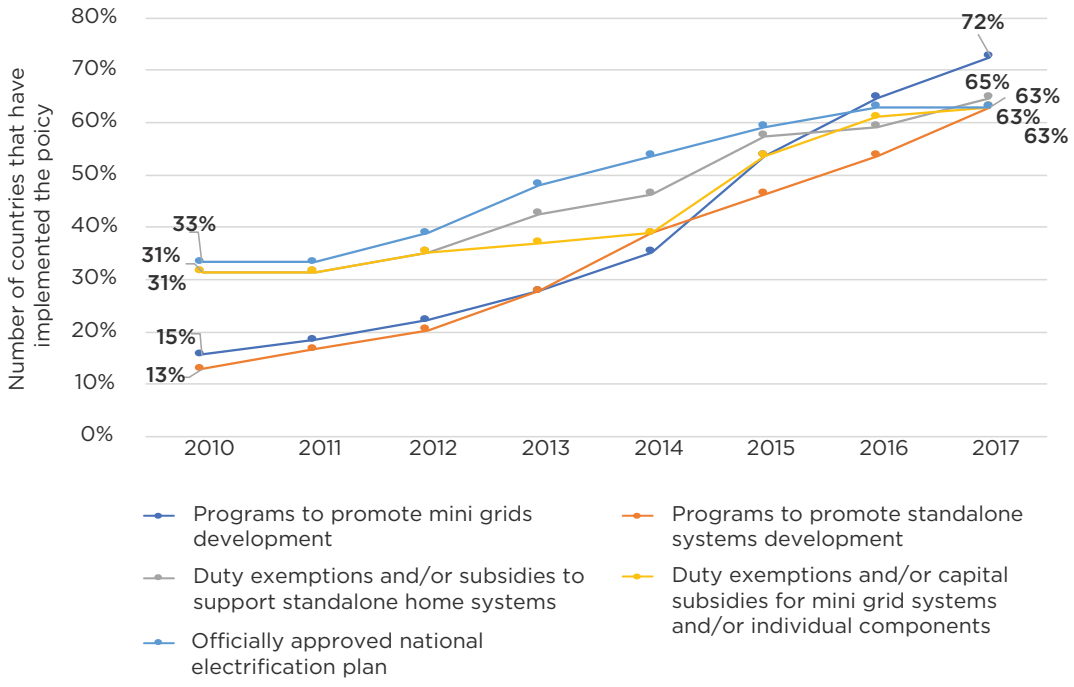
panies is important for the success of energy access projects. The typical process is to have part of the capital costs of rural electrification subsidized by the government or international donors, leaving at least part of the capital costs and all the operating costs to be paid by consumers. Thus, making electricity affordable to consumers after all the subsidies are taken into consideration is vital for ensuring a flow of revenue commensurate with the cost of providing service.

Programs to promote mini grids and develop standalone systems have progressed the most since 2010, with more than half of the access-deficit countries adopting them. Along with the establishment of these programs, financial support for them – either duty exemptions or subsidies – were common in two-thirds of countries *(Figure 3.5)*. Policies that focus on making subsistence electricity affordable emerged as the most widespread as of 2017, while progress on the creditworthiness of utilities has come to a standstill. Frameworks for electricity access have gained only intermediate maturity, leaving room for further improvement.

REGIONAL AND COUNTRY OVERVIEW OF ELECTRICITY ACCESS POLICY

From a regional perspective, access-deficit countries in South Asia score highest, in particular thanks to policy frameworks for standalone systems, utility transparency, monitoring, and creditworthiness. However, over the last seven years, the East Asia & Pacific region has been the fastest mover among all the regions in developing policy frameworks for electrification, with emphasis on frameworks

FIGURE 3.5 PERCENTAGE OF COUNTRIES WITH TOP FIVE FASTEST-MOVING POLICIES FOR ELECTRICITY ACCESS, 2010-2017

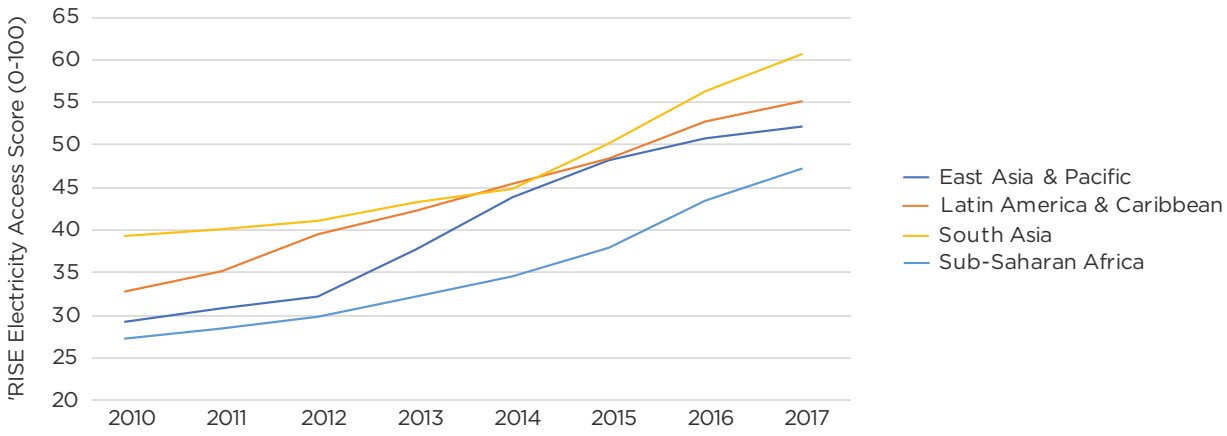


Source: World Bank RISE 2018

for grid extension as well as off-grid systems. Grid electrification policies have improved in all countries in East Asia & Pacific, with Cambodia, Indonesia and Philippines leading the way. These countries have adopted the three key components of grid electrification – i) dedicated funding line, ii) service level standards and, iii) monitoring systems to enforce them.

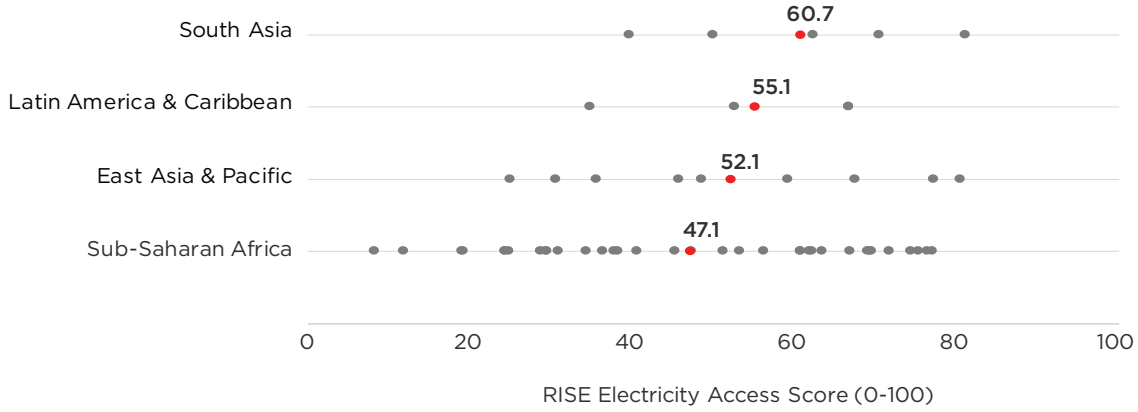
Sub-Saharan African countries have also registered strong progress, especially since 2015, in particular on policies and regulations for mini grids and standalone systems (*Figures 3.6 and 3.7*). This effort is mainly driven by Ethiopia, which has the most comprehensive energy-access-enabling environment on the continent, followed by Tanzania, Kenya, and South Africa. Ethiopia has one of the most advanced and comprehensive National Elec-

FIGURE 3.6 EVOLUTION OF RISE ELECTRICITY ACCESS SCORE BY REGION, 2010-2017



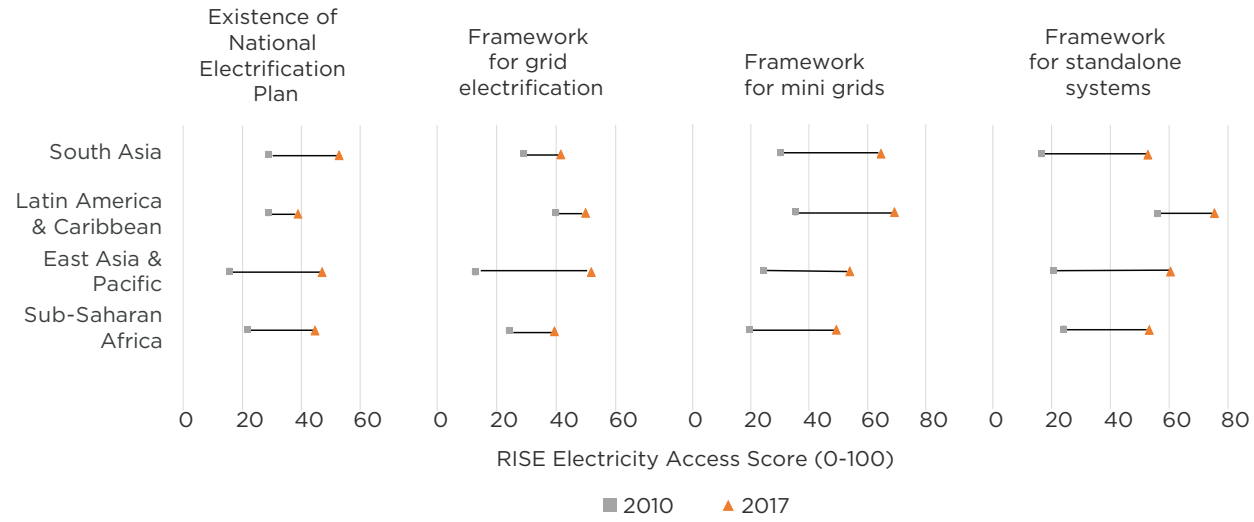
Source: World Bank RISE 2018

FIGURE 3.7 RISE ELECTRICITY ACCESS SCORE BY REGION, 2017



Note: For the Middle East & North Africa region, RISE only conducted a survey for Yemen, and in that country the electricity access pillar score was 14 in 2017.
Source: World Bank RISE 2018

FIGURE 3.8 IMPROVEMENT ON SELECTED ELECTRICITY ACCESS INDICATORS, BY REGION, 2010 TO 2017



Source: World Bank RISE 2018

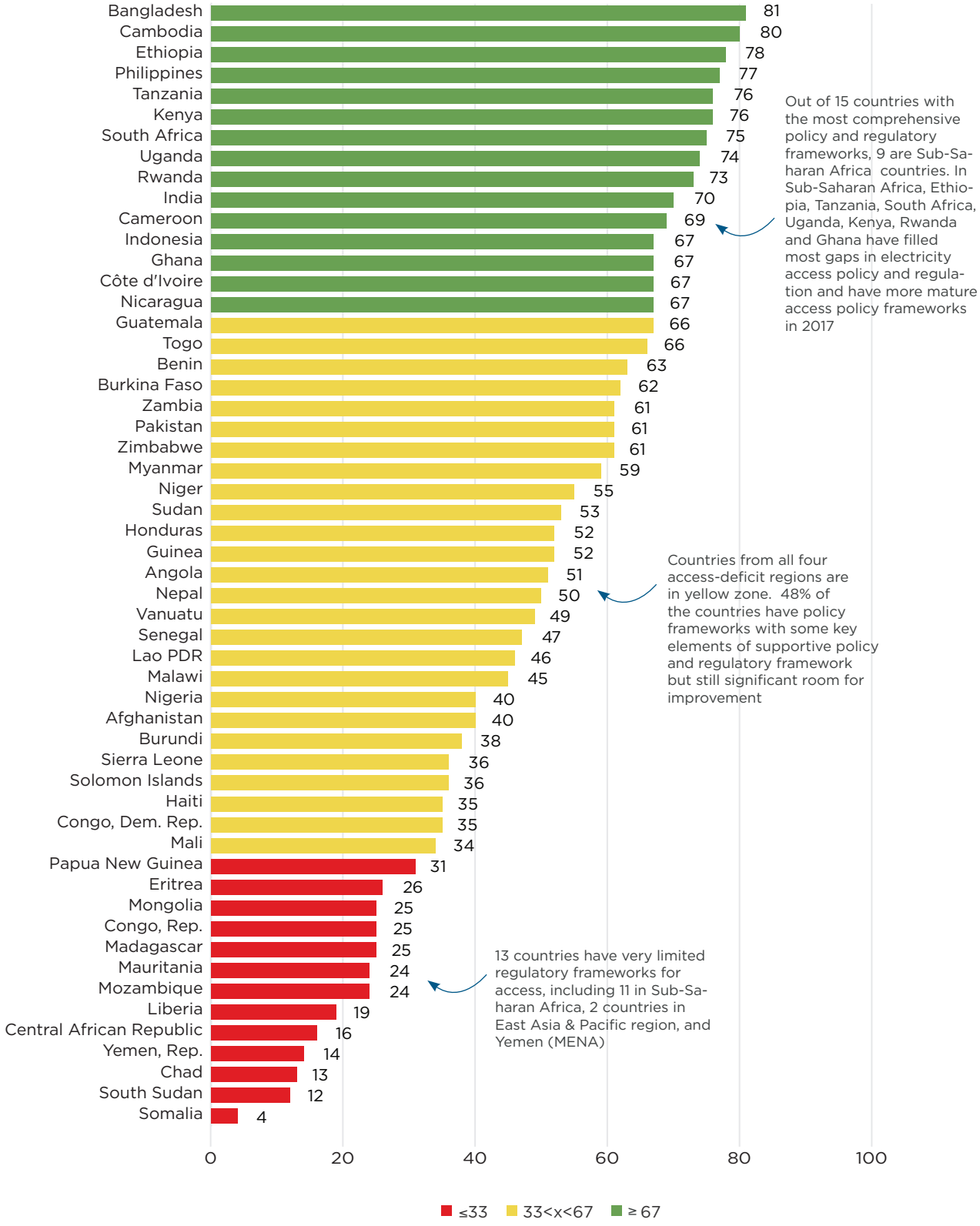
trification Programs in Africa, allowing it to develop clear policy frameworks for grid electrification, mini grids, and standalone systems. Tanzania and Kenya have dedicated their efforts to developing mini grids and standalone systems by establishing national programs and providing dedicated financing facilities. Meanwhile, South Africa benefits from its robust Integrated National Electrification Program (INEP), which not only sets ambitious universal access targets for 2025 but also lays out concrete steps to achieve them.

However, global policy advances have not trickled down to the least electrified countries and countries with fragility, conflict and violence, and their policy frameworks lag behind the rest of the world (Figure 3.10).

Bangladesh, Cambodia, and the Philippines are the three top-scoring countries for policy regulatory environment for electricity access in 2017 *(Figure 3.9)*. All three countries have consistently laid the foundation to establish robust policies, from electrification plans to regulatory frameworks promoting each supply option *(Figure 3.11)*. In Bangladesh, IDCOL (the financial intermediary) was the key player in developing guidelines and providing financing facilities for both suppliers and customers of mini grid and off-grid systems. In comparison, the Philippines decided to establish clear guidelines on setting tariffs and subsidies for small grids and standalone systems. In addition, both countries have regularly updated their national electrification plans, which include periodic valuation and reporting requirement. Cambodia has also committed to establishing an electrification monitoring system, but it has no provision yet to enforce the policy.

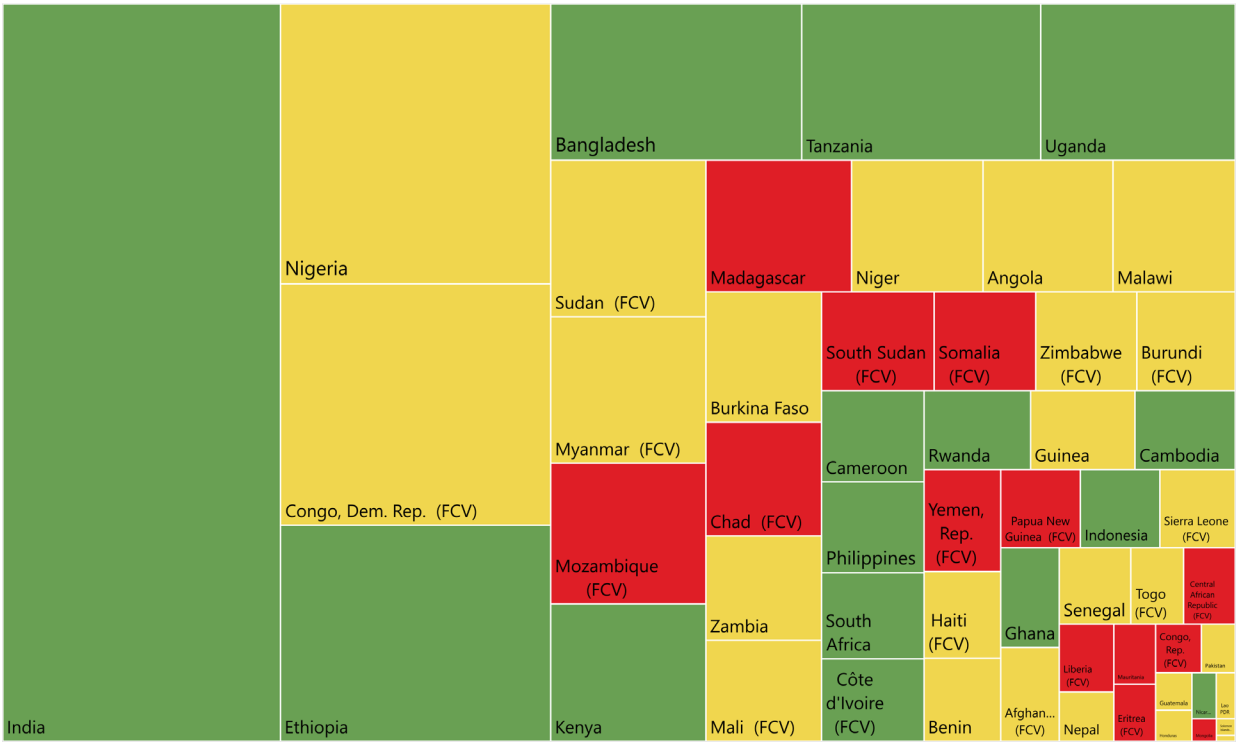
Indonesia, Rwanda, and Tanzania have been the fastest policy improvers from 2010 to 2017 *(Figure 3.12)*. All countries have shown continuous progress throughout the seven years, showing that long-term effort is required to build strong and comprehensive electricity access policies. Across the three countries, the existence of national electrification plans stands out. However, each country adopted its own strategy and prioritized policies to promote specific supply options. On paper, Tanzania has established comprehensive policies across all three supply options, while Rwanda on policy level seems to have focused on promoting mini grid and standalone system solu-

FIGURE 3.9 DISTRIBUTION OF RISE 2017 ELECTRICITY ACCESS SCORES, 54 ACCESS-DEFICIT COUNTRIES



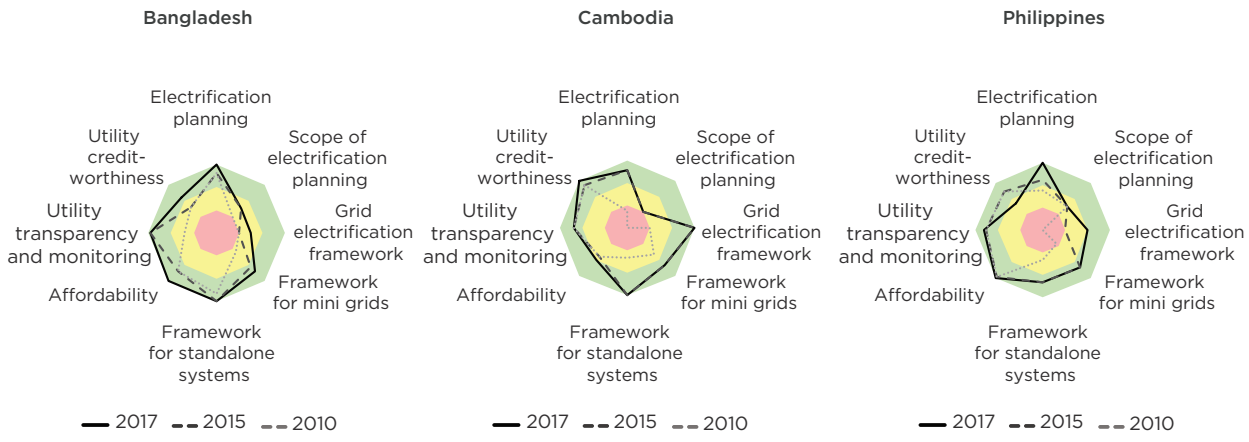
Source: World Bank RISE 2018

FIGURE 3.10 ELECTRICITY ACCESS SCORES FOR ALL 54 RISE ACCESS-DEFICIT COUNTRIES, WEIGHTED BY NUMBER OF PEOPLE WITHOUT ACCESS, 2017



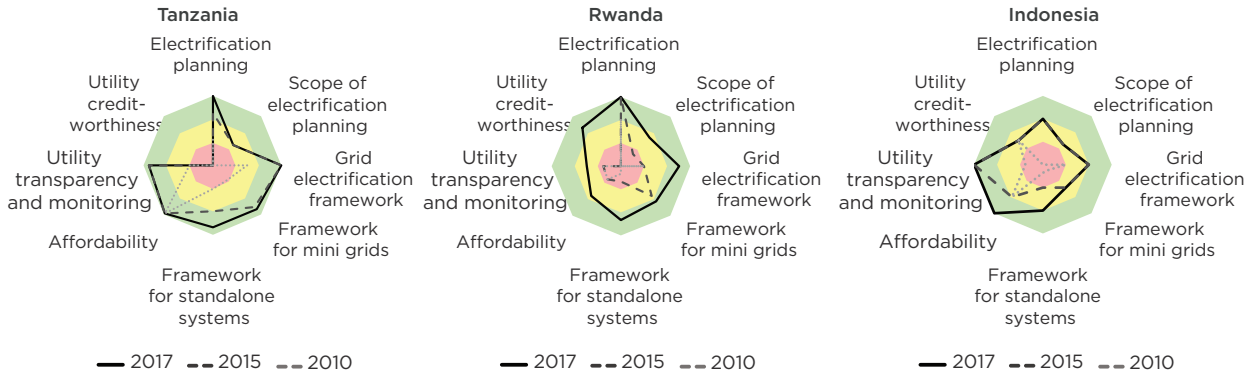
Note: (FCV) indicates the country is categorized as a fragile, conflict, and violent area.
Source: World Bank RISE 2018

FIGURE 3.11 PROGRESS ON INDICATORS FOR THE TOP THREE PERFORMERS IN THE ELECTRICITY ACCESS PILLAR, 2010 - 2017



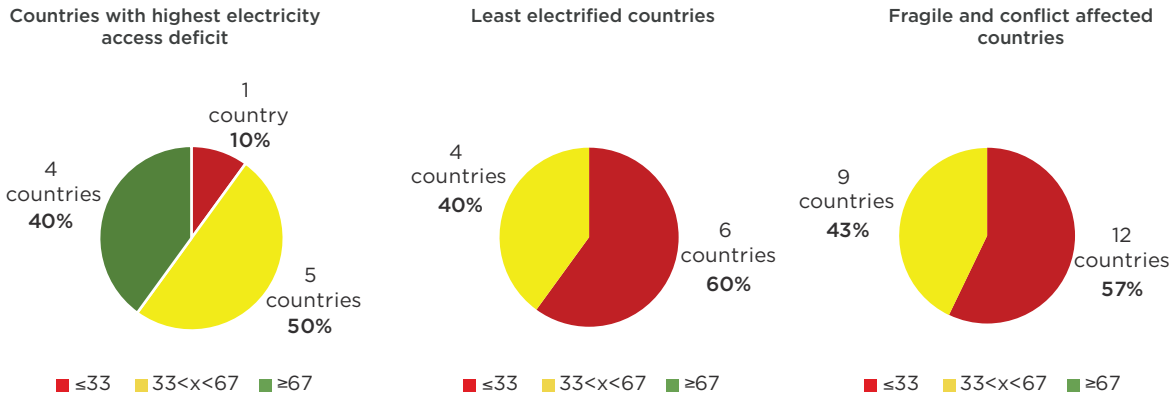
Source: World Bank RISE 2018

FIGURE 3.12 PROGRESS ON INDICATORS FOR THE TOP THREE FAST MOVERS IN THE ELECTRICITY ACCESS PILLAR, 2010-2017



Source: World Bank RISE 2018

FIGURE 3.13 RISE ELECTRICITY ACCESS SCORES FOR COUNTRIES WITH HIGHEST ACCESS DEFICIT, LEAST-ELECTRIFIED COUNTRIES, AND FRAGILE AND CONFLICT-AFFECTED COUNTRIES, 2017



Source: World Bank RISE 2018

tions rather than grid electrification.

Compared to countries with the largest access deficits, the least electrified countries have weaker access-policy frameworks and are yet to see a major push, especially in electrification planning. In the context of conflict, fragility and, as a consequence, deep uncertainty, only half of these latter countries have started to develop targeted regulation to foster electricity access (*Figure 3.13*). Electrification planning—which is relatively low-hanging fruit—and utility creditworthiness particularly lag behind.

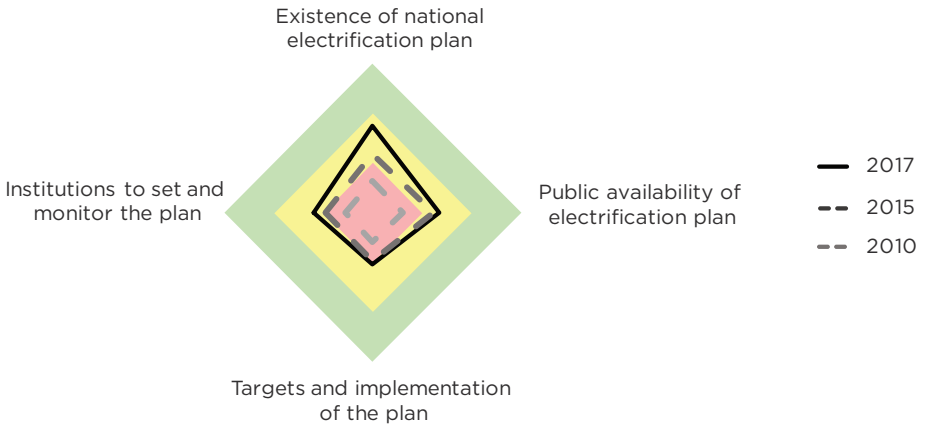
NATIONAL ELECTRIFICATION PLANS

The importance of national electrification plans as a preliminary step in developing a regulatory framework for electricity access is evident in RISE results across all countries with electricity access deficits. A majority of access-deficit countries have designed electrification strategies, and the number of countries with officially approved national electrification plans almost doubled from 2010 to 2017. Countries such as Mozambique, Togo, and Burundi approved their national electrification plans in 2018 (post the reporting period

of this RISE edition). However, among those countries that have approved such plans, only a few have set up measures to share, update, and track progress *(Figure 3.14)*. Although most countries have established institutions to set electrification strategies and monitor their implementation, only half of the countries track progress and report an actual roll-out of the plans *(Figure 3.15)*.

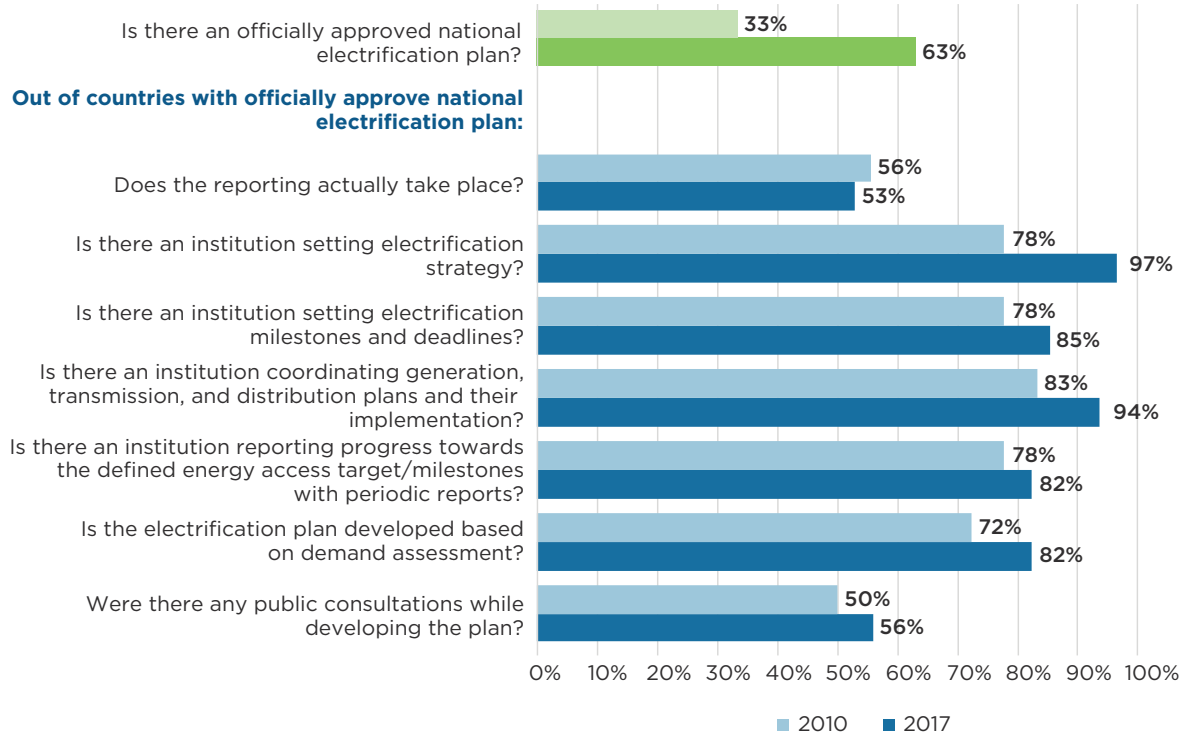
However, most electrification plans are not inclusive and comprehensive enough in scope. Having a national electrification plan alone is insufficient for developing a robust regulatory framework for electricity access. Best practices include incorporating all electrification solutions within the plans, as well as including a definition of quality of service, considering disparate pockets of the popula-

FIGURE 3.14 PROGRESS ON NATIONAL ELECTRIFICATION PLANS, BY SUB-INDICATOR, 2010, 2015 AND 2017



Source: World Bank RISE 2018

FIGURE 3.15 PROGRESS ON THE MAIN ATTRIBUTES OF NATIONAL ELECTRIFICATION PLANNING BEYOND APPROVAL: PERCENTAGE OF COUNTRIES, 2010 VS. 2017

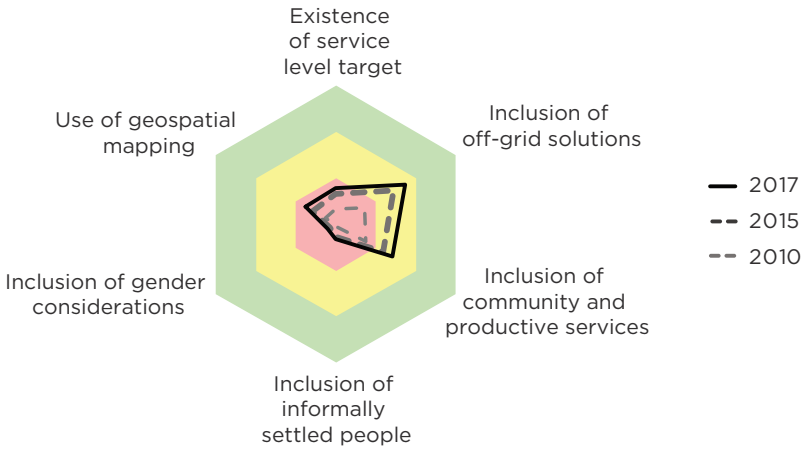


Source: World Bank RISE 2018

tion, and using technical tools like geospatial mapping. Only six countries have developed plans with a comprehensive scope that scores in the green zone in the last seven years: Angola, Cameroon, Ethiopia, Guinea, South Africa, and Tanzania.

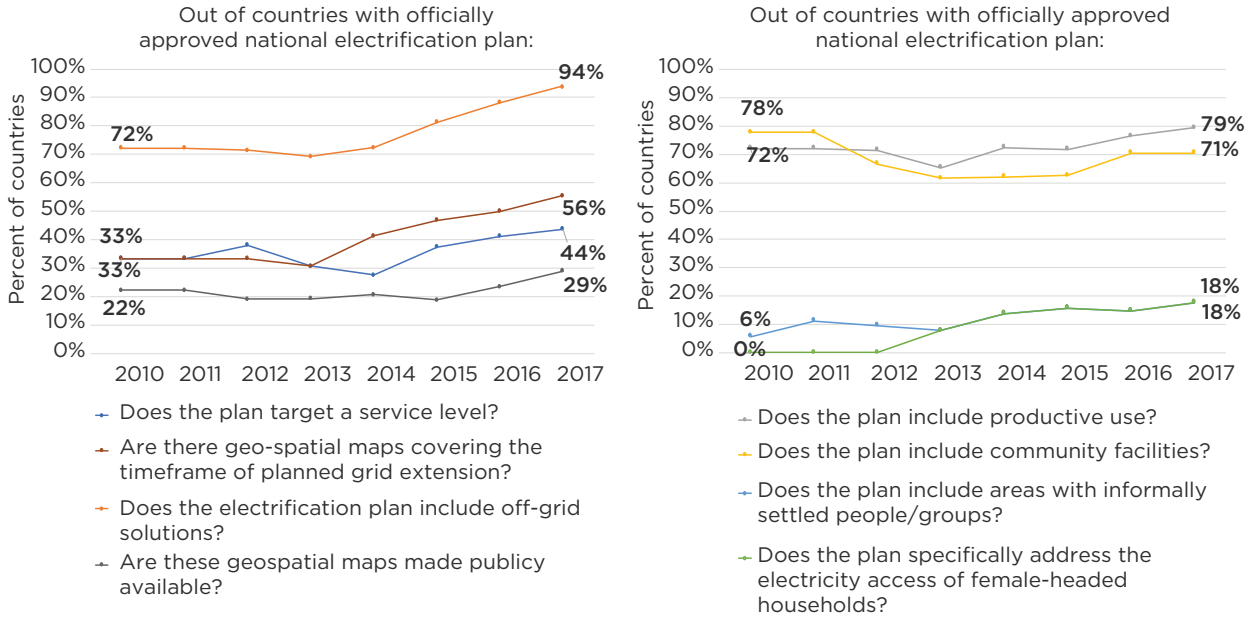
The development of off-grid solutions has been the most common attribute included in national electrification plans, followed by the inclusion of community and productive services *(Figure 3.16)*. Of the countries with approved national electrification plans, 94 percent have included off-grid solutions, and 79 percent have planned for the productive use of electricity. Meanwhile, only 18 percent of them (Ethiopia, Ghana, Myanmar, Senegal, Tanzania, and Vanuatu) have introduced energy provisions to foster electricity access among female-headed households *(Figure 3.17)*.

FIGURE 3.16 PROGRESS ON INCLUSIVE ELECTRIFICATION PLANS, BY SUB-INDICATOR, 2010 – 2017



Source: World Bank RISE 2018

FIGURE 3.17 IMPROVING SCOPE OF ELECTRIFICATION PLANS: PERCENTAGE OF COUNTRIES WITH QUALITATIVE AND INCLUSIVE PLAN ELEMENTS, BY SUB-INDICATOR, 2010 – 2017

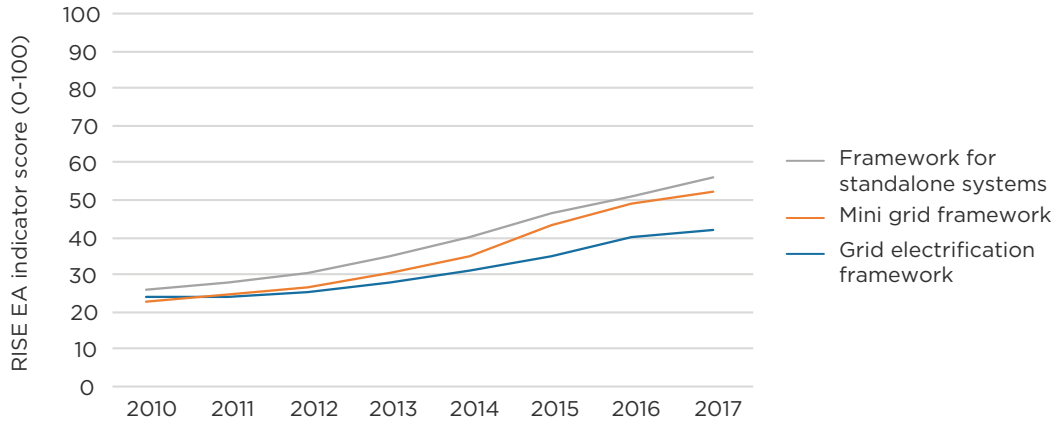


Source: World Bank RISE 2018

DEVELOPMENT OF OFF-GRID SOLUTIONS

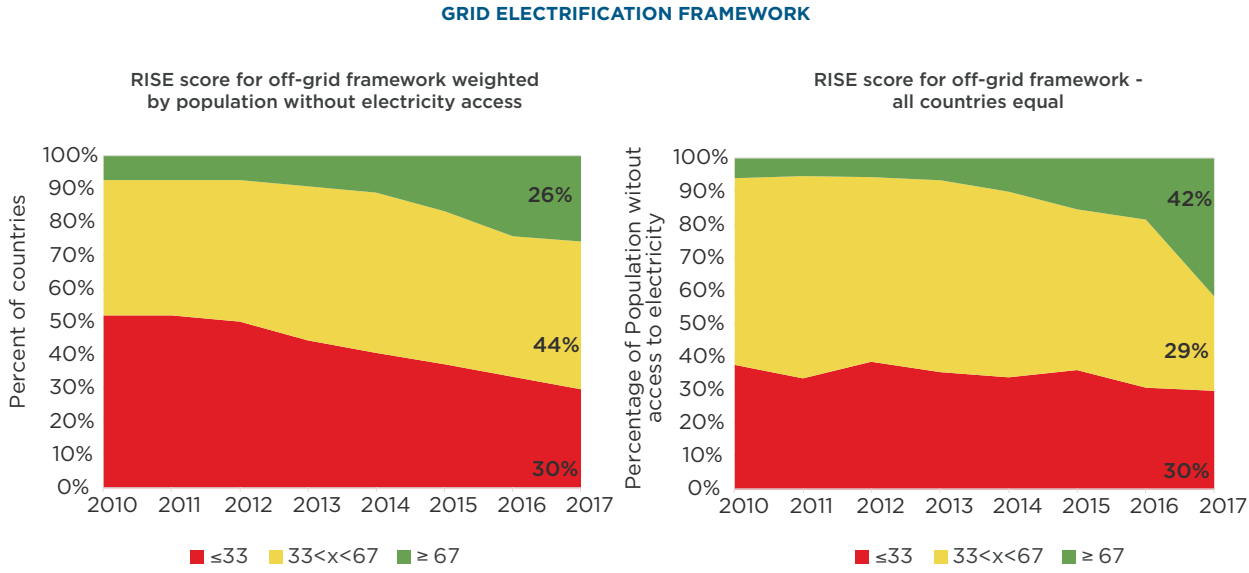
Policies and regulations to support the development of mini grids and standalone systems across regions have improved rapidly since 2010, surpassing (as of 2017) those designed to support grid electrification. In almost all the countries with the largest electricity access deficits, policy and regulatory frameworks for mini grids and standalone systems are usually more common than frameworks for grid electrification (*Figures 3.18* and *3.19*). Countries such as the DRC and Mozambique have actually neglected policies supporting grid expansion altogether.

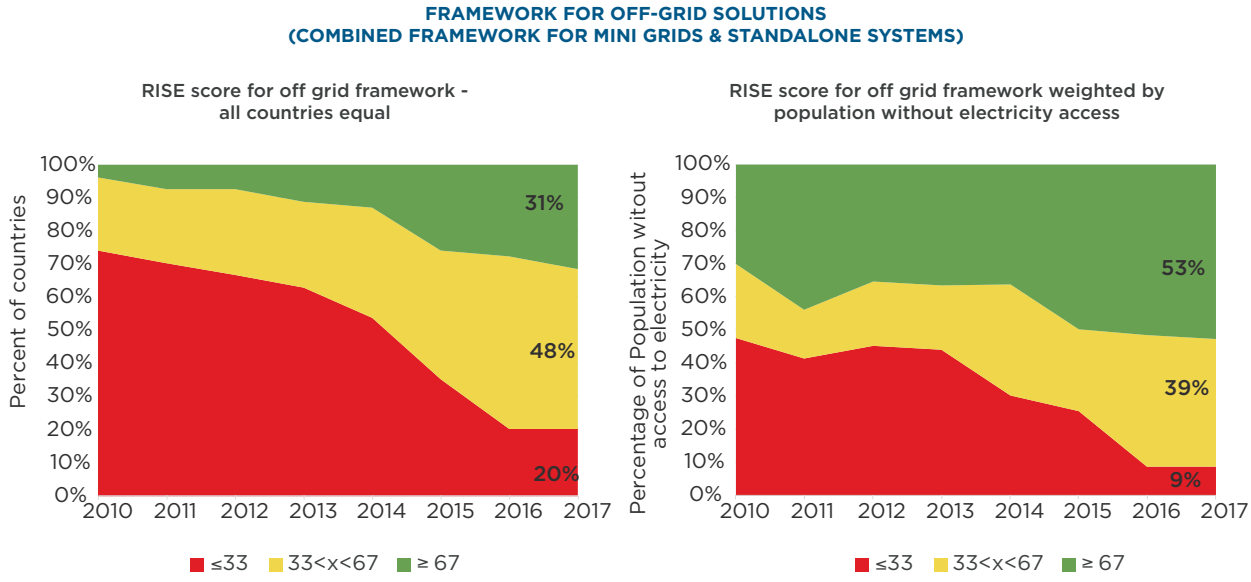
FIGURE 3.18 EVOLUTION OF RISE SCORES FOR FRAMEWORKS FOR GRID ELECTRIFICATION, MINI GRIDS AND STANDALONE SYSTEMS BETWEEN 2010 AND 2017



Source: World Bank RISE 2018

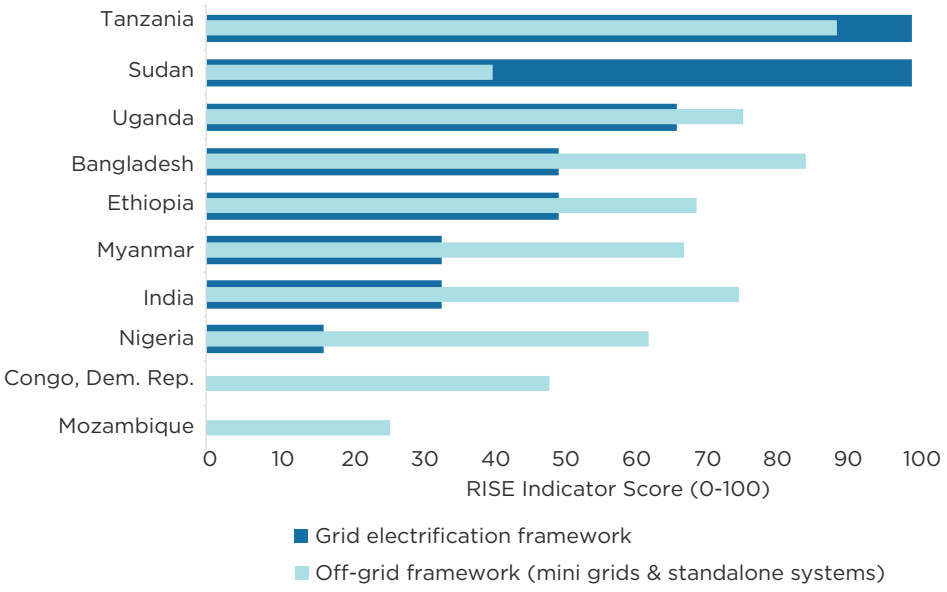
FIGURE 3.19 DISTRIBUTION OF RISE SCORES FOR GRID ELECTRIFICATION VS OFF GRID FRAMEWORKS BETWEEN 2010 AND 2017





Source: World Bank RISE 2018, World Bank Tracking SDG7: The Energy Progress Report 2018

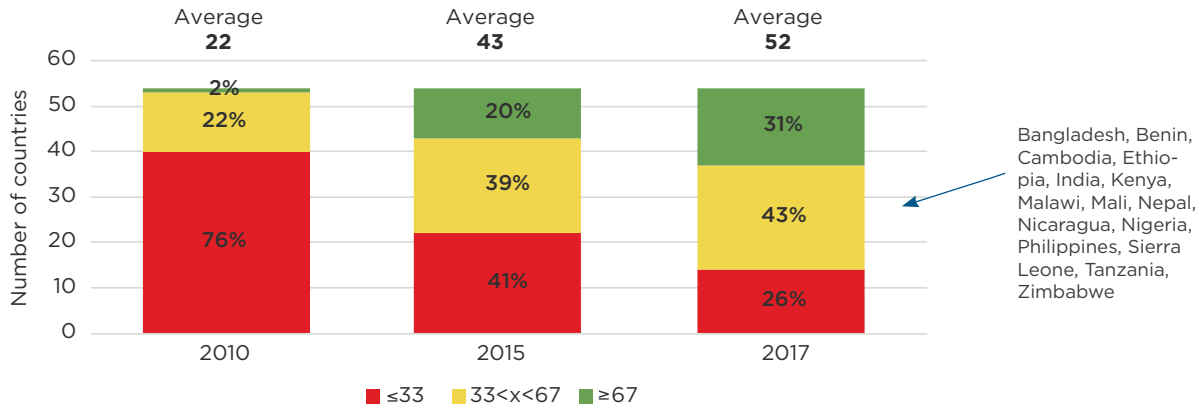
FIGURE 3.20 RISE SCORES FOR GRID AND OFF-GRID ELECTRIFICATION FRAMEWORKS FOR 10 COUNTRIES WITH THE LARGEST POPULATIONS WITHOUT ACCESS TO ELECTRICITY, 2017



Source: World Bank RISE 2018

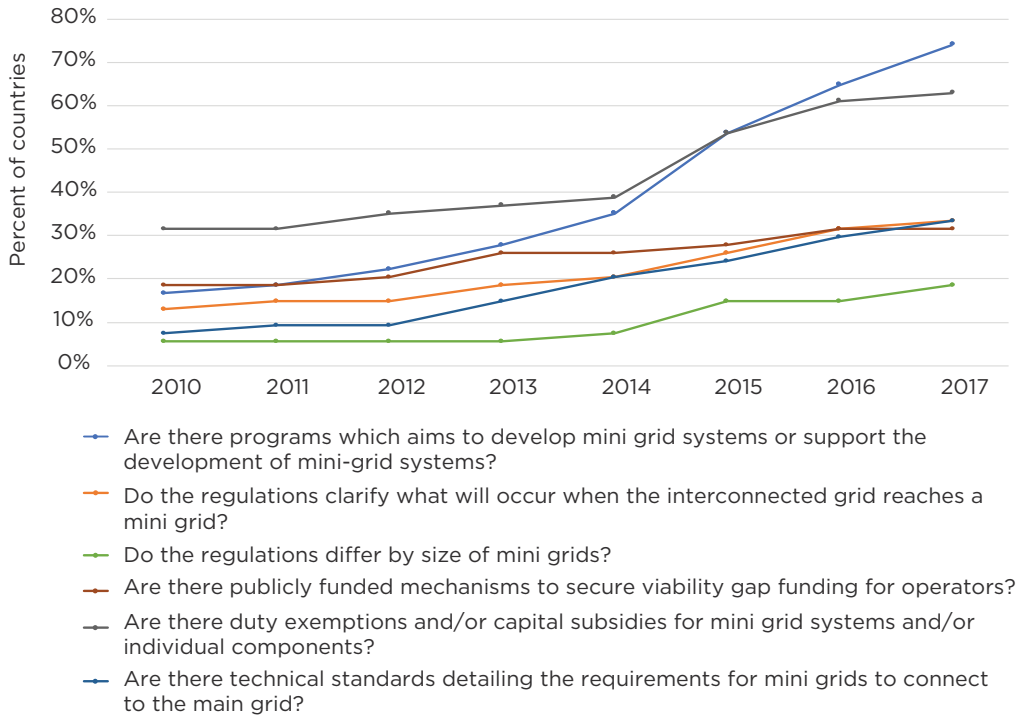
Since 2010, the number of countries with comprehensive mini grid framework policies and regulations has increased from 1 to 17. Starting from having only one country (Nicaragua) in 2010 with a robust mini grid framework, by 2017 there were 17 countries *(Figure 3.21)*. While almost 60 percent of the countries introduced programs dedicated to mini grid development between 2010 and 2017, a smaller number of countries developed more detailed provisions, such as having regulations that differ by the size of the mini grids (19 percent of countries) or clarifying what will occur when a main grid reaches a mini grid (33 percent) *(Figure 3.22)*.

FIGURE 3.21 DISTRIBUTION OF SCORES FOR MINI GRID FRAMEWORKS, 2010, 2015, AND 2017



Source: World Bank RISE 2018

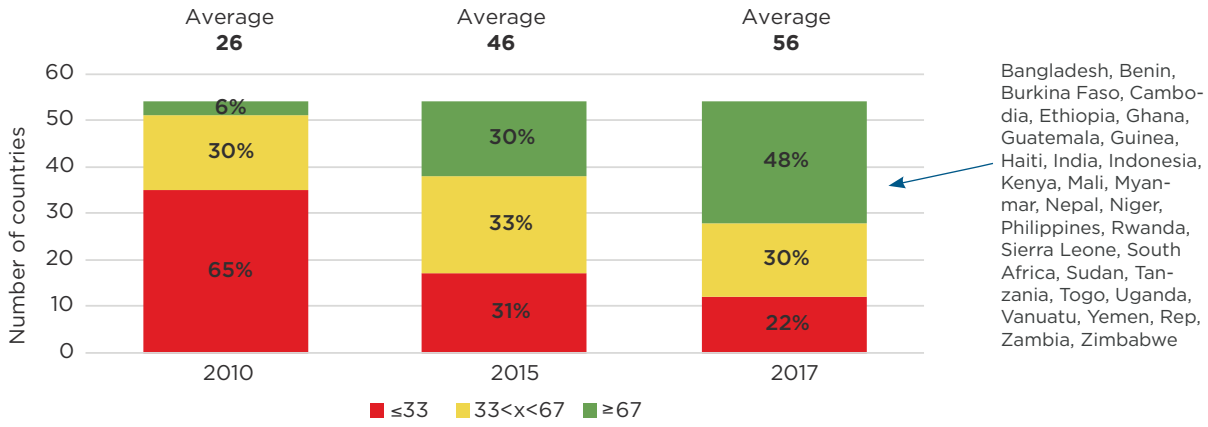
FIGURE 3.22 EVOLUTION OF THE MAIN ATTRIBUTES FOR MINI GRID FRAMEWORKS: PERCENTAGE OF COUNTRIES WITH ATTRIBUTES IN PLACE, 2010 – 2017



Source: World Bank RISE 2018

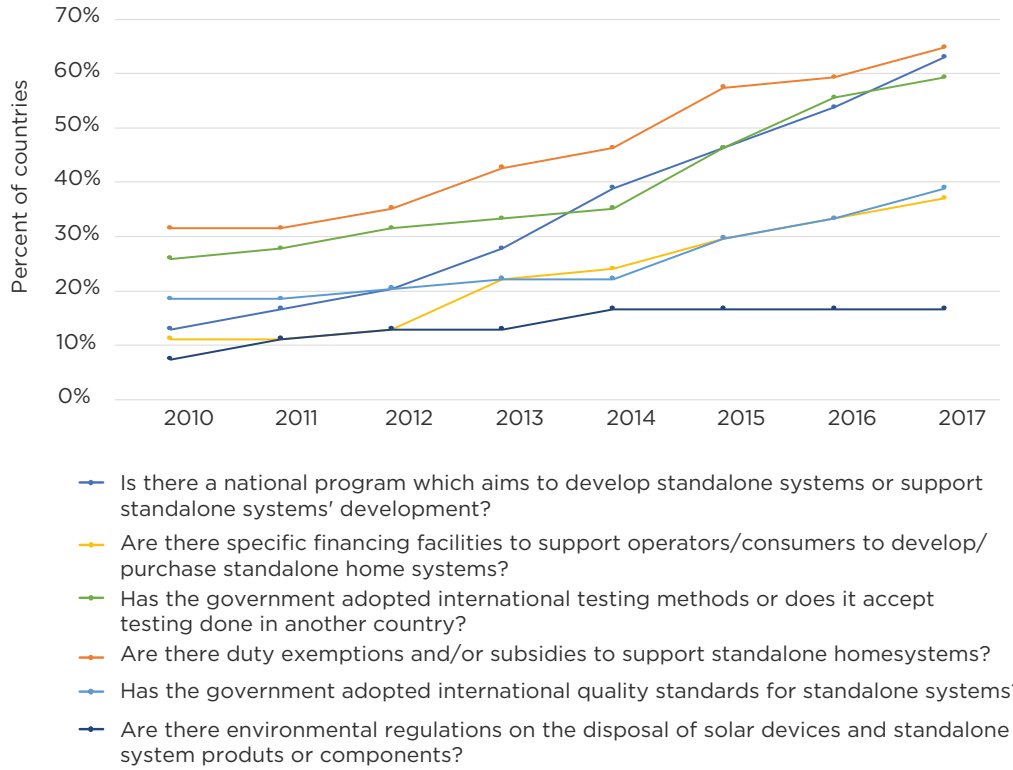
In addition, good policy practices to promote standalone systems have been established rapidly in more than half of the countries covered since 2010 *(Figure 3.23)*. However, countries concentrate on expanding their markets by establishing national promotion programs, but give much less consideration to standards, quality control, and waste management (*Figure 3.24)*.

FIGURE 3.23 DISTRIBUTION OF COUNTRY SCORES FOR STANDALONE SYSTEM FRAMEWORKS, 2010, 2015, AND 2017



Source: World Bank RISE 2018

FIGURE 3.24 EVOLUTION OF MAIN ATTRIBUTES FOR STANDALONE SYSTEM FRAMEWORKS: PERCENTAGE OF COUNTRIES WITH ATTRIBUTES IN PLACE, 2010 – 2017



Source: World Bank RISE 2018

BOX 3.1 MULTI-TIER FRAMEWORK: HOW HIGH-QUALITY ELECTRIFICATION DATA INFORM BETTER NATIONAL POLICIES TO ACHIEVE UNIVERSAL ACCESS

The Multi-Tier Framework (MTF) collects information on seven attributes of electricity service: capacity, service hours, reliability of service, quality of voltage, affordability, legality, and safety. These attributes are used to clasify household into five levels of service (MTF tiers), from tier 1 (minimum basic service) to tier 5 (highest level of service) .

Countries have already been incorporating data obtained from the MTF surveys to inform and update their targets and policies. Both Ethiopia and Rwanda are using the MTF terminology to set or adjust their energy access targets. Moreover, the Rural Electrification Fund in Rwanda – the entity responsible for rural electrification – is using information obtained from the MTF surveys to inform their investment needs. Other country examples include Cambodia and Myanmar, which are using information from the MTF surveys, such as households' willingness to pay, expenditures, consumption patterns, appliance use, and other variables, to quantify the need for private-sector investment in the sector.

The combined analysis of, the MTF survey and RISE results, points to a time lag between the establishment of the policy framework and the encouraging results that the policy achieves *(Table 3.1 shows an example for standalone systems)*. This time lag should be taken into consideration by countries when they set energy access targets and develop detailed electrification road maps.

TABLE 3.1 THE FRAMEWORK ON STANDALONE SYSTEMS FOR MTF-SURVEYED COUNTRIES

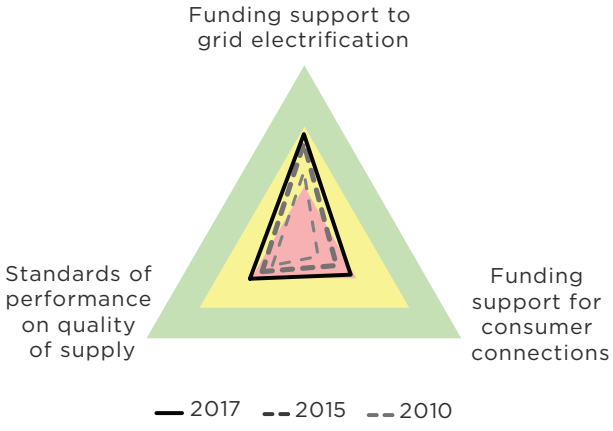
Countries	RISE score for standalone system framework (out of 100)	Percent of households which obtain electricity through off-grid technologies, 2017	Launch year of the national standalone system program
Cambodia	100	26.1%	2013
Ethiopia	89	23.9%	2010
Myanmar	78	48%	2014
Rwanda	67	5.1%	2016

Source: World Bank RISE 2018

GRID ELECTRIFICATION POLICY FRAMEWORK

Compared to other policies, the development of grid electrification frameworks in the period 2010-2017 has been moderate. Encouragingly, however, while in 2010 there were 15 out of 54 countries that had both dedicated funding for national electrification and capital subsidies for rural grid electrification, this number increased to 25 countries in 2017. The main improvement in the grid electrification framework is to set a dedicated funding line for electrification, followed by specifying standards of performance on reliability *(Figure 3.25)*. In addition, 31 percent of countries provide financing mechanisms for consumers to connect to the grid in 2017, compared to only

FIGURE 3.25 GLOBAL PROGRESS ON GRID ELECTRIFICATION FRAMEWORKS BY SUB-INDICATOR, 2010, 2015, AND 2017



Source: World Bank RISE 2018

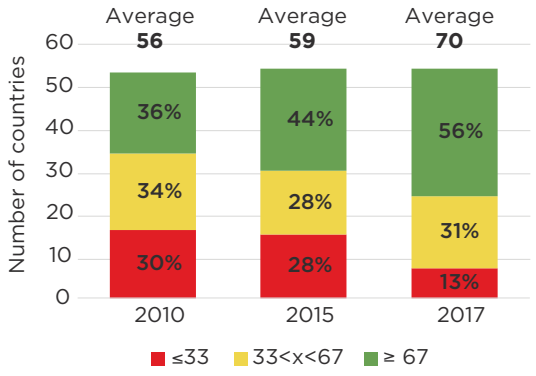
9 percent in 2010. However, eight countries still have not set up any form of supporting grid policies (Central African Republic, Chad, Democratic Republic of Congo, Mozambique, Sierra Leone, Somalia, South Sudan, and Yemen), many of these countries, however, are in conflict or post-conflict situations, which may have prevented them from actively pursuing grid infrastructure building.

AFFORDABILITY AND UTILITY CREDITWORTHINESS

The affordability of electricity to consumers improved significantly between 2015 and 2017, compared to relatively slow progress between 2010 and 2015. Consumer affordability is evaluated based on a combination of three relevant measures, comprising: the affordability of subsistence consumption (meaning that the cost of a minimal consumption of 30 kilowatt-hours per month falls below a threshold of 5 percent of household monthly GNI for the poorest 40% of the population); the affordability of connection fees (meaning that the up-front cost of connection falls below average monthly household GNI for the bottom 40% of the population); as well as the existence of a lifeline tariff. In 2017, half of the access-deficit countries provided affordable subsistence electricity supply and electricity connection to households for the bottom 40% of their population, with affordability having substantially improved in half of the access-deficit countries between 2010 and 2017 *(Figure 3.26)*.

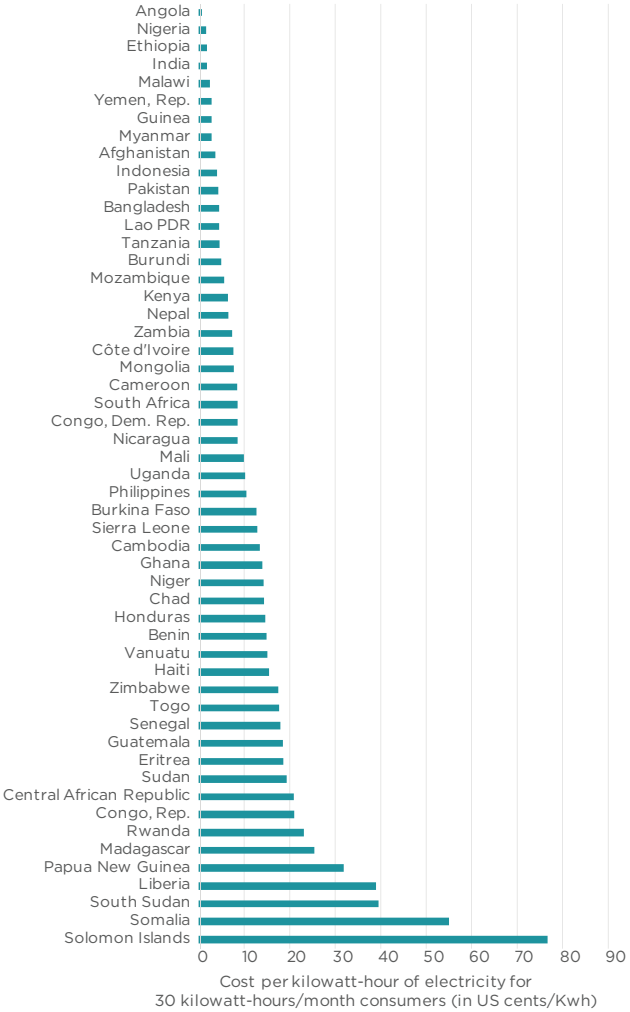
Nevertheless, in about half of the countries the poorest 40 percent of households could not afford subsistence consumption of electricity due to a combination of low incomes and high costs.[11] The monthly cost of subsistence consumption of electricity varied from under $0.01 per kilowatt-hour in Angola to over $0.75 per kilowatt-hour in Solomon Islands, with a median value of around $0.10 per kilowatt-hour *(Figure 3.27)*. A significant minority comprising 18 out of 54 countries face relatively high electricity tariffs in excess of $0.15 per kilowatt-hour, entailing monthly expendi-

FIGURE 3.26 DISTRIBUTION OF COUNTRY SCORES ON CONSUMER AFFORDABILITY OF ELECTRICITY, 2010, 2015, AND 2017



Source: World Bank RISE 2018

FIGURE 3.27 COST OF ELECTRICITY/KILOWATT-HOUR FOR 30 KILOWATT-HOURS/MONTH CONSUMERS, BY COUNTRY, 2017

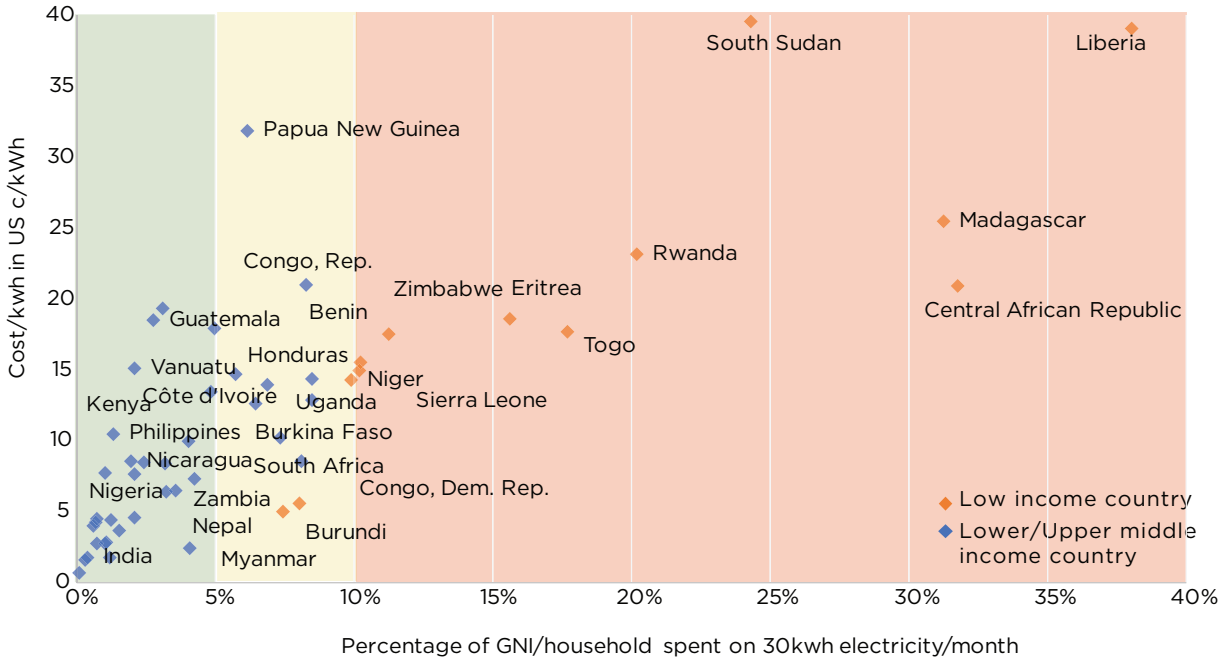


**Note:* This chart excludes Mauritania.
Source: World Bank RISE 2018

tures in excess of $4.50 for 30 kilowatt-hours of electricity. High costs are often associated with landlocked countries (Rwanda), island states (Madagascar, Papua New Guinea), or fragile countries with under-developed power systems (Liberia, Somalia). Affordability problems arise when low income countries also face high costs of electricity. All the countries in the red zone are low income countries facing power costs in excess of $0.15/kWh, meaning that subsistence consumption absorbs more than 10% of the budget of the poorest 40% *(Figure 3.28)*. Countries with lower cost electricity and/or middle income status typically do not face affordability challenges for subsistence consumption.

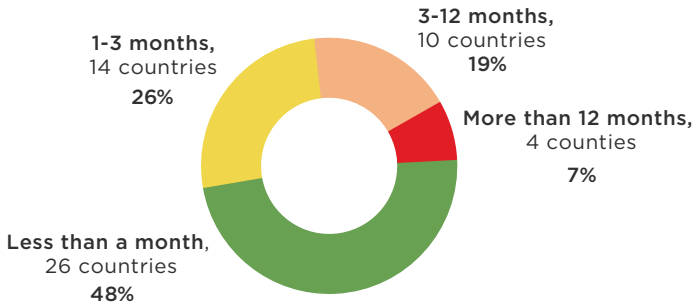
At the same time, as of 2017, in over half of the access-deficit countries, getting connection to electricity costs more than one month's income of a household in the bottom 40 percent. *(Figure 3.29)*. In over one-third of

FIGURE 3.28 ELECTRICITY TARIFFS AS A SHARE OF GNI PER HOUSEHOLD FOR THE BOTTOM 40 PERCENT OF HOUSEHOLDS, BY COUNTRY, 2017



Source: World Bank RISE 2018
Note: This chart excludes Mauritania and Solomon Islands.

FIGURE 3.29 DISTRIBUTION OF COUNTRIES BY ELECTRICITY CONNECTION FEE (IN MONTHS OF HOUSEHOLD GNI), 2017

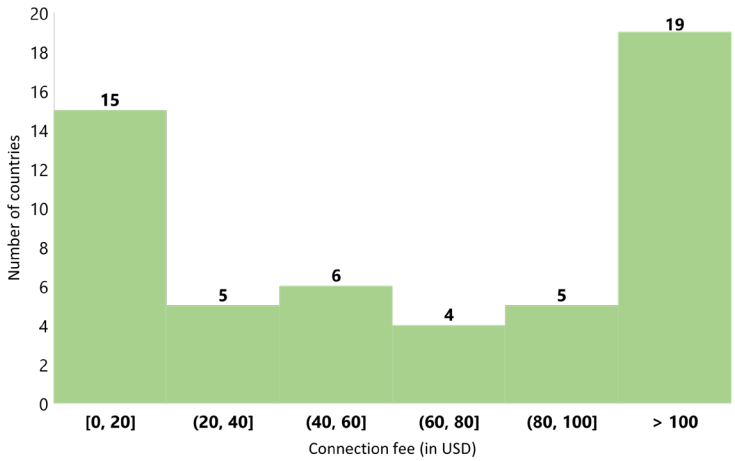


Source: World Bank RISE 2018

the countries, the connection fee was greater than US$100 *(Figure 3.30)*. To tackle the burden of electricity connection costs, some countries provide government subsidies to connection, offer consumers the option to pay for connection by installments, or simply allow utilities to recover connection costs through general tariffs.

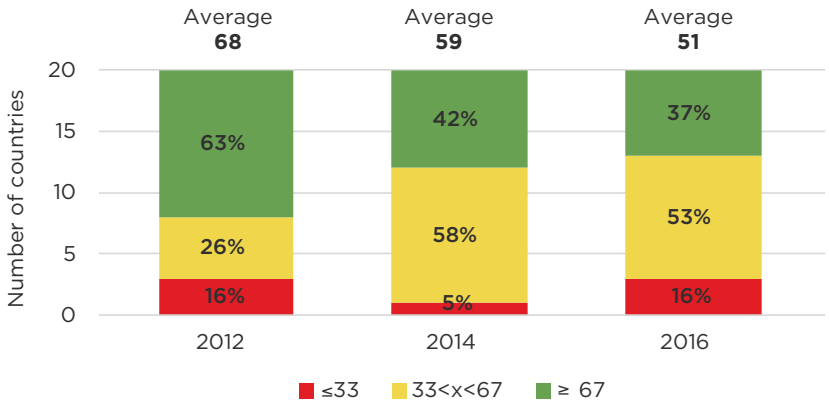
While consumer affordability of electricity has improved, utility creditworthiness has declined in access deficit countries. Between 2012 and 2016, the creditworthiness of utilities declined in almost two-third of the access-deficit countries *(Figure 3.31)*. Factors responsible for the decline in creditworthiness of utilities in access-deficit countries include

FIGURE 3.30 NUMBER OF COUNTRIES BY THE RANGE OF ELECTRICITY CONNECTION FEE CHARGED (USD), 2017



Source: World Bank RISE 2018

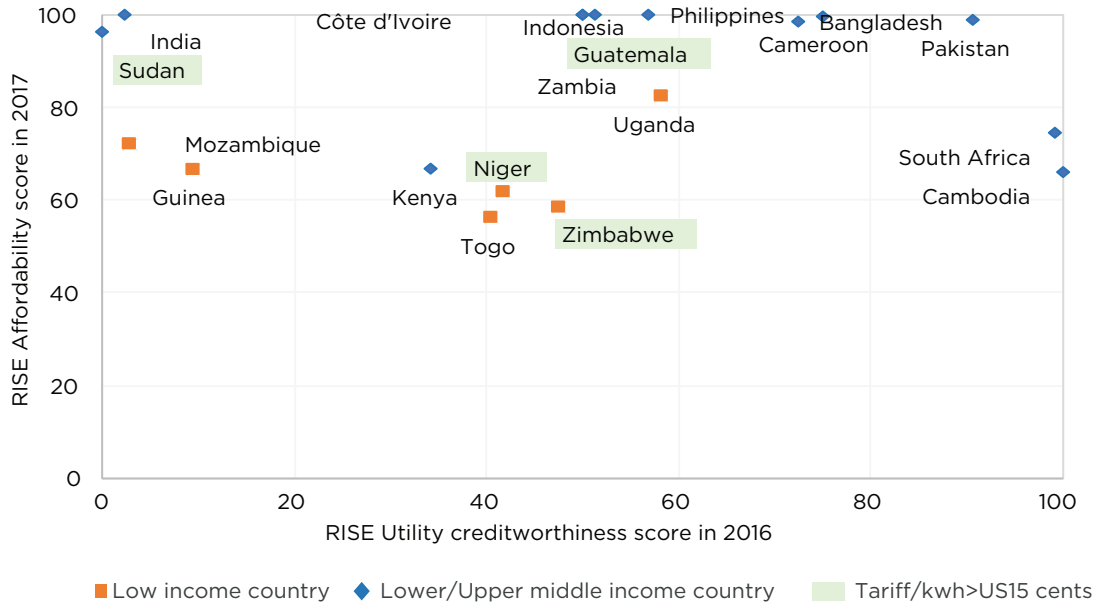
FIGURE 3.31 DISTRIBUTION OF COUNTRIES' UTILITY CREDITWORTHINESS, 2012, 2014, AND 2016



Note: The time series for utility creditworthiness is available *only for 20 out of 54 access deficit countries.*
Source: World Bank RISE 2018

the difficulty of setting cost-recovery tariffs or cross-subsidizing the use of revenue from other consumer bases and the financial pressures of providing connections to remote, low-volume consumption areas. *(Figure 3.32)*. While there are some countries that are managing to deliver simultaneously on affordability and creditworthiness objectives (e.g., Bangladesh, Pakistan, South Africa in the top right-hand quadrant of *Figure 3.32*), many others seem to have bought affordability at the expense of creditworthiness (e.g., India, Mozambique, Guinea in the top left-hand quadrant of *Figure 3.32*). Almost all of the countries that have sacrificed creditworthiness in the interests of affordability are either low income countries and/or countries facing relatively high prices for electricity in excess of $0.15 per kilowatt-hour. Interestingly, there are no countries that have chosen to sacrifice affordability in the interests of creditworthiness; as the bottom right-hand quadrant is blank.

FIGURE 3.32 COMPARISON BETWEEN RISE AFFORDABILITY SCORE IN 2017 AND RISE UTILITY CREDITWORTHINESS SCORE IN 2016



Note: The time series for utility creditworthiness is available only for 20 out of 54 access deficit countries
Source: World Bank, RISE 2018

ENDNOTES

[9] Electricity access policies were assessed in countries where less than 90% of the population or more than 5 million people lack access to electricity.

[10] Tracking SDG 7: The Energy Progress Report was authored by the International Energy Agency, International Renewable Agency, United Nations Statistics Division, World Bank, and the World Health Organization. It is available online at https://trackingsdg7.esmap.org/

[11] This calculation is used to determine household affordability of electricity. 30 kWh per month is considered the minimum electricity consumption for subsistence.

CHAPTER FOUR
CLEAN COOKING

4. CLEAN COOKING

KEYS MESSAGES:

- The RISE pilot on clean cooking solutions[a] includes 12 countries that constitute 55 percent of the unserved population.
- In all pilot countries, there has been considerable progress in clean cooking planning activity, but to achieve universal access to clean cooking by 2030, more aggressive policy and financing support are needed.
- Most countries are not yielding adequate results in the uptake of modern clean cooking solutions as described under SDG7 for two main reasons:
    i. There is a wide chasm between policy and outcome for clean cooking. This maybe owing to the fact that uptake of clean cooking is contingent upon and largely driven by consumer preferences. Therefore, having enabling policies, while important, is still insufficient to increase access;
    ii. The most progress in regulations is focused on improvements in biomass stoves, which are not tracked as a clean cooking option in SDG7, which tracks only primary clean cooking fuels (biogas, LPG, ethanol, electricity, natural gas). The RISE pilot has demonstrated that the standards and definitions of "clean" with respect to cooking solutions vary depending on country context.
- Standards, labeling, and testing for clean cooking fuels and technologies are critical. To ensure cleanliness of cooking solutions for end users, about half of the pilot countries include standards for emissions, efficiency and safety in their policy frameworks.

WHY THE FOUR INDICATORS?

The choice of the four indicators in this pilot covers four distinct facets of the clean cooking policy apparatus:

i. *Planning indicator:* includes government plans to scale-up access, household-level data on access, budgetary allocation, and institutions responsible for setting strategies, monitoring and tracking progress. These features form the foundation on which clean cooking industry can thrive.

ii. *Scope of planning indicator:* accounts for policies tailored to gender and vulnerable communities, awareness strategies to drive adoption of clean cooking solutions, and last-mile distribution measures. A broad scope of planning ensures that the planning process is inclusive and reaches all pockets of the population.

iii. *Standards and labels indicator:* includes efficiency, emissions, and safety of clean cooking solutions and checks whether they are devised through testing and approved by accredited labs. The objective of this indicator is to ensure that solutions that are considered clean are tracked and enforced to be clean.

iv. *Financial incentives indicator:* tracks financing mechanisms and incentives for both consumers and suppliers of clean cooking solutions. This indicator captures active policies to increase consumer affordability and market competitiveness for clean cooking fuels and/or technologies.

a Throughout the entirety of this report, any reference to "clean cooking solutions" applies to the combination of stove technologies and fuels that produce lower particulate and carbon emissions levels than the current baseline in a given country. Details about emission levels and efficiency are defined by the ISO Tiers of Performance for the indoor emissions indicator, within the Global Alliance's Monitoring and Evaluation framework.
http://cleancookstoves.org/technology-and-fuels/standards/iwa-tiers-of-performance.html

OVERVIEW OF CLEAN COOKING POLICY FRAMEWORK

According to the Tracking SDG 7 report, access to clean cooking solutions[12] , including stoves and fuels, is not currently on track to reach universal access by 2030. A little less than three billion people, or over 40 percent of the world's population, cook with solid fuels, including wood, charcoal, coal, animal dung, and crop waste, using open fires and traditional stoves. These are the primary energy sources for cooking throughout Asia, Sub-Saharan Africa, Latin America, the Caribbean, and Eastern Europe. Although many countries have experienced a rapid scale-up of electrification among households in the US$500–US$1,000 per capita income bracket, access to clean cooking solutions takes much longer to develop, and shows increased uptake at household income levels of US$12,000 per capita[13].

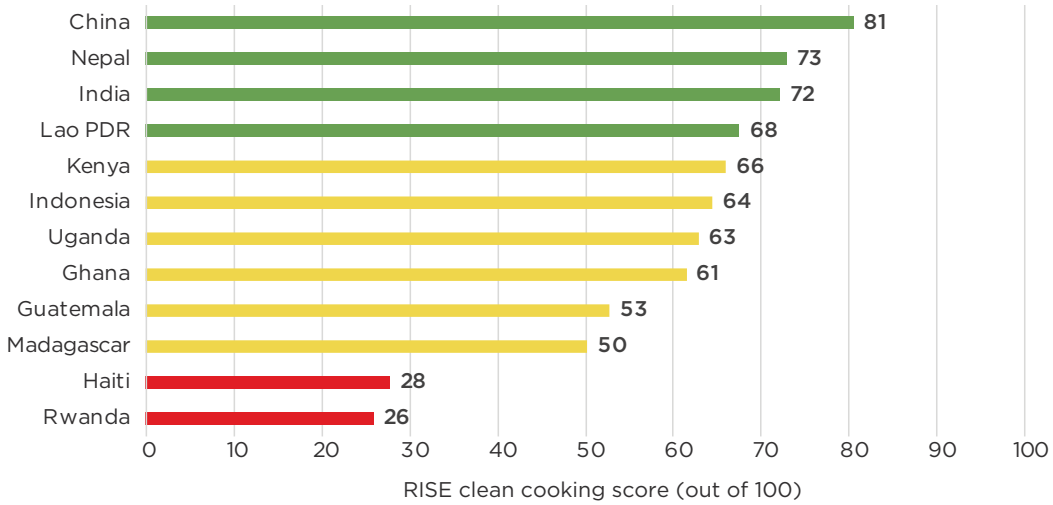
There are significant climate, public health, economic, and social impacts of cooking and heating with solid fuels and traditional stoves. Cooking with traditional stoves and solid fuels is a leading cause of indoor air pollution and one of the most significant contributors to climate change in developing countries as it emits global warming gases and particulates, including carbon dioxide, methane, and black carbon. It is one of the largest contributors to disease and early mortality, contributing to more deaths than malaria, TB, and HIV combined. In South Asia, for example, more than half of black carbon comes from the use of inefficient cookstoves.[14] If adopted at scale, clean cooking solutions could effectively reduce black carbon emissions. Research shows that decreasing short-lived climate pollutants in conjunction with controlling long-lived greenhouse gases could help limit global temperature rise to below 2ºC, a Paris Agreement goal for avoiding severe impacts of climate change.

The RISE pilot on clean cooking solutions includes 12 countries: China, Ghana, Guatemala, Haiti, India, Indonesia, Kenya, Lao PDR, Madagascar, Nepal, Rwanda, and Uganda. The countries were selected because they make up over 55 percent of the global population without access to clean cooking solutions and include countries with the highest electricity access deficits as well as those with the lowest clean-cooking access rates. They were also selected to account for different regions globally, varying degrees of dependence on hydrocarbons within households, and various trade barriers that might impede the import of clean cooking solutions. In 10 out of the 12 pilot countries, the governments have at least moderately evolved policy frameworks that can help scale up access to clean cooking (*Figure 4.1*).

Policy frameworks for clean cooking solutions have been receiving more traction since 2010, but it has not yielded substantial outcomes in terms of clean cooking uptake. While policymakers in the pilot countries have devoted increasing attention to issues surrounding policies for clean cooking solutions since 2010, only one third of the countries score in the green zone (*Figure 4.2)*. Kenya has made the most progress relative to where it was in 2010, followed by Nepal and Lao PDR. Although progress is seen in all the countries, they are at different points in the process of developing a robust clean cooking policy apparatus.

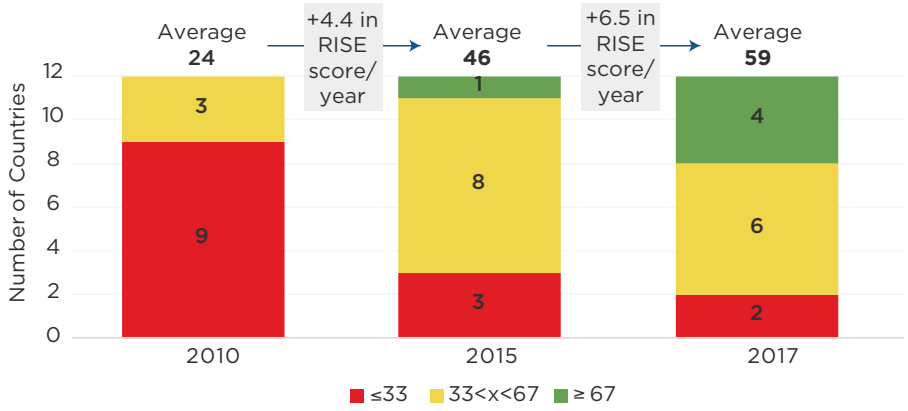
Among the 12 pilot countries, clean cooking planning has seen substantial increase since 2010, and this has been complemented by a robust scope of planning. Since 2010, in the RISE pilot countries, there has been a flurry of clean cooking planning activity that is also inclusive, but the countries have been slow in instituting standards and incentives *(Figure 4.3).*

FIGURE 4.1 CLEAN COOKING POLICY FRAMEWORK SCORES FOR THE 12 PILOT COUNTRIES, 2017



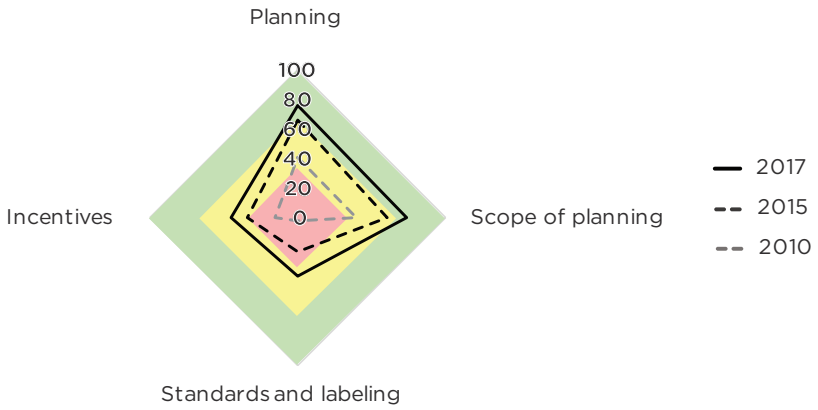
Source: World Bank RISE 2018

FIGURE 4.2 DISTRIBUTION OF COUNTRY SCORES FOR POLICY FRAMEWORKS ON ACCESS TO CLEAN COOKING, 2010–2017



Source: World Bank RISE 2018

FIGURE 4.3 PROGRESS IN CLEAN COOKING POLICY FRAMEWORK, BY PILLAR, 2010 – 2017

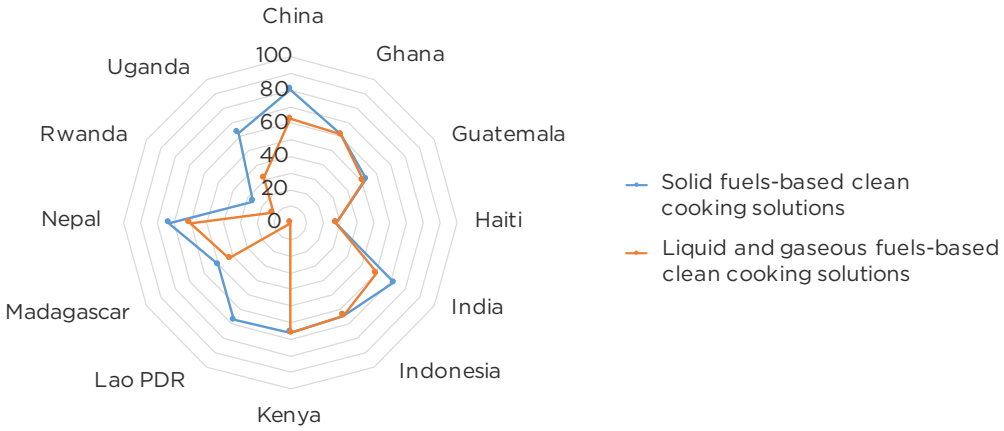


Source: World Bank RISE 2018

THE TUSSLE BETWEEN TRANSITIONAL COOKING SOLUTIONS AND THE CLEANEST OPTIONS

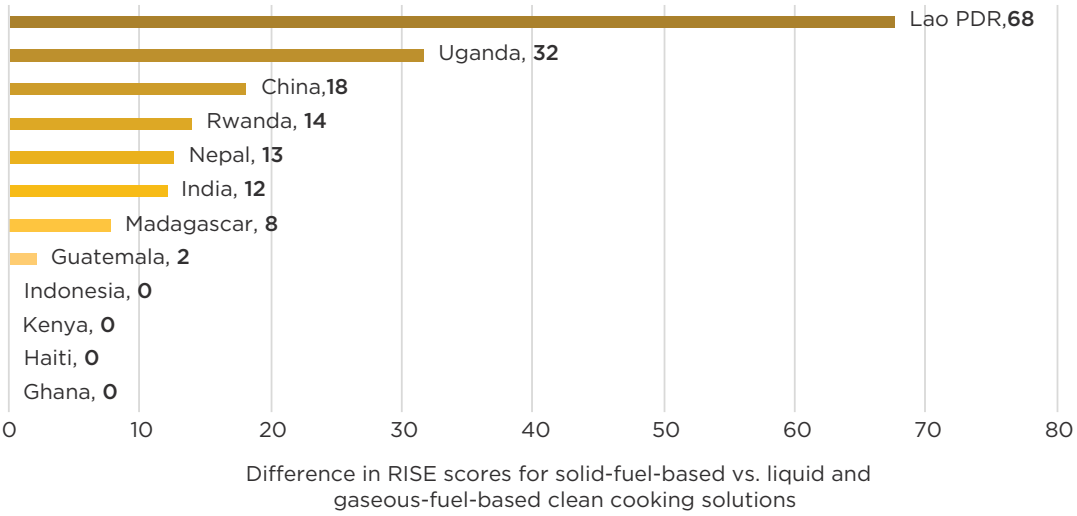
As of 2017, the policy emphasis seems to be more on solid fuels-based solutions rather than electric-powered or liquid/gaseous fuel-based solutions. Among fuel-based cooking options, most pilot countries rely on solid-fuel-based cooking solutions, which are often the transitional solutions, rather than liquid or gaseous-fuel-based solutions *(Figure 4.4)*. This maybe because solid fuels tend to be generally more affordable than liquid and gaseous fuels[15]. Moreover, there is not an evident policy focus on electric-powered options for cooking solutions. Ghana, Guatemala, Haiti, Indonesia, and Kenya all place emphasis on both solid and liquid/gaseous fuels in their clean cooking policies *(Figure 4.5)*.

FIGURE 4.4 SOLID-FUEL-BASED VS. LIQUID AND GASEOUS-FUEL-BASED CLEAN COOKING SOLUTIONS POLICY, BY COUNTRY, 2017



Source: World Bank RISE 2018

FIGURE 4.5 COUNTRIES RANKED IN ORDER OF DIFFERENCE IN RISE SCORES FOR SOLID-FUEL-BASED VS. LIQUID AND GASEOUS-FUEL-BASED CLEAN COOKING SOLUTIONS



Source: World Bank RISE 2018

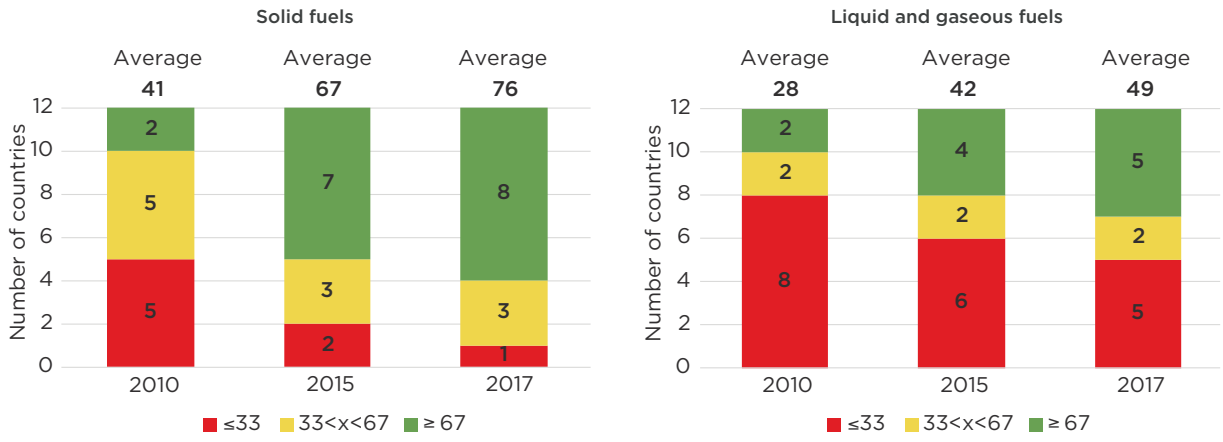
While countries work to shift toward cleaner cooking solutions, it is important to have policies that set emissions requirements based on the country context and encourage consumer adoption of cooking solutions that are as clean as possible at the point of use. In 10 of the 12 pilot countries, the governments have policies focused on scaling-up access to at least one type of cooking solution. In 9 out of 10 of the countries the policies are complemented by government efforts to collect data on access to fuel and cooking solutions within households. National data tracking on cooking solutions is publicly available in seven out of the nine countries where it is collected; but only one-third of the pilot countries have data that is gender-disaggregated. RISE also considers the scope of planning, which is captured through indicators like the inclusiveness of the planning process, the use of awareness strategies, and the assessment of last-mile distribution strategies.

MULTIDIMENSIONALITY OF CLEAN COOKING POLICY MAKING

Clean cooking policymaking and implementation are cross-sectoral issues with multiple institutional players and inter-ministerial coordination. Data collection for the RISE pilot countries has shown that the responsibility for clean cooking policies and implementation is distributed among many government agencies, which compounds the multidimensionality of clean cooking policy making. Institutional support for clean cooking could be diverse, with specific agencies in charge of distinct aspects of clean cooking, while involving inter-ministerial coordination (*Figure 4.7*). For example, in Lao PDR, the Ministries of Energy and Mines; Health, Education and Sports; and Natural Resources and Environment all work in collaboration on the clean cooking agenda, and there is also a cross-sectoral National Cookstoves Taskforce. This taskforce, established by the Ministry of Energy and Mines and its Institute of Renewable Energy Promotion serves as the coordinating agency.

More than four-fifths of the pilot countries have a government agency dedicated to clean cooking strategy or standards. However, only just over half of the pilot countries have a government agency that is dedicated to tracking access to clean cooking. The Ministry of Energy or equivalent agency takes on many roles in the pilot countries and is sometimes the sole agency responsible for all three roles: strategy setting, monitoring, and enforcement.

FIGURE 4.6 DISTRIBUTION OF COUNTRY SCORES FOR PLANNING CLEAN COOKING SOLUTIONS, 2010–2017



Source: World Bank RISE 2018

FIGURE 4.7 INSTITUTIONS RESPONSIBLE FOR THE VARIOUS FACETS OF CLEAN COOKING, BY COUNTRY, 2017

Countries	Agency responsible for setting / monitoring and enforcement /tracking adoption of clean cooking strategy					
	Ministry of Energy	Ministry of Health	Ministry of Agriculture/ Forestry	Bureau of Standards	Non governmental organization	Other
China		☑	☑ ☑ ☑	☑	☑	☑ ☑
Ghana	☑ ☑					☑
Guatemala	☑			☑		☑
Haiti	☑		☑			
India	☑ ☑ ☑			☑	☑	☑
Indonesia	☑ ☑ ☑			☑	☑	☑
Kenya	☑ ☑			☑	☑	
Lao PDR	☑ ☑	☑ ☑	☑ ☑	☑	☑ ☑	☑ ☑
Madagascar	☑	☑	☑			☑ ☑
Nepal	☑				☑	☑ ☑ ☑
Rwanda				☑	☑	☑
Uganda	☑ ☑ ☑			☑		

☑ Agency responsible for setting clean cooking strategy

☑ Agency responsible for monitoring and enforcement of clean cooking strategy

☑ Agency responsible for tracking adoption of clean cooking strategy

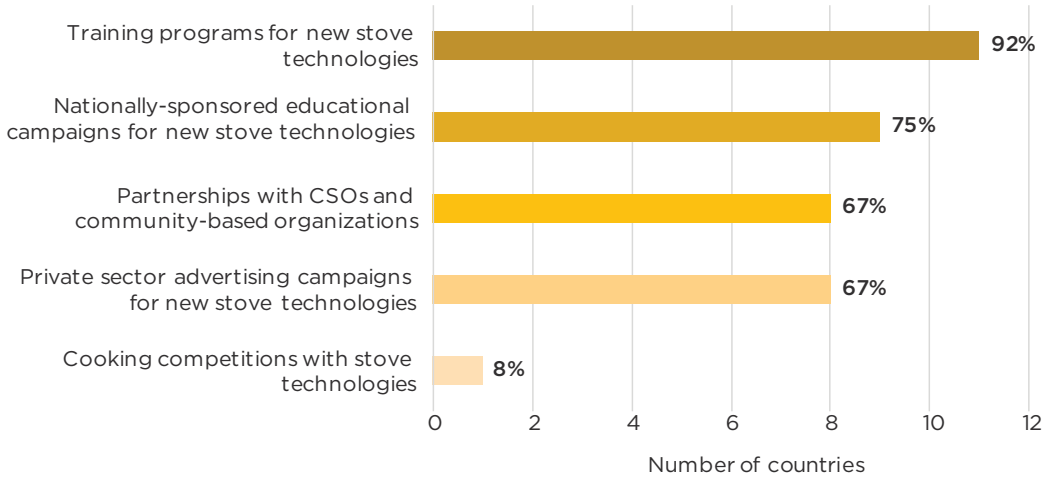
Note: Ministry of Energy includes mines, minerals, and renewables; Other = Other ministries and government institutions.
Source: World Bank, RISE 2018

POLICIES IN CLEAN COOKING FOR CONSUMER OUTREACH

All of the RISE pilot countries are conducting some form of campaigns to create awareness about clean and efficient cooking practices to protect health, but awareness is an area that remains vastly underprioritized and underfunded *(Figure 4.8)*. Uptake of clean cooking is dependent on household preferences that are in turn determined by cultural norms, household dynamics, and the availability and affordability of fuels. Therefore, awareness campaigns, often led by community-based organizations, are a key component of the clean cooking policy framework. A multitude of strategies to create awareness about clean cooking fuels and technologies are in use in the pilot countries, including training programs, cooking competitions, educational campaigns, private sector advertising campaigns, and partnerships with civil society organizations and community-based organizations. Most of the countries adopt two or more of these strategies to drive the adoption of clean cooking technologies.

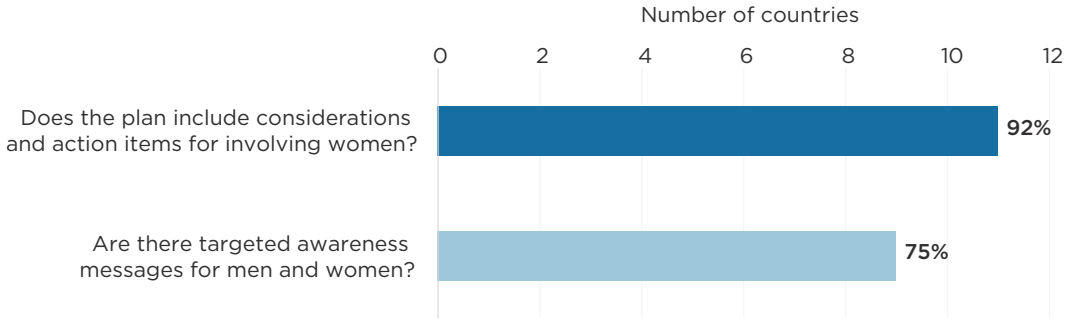
For example, in Ghana, the Ministry of Education, in partnership with an NGO, also launched a project to educate students on the benefits

FIGURE 4.8 SHARE OF PILOT COUNTRIES WITH CLEAN COOKING AWARENESS STRATEGIES, BY STRATEGY, 2017



Source: World Bank RISE 2018

FIGURE 4.9 SHARE OF PILOT COUNTRIES WITH GENDER-BASED CLEAN COOKING AND AWARENESS CAMPAIGNS, 2017



Source: World Bank RISE 2018

of clean fuels and technologies. Education and sensitization are key pillars of success and are outlined in Ghana's national plan. In conjunction with policies, these large-scale awareness campaigns, similar to national health campaigns such as those around HIV, have been effective in creating an enabling environment for clean cooking interventions to thrive.

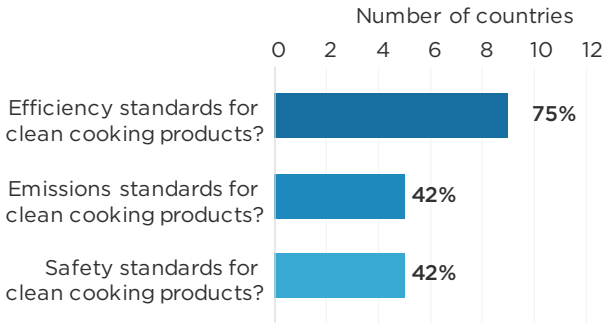
In 11 out of the 12 RISE pilot countries, gender is taken into consideration in the policy framework for cooking, but the intent does not necessarily translate to a gendered approach. Lack of access to clean fuels leads to health and economic burdens that disproportionately impact women and girls. In many countries, gender roles dictate that women and girls act as the primary procurers and users of cooking fuel, resulting in a gender disparity in exposure to household air pollution and the drudgery of manual fuel collection and cooking practices. In this context, it is important that policies and programs to promote clean cooking be well-informed by gender considerations. A gendered approach is also needed in the dissemination of clean cooking solutions. There is a clear gap between the policy intent and the actual dissemination with respect to gender-focused awareness strategies.

POLICY GAPS IN CLEAN COOKING

About half of the RISE pilot countries have efficiency, emissions, and safety standards for cooking solutions, as well as verification system through field testing, but not all are stringent enough to achieve improvement in cooking outcomes. The International Standards Organization (ISO) recommends testing cooking technologies and fuels in use in the field, in addition to lab testing to verify performance standards. Good practice for setting standards should consider compatibility with the rating framework developed by the ISO, which includes thermal efficiency, emissions, and safety and durability as performance indicators. Standards and verification should also be supported and enforced by the government at the national and local levels. Three quarters of the pilot countries have efficiency standards, while half of the pilot countries have emissions and safety standards *(Figure 4.10)*. Also, half of the pilot countries have a standards verification program, but not all of these countries include field testing *(Figure 4.11)*.

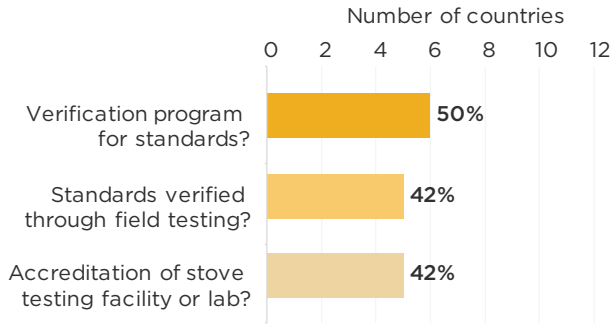
Financial incentive mechanisms for consumers and suppliers of clean cooking solutions are not widespread among the pilot countries, but some good practices have emerged *(Figure 4.12).* Overall, there is slightly great-

FIGURE 4.10 NUMBER OF PILOT COUNTRIES WITH EFFICIENCY, EMISSIONS AND SAFETY STANDARDS FOR CLEAN COOKING, 2017



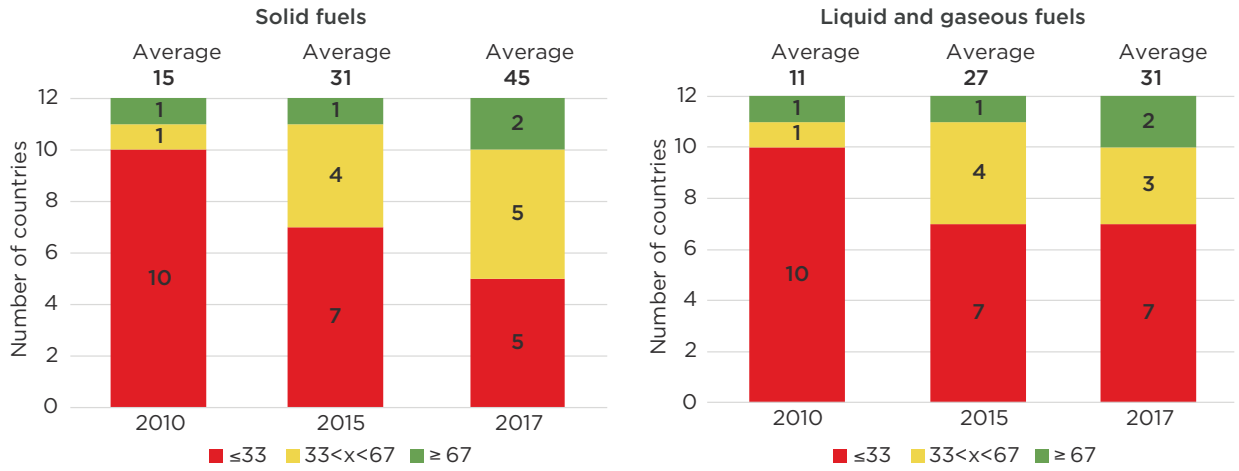
Source: World Bank RISE 2018

FIGURE 4.11 NUMBER OF PILOT COUNTRIES WITH VERIFICATION AND FIELD TESTING OF CLEAN COOKING STANDARDS, 2017



Source: World Bank RISE 2018

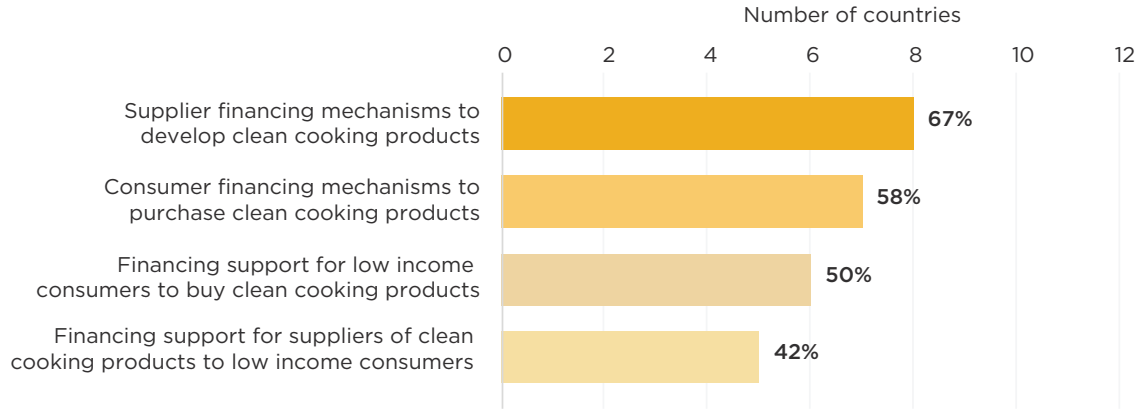
FIGURE 4.12 DISTRIBUTION OF COUNTRY SCORES ON INCENTIVES FOR CLEAN COOKING SOLUTIONS, 2010–2017



Source: World Bank RISE 2018

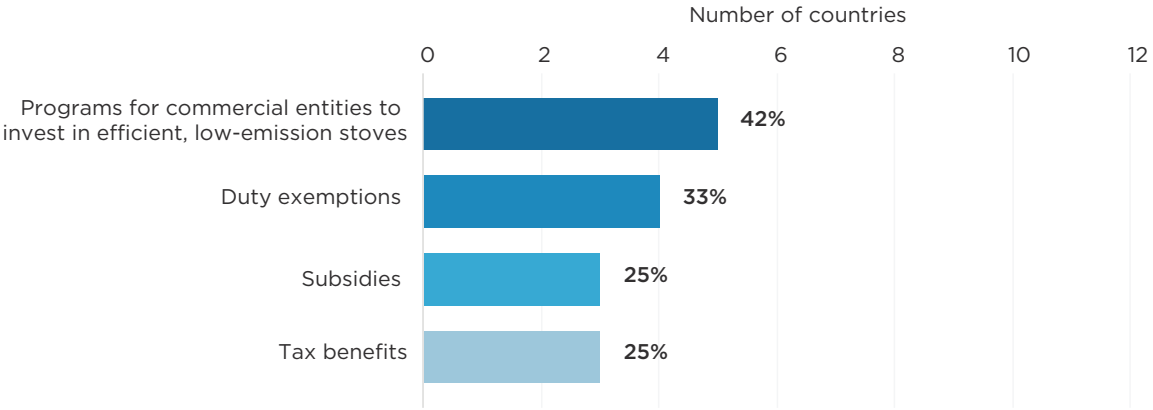
er support for consumers of clean cooking solutions than for suppliers *(Figure 4.13).* For example, the Government of India, in collaboration with oil companies, has launched Give It Up, an ambitious LPG subsidy reform program, to facilitate the expansion of LPG access to low-income rural households, which includes a public campaign directed at urban consumers to voluntarily surrender their subsidy.[16] In Nepal, targeted consumer subsidies for biogas and improved traditional biomass stoves exist in the form of bank transfers for qualified brands, but supply- side subsidies will be necessary to adequately meet the demand for modern solutions. Suppliers of clean cooking solutions are typically provided with financial incentives like tax benefits and duty exemptions in 3 of the 12 pilot countries (*Figure 4.14)*. For example, in Kenya, manufacturers and retailers benefit from well-established carbon financing mechanisms within the country, and multiple Savings and Credit Cooperatives (SACCOS) have been established by Kenyan community leaders to help finance improved cookstoves. In Rwanda, microfinance programs, subsidies for biogas stoves and suppliers, and duty exemptions for stoves above tier 2 are in place, but investment needs to be scaled up.

FIGURE 4.13 FINANCING MECHANISMS FOR CONSUMERS AND SUPPLIERS OF CLEAN COOKING SOLUTIONS, 20177



Source: World Bank RISE 2018

FIGURE 4.14 FINANCIAL INCENTIVES FOR SUPPLIERS OF CLEAN COOKING SOLUTIONS, 2017



Source: World Bank RISE 2018

ENDNOTES

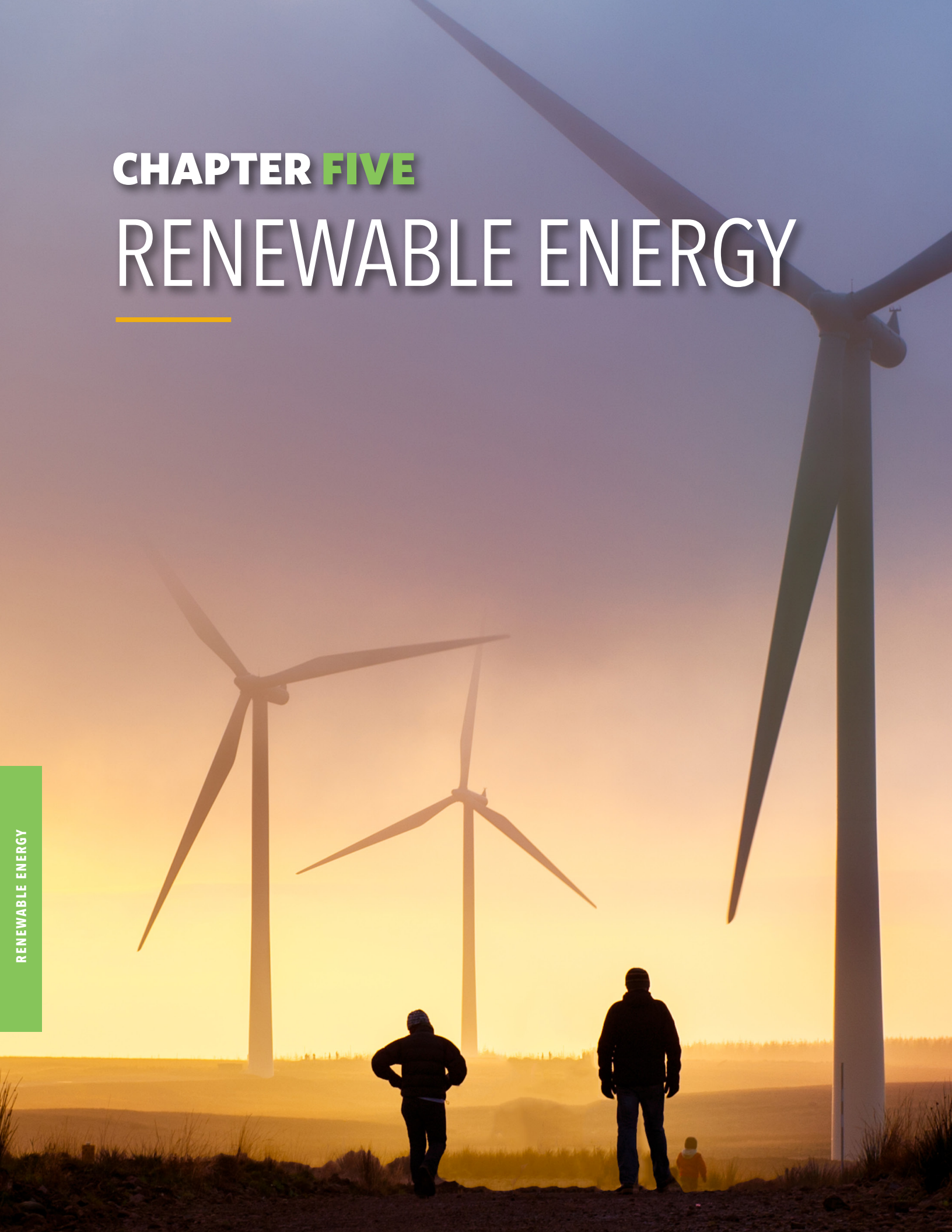
[12] Throughout the entirety of this report, any reference to "clean cooking solutions" will apply to the combination of stove technologies and fuels that have higher efficiency and/or produce lower particulate and carbon emissions levels than the current baseline in a given country. This definition differs from the category of access to clean cooking described in the Tracking SDG7 Report because it also considers improvements in efficiency for cooking solutions that use solid fuels. Details about emission levels and efficiency are defined by the ISO Tiers of Performance for the indoor emissions indicator, within the Global Alliance's Monitoring and Evaluation framework.
http://cleancookstoves.org/technology-and-fuels/standards/iwa-tiers-of-performance.html

[13] Clean Cooking - SE4ALL
https://www.seforall.org/sites/default/files/Clean_Cooking.pdf

[14] According to the Global Alliance for Clean Cookstoves, black carbon, which results from incomplete combustion, is estimated to contribute to the equivalent of 25 to 50 percent of carbon dioxide warming globally. Residential solid fuel burning accounts for up to 25 percent of global black carbon emissions, over 80 percent of which is from households in developing countries.
http://cleancookstoves.org/impact-areas/environment/

[15] Liquid and gaseous fuels included in this distinction are biogas, ethanol, LPG, and natural gas including piped natural gas (PNG).

[16] The campaign has seen over 10.5 million people volunteering to give up their subsidy. The government also has made the subsidy unavailable to households where the primary consumer or his/her spouse has taxable income of more than INR 10,000,000 in the previous financial year. As an add-on to the Give-it-Up campaign, the launch of the Pradhan Mantri Ujjwala Yojna (PMUY) subsidy scheme in May 2016 has provided 57 million cooking gas connections to rural poor women across the country. The PMUY subsidizes the connection cost to provide LPG to below-poverty-line households against the name of the female head of household. Eligible households are identified from the Socio-Economic Caste Census (SECC) 2011. Under this scheme, households get a cylinder and regulator for free, although the price of the stove is recovered (upfront/installments) from the first few refills and the households receive the cylinders at a subsidized cost after the recovery of the stove cost. This scheme has helped increase the share of rural distributorships from since its launch in 2009–10 from 14 percent to over 40 percent (in 2016–17).



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.

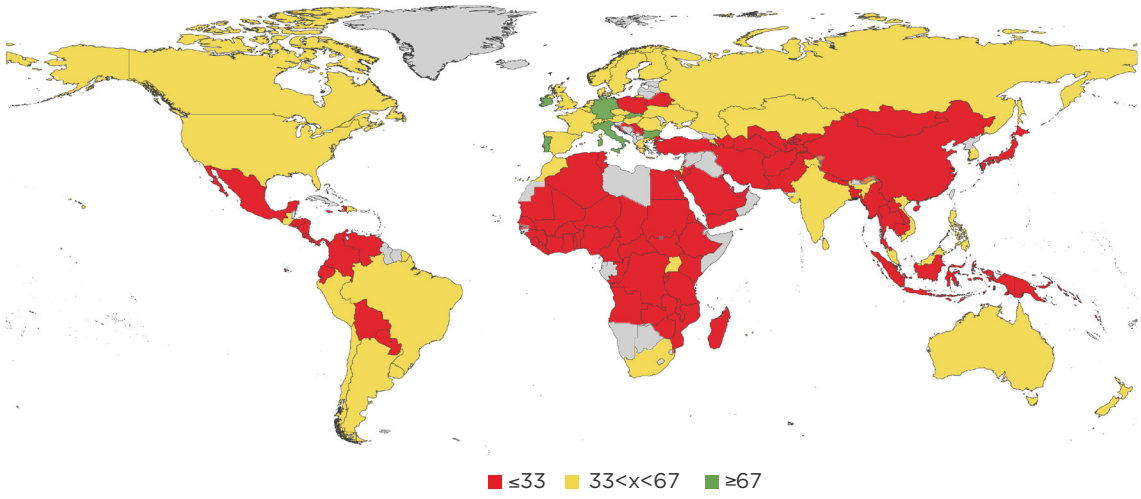
The path towards developing an enabling policy framework for renewable energy can be different for every country. It is possible to find RISE countries with low scores on indicators 2 and 3, but higher scores for indicators 4 and 5 and high levels of renewable investment. Equally, there are countries 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).*

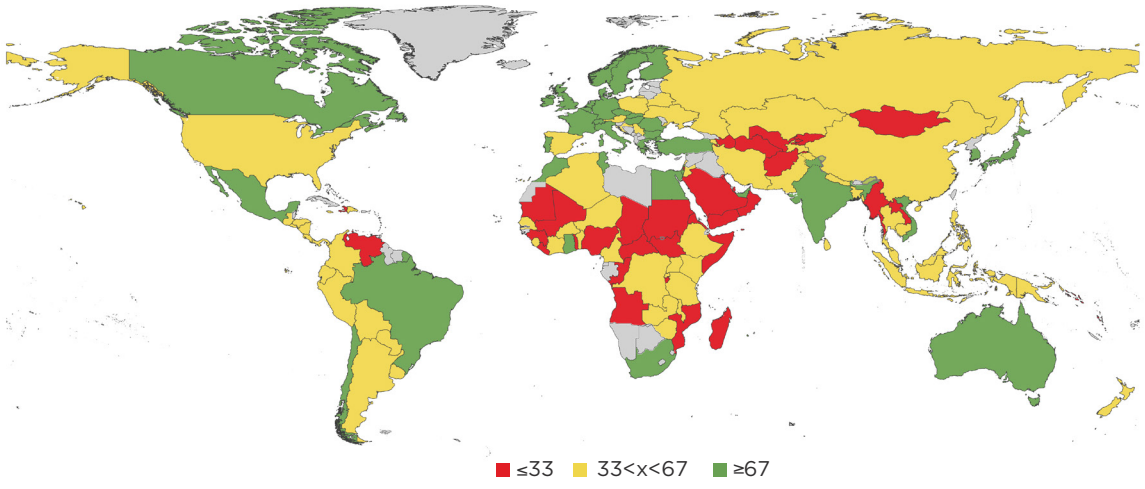
Despite significant global improvements in developing renewable energy legal frameworks, the adoption of regulatory measures has been slow. Legislation to support renew-

FIGURE 5.1 MAP: RISE RENEWABLE ENERGY SCORES IN 2010



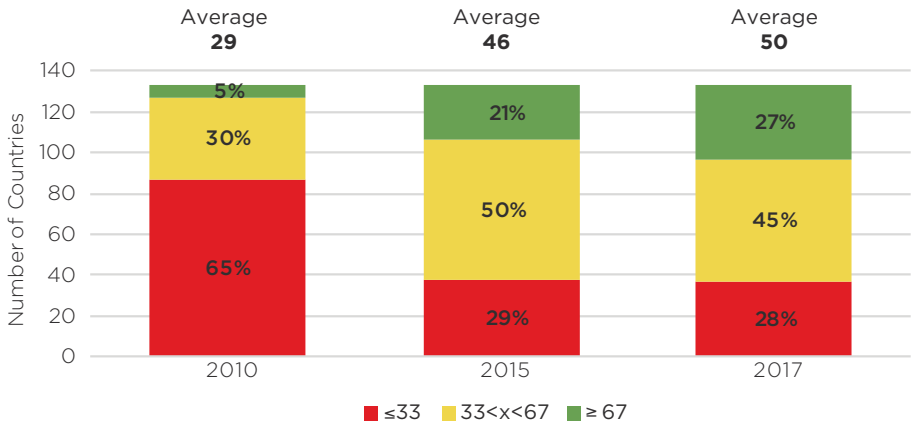
Source: World Bank RISE 2018

FIGURE 5.2 MAP: RISE RENEWABLE ENERGY SCORES IN 2017



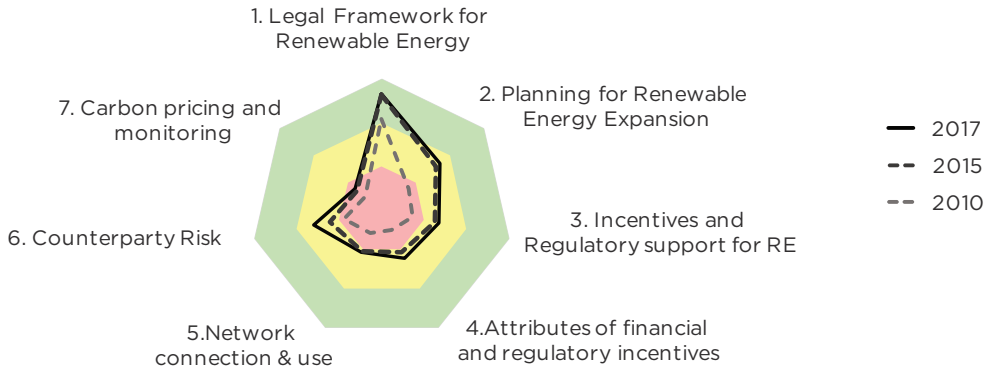
Source: World Bank RISE 2018

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

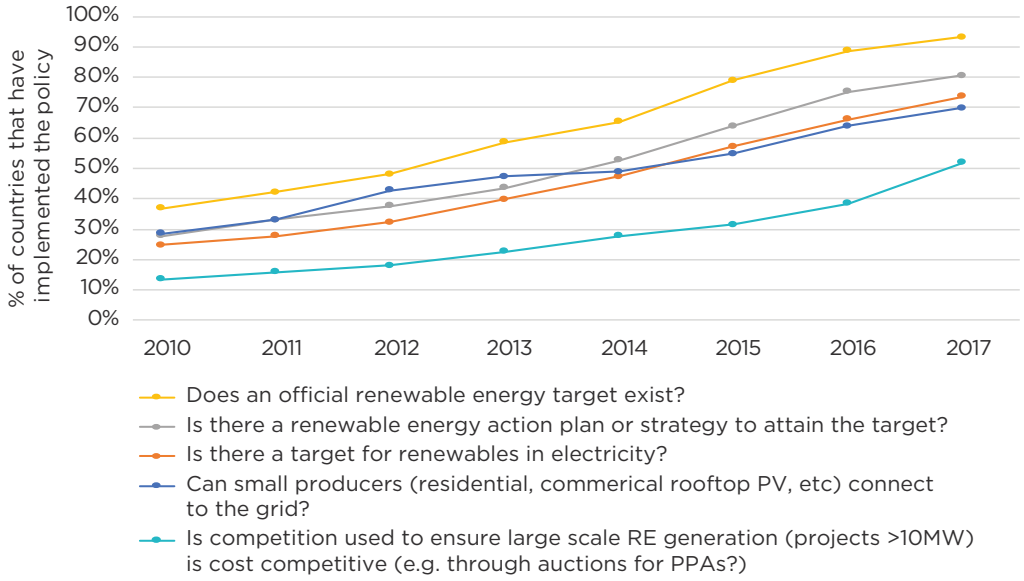
The fastest-growing policy measure since 2010 was the creation of renewable energy targets, which was partly driven by European Union regulations and the build-up to the Paris Climate Accords. However, many of

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*).

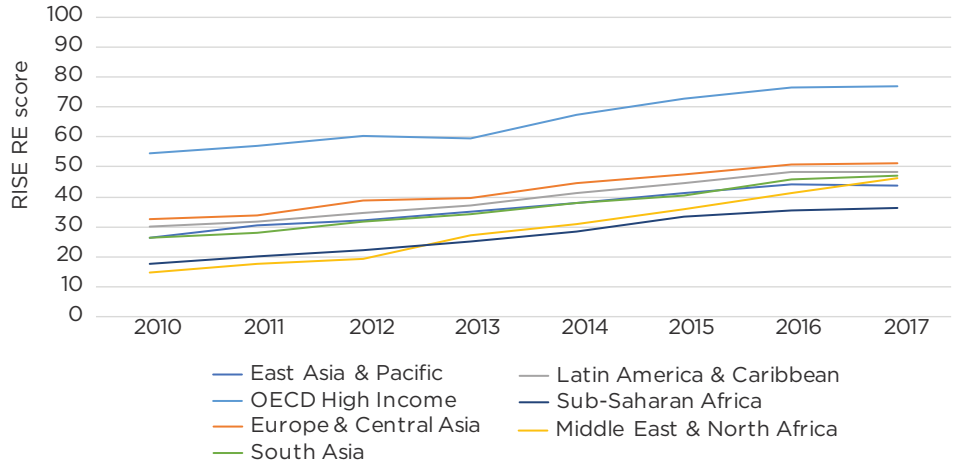
While high-income countries are leading the overall effort in renewable energy frameworks, attaining a certain income level is

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



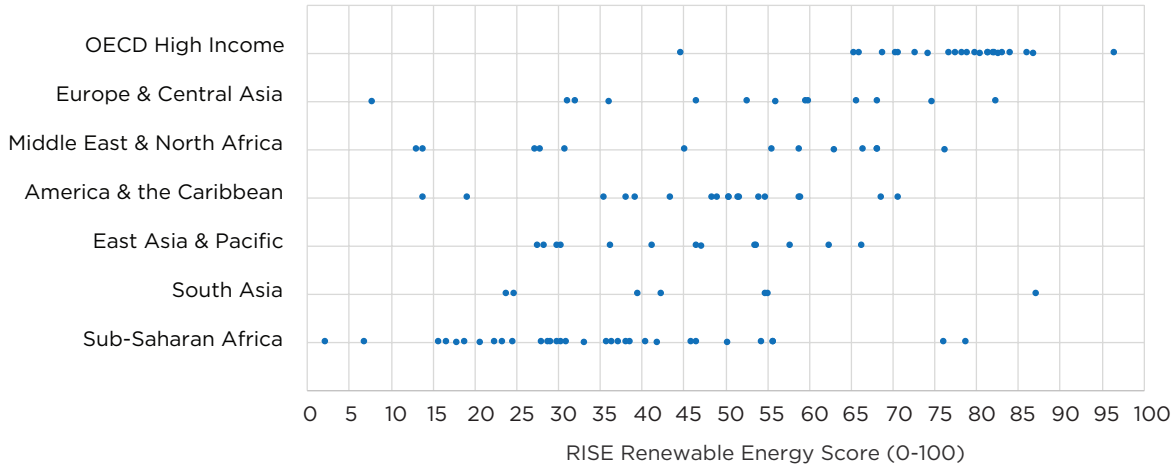
Source: World Bank RISE 2018

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



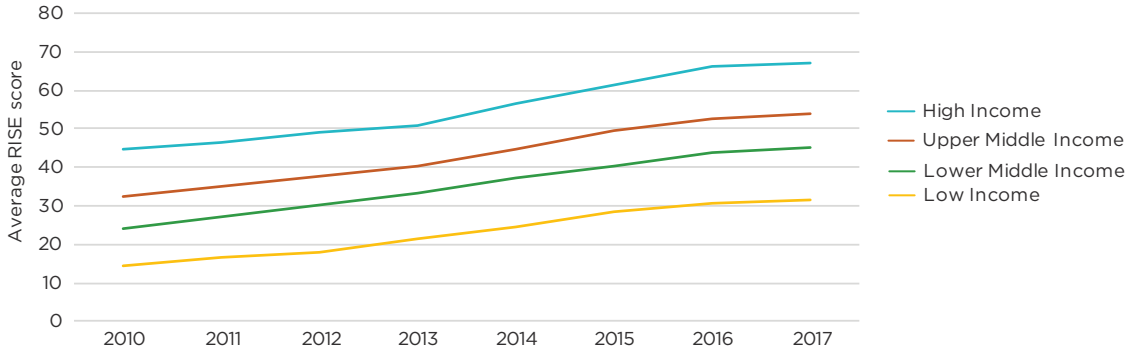
Source: World Bank RISE 2018

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

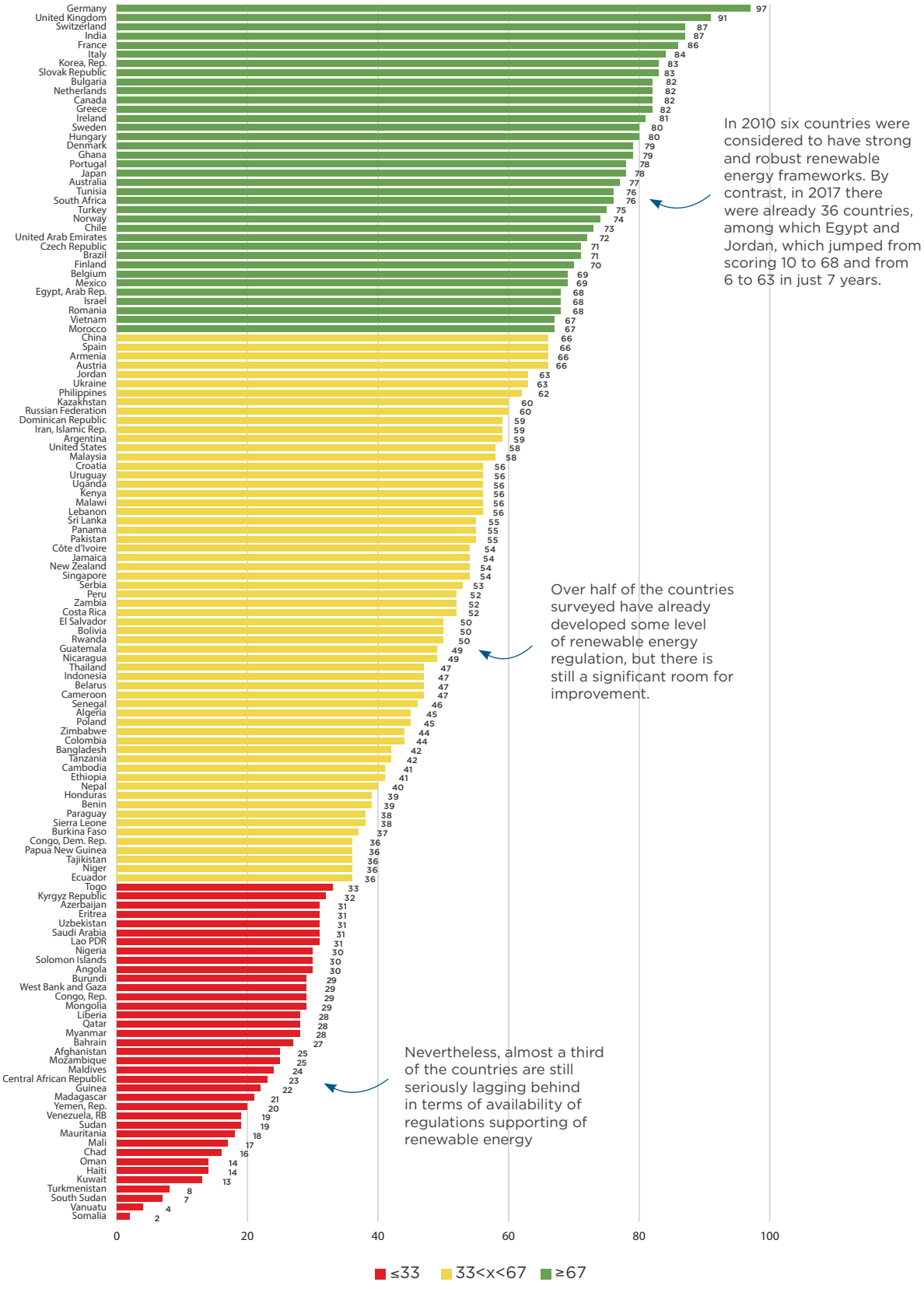


Source: World Bank RISE 2018

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

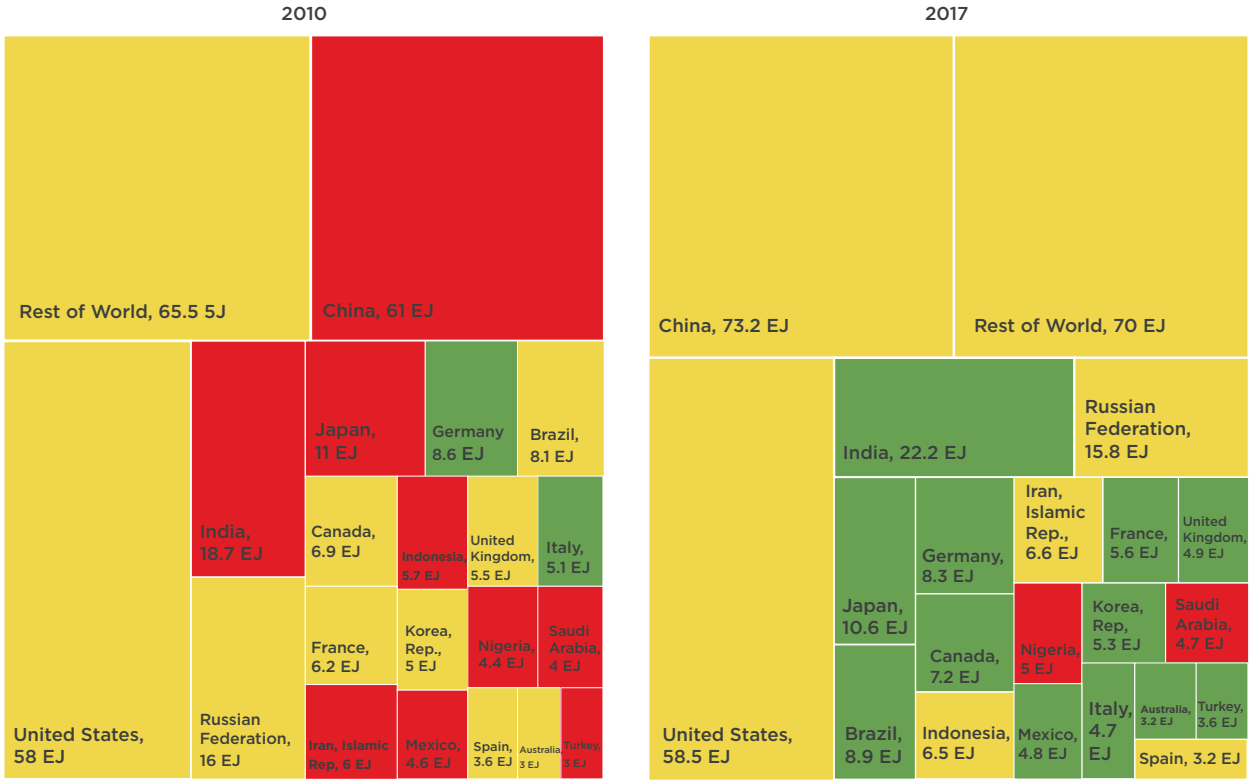


Source: World Bank RISE 2018

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.

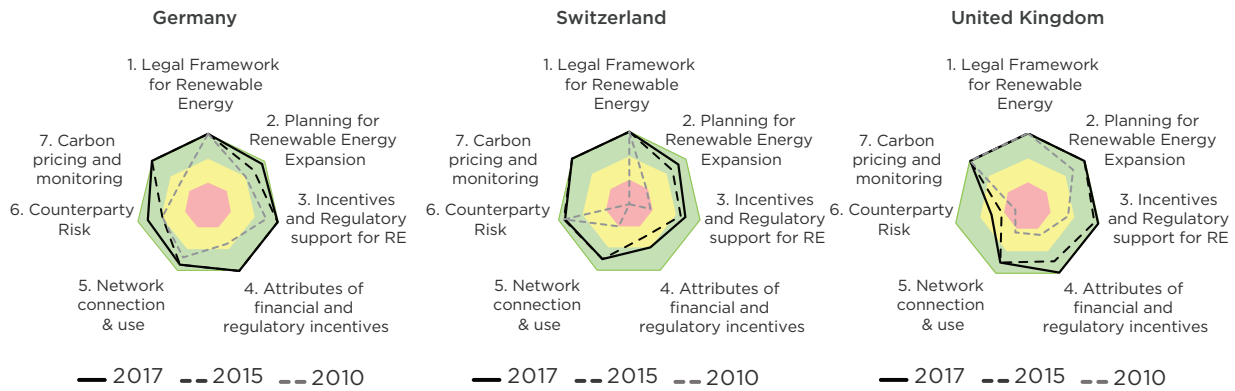
The strongest renewable energy performers as of 2017 were Germany, Switzerland, and the United Kingdom (UK) (*Figure 5.11*). In Ger-

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



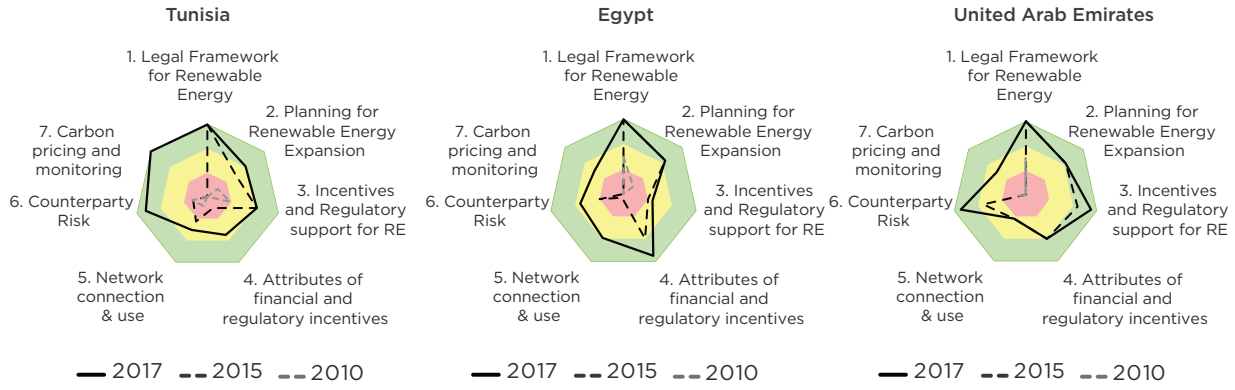
Note: The TFEC used for 2010 and 2017 was sourced from the *Tracking SDG 7* 2018 report. For the year 2010, data was drawn from 2010 TFEC and for 2017 it was drawn from the 2015 TFEC.

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

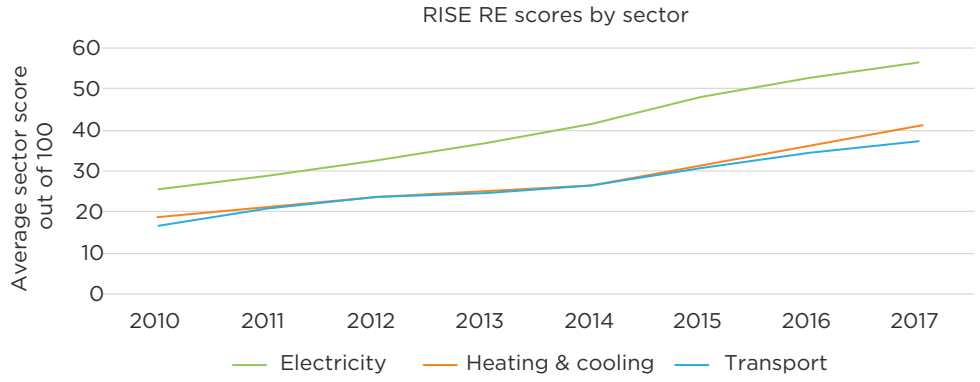
many and Switzerland, improvements in carbon pricing and greenhouse gas monitoring were among the biggest areas of improvement. Progress in financial and the regulatory incentives for renewable energy deployments was common among all three countries. Both the UK and Germany also saw improvements in their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

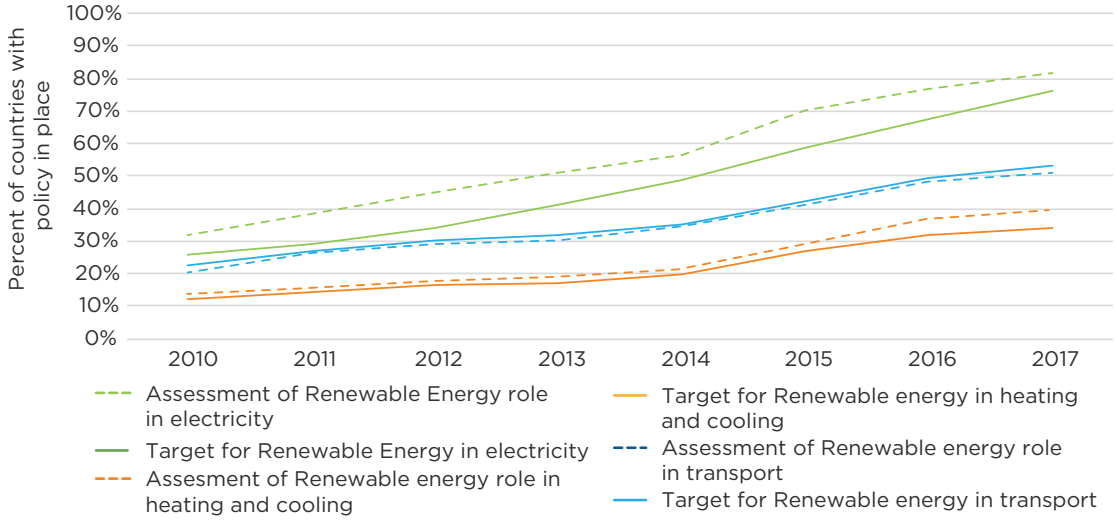
Globally, policymakers' focus remains heavily concentrated on supporting renewable energy in the electricity sector, privileging it above the transport and heating and cooling sectors. This is a particular concern given that electricity accounts for only around 20 percent of total final energy consumption,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

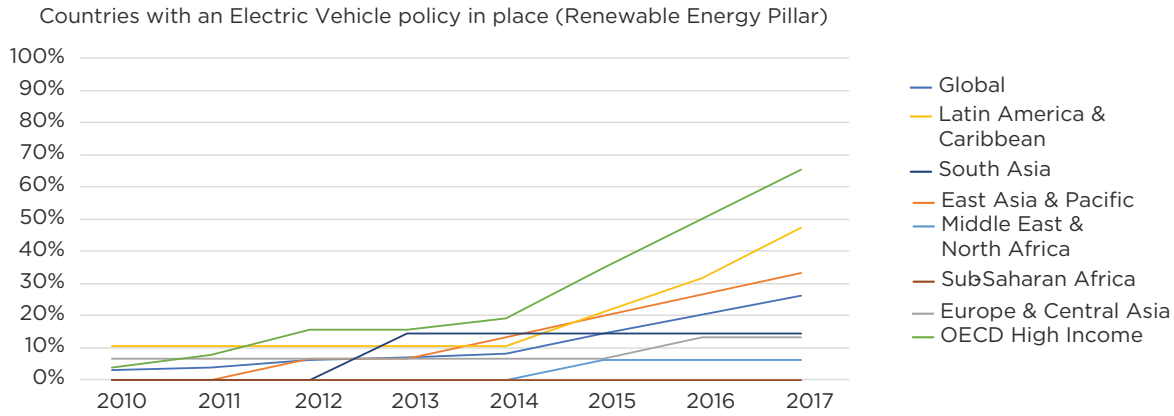


Source: World Bank RISE 2018

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

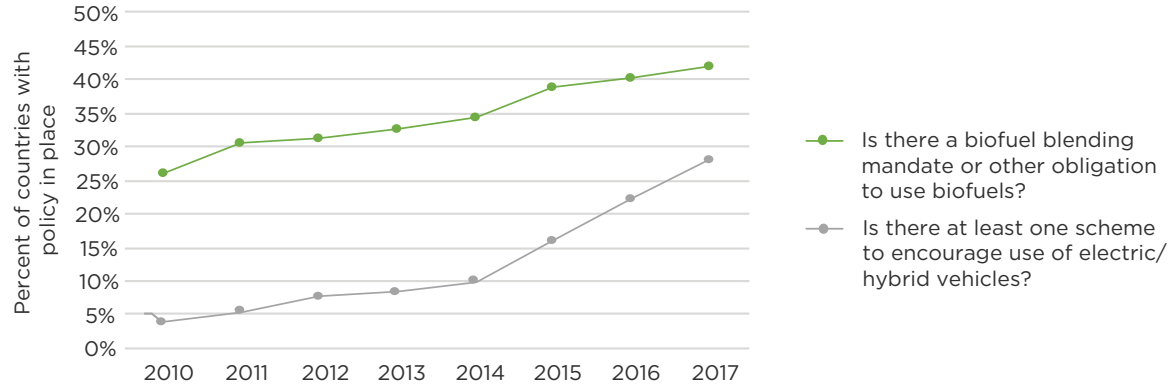


Source: World Bank RISE 2018

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.

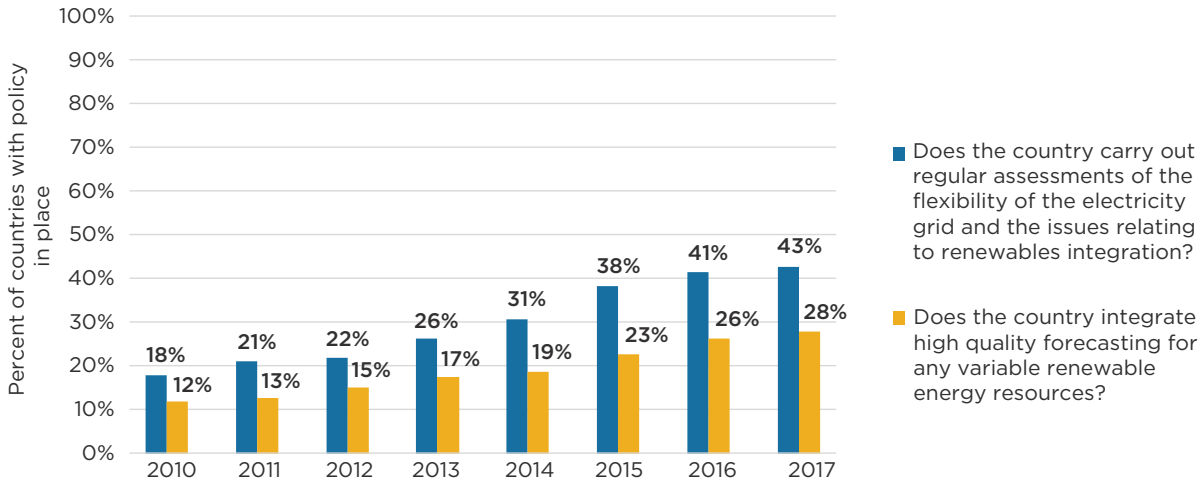
Only 26 percent of countries integrate high-quality forecasting and grid-flexibility assessment for variable renewable energy. *Figure 5.17* shows the progress of countries over the 2010–2017 period in adopting policies targeted at integrating variable renewable energy into the power system. Renewable 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

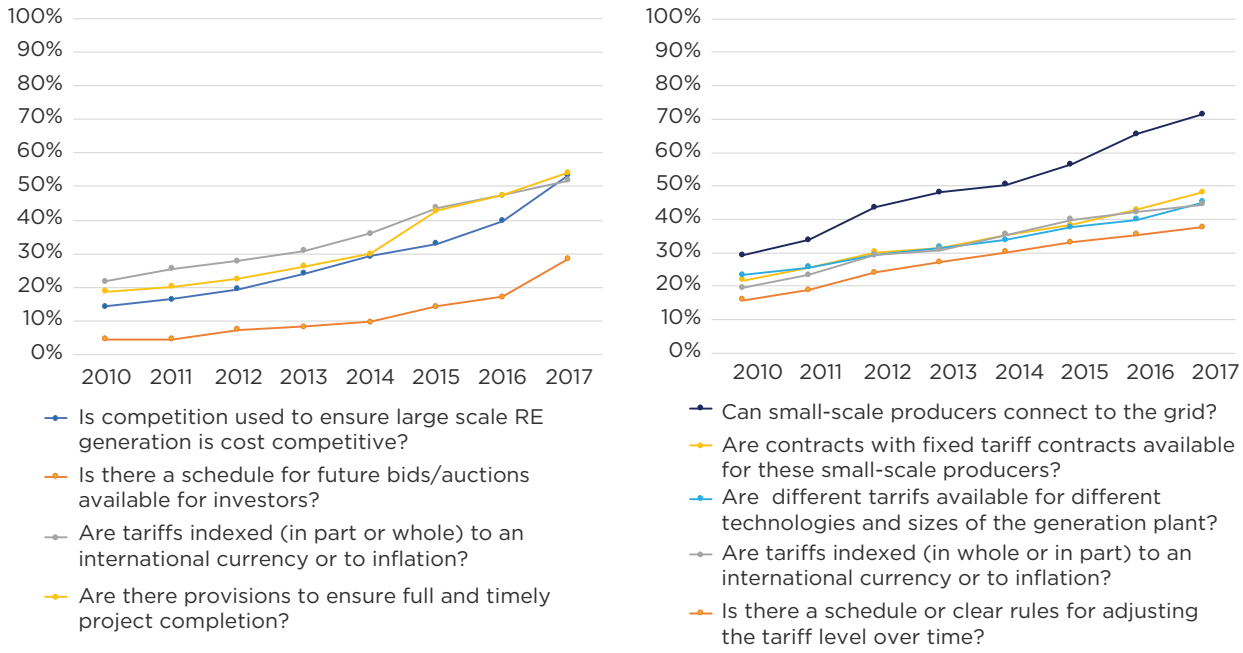


Source: World Bank RISE 2018

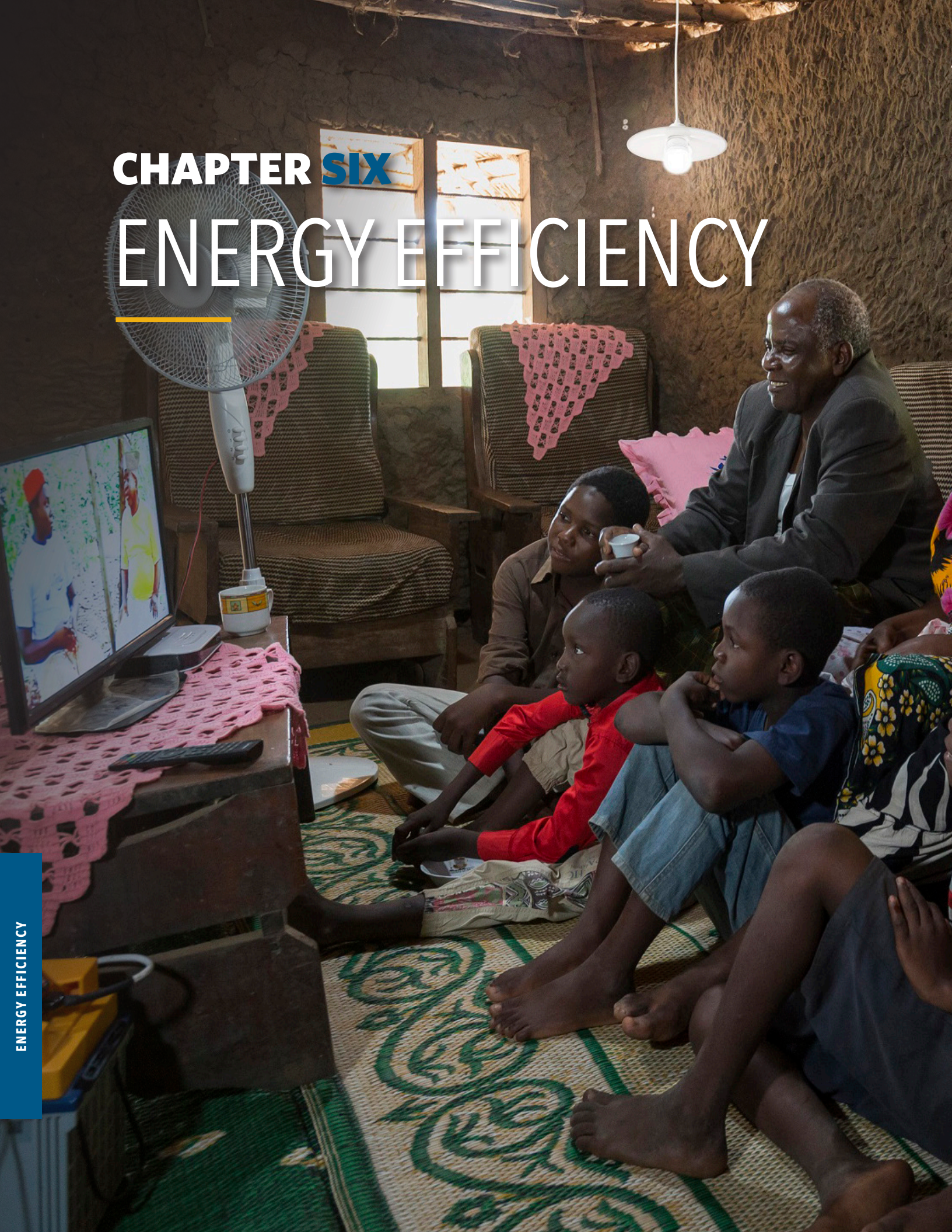
transparency around grid connection procedures, the allocation of grid-connection costs, and the costs incurred from ancillary services, to drive more consistent renewable energy deployment.

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



CHAPTER SIX
ENERGY EFFICIENCY

6. ENERGY EFFICIENCY

KEY MESSAGES

- Global progress on energy efficiency policy has been achieved across all indicators, but growth has been slower on critical sector-specific energy efficiency regulations. Important energy efficiency measures such as minimum energy performance standards compliance, building energy codes, and regulations for utilities and the transport sector remain overlooked or underfunded.
- Energy efficiency measures are more readily adopted in the industrial sector than in other sectors in most countries. But while industrial efficiency mandates are common globally, monitoring and verification of mandates needs to improve.
- Heating and cooling are crucial issues in the residential building sector, especially in the developing world. There is a clear gap between residential building codes and compliance systems that policymakers need to address.

POLICY DIMENSIONS FOR ENERGY EFFICIENCY

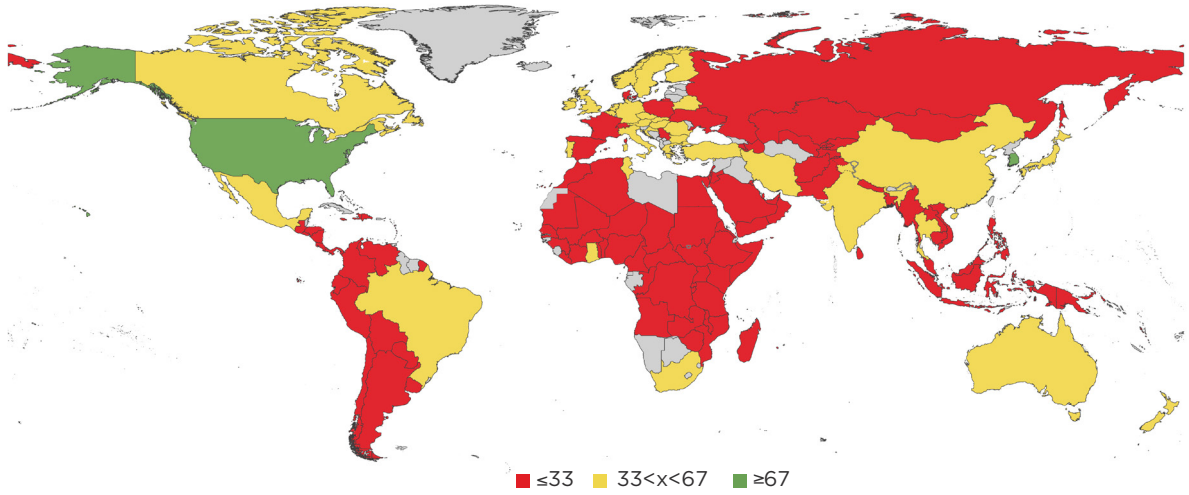
The energy efficiency pillar in the RISE 2018 report, includes 13 indicators and 31 sub-indicators, with additional indicators spanning heating and transport. The update aims to enhance the clarity and granularity of the questions and collect more accurate data. These thirteen indicators include: 1. National energy efficiency planning; 2. Energy efficiency entities; 3. Information provided to consumers about electricity usage; 4. Energy efficiency incentives from electricity rate structures; 5. Incentives and mandates: Industrial and commercial end users; 6. Incentives and mandates - public sector; 7. Incentives and mandates - utilities; 8. Financing mechanisms for energy efficiency; 9. Minimum energy efficiency performance standards; 10. Energy labeling systems; 11. Building energy codes; 12. Transport sector energy efficiency; and 13. Carbon pricing and monitoring.

The main sources that guided the selection of indicators for the energy efficiency pillar are experts from international organizations, the World Bank's internal sector specialists, academia and private sector stakeholders. Every country follows a different trajectory in developing an enabling framework for energy efficiency. For example, countries that develop their energy efficiency legislation, see their scores for indicators 1 and 2 generally improve. However, even countries that score in the top range of RISE energy efficiency scores and have the proper plans and targets in place, sometimes lack certain sector specific efficiency measures. So, an area of opportunity for the users of RISE data would be to assess what combination of policies and measures appear to be essential for energy efficiency and what is needed to make continued progress.

GLOBAL OVERVIEW OF ENERGY EFFICIENCY POLICY FRAMEWORK

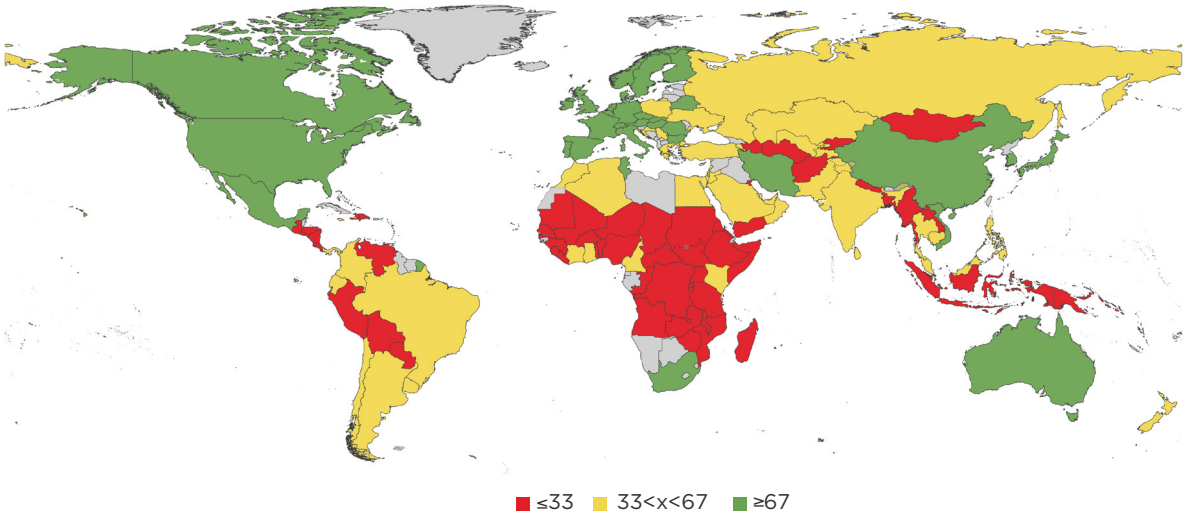
In the period 2010–2017, there has been a significant increase in global RISE scores for energy efficiency, as one quarter of the surveyed countries have adopted good practices for policies and regulations *(Figure 6.1)*. Energy efficiency incentives from electricity rate structures and energy efficiency entities have gained the most traction, followed by national energy efficiency action plans, which have been the most widely adopted. However, while there is progress overall, other important energy efficiency measures are lagging behind, such as minimum energy performance standards and labels, building codes, and regulations for utilities, and the transport sector. The transport sector should not be overlooked, as it is typically the most energy intensive in terms of fossil fuels in most regions. This edition of RISE has added a new indicator focused exclusively on transport energy efficiency.

FIGURE 6.1 MAP: RISE ENERGY EFFICIENCY SCORES, 2010



Source: World Bank RISE 2018

FIGURE 6.2 MAP: RISE ENERGY EFFICIENCY SCORES, 2017



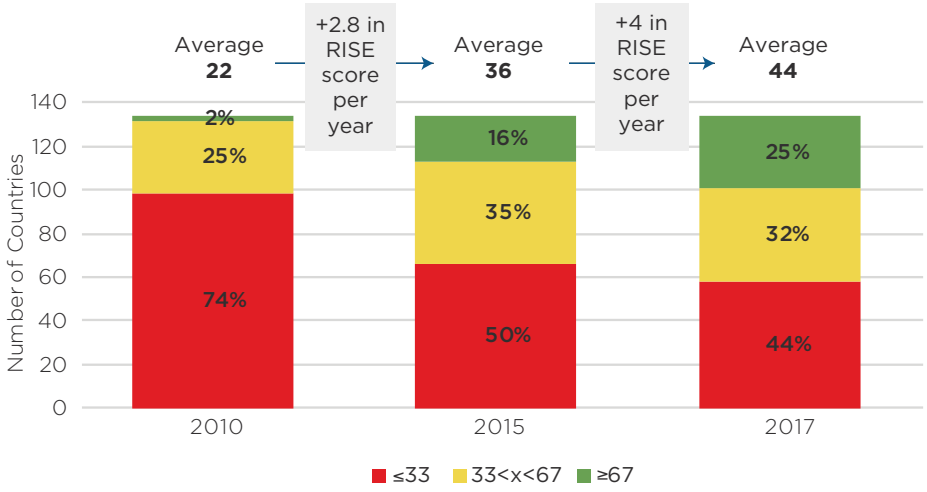
Source: World Bank RISE 2018

The percentage of countries achieving a RISE score in the green zone has increased more than 10-fold, from 2 percent in 2010 to 25 percent in 2017. Within seven years, the percentage of countries with few or no meaningful energy efficiency policies in place has declined by almost half, from 74 percent to 44 percent. The global average, however, remains low (*Figure 6.3*).

Almost 60 percent of the RISE countries have legislation in place to support energy efficiency, but adoption of specific energy efficiency measures is lagging. As shown in *Figure 6.4*, national energy efficiency planning has improved the most since 2010, followed by energy efficiency entities and financing mechanisms for energy efficiency. Meanwhile, transport sector energy efficiency has shown the least improvement.

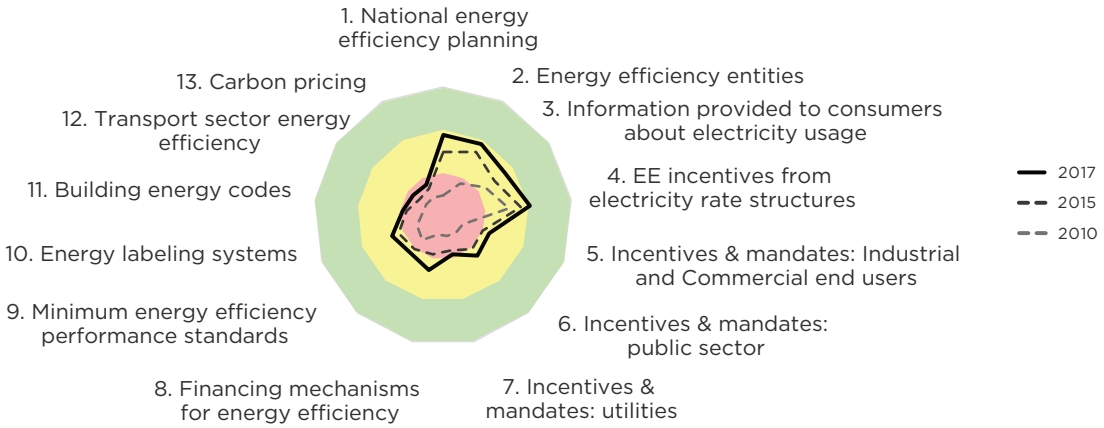
Since 2010, the fastest improving scores in adopted policies have been for energy efficiency legislation/action plans and national energy efficiency targets. National legislation or action plans focused on energy efficien-

FIGURE 6.3 DISTRIBUTION OF RISE ENERGY EFFICIENCY SCORES, 2010, 2015, AND 2017



Source: World Bank RISE 2018

FIGURE 6.4 GLOBAL PROGRESS BY ENERGY EFFICIENCY INDICATOR, 2010, 2015 AND 2017



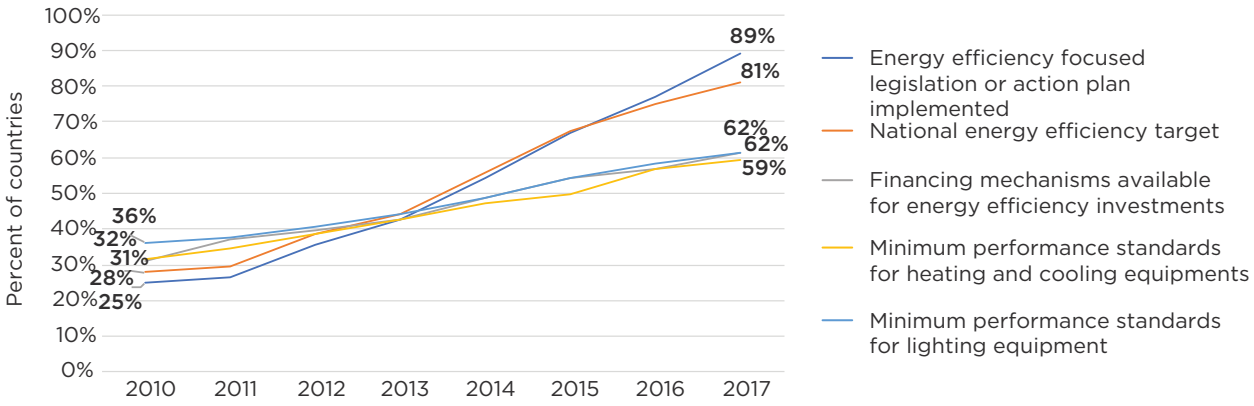
Source: World Bank RISE 2018

cy represented the fastest improving policy area, showing an increase from just a quarter of countries in 2010 to nearly 90 percent of countries in 2017. The second fastest improving energy efficiency measure was national level targets for energy efficiency, increasing from 28 percent of countries in 2010 to over 80 percent in 2017. Financing mechanisms for energy efficiency and minimum energy performance standards for lighting equipment and heating, ventilation, and air conditioning (HVAC) have also shown a fast improvement in scores from 2010 to 2017, although less so than energy efficiency legislation and targets *(Figure 6.5)*.

REGIONAL AND COUNTRY OVERVIEW OF ENERGY EFFICIENCY POLICY FRAMEWORK

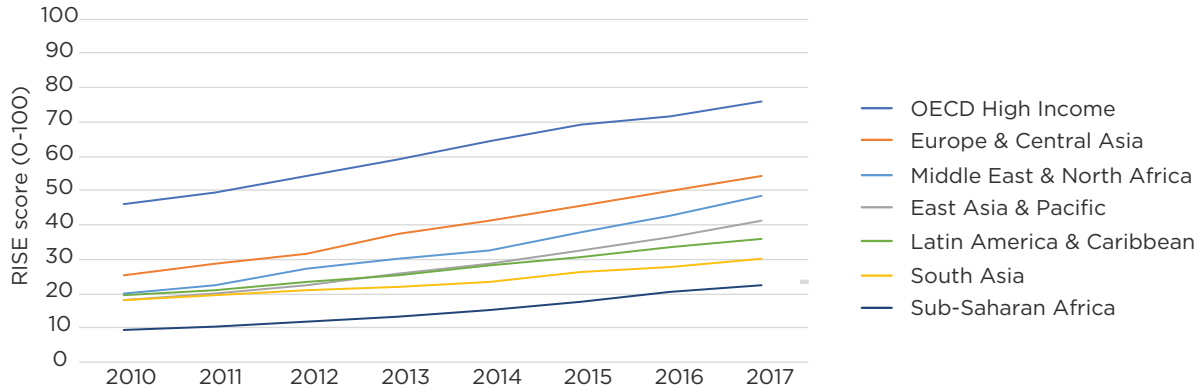
OECD countries are ahead on energy efficiency policy and regulations, but other regions are catching up. Progress on energy efficiency is uneven across regions *(Figure 6.6)*. The Europe & Central Asia region has adopted the most regulations for utilities. South Asia is among the top scorers on energy efficiency incentives from electricity rate structures. Meanwhile, Sub-Saharan Africa, which has been the lowest scoring region over time, is also catching up. South Africa is an outlier

FIGURE 6.5 FASTEST IMPROVING SCORES (PERCENTAGE OF COUNTRIES) IN ADOPTION OF ENERGY EFFICIENCY POLICIES, BY POLICY AREA, 2010-2017



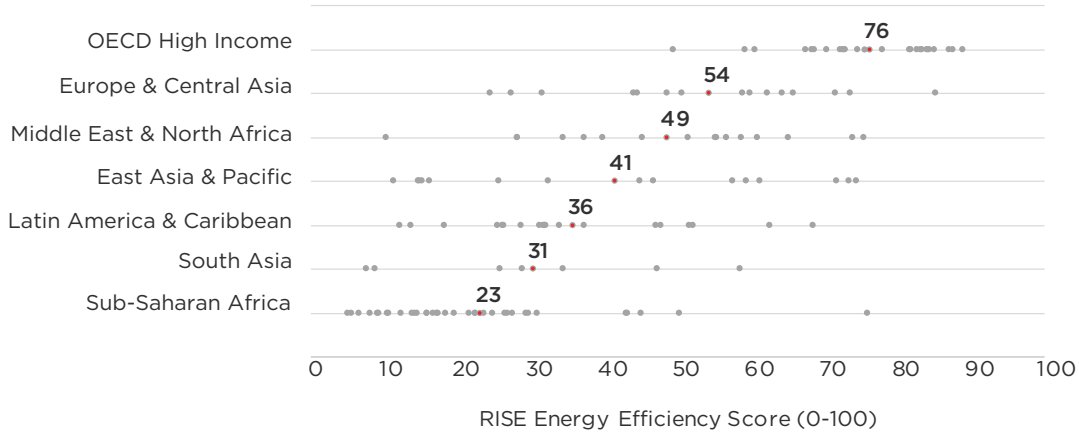
Source: World Bank RISE 2018

FIGURE 6.6 EVOLUTION OF ENERGY EFFICIENCY PILLAR SCORES BY REGION



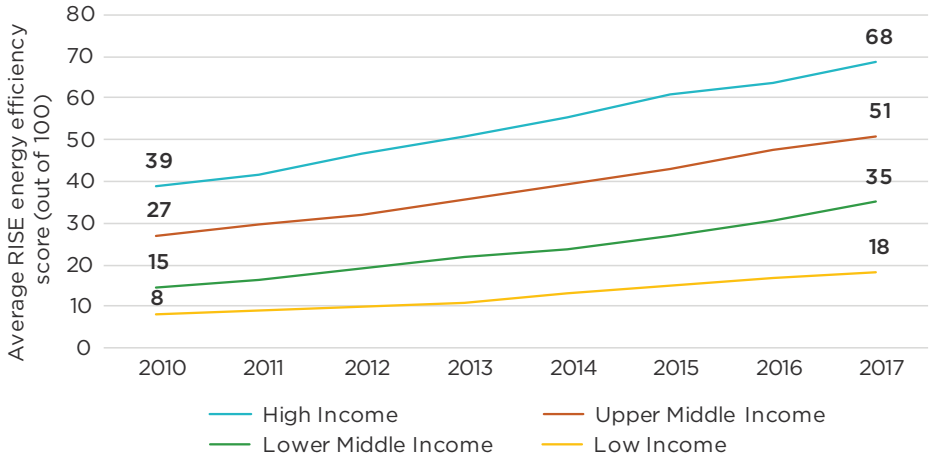
Source: World Bank RISE 2018

FIGURE 6.7 ENERGY EFFICIENCY COUNTRY SCORES BY REGION, 2017



Source: World Bank RISE 2018

FIGURE 6.8 AVERAGE RISE ENERGY EFFICIENCY SCORE BY COUNTRY INCOME GROUP, 2010 – 2017



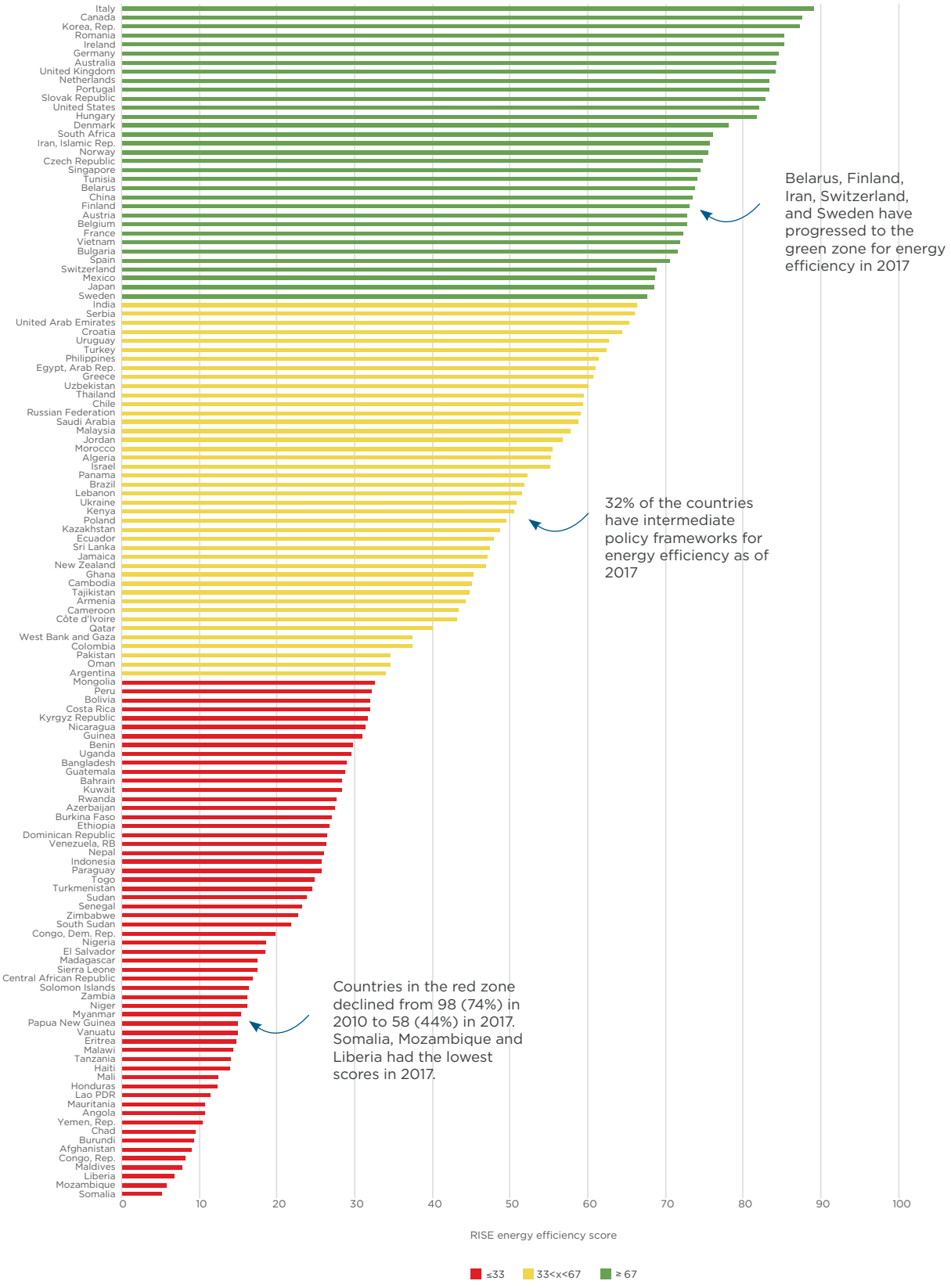
Source: World Bank RISE 2018

with a high score in Sub-Saharan Africa with regard to energy efficiency policy and regulation, along with Mexico in Latin America & the Caribbean (*Figure 6.7*).

Income levels are generally correlated with a country's overall energy efficiency score, although there are encouraging outliers in each income group. Apart from high-income countries, no other income group has an average score in the green zone for energy efficiency in 2017, while low-income countries were the only ones to score consistently in the red zone. Middle-income countries are narrowing the gap with high-income countries, with Belarus, Mexico and Romania having achieved energy efficiency scores in the green zone in 2017.

About one-quarter of the countries scored in the green zone. These countries have successfully established good practices in institutions, policies, and mechanisms to promote energy efficiency (*Figure 6.9*).

FIGURE 6.9 RISE 2017 ENERGY EFFICIENCY PILLAR SCORES FOR ALL 133 COUNTRIES

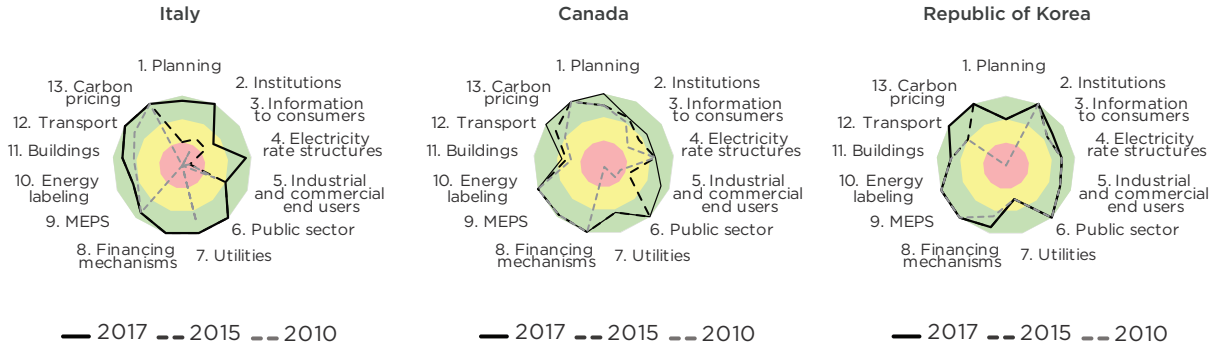


Source: World Bank RISE 2018

The top three performers on energy efficiency in 2017 were Canada, Italy, and Korea (*Figure 6.10*). All three countries scored full points for incentives and mandates in the public sector, transport sector energy efficiency, and carbon pricing. They also scored very high on financing mechanisms for energy efficiency, minimum energy performance standards, and energy labeling systems. From 2010 to 2017, Canada saw the most improvement in incentives and mandates for the public sector, while Italy improved its score on both incentives for the public sector and financing mechanisms. In the case of Korea, the most improvement in its score came from national energy efficiency planning and carbon pricing, because the Korea Emission Trading Scheme was launched in 2015.

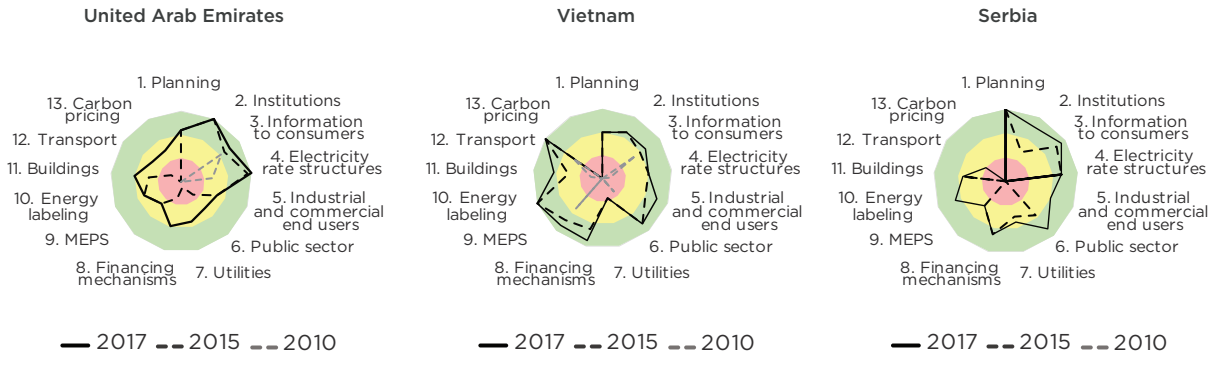
Serbia, the United Arab Emirates (UAE), and Vietnam were the fastest improvers from 2010 to 2017 (*Figure 6.11*).[17] Establishing dedicated energy efficiency entities was the most evident area of progress for Serbia and the UAE. Vietnam improved its score the most on incentives and mandates for industrial and commercial end users. Both Vietnam and Serbia have also improved their scores on energy labeling schemes, while the UAE was a middle-tier performer in this regard. The UAE was the only country in this group that scored in the green zone for building energy codes.

FIGURE 6.10 TOP THREE PERFORMERS IN THE ENERGY EFFICIENCY PILLAR, 2017



Source: World Bank RISE 2018

FIGURE 6.11 TOP THREE FASTEST MOVERS IN THE ENERGY EFFICIENCY PILLAR, 2010-2017



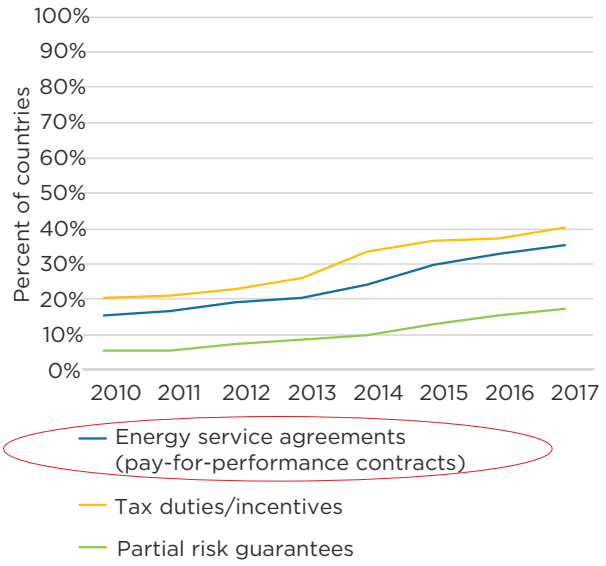
Source: World Bank RISE 2018

ADOPTING FINANCING MECHANISMS FOR ENERGY EFFICIENCY

Obtaining financing for energy efficiency investments is a crucial barrier to address, especially in the private sector. Financing initial investment costs presents a challenging hurdle, because payback periods and returns on investment are typically analyzed based on financial savings as opposed to income streams. Therefore, public sector support and/or clearly defined regulatory incentives are critical. Typically, public sector support is most effective at the early stages of market development and is then phased out as markets mature. OECD countries are top scorers for financing mechanisms for energy efficiency, while most of Sub-Saharan Africa scores the lowest. In Sub-Saharan Africa, only six countries offer financing mechanisms for energy efficiency: Benin, Ethiopia, Malawi, Rwanda, Sierra Leone, and Uganda, and five of them offer government tax incentives across sectors.

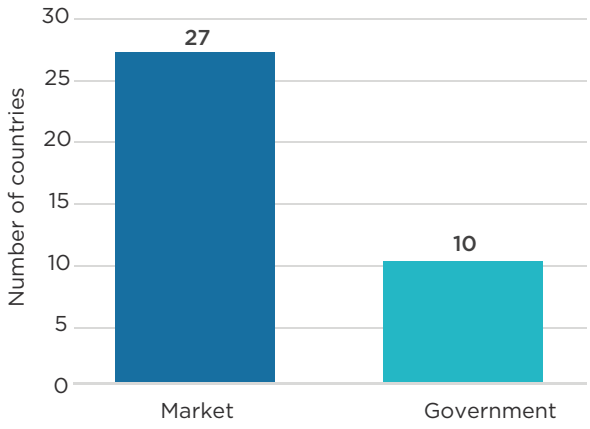
Energy service agreements have become nearly as prevalent a financing option as government tax incentives *(Figure 6.12)*. Markets for energy service companies—private and/or semi-private companies that design, install, and can finance energy efficiency projects through energy service agreements—have grown significantly. Of the 133 countries surveyed worldwide, the percentage of countries with energy service companies for energy efficiency financing has more than doubled, rising from 16 percent in 2010 to over 36 percent as of 2017. In dollar terms, the global market for these companies grew to US$28.6 billion as of 2017, of which about one-quarter of the market share is in the United States and 10 percent is in the EU.[18] Among middle-income countries, India, Mexico, South Africa, and Thailand have developed profitable energy service company markets focused on industrial and public infrastructure energy efficiency. Among all the surveyed countries where energy service agreements are available, more than two-thirds are in private sector markets without any government-owned energy service companies (*Figure 6.13*).

FIGURE 6.12 EVOLUTION OF COUNTRY PROGRESS IN ENERGY EFFICIENCY FINANCING MECHANISMS, 2010-2017



Source: World Bank RISE 2018

FIGURE 6.13 ENERGY SERVICE AGREEMENTS: NUMBER OF COUNTRIES WITH PRIVATE MARKET OPERATED VS. GOVERNMENT-OWNED AGREEMENTS, 2017



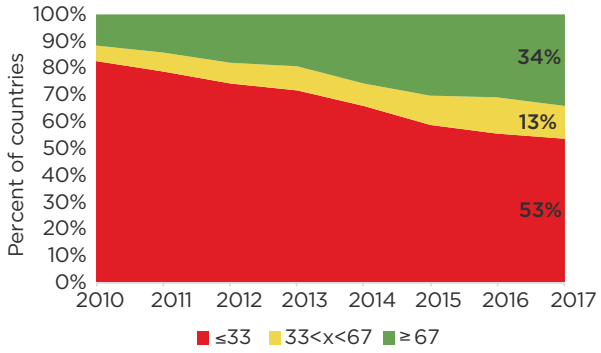
Source: World Bank RISE 2018

ENERGY EFFICIENCY POLICY, BY END-USES

In most countries, energy efficiency measures have been more readily adopted in the industrial sector than in other sectors. The *Tracking SDG7* report indicates that industrial energy efficiency was the fastest improving sector globally in terms of energy intensity. The four most energy-intensive areas of most economies are buildings, transport, industry, and utilities. When comparing energy efficiency mandates and incentives across these four areas with respect to global energy consumption, industry stands out as the most advanced thus far.

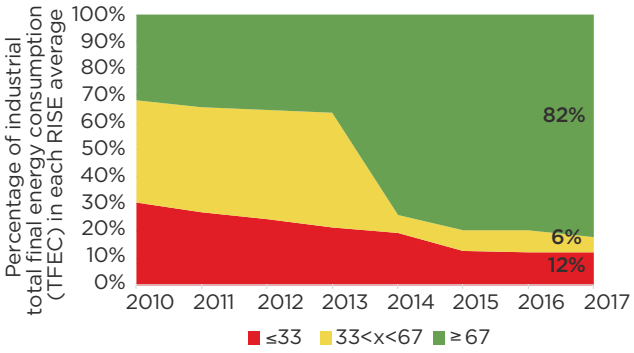
While all regions have countries that score green for industrial energy efficiency, adoption of regulations and enforcement systems is far from universal. Still, uptake of efficiency measures more than doubled in the industrial sector between 2010 and 2017, increasing from 26 percent to 60 percent (*Figure 6.22*). Encouragingly, small and medium-size enterprises (SMEs) are not being overlooked with respect to industrial energy efficiency programs. SMEs have seen an increase in uptake of energy efficiency measures since 2010, in conjunction with industrial incentives, improving from 17 percent to 41 percent (*Figure 6.23*).

FIGURE 6.14 SCORES FOR INDUSTRIAL MANDATES (ALL COUNTRIES EQUAL), 2010-2017



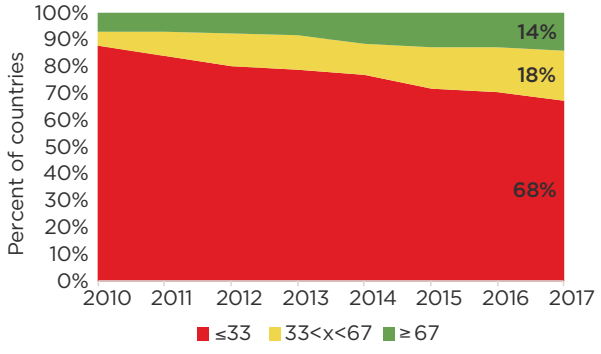
Source: World Bank RISE 2018

FIGURE 6.15 SCORES FOR INDUSTRIAL MANDATES WEIGHTED BY INDUSTRIAL TFEC, 2010-2017



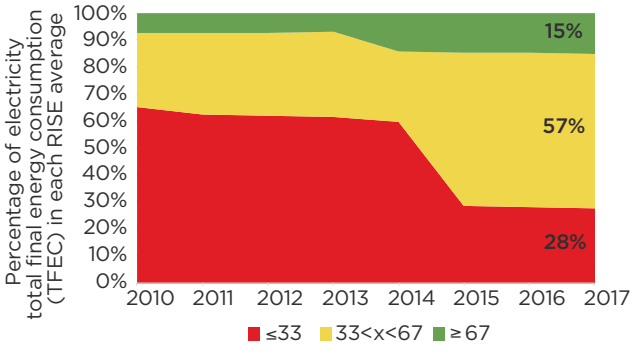
Source: World Bank RISE 2018

FIGURE 6.16 SCORES FOR UTILITIES MANDATES (ALL COUNTRIES EQUAL), 2010-2017



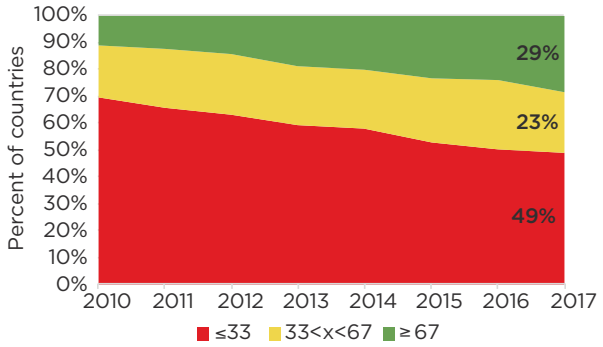
Source: World Bank RISE 2018

FIGURE 6.17 SCORES FOR UTILITIES MANDATES WEIGHTED BY ELECTRICITY TFEC, 2010-2017



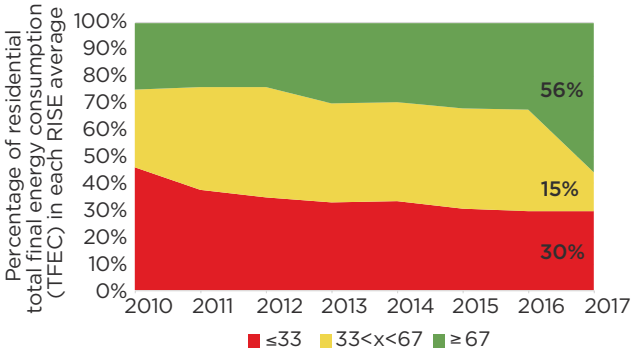
Source: World Bank RISE 2018

FIGURE 6.18 SCORES FOR RESIDENTIAL BUILDINGS (ALL COUNTRIES EQUAL), 2010-2017



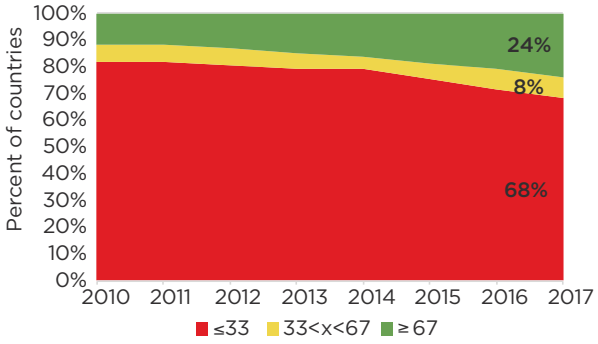
Source: World Bank RISE 2018

FIGURE 6.19 SCORES FOR RESIDENTIAL BUILDINGS WEIGHTED BY RESIDENTIAL TFEC, 2010-2017



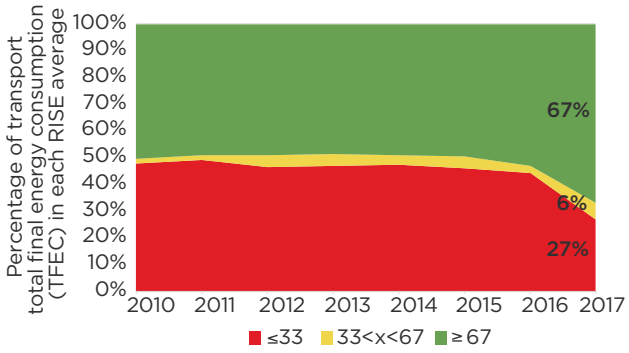
Source: World Bank RISE 2018

FIGURE 6.20 SCORES FOR TRANSPORT (ALL COUNTRIES EQUAL), 2010-2017



Source: World Bank RISE 2018

FIGURE 6.21 SCORES FOR TRANSPORT WEIGHTED BY TRANSPORT TFEC, 2010-2017

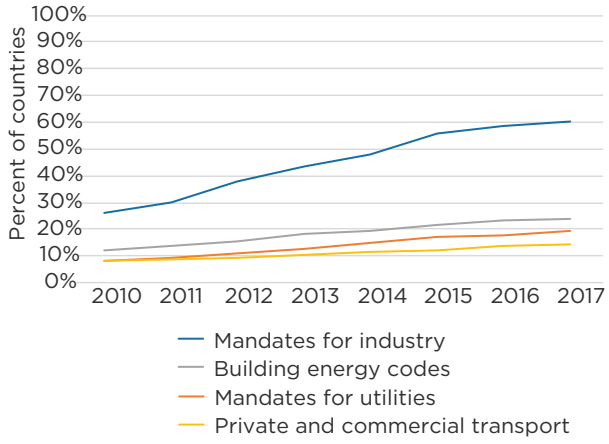


Source: World Bank RISE 2018

Mandates for industrial consumers and minimum energy performance standards for industrial equipment are generally adopted globally, but significant improvements are needed in monitoring and verification. Monitoring and verification measures to support mandates are less common than the mandates themselves. Only 26 percent of the countries have penalties in place for noncompliance, while even fewer (22 percent) have measurement and verification programs in place for the data reported by large consumers (*Figure 6.24*). Some countries have penalties on the books for noncompliance but have no monitoring and verification system. In Ethiopia, for example, large consumers are required to self-report their energy consumption improvements. It is best practice to have a third-party verification system for energy consumption targets, especially for industrial consumers.

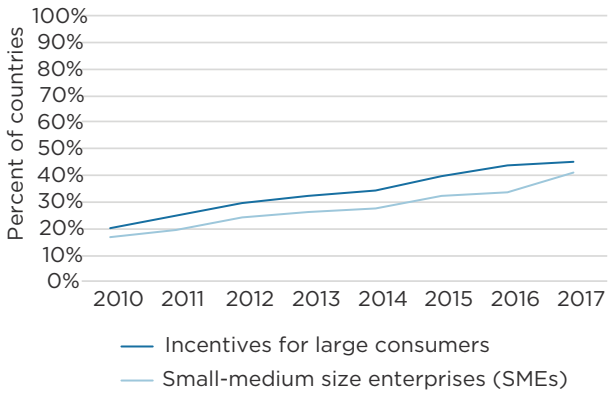
Minimum energy performance standards for industrial equipment cover a significant portion of global industrial energy consumption, while verification of standards compliance leaves ample room for improvement. While more than three quarters of the world's industrial energy consumption is covered by standards for industrial equipment, only about half of that energy consumption covered by standards is actually supported with a robust compliance system of monitoring and enforcement. Periodic updates of standards to match appropriate global thresholds, objective verification processes, and penalties for noncompliance with standards are all crucial building blocks to make industrial energy efficiency standards effective (*Figure 6.25*).

FIGURE 6.22 PERCENTAGE OF COUNTRIES WITH ENERGY EFFICIENCY MEASURES FOR INDUSTRY, BUILDINGS, UTILITIES, AND TRANSPORT, 2010–2017



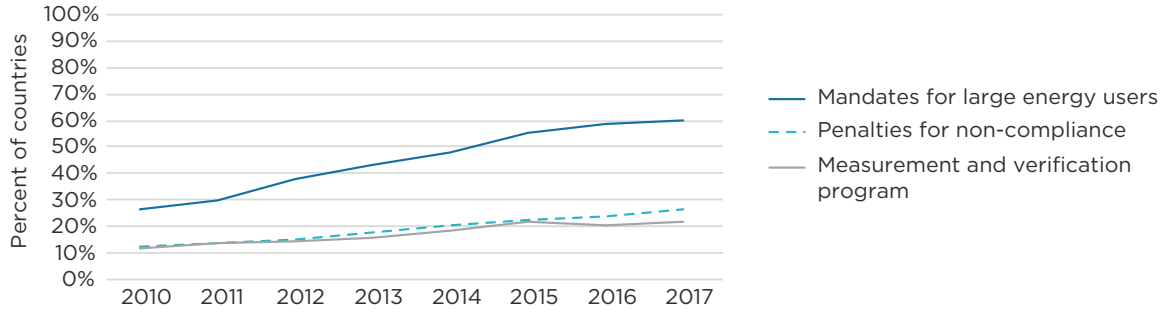
Source: World Bank RISE 2018

FIGURE 6.23 PERCENTAGE OF COUNTRIES WITH ENERGY-EFFICIENCY INCENTIVES FOR INDUSTRIAL AND SMALL-MEDIUM SIZE ENTERPRISE CONSUMERS, 2010–2017



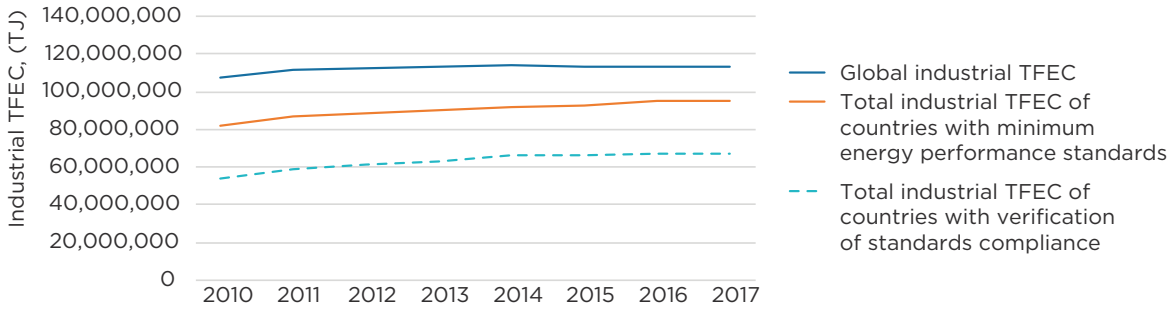
Source: World Bank RISE 2018

FIGURE 6.24 PERCENTAGE OF COUNTRIES WITH INDUSTRIAL ENERGY EFFICIENCY MANDATES AND ACCOMPANYING COMPLIANCE PROGRAMS, 2010 - 2017



Source: World Bank RISE 2018

FIGURE 6.25 COVERAGE OF MINIMUM ENERGY PERFORMANCE STANDARDS IN GLOBAL INDUSTRIAL ENERGY CONSUMPTION, 2010 – 2017

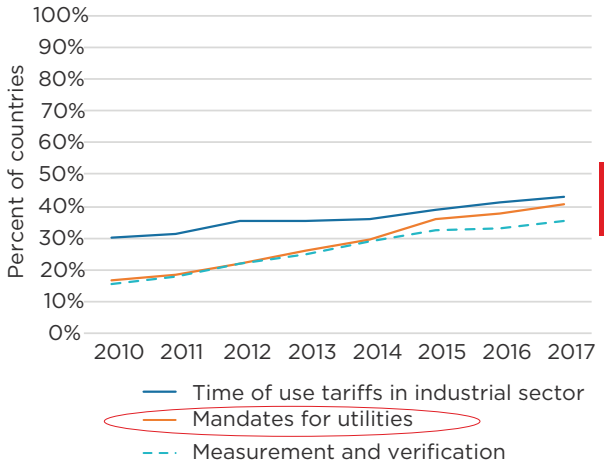


Note: 2015 consumption data was used for RISE 2015, 2016 and 2017 scores. Source: World Bank RISE 2018.
Source: World Bank RISE 2018

Similarly, 41 percent of countries have adopted energy efficiency measures for utilities, while only 35 percent have robust monitoring and verification programs for each type of utility. Though many countries have taken steps to impose energy efficiency mandates on utilities, very few use this approach to its full potential. This indicator has the second lowest average scores in the energy efficiency pillar, with just 23 percent of countries attaining scores in the green zone, while 60 percent of countries receive scores in the red zone, half of which have not adopted any standards at all. Top scorers include countries that were early movers in this area, including countries in Europe & Central Asia and OECD high-income countries, while the lowest scorers mostly span Sub-Saharan Africa. Income, however, is not a determining factor in this regard. Any country can choose to take advantage of the utility customers to develop energy efficiency programs.

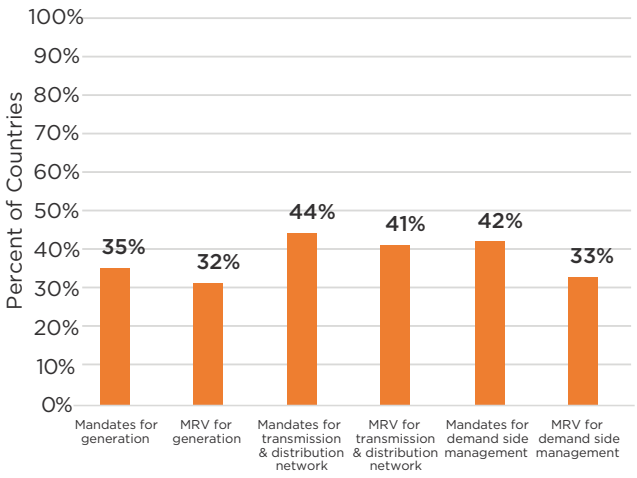
As shown in *Figure 6.26* and *Figure 6.27,* most countries with utility obligations also track performance in meeting energy efficiency requirements. However, this is being adopted much more slowly in all three areas (generation, transmission and distribution, and de-

FIGURE 6.26 PERCENTAGE OF COUNTRIES WITH ENERGY EFFICIENCY REGULATIONS FOR UTILITIES, 2010 - 2017



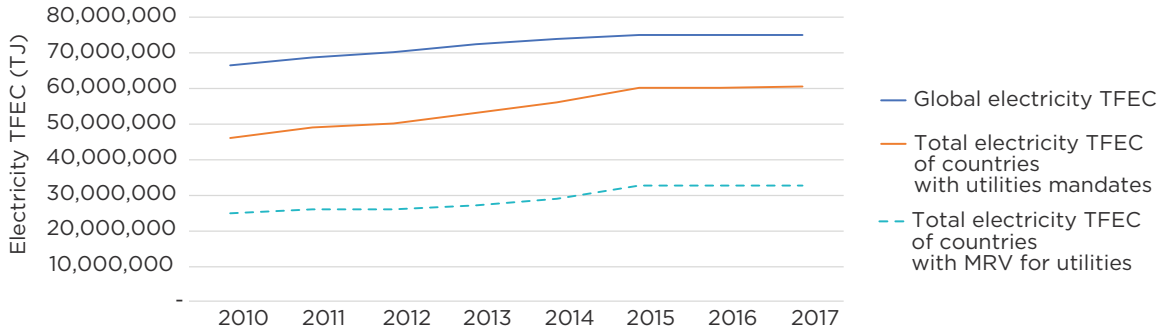
Source: World Bank RISE 2018

FIGURE 6.27 AVERAGE RISE SCORE OF COUNTRIES WITH ENERGY EFFICIENCY REGULATIONS FOR GENERATION, T&D AND DSM, 2017



Source: World Bank RISE 2018

FIGURE 6.28 COVERAGE OF UTILITIES MANDATES AND MRV IN GLOBAL ELECTRICITY CONSUMPTION, 2010 – 2017



Note: 2015 consumption data was used for RISE 2015, 2016 and 2017 scores.
Source: World Bank RISE 2018

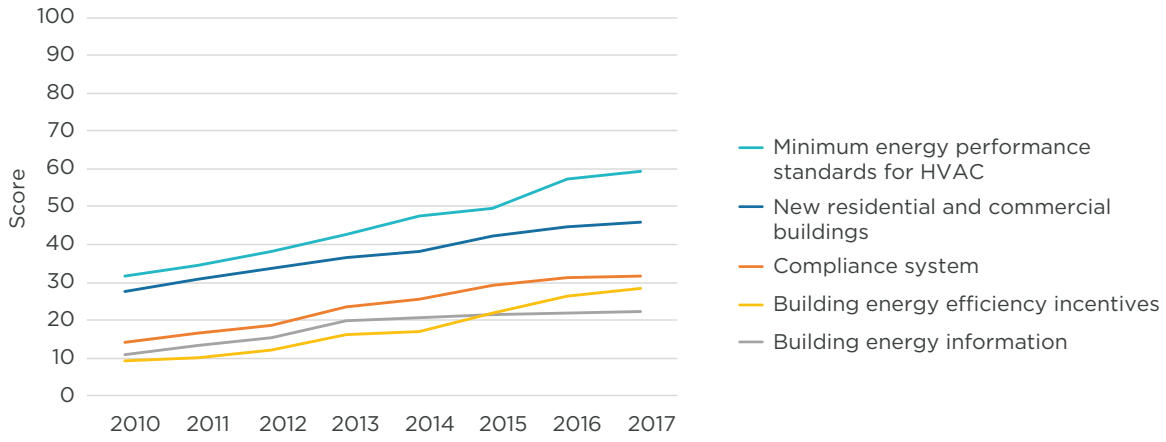
mand-side management) than the mandates themselves. Time-of-use tariffs have become a more popular energy-efficiency measure. The most prevalent form of time-of-use tariff is peak-time rebates/time-of-day tariffs, used for the industrial sector in 43 percent of the surveyed countries.

Measures to improve the energy performance of buildings have been mostly adopted by OECD high income countries, while most developing countries have not adopted them. This is important, because countries that will have the bulk of the world's new construction are unprepared to mandate that their buildings will incorporate measures for ensuring good energy performance. Compliance systems and building energy information are also less prevalent in countries with energy codes *(Figure 6.29)*.

For buildings, a major energy efficiency issue is heating and cooling, and only 59 percent of the countries had an energy efficiency plan for this sector in 2017. Minimum standards for HVAC equipment and building energy codes are two important measures to address this. However, compliance programs and building energy efficiency incentives are lagging. Nearly all OECD high income countries score in the top tier for building energy codes, as do most countries in Europe & Central Asia. Qatar, Tunisia, and UAE are the only three Middle East & North Africa countries that score in the green zone.

Similarly, minimum energy performance standards for HVAC are the most widely adopted standard. These standards are well developed in OECD high income countries, while other regions also have good performers – Brazil, China, India, South Africa, Tunisia, and Vietnam – among many others. This is encouraging, since the demand for these products is growing, especially in developing countries where more and more segments of the population can afford air conditioning and modern heating systems.

FIGURE 6.29 BUILDING ENERGY CODES: SUB-INDICATOR SCORES, GLOBAL AVERAGE, 2010 -2017

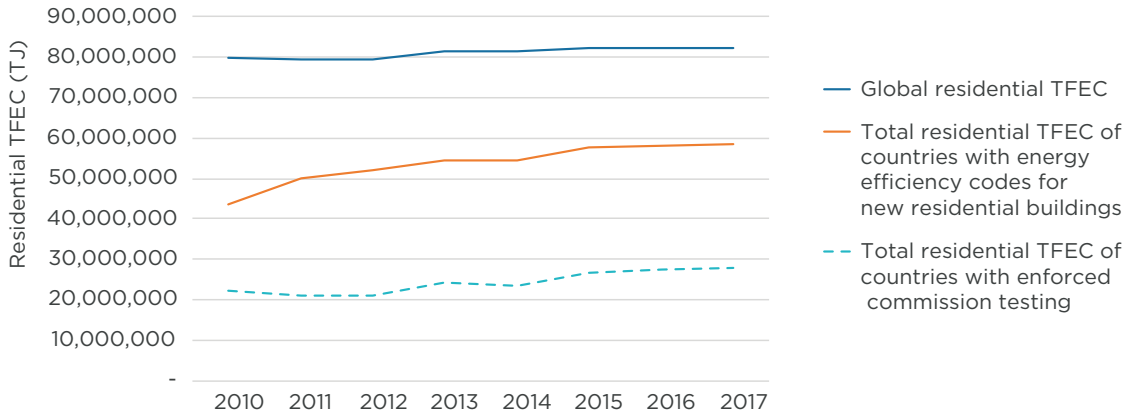


Source: World Bank RISE 2018

There is a clear gap between residential building codes and compliance systems. Heating and cooling is a crucial issue in the residential building sector, especially in the developing world, where energy demand for residential space heating and cooling is expected to more than double by 2050 from a 2010 baseline. Effective residential building energy codes are an important policy lever to ensure that demands for heating and cooling are minimized as much as possible *(Figure 6.30).* Having a building code in place is not sufficient; the code needs to be supplemented with an effective compliance system that includes commission testing and incentives for energy efficiency investments by building developers. Globally, there is a clear shortcoming when it comes to compliance systems for residential building energy codes. This gap is more pronounced for middle-income countries than for high-income countries (*Figure 6.31*).

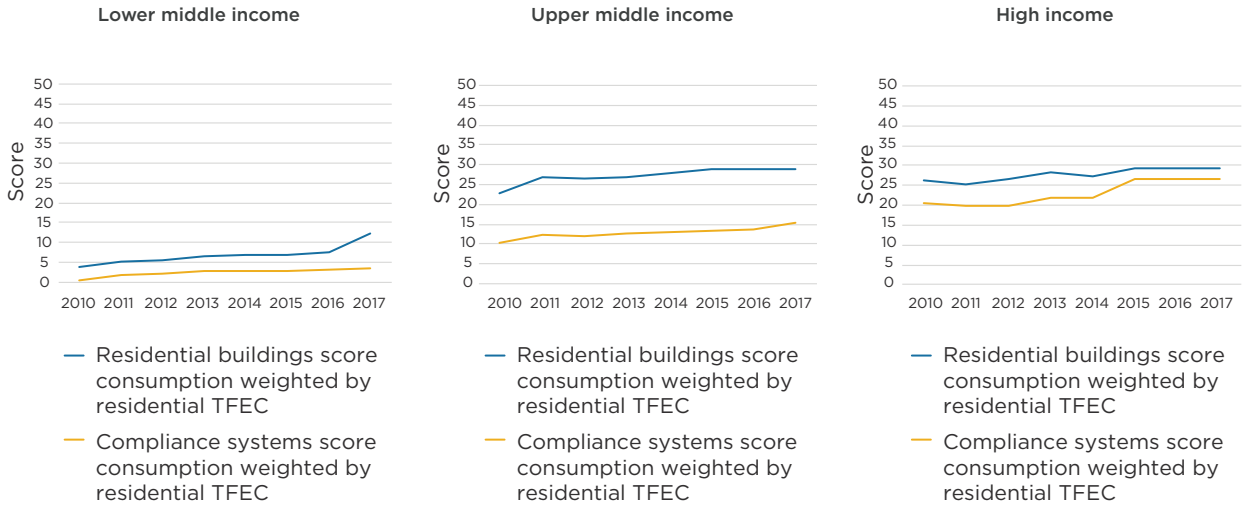
In the transport sector, the adoption of energy efficiency policies in high income countries is far ahead of all other income groups.

FIGURE 6.30 COVERAGE OF RESIDENTIAL BUILDINGS AND COMPLIANCE SYSTEMS IN RESIDENTIAL TFEC, 2010 - 2017



Note: 2015 consumption data was used for RISE 2015, 2016 and 2017 scores
Source: World Bank RISE 2018

FIGURE 6.31 SCORES FOR RESIDENTIAL BUILDING CODES AND COMPLIANCE SYSTEMS, BY COUNTRY INCOME GROUP, 2010 – 2017

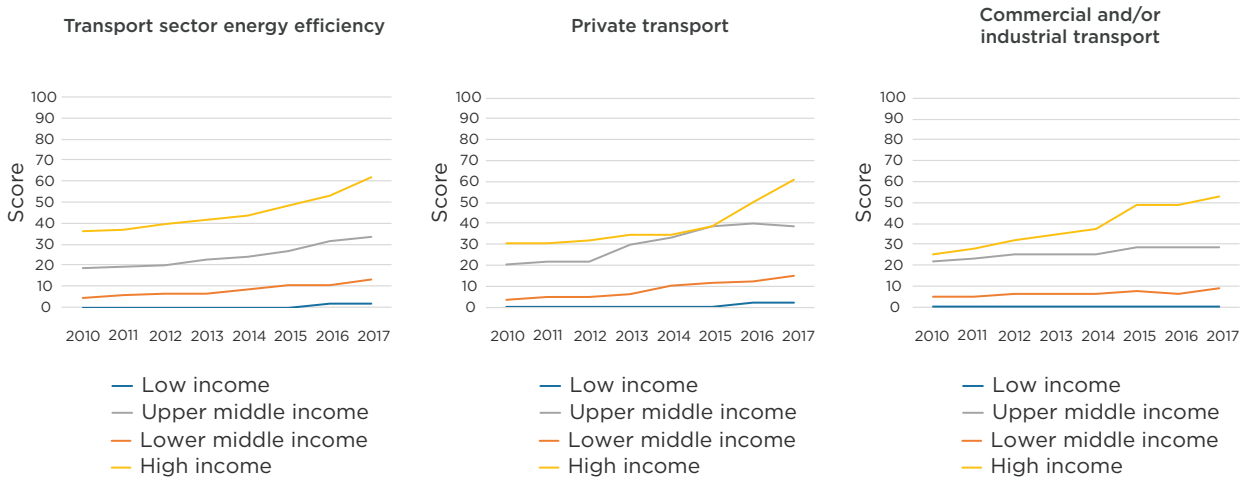


Source: World Bank RISE 2018

OECD high-income countries have made the most progress on transport sector energy efficiency and are top scorers on this indicator (*Figure 6.32*). However, most other regions score in the red zone, and it is overall the lowest scoring indicator in the energy efficiency pillar. This trend is prevalent for both private and freight transport. Mandates for private transport are becoming increasingly common. For commercial freight transport, 20 percent of the surveyed countries have an efficient fuel switching mandate in place.

In electric vehicle incentives and/or mandates, there has been a clear uptick since 2012–2013, with priority attention going to passenger transportation. As evidenced by the *Tracking SDG 7* report, there is more focus on passenger transport (both public and private) than on freight transport, with electric vehicle programs being a popular policy lever for reducing transport local and global emissions. There has been a clear increase in uptake of electric vehicle incentives and/or mandates since 2012–2013, although not many new countries have adopted light-duty vehicle fuel economy standards since then. For heavy-duty vehicles, there has been a more pronounced uptake of fuel economy standards, with a handful of large economies—such

FIGURE 6.32 AVERAGE SCORES BY COUNTRY INCOME GROUP FOR TRANSPORT ENERGY EFFICIENCY INDICATORS AND SUB-INDICATORS, 2010 – 2017

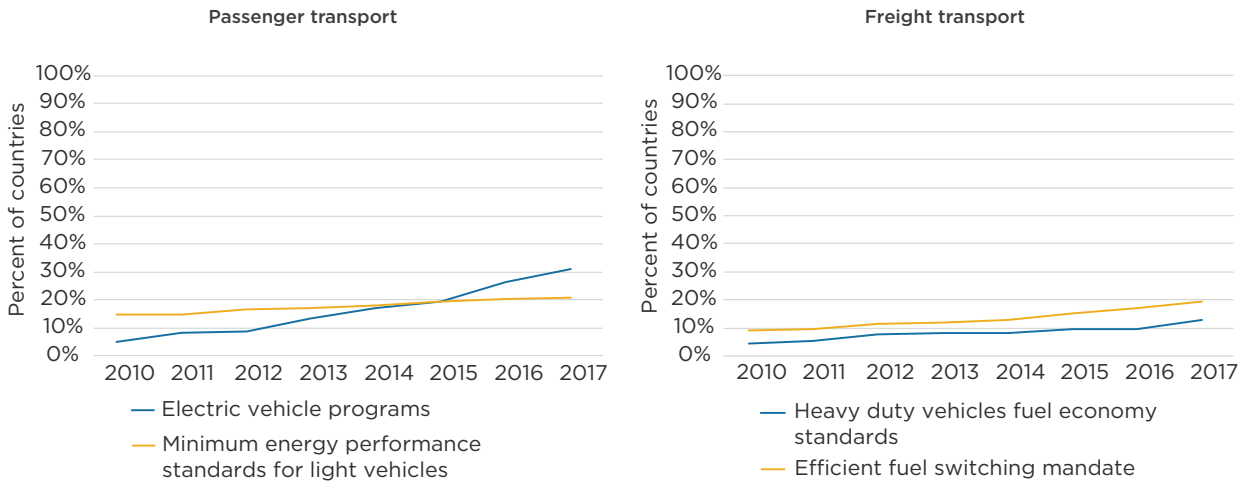


Source: World Bank RISE 2018

as India, Korea, and Mexico—planning to implement them before 2020, as highlighted in the IEA's *Future of Trucks* publication series[19] (*Figure 6.33*).

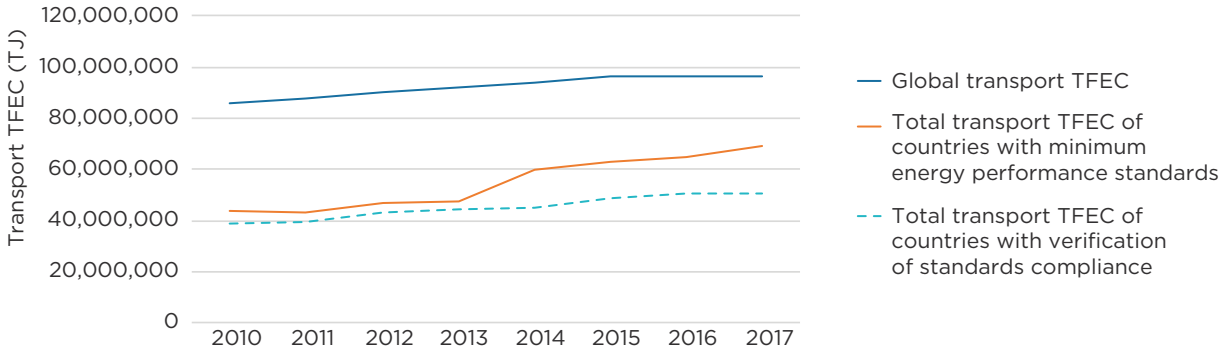
Fuel economy standards now cover more than 70 percent of transport energy consumption worldwide, but verification programs for these standards are not widely adopted. With increasing motorization of passengers and freight travel in developing countries, and with most growth in transport demand expected to come from them, fuel economy standards and compliance mechanisms are a clear opportunity for progress against the SDG7 energy efficiency target. *(Figure 6.34).*

FIGURE 6.33 PERCENTAGE OF COUNTRIES HAVING THE TWO MOST PREVALENT ENERGY-EFFICIENCY MEASURES IN THE PASSENGER AND FREIGHT TRANSPORT SUBSECTORS GLOBALLY, 2010 – 2017



Source: World Bank RISE 2018

FIGURE 6.34 COVERAGE OF FUEL ECONOMY STANDARDS IN GLOBAL TRANSPORT ENERGY CONSUMPTION, 2010 - 2017



Note: 2015 consumption data was used for RISE 2015, 2016 and 2017 scores.
Source: World Bank RISE 2018

ENDNOTES

[17] This group of fast-improving countries for energy efficiency also includes Denmark, Egypt, Malaysia, and Uzbekistan.

[18] IEA, Energy Efficiency Market Report 2018, https://webstore.iea.org/download/direct/2369?fileName=Market_Report_Series_Energy_Efficiency_2018.pdf

[19] IEA, The Future of Trucks: Implications for Energy and the Environment, https://www.iea.org/publications/freepublications/publication/TheFutureofTrucksImplicationsforEnergyandtheEnvironment.pdf

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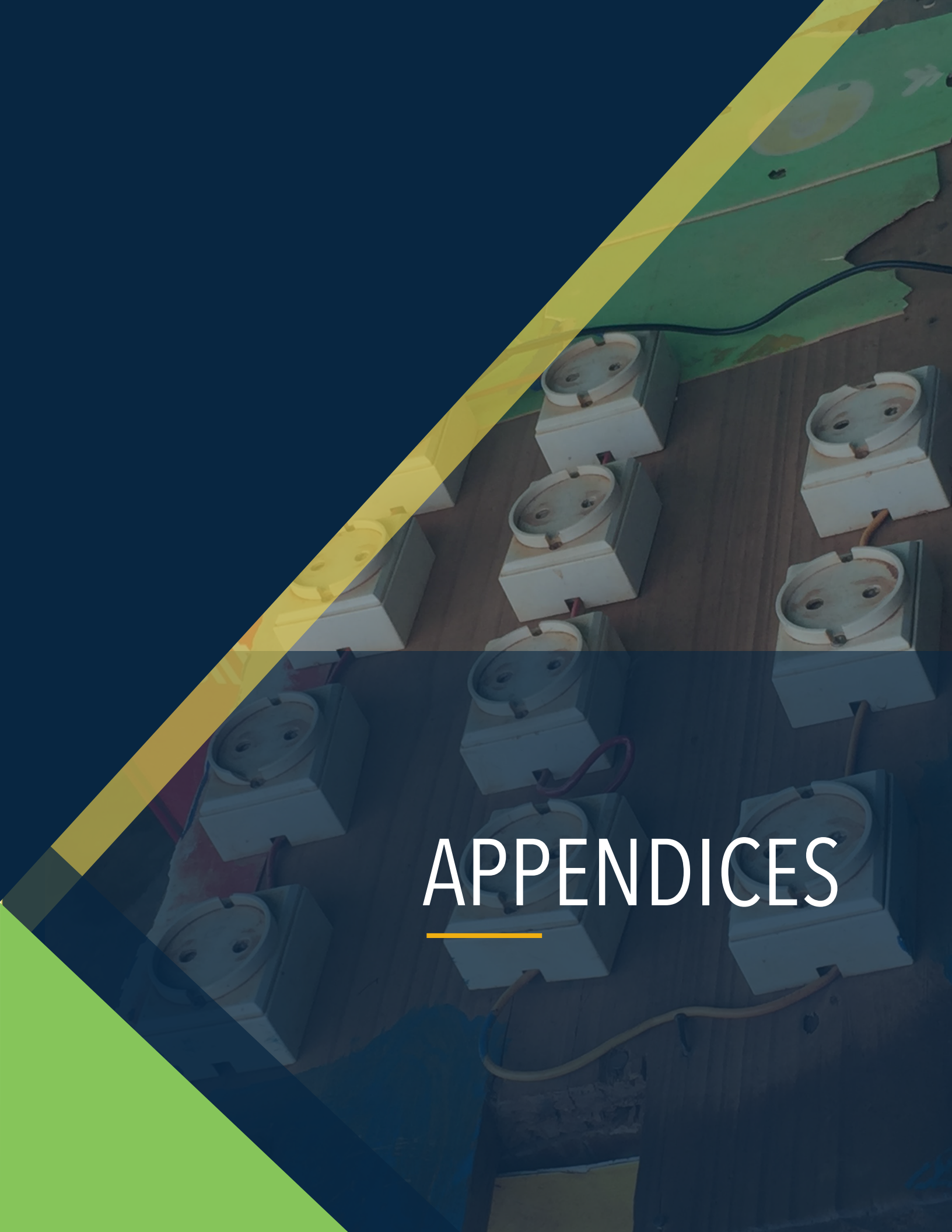

APPENDICES

A. METHODOLOGY

RENEWABLE ENERGY

INDICATOR 1. LEGAL FRAMEWORK FOR RENEWABLE ENERGY

Questions	Scoring	Traffic light
	Sum and divide by 2	
1. Primary legislation		If the score X is:
1.1 Does a legal framework for renewable energy development exist?	Yes – 100, No – 0	x≥ 67 🟢
2. Legal private ownership of generation		33 < x < 67 🟡
2.1 Does the legal framework allow private sector ownership of renewable energy generation?	Yes – 100, No – 0	33 ≤ x 🔴

INDICATOR 2. PLANNING FOR RENEWABLE ENERGY EXPANSION

Questions	Scoring	Traffic light
	X= sum and divide by 7	
3. Renewable energy targets and plans		
3.1 Does an official renewable energy target exist?	Yes – 16.7, No – 0	
3.2 Is the target legally binding?	Yes – 16.7, No – 0	
3.3 Is the RE target linked to international commitments (eg. NDC or regional commitment)?	Yes – 16.7, No – 0	
3.4 Is the target based on a transparent methodology?	Yes – 16.7, No – 0	
3.5 Is there a renewable energy action plan or strategy to attain the target ?	Yes – 16.7, No – 0	
3.6 Is there any provision for consultation with the public on the renewable plan?	Yes – 16.7, No – 0	If the score X is:
4. Electricity- Targets and Plans		x≥ 67 🟢
4.1 Is there an assessment of the role of renewables in electricity supply?	Yes – 50,No – 0	33 < x < 67 🟡
4.2 Is there a target for renewables in electricity?	Yes – 50,No – 0	33 ≤ x 🔴
5. Heating and Cooling- Targets and Plans		
5.1 Is there an assessment of the needs for heating and cooling in buildings and industry in the country and of how renewables can contribute?	Yes – 50,No – 0	
5.2 Is there a specific target for renewables for heating and cooling?	Yes – 50,No – 0	
6. Transport- Targets and Plans		
6.1 Is there an assessment of the potential role for renewables in transport including biofuels and electrification?	Yes – 50,No – 0	
6.2 Is there a specific target for renewables in transport?	Yes – 50,No – 0	

INDICATOR 2. PLANNING FOR RENEWABLE ENERGY EXPANSION *(Continued)*

Questions	Scoring	Traffic light
	X= sum and divide by 7	
7. Institutions and Meeting Targets		
7.1 Does the renewable plan or strategy estimate the amount of investment necessary to meet the RE target?	Yes – 20,No – 0	
7.2 Is there an institution responsible for tracking progress in renewable energy development?	Yes – 20,No – 0	
7.3 Is there any periodic reporting mechanism for renewable energy progress?	Yes – 20,No – 0	
7.4 Is there a mechanism for adjusting the plan based on reporting of renewable energy deployment?	Yes – 20,No – 0	
7.5 Is current policy environment conducive to renewable energy deployment?	Yes – 20,No – 0	
8. Renewable energy in generation and transmission planning		
8.1 Is generation and transmission planning integrated?	Yes - 25, No - 0	If the score X is:
8.2 Is planning for dispatch included in the generation and transmission plan?	Yes - 25, No - 0	$x \geq 67$
8.3 Is the generation plan based on a probabilistic approach?	Yes - 25, No - 0	$33 < x < 67$
8.4 Does the current transmission planning consider renewable energy scale-up?	Yes - 25, No - 0	$33 \leq x$
9. Resource data and siting		
9.1 Does the government endorse and use the solar/wind resource maps and data applicable to their country that are available through the Global Solar Atlas / Global Wind Atlas, or have they published some other solar/wind resource map that conforms to best practice in the last five years?	Yes – 33.33, No – 0	
9.2 Has the country carried out geospatial planning or produced zoning guidance to inform the commercial development of the RE resource?	Yes – 33.33, No – 0	
9.3. Has the geospatial planning or zoning guidance been carried out according to best practice by: i) being undertaken as part of a strategic environmental and social assessment or equivalent process; and ii) by making the outputs publically available?	Yes – 33.33, No – 0	

INDICATOR 3. INCENTIVES AND REGULATORY SUPPORT FOR RENEWABLE ENERGY

Questions	Scoring	Traffic light
	Sum and divide by 4	
10. Financial and regulatory support for electricity		
10.1 Does the country offer long term PPA's for renewable electricity production for large scale producers(e.g. via. feed-in-tariffs, PPA's awarded through auctions etc.)	Yes – 25, No – 0	
10.2 Does the country offer long term PPA's for renewable electricity production for small scale producers(e.g. via. feed-in-tariffs, PPA's awarded through auctions etc.)	Yes – 25, No – 0	
10.3 Does the government publish clear and practical guidance on what permissions are required to develop a RE electricity project?	Yes – 25, No – 0	
10.4 Does the government offer other direct fiscal incentives for renewable electricity (e.g. capital subsidies, grants or rebates, investment tax credits, tax reductions, production tax credits, FITs for large producers?)	Yes – 25, No – 0	
11. Electricity Grid access and dispatch		
11.1 Does the country provide prioritized access to the grid for RE?	Yes – 20, No – 0	
11.2 Do RE projects receive priority in dispatch?	Yes – 20, No – 0	
11.3 Are there provisions to compensate seller if offtake infrastructure is not built in time?	Yes – 20, No – 0	
11.4 Are there mechanisms to compensate RE projects for lost generation due to certain curtailments after project commissioning?	Yes – 20, No – 0	If the score X is: $x \geq 67$ ● $33 < x < 67$ ● $33 \leq x$ ●
11.5 Is the compensation due because of curtailment actually given out.	Yes – 20, No – 0	
12 Financial and regulatory support for Transport		
12.1 Is there a biofuels blending mandate or other obligation to use biofuels?	Yes – 25, No – 0	
12.2 Are there sustainability criteria which biofuels which contribute to the mandate must meet?	Yes – 25, No – 0	
12.3 If there is a plan for producing biofuels in the country, has this included an assessment of sustainability impacts (e.g. against the GBEP Sustainability indicators) including an assessment of impacts on food security.	Yes – 25, No – 0	
12.4 Is there at least one scheme to encourage use of electric/hybrid vehicles? (e.g. Tax benefit to consumers and manufacturers, etc.)	Yes – 25, No – 0	
13. Financial and regulatory support for Heating and Cooling		
13.1 Are there any policies to encourage deployment of any renewable energy heating and cooling technologies?	Yes – 33.3, No – 0	
13.2 Are there specific measures (financial support or promotion) designed to encourage the use of renewables in the heating and cooling sectors?	Yes – 33.3, No – 0	
13.3 Are opportunities for renewable heat promoted alongside energy efficiency measures in buildings and/or industry?	Yes – 33.3, No – 0	

INDICATOR 4. ATTRIBUTES OF FINANCIAL AND REGULATORY INCENTIVES

Questions	Scoring	Traffic light
	Sum and divide by 2	
14 Auctions		
14.1 Is competition used to ensure large scale RE generation (projects >10MW) is cost competitive (e.g. through auctions for PPA's)	(14.2 to 14.7 are scored)	
If so:		
14.2 Is there a schedule for future bids/auctions available for investors?	Yes – 16.7, No – 0	
14.3 Is there a pre-qualification process to select bidders?	Yes – 16.7, No – 0	
14.4 Are tariffs indexed (in part or in whole) to an international currency or to inflation?	Yes – 16.7, No – 0	
14.5 Are there provisions to ensure full and timely project completion (e.g. bid-bonds, project milestones)	Yes – 16.7, No – 0	
14.6 Are projects awarded through auctions/bids online/on track to be online on stated date?	Yes – 16.7, No – 0	If the score X is: x≥ 67 ● 33 < x < 67 ● 33 ≤ x ●
14.7 Have auctions/bids met stated target for installations?	Yes – 16.7, No – 0	
15 Fixed tariffs for small producers		
15.1 Can small producers (residential, commercial rooftop PV,etc) connect to the grid?	Yes – 16.7, No – 0	
15.2 Are contracts with fixed tariffs available for such producers?	Yes – 16.7, No – 0	
15.3 Is there a schedule or clear rules (e.g. capacity based limits) for adjusting the tariff level over time?	Yes – 16.7, No – 0	
15.4 Are different tariffs available for different technologies and sizes of the generation plant?	Yes – 16.7, No – 0	
15.5 Is there a mechanism to control the capacity built under each tariff?	Yes – 16.7, No – 0	
15.6 Are tariffs indexed (in part or in whole) to an international currency or to inflation?	Yes – 16.7, No – 0	

INDICATOR 5. NETWORK CONNECTION AND USE

Questions	Scoring	Traffic light
	Sum and divide by 3	
16. Connection and cost allocation		
16.1 Does the country have a grid code that clearly specifies connection procedures?	Yes – 20, No – 0	
16.2 Do the connection procedures meet international best practices?	Yes – 20, No – 0	If the score X is: x≥ 67 ● 33 < x < 67 ● 33 ≤ x ●
16.3 Does the grid code include measures or standards addressing variable renewable energy?	Yes – 20, No – 0	
16.4 Are there rules defining the allocation of connection costs?	Yes – 20, No – 0	
16.5 What is the type of the connection cost allocation policy (i.e. shallow/ deep)?	Shallow – 20, Deep – 0	

INDICATOR 5. NETWORK CONNECTION AND USE *(Continued)*

Questions	Scoring	Traffic light
	Sum and divide by 3	
17. Network usage and pricing		
17.1 Do the rules define the size and allocation of costs for use of the transmission and distribution system (e.g. wheeling charges, locational pricing?)	Yes - 50, No - 0	
17.2 Are the rules being used in practice?	Yes - 50, No - 0	
18. Renewable grid integration		
18.1 Does the country carry out regular assessments of the flexibility of the electricity grid and the issues relating to renewables integration?	Yes – 16.7, No - 0	
18.2 Can renewable energy projects sell into balancing/ancillary services?	Yes – 16.7, No - 0	
18.3 Are there rules for exchanging power between balancing areas that penalize variable renewable energy (e.g. through imbalance penalties)? *	Yes – 16.7, No - 0	
18.4 Are there provisions in the power exchange rules that allow for plant forecasting?*	Yes – 16.7, No - 0	
18.5 Does the country integrate high quality forecasting for any variable RE resources (either through subscription service or provided by national agencies) into their dispatch operations?	Yes – 16.7, No - 0	
18.6 Are dispatch operations being carried out in real time?	Yes – 16.7, No - 0	
***Only scored in countries with multiple balancing areas.**		

If the score X is:
x≥ 67
33 < x < 67
33 ≤ x

INDICATOR 6. COUNTERPARTY RISK

Questions	Scoring	Traffic light
	Sum and divide by 3.If there is one answer just look at that, otherwise average	
19. Credit worthiness	**SUM**	
19.1. If counterparty is the utility, is it credit worthy? Based on the following financial ratios:		
Current ratio	<1 -- 0 in between -- scale >= 1.2 – 25	
EBITDA margin	<0 – 0 in between -- scale >= 15% -- 25	
Debt service coverage ratio	<1 – 0 in between -- scale >= 1.2 – 25	
Days payable outstanding	>180 – 0 in between -- scale <=90 -- 25	
20. Payment risk mitigation		
20.1 If the counterparty is a special purpose entity, is it underwritten by a government guarantee or are there other mechanisms to ensure credit worthiness (e.g. through a letter of credit, escrow account, payment guarantee, or other)?	Yes- 50, No-0	
20.2 Are standard PPAs bankable?	Yes- 50, No-0	

If the score X is:
x≥ 67
33 < x < 67
33 ≤ x

INDICATOR 6. COUNTERPARTY RISK *(Continued)*

Questions	Scoring	Traffic light
	Sum and divide by 3.If there is one answer just look at that, otherwise average	
21. Utility Transparency and Monitoring		
21.1 Are the financial statements of the largest utility publicly available?		
a) Generation	Yes – 25/8, No - 0	
b) Transmission	Yes – 25/8, No - 0	
c) Distribution	Yes – 25/8, No - 0	
d) Retail sales	Yes – 25/8, No - 0	
If yes, are they audited by an independent auditor?		
e) Generation	Yes – 25/8, No - 0	
f) Transmission	Yes – 25/8, No - 0	
g) Distribution	Yes – 25/8, No - 0	
h) Retail sales	Yes – 25/8, No - 0	
21.2 Are the following metrics published in a primary official document (by the utility, regulator or ministry and/or government)?	Yes – 25/8, No - 0	If the score X is: x≥ 67 ● 33 < x < 67 ● 33 ≤ x ●
a) Generation - Electricity available for sale to end-users	Yes – 25/4, No - 0	
b) Transmission - Transmission loss rate	Yes – 25/4, No - 0	
c) Distribution - Distribution loss rate	Yes – 25/4, No - 0	
d) Retail Sales – Bill collection rate	Yes – 25/4, No - 0	
21.3 Is the utility operating an incidence/outage recording system (or SCADA/EMS with such functionality)?	Yes – 25, No – 0	
21.4 Is the utility measuring the SAIDI and SAIFI or any other measurements for service reliability?	Yes – 25/3, No – 0	
a) Are the measurements reported to the regulatory body?	Yes – 25/3, No – 0	
b) Are the measurements available to public?	Yes – 25/3, No – 0	

INDICATOR 7. CARBON PRICING AND MONITORING

Questions	Scoring	Traffic light
VI. Counterparty Risk	*Sum*	
24.1 Is there a carbon pricing mechanism (eg: carbon tax, emission trading) implemented?	Yes – 50, No – 0	If the score X is: x≥ 67 ● 33 < x < 67 ● 33 ≤ x ●
25.1 Is there a monitoring, reporting and verification system for greenhouse gas emissions in place?	Yes – 50, No – 0	

ENERGY EFFICIENCY

INDICATOR 1. NATIONAL ENERGY EFFICIENCY PLANNING

Questions	Scoring	Traffic light
	Sum and divide by 3	
1. National energy efficiency legislation/action planning		
1.1 Is there legislation or a national action plan that aims to increase EE?	Yes – 50, No – 0	
1.2 Is there an energy efficiency goal or target at the national level?	Yes – 50, No – 0	
2. Sub-sectoral targets		
2.1 Are there targets defined for any of the following sectors?		If the score X is:
• Residential sector	Yes – 20, No – 0	x≥ 67
• Commercial services sector	Yes – 20, No – 0	33 < x < 67
• Transport sector	Yes – 20, No – 0	33 ≤ x
• Industrial sector	Yes – 20, No – 0	
• Power sector	Yes – 20, No – 0	
3. Scope of targets		
3.1 Are targets derived from detailed analysis that is publicly available?	Yes – 50,No – 0	
3.2 Is there a requirement for periodic progress reports tracking data related to the efficiency target(s)?	Yes – 50,No – 0	

INDICATOR 2. ENERGY EFFICIENCY ENTITIES

Questions	Scoring	Traffic light
4. Human Capital and Institutions		
4.1 Are there governmental and/or independent bodies that carry out formulation and implementation of EE strategy, policy and regulation for each of the roles listed below:		
• Setting EE strategy	For each role	If the score X is:
• Setting EE standards	Yes – 50, No – 0	x≥ 67
• Regulating EE activities of energy suppliers	Sum and divide by the 7 roles	33 < x < 67
• Regulating EE activities of energy consumers		33 ≤ x
• Certifying compliance with equipment EE standards		
• Certifying compliance with building EE standards		
• Selecting and/or approving third party auditors tasked with certifying EE standards		
4.2 Are energy efficiency programs developed based on market analyses with plans open to public consultation and periodic evaluation?	Yes – 25, No – 0	
4.3 Are there professional certification/accreditation programs mandated for energy efficiency activities. Select all that apply:		If the score X is:
• Energy auditing/energy management	Yes to at least 1 – 25, No to all – 0	x≥ 67
• Energy efficiency financing		33 < x < 67
• Monitoring and verification of energy consumption/savings		33 ≤ x
• Building energy efficiency construction/design		
• Other		

INDICATOR 3. INFORMATION PROVIDED TO CONSUMERS ABOUT ELECTRICITY USAGE

Questions	Scoring	Traffic light
	Sum and divide by 4	
5. Reports on electricity usage		
5.1 Is it mandatory for the selected utility to provide the following customers with reports of their energy usage, in a bill or by other means for residential customers, commercial services customers, and industrial customers?	Each sector: Yes – 33.3, No – 0	
6. Quality of information in report		
6.1 At what intervals do they receive these reports (times per year)?	≤1 month – 100 1-6 months – 75 6-12 months – 50 >12 months – 0 Divide by 3 sectors	
6.2 Do the reports include the price levels customers pay for energy usage?	Each sector: Yes – 33.3, No – 0	
6.3 Does the regulator track the utility's compliance with laws for providing energy usage information to customers?	Each sector: Yes – 33.3, No – 0	
7. Comparison with other users	Each sector: Yes – 33.3, No – 0	
7.1 Do customers receive a bill or report which compares them to other users in the same region and/or usage class?		
8. Information related to energy savings		
8.1 Do customers receive a bill or report that shows their energy usage compared to previous bills or reports over time?	Each sector: Yes – 33.3, No – 0 Divide by 3 sectors	
8.2 Does the selected utility offer customers access real time feedback on energy usage (for either prepaid or post-paid systems)?	Yes – 33.3, No – 0	
8.3 Does the selected utility offer customers the ability to manage energy usage levels remotely (through apps or other technology mediums that can track real time usage)	Yes – 33.3, No – 0	

If the score X is:

x≥ 67 ●

33 < x < 67 ●

33 ≤ x ●

INDICATOR 4. EE INCENTIVES FROM ELECTRICITY RATE STRUCTURES

Questions	Scoring	Traffic light
	Sum and divide by 3	
9. Electricity rate structure 9.1 What types of electricity rate structure do the residential, commercial services, and industrial customers face? ***(time stamping) please indicate the years in which the electricity rate structure is in place for each type of customers.*** • Flat fee (per connection) • Constant (uniform) block rates • Declining block rates • Increasing block rates	Flat fee – 33.3 Declining block – 0 Constant block – 67 Increasing block – 100 If a country selects more than one option, the highest score is selected. Sum and divide by the 3 sectors	
10. Demand charges (large customers) 10.1 Which of the following charges do electricity customers pay in the commercial services sector, and industrial sector? • Energy (kWh) • Demand (kW) • Reactive power (kVAr)	Yes – 33.3, No – 0 Sum and divide by the 2 sectors	If the score X is: x≥ 67 ● 33 < x < 67 ● 33 ≤ x ●
11. Time of use tariffs 11.1 Are any of the following time-of-use (TOU) rate structures applied to the residential sector, commercial services sector, and industrial sector? • Real-time pricing • Variable peak pricing • Critical peak pricing • Seasonal rate • Peak-time rebates and/or time of day tariffs	For each sector Yes to 1 or more – 100 No to all – 0 Sum and divide by the 3 sectors	

INDICATOR 5. INCENTIVES & MANDATES: INDUSTRIAL AND COMMERCIAL END USERS

Questions	Scoring	Traffic light
	Sum and divide by 4	
12. Mandates for large consumers		
12.1 Are there any of the following energy-efficiency mandates for large energy users? • Targets (e.g. kWh savings or lower energy intensity or carbon dioxide reductions, etc.) • Mandatory audits • Progress/tracking reports • Energy-management system (computer technologies to optimize energy use)	Yes to 1 or more 33.3– , No to all – 0	
12.2 Are there penalties in place for non-compliance with regulatory obligations for EE?	Yes – 33.3, No – 0	
12.3 Is there a requirement for periodic reporting of energy consumption in order to enforce and/or track progress of energy efficiency in large consumers' facilities?	Yes – 16.7, No – 0	If the score X is: x≥ 67 ● 33 < x < 67 ● 33 ≤ x ●
12.4 Is there a measurement and verification program in place?	Yes – 16.7, No – 0	
13. Incentives for large consumers 13.1 Are energy efficiency incentives in place for large-scale users?	Yes – 100, No – 0	
14. Small-medium size enterprises (SMEs) 14.1 Is there an energy efficiency mandate or incentive program for SMEs?	Yes – 100, No – 0	
15. Performance recognition		
15.1 Is there a program to publicly recognize end users that have achieved significant energy savings measures?	Yes – 33.3 No – 0	
15.2 Are energy savings and/or financial savings publicized?	Yes – 33.3 No – 0	
15.3 Does the program offer assistance (from a government or independent entity) to end users to identify energy savings investments opportunities?	Yes – 33.3 No – 0	

INDICATOR 6. INCENTIVES & MANDATES: PUBLIC SECTOR

Questions	Scoring	Traffic light
	Sum and divide by 4	
16. Obligations for public infrastructure		
16.1 Are there binding energy savings obligations for public buildings and/or other public facilities (may include water supply, wastewater services, municipal solid waste, street lighting, transportation, and heat supply) ?	Yes – 100, No – 0	
17. Tracking and enforcement of obligations		
Is there a reporting mechanism to track and enforce energy savings in public sector facilities (either in-house or by a third party)?	Yes – 100, No – 0	
18. Public procurement of energy efficiency products		
18.1 Is there a specific policy or mandated guidelines for public procurement of energy-efficient products and services at the following levels: • National level • Region/state/province level • Municipal/city/county level	Yes on at least one level – 50 No to all – 0	If the score X is: $x \geq 67$ 🟢 $33 < x < 67$ 🟡 $33 \leq x$ 🔴
18.2 Are procurement guidelines updated periodically to reflect technological advances and best practices in energy efficient products and services?	Yes – 50, No – 0	
19. Ability to retain energy savings		
19.1 Do public budgeting regulations and practices allow public entities to retain energy savings at the following levels? Tick all applicable levels: • National level • Region/state/province level • Municipal/city/county level	Yes on at least one level – 100 No to all – 0	

INDICATOR 7. INCENTIVES & MANDATES: UTILITIES

Questions	Scoring	Traffic light
	Sum and divide by 2	
20. Mandates for utilities		
For each area: (i) generation, (ii) transmission and distribution networks, and (iii) demand-side management:	Sum and divide by the 3 areas	
20.1 Are utilities required to carry out energy efficiency activities in this area?		
20.2 Are there penalties in place for non-compliance with EE requirements?	Yes – 25, No – 0	
20.3 Are energy savings or other target indicators measured to track performance in meeting EE requirements?	Yes – 25, No – 0	
20.4 Are the requirements measured/validated by an independent third party?	Yes – 25, No – 0 Yes – 25, No – 0	If the score X is: x≥ 67 ● 33 < x < 67 ● 33 ≤ x ●
21. Cost recovery for utilities		
21.1 Are any of the following mechanisms available for utilities to recover costs associated with or revenue lost from mandated energy efficiency activities: Public budget financing Compensation for revenue losses from EE activities via a tracking account Revolving funds and/or credit lines for EE activities Partial risk guarantees Program cost recovery On-bill financing/pre-payment Decoupling	Yes to 3 or more – 100 Yes to 2 or less – 50 No to all – 0	

INDICATOR 8. FINANCING MECHANISMS FOR ENERGY EFFICIENCY

Questions	Scoring	Traffic light
	Sum and divide by 2	
22. Financing mechanisms available in each sector		
22.1 Are any of the following financing mechanisms for energy efficiency activities available in the (R) residential sector, (C) commercial services sector, and (I) industrial sector? ***(time stamping)*** If yes, please indicate the years in which the financing mechanisms are available for each type of customers. • Discounted "green" mortgages • On-bill financing/repayment • Credit lines and/or revolving funds with banks for energy efficiency activities • Energy services agreements (pay-for-performance contracts) • Green or energy efficiency bonds • Vendor credit and/or leasing for energy efficiency activities • Partial risk guarantees • Other ****Market/government mechanism information was tracked but not incorporated into the scoring***	For each sector, Yes to 3 or more – 50 Yes to 1 or 2 – 25 No to all – 0 Average of the 3 sectors	If the score X is: x≥ 67 ● 33 < x < 67 ● 33 ≤ x ●
22.2 How many financial and/or non-financial institutions offer financial products for energy efficiency investments in each sector? • None • Between 1-3 • More than 3	For each sector, More than 3– 50 Between 1-3 – 40 None – 0 Average of the 3 sectors	

INDICATOR 9. MINIMUM ENERGY EFFICIENCY PERFORMANCE STANDARDS

Questions	Scoring	Traffic light
	Sum and divide by 2	
23. Have minimum energy performance standards been adopted for?		
23.1 Refrigerators	For each category,	
23.2 Heating, ventilation and/or air conditioning (HVAC)	Yes – 100, No – 0	
23.3 Lighting equipment	Sum and divide by the 6 categories	
23.4 Industrial electric motors		
23.5 Other industrial equipment		
23.6 Light vehicles (heavy duty transport vehicles were tracked but not included in the scoring)		If the score X is: x≥ 67 🟢 33 < x < 67 🟡 33 ≤ x 🔴
24. Verification and penalties for non-compliance	For each category,	
24.1 Are the standards mandatory?	Yes – 20, No – 0	
24.2 Is there a requirement for periodic reporting to verify compliance with standards?	Yes – 20, No – 0	
24.3 Is the verification of standards compliance carried out by a third party?	Yes – 20, No – 0	
24.4 Is there a penalty for non-compliance with energy efficiency standards?	Yes – 20, No – 0	
24.5 Is there a periodic update of standards to reflect technological advances and changes in best practices for energy efficiency standards?	Yes – 20, No – 0	
	Sum and divide by the 6 categories	

INDICATOR 10. ENERGY LABELING SYSTEMS

Questions	Scoring	Traffic light
	Sum and divide by 2	
25. Have energy efficiency labeling schemes been adopted for?		
25.1 Refrigerators	For each category,	
25.2 HVAC	Yes – 100, No – 0	
25.3 Lighting equipment	Sum and divide by the 6 categories	
25.4 Industrial electric motors		
25.5 Other industrial equipment		If the score X is: x≥ 67 🟢 33 < x < 67 🟡 33 ≤ x 🔴
25.6 Transport vehicles		
26. Mandatory vs voluntary labeling system	For each category,	
26.1 Are any of the above labeling schemes mandatory?	Yes – 50, No – 0	
26.2 Is there a periodic update of standards to reflect technological advances and changes in best practices for energy efficiency labels?	Yes – 50, No – 0	
	Sum and divide by the 6 categories	

INDICATOR 11. BUILDING ENERGY CODES

Questions	Scoring	Traffic light
	Sum and divide by 5	
27. New residential and commercial buildings		
27.1 Are there energy efficiency codes for new residential buildings?	Yes – 25, No – 0	
27.2 Are there energy efficiency codes for new commercial buildings?	Yes – 25, No – 0	
27.2 Are the building energy efficiency standards required to be updated on a regular basis to reflect technological advances and changes in best practices for building energy efficiency?	For each sector Yes – 25, No – 0	
28. Compliance system		
28.1 Is commission testing for energy efficiency required for final building acceptance documentation?	Yes – 33.3, No – 0	
28.2 Is there a requirement for periodic reporting to verify compliance with building energy efficiency requirements?	Yes – 33.3, No – 0	
28.3 Is verification carried out by a third party?	Yes – 33.3, No – 0	
29. Renovated buildings	For each sector	If the score X is: $x \geq 67$ ● $33 < x < 67$ ● $33 \leq x$ ●
29.1 Are renovated buildings required to meet a building energy code, in residential and commercial sectors?	Yes – 25, No – 0	
29.2 Are the building energy efficiency standards required to be updated on a regular basis to reflect technological advances and changes in best practices for building energy efficiency?	Yes – 25, No – 0	
30. Building energy information		
30.1 Is there a mandatory standardized rating or labeling system for the energy performance of existing buildings?	Yes – 33.3, No – 0	
30.2 Are commercial and residential buildings required to disclose property energy usage at the point of sale or when leased?	Yes – 33.3, No – 0	
30.3 Are large commercial and residential buildings required to disclose property energy usage annually?	Yes – 33.3, No – 0	
31. Building energy efficiency incentives		
31.1 Are there mandates or targets for new building stocks to achieve high quality energy efficiency certifications, such as LEED (Leadership in Energy & Environmental Design) (e.g. percentage of new building stocks that must be LEED certified)?	Yes – 100 , No – 0	

INDICATOR 12. TRANSPORT SECTOR

Questions	Scoring	Traffic light
	Sum and divide by 3	
32. Planning		
32.1 Is there a national database or national reporting system to periodically track and report the following transport efficiency metrics: • Fuel per mile driven • Average distance traveled per vehicle • Distance traveled by public transit as a share of total passenger distance traveled • Vehicle miles traveled per capita • Other	Yes to 1 or more – 100, No to all – 0	
33. Private transport		
33.1 Are there any mandate or incentive programs that support reduction of transport demands or shifts to more energy efficient modes of transport for personal use, such as: • Regularly scheduled teleworking • Bicycle and/or other non-motorized schemes • Car sharing • Public transit subsidies for consumers • Congestion charges • Electric vehicle programs • Other	Yes to 1 or more – 50, No to all – 0	If the score X is: x≥ 67 🟢 33 < x < 67 🟡 33 ≤ x 🔴
33.2 Is there a requirement for periodic reporting to verify compliance or progress of the program(s)?	Yes – 50, No, 0	
34. Commercial and/or industrial transport		
34.1 Are there any mandate or incentive programs that support reduction of transport demands or shifts to more energy efficient modes of transport for commercial and/or industrial use, such as: • Heavy duty vehicle fuel economy standards (data already collected in Indicator 10 can be scored here) • Freight rail mandatory fuel economy standards or efficiency incentives • Energy efficiency procurement standards or incentives for municipal rail and bus fleets • Efficient fuel switching mandate or incentive programs for commercial/industrial vehicle fleets • Other	Yes to 1 or more – 50, No to all – 0	
34.2 Is there a requirement for periodic reporting to verify compliance or progress of the program(s)?	Yes – 50, No, 0	

INDICATOR 13. CARBON PRICING AND MONITORING

Questions	Scoring	Traffic light
	Sum	
35.1 Is there a carbon pricing mechanism (eg: carbon tax, emission trading) implemented?"	Yes – 50, No – 0	If the score X is: x≥ 67 🟢 33 < x < 67 🟡 33 ≤ x 🔴
35.2 Is there a monitoring, reporting and verification system for greenhouse gas emissions in place?	Yes – 50, No – 0	

ENERGY ACCESS

INDICATOR 1. EXISTENCE OF OFFICIALLY APPROVED ELECTRIFICATION PLAN

Questions	Scoring	Traffic light
	Sum and divide by 4	
1. Existence	≤ 5 yrs – 100	If the score X is: x≥ 67 ● 33 < x < 67 ● 33 ≤ x ●
1.1 Is there an officially approved national electrification plan?	5 > X ≤ 10 yrs - 50, other – 0	
2. Public availability of electrification plan	Yes – 100, No – 0	
2.1 Are the electrification plan and the updates publicly available?		
3. Targets and implementation	Yes – 50, No – 0	
3.1 Is there a requirement for periodic progress reports tracking progress towards the defined energy access target?	Yes – 50, No – 0	
3.2 Does the reporting actually take place?		
4. Institutions		
4.1 Are there institution(s) responsible for carrying out the following functions: • Setting electrification strategy • Setting electrification milestones and deadlines • Coordinating generation, transmission, and distribution plans and their implementation • Reporting progress towards the defined energy access target/milestones with periodic reports	For each role If yes to one or more - 25, if no to all - 0	
4.2 Is the electrification plan developed based on demand assessment?	Yes – 25, No – 0	
4.3 Were there any public consultations while developing the plan?	Yes – 25, No – 0	
4.4 Is there a provision for the plan periodic evaluations?	Yes – 25, No – 0	

INDICATOR 2. SCOPE OF OFFICIALLY APPROVED ELECTRIFICATION PLAN

Questions	Scoring	Traffic light
	Sum and divide by 6	
5. Service level target		
5.1 Does the plan target a service level (e.g. power availability, number of guaranteed hours of power supply etc.)?	Yes – 100, No – 0	
6. Inclusion of off-grid solutions		
6.1 Does the electrification plan include off-grid solutions (either/or both minigrids and standalone systems)?	Yes – 100, No – 0	
7. Inclusion of community and productive services		
7.1 Does the plan include productive uses (e.g. agricultural, commercial, and industrial activities)?	Yes – 50, No – 0	
7.2 Does the plan include community facilities (e.g. health centers, schools, administrative buildings)?	Yes – 50, No – 0	
8. Inclusion of informally settled people	Yes – 100, No – 0	
8.1 Does the plan include areas with informally settled people/groups?		
9. Gender Sensitivity		
9.1 Does the plan specifically address the electricity access of female-headed households?	Yes – 50, No – 0	
9.2 Does the plan set up a specific target on female-headed households' electrification?	Yes – 50, No – 0	
10. Geospatial mapping		
10.1 Are there geospatial maps conveying the timeframe of planned grid extension?	Yes – 50, No – 0	
10.2 Are these geospatial maps made publicly available?	Yes – 50, No – 0	

If the score X is:

$x \geq 67$ 🟢

$33 < x < 67$ 🟡

$33 \leq x$ 🔴

INDICATOR 3. FRAMEWORK FOR GRID ELECTRIFICATION

Questions	Scoring	Traffic light
	Sum and divide by 3	
11. Funding support to grid electrification		
11.1 Does the government have a dedicated funding line or budget for electrification (e.g. funded national program, budget item, rural electrification fund to finance grid extension)?	Yes – 50, No – 0	
11.2 Are there capital subsidies paid to the utilities to provide distribution systems to rural areas/villages?	Yes – 50, No – 0	If the score X is: x≥ 67 ● 33 < x < 67 ● 33 ≤ x ●
12. Funding support for consumer connections		
12.1 Are there consumer financing mechanisms (i.e. utility loans, on bill financing, micro-loans etc.) and/or direct subsidies available to support the payment of connection fees by consumers?	Yes – 100, No – 0	
13. Standards of performance on quality of supply		
13.1 Does the government specify standards of performance on reliability (e.g. number of guaranteed hours per day, duration of the electricity, frequency of outages, SAIDI, SAIFI etc.)?	Yes – 50, No – 0	
13.2 Is there a periodic reporting system in place to ensure standards compliance?	Yes – 50, No – 0	

INDICATOR 4. FRAMEWORK FOR MINIGRIDS

Questions	Scoring	Traffic light
	Sum and divide by 5	
14. Existence of national program		
14.1 Are there programs which aim to develop minigrid systems or support the development of minigrids systems?	Yes – 50, No – 0	
14.2 Do the regulations clarify what will occur when the interconnected grid reaches a minigrid?.	Yes – 50, No – 0	
15. Legal framework for operation		
15.1 Are minigrids legally allowed to operate in the country?	Yes – 25, No – 0	
15.2 Can minigrids be owned and operated by private operators?	Yes – 25, No – 0	
15.3 Do the regulations detail procedures for consumers to get connected to minigrids?	Yes – 25, No – 0	
15.4 Do the regulations differ by size of minigrids?	Yes – 25, No – 0	
16. Ability to charge cost-reflective tariffs		If the score X is: $x \geq 67$ ● $33 < x < 67$ ● $33 \leq x$ ●
16.1 Are minigrid operators legally allowed to charge a different tariff from the national tariff?	Yes – 100, No – 0	
17. Financial incentives		
17.1 Are there publicly funded mechanisms to secure viability gap funding for operators?	Yes – 33.3, No – 0	
17.2 Are there duty exemptions and/or capital subsidies for minigrid systems and/or individual components?	Yes – 33.3, No – 0	
17.3 Are there specific financing facilities (access to credit etc.) available to support operators?	Yes – 33.3, No – 0	
18. Standards and quality		
18.1 Are there technical standards detailing the requirements for minigrids to connect to the main grid?	Yes – 25, No – 0	
18.2 Are technical standards made publicly available?	Yes – 25, No – 0	
18.3 Are there safety standards for minigrids (e.g. overcurrent protection, system control etc.)?	Yes – 25, No – 0	
18.4 Are safety standards made publicly available?	Yes – 25, No – 0	

INDICATOR 5. FRAMEWORK FOR STANDALONE SYSTEMS

Questions	Scoring	Traffic light
	Sum and divide by 3	
19. Existence of national program		
19.1 Is there a national program which aims to develop standalone systems or supports standalone systems development?	Yes – 100, No – 0	
20. Financial Incentives		
20.1 Are there duty exemptions and/or subsidies to support standalone home systems?	Yes – 33.3, No – 0	If the score X is: x≥ 67 ● 33 < x < 67 ● 33 ≤ x ●
20.2 Are there legal restrictions that limit the prices standalone home system retailers or service providers can charge?	No– 33.3, Yes – 0	
20.3 Are there specific financing facilities available to support operators/consumers to develop/ purchase standalone home systems?	Yes – 33.3, No – 0	
21. Standards and quality		
21.1 Has the government adopted international quality standards for standalone systems?	Yes – 33.3, No – 0	
21.2 Has the government adopted international testing methods or does it accept testing done in another country?	Yes – 33.3, No – 0	
21.3 Are there environmental regulations on the disposal of solar devices and standalone home system products or components?	Yes – 33.3, No – 0	

INDICATOR 6. CONSUMER AFFORDABILITY OF ELECTRICITY

Questions	Scoring	Traffic light
	Sum and divide by 3	
22. Cost of subsistence consumption	If the percentage x is:	
22.1 What is the annual cost of subsistence consumption (30kWh/month) as a percentage of GNI per household of bottom 20 percent of population?	X ≥10% - 0 5% < x < 10% - scale x ≤5% - 100	If the score X is: x≥ 67 ● 33 < x < 67 ● 33 ≤ x ●
23. Affordability of the connection fee	X ≤ 12 months - 100 X between 12 and 36 months– scale X ≥ 36 months - 0)	
23.1 How many months does it take for the consumer to pay the connection fee based on savings of the bottom 20 percent of population?		
24. Policy to support low-volume consumers		
24.1 Is there a mechanism to support low-volume consumers such as social or lifeline tariff?	Yes – 100, No – 0	

INDICATOR 7. UTILITY TRANSPARENCY AND MONITORING

Questions	Scoring	Traffic light
	Sum and divide by 4	
25. Public financial statements		
25.1 Are the financial statements of the largest utility publicly available?		
a) Generation	Yes – 12.5, No - 0	
b) Transmission	Yes – 12.5, No - 0	
c) Distribution	Yes – 12.5, No - 0	
d) Retail sales	Yes – 12.5, No – 0	
25.2 If yes, are they audited by an independent auditor?		
e) Generation	Yes – 12.5, No – 0	
f) Transmission	Yes – 12.5, No – 0	
g) Distribution	Yes – 12.5, No – 0	
h) Retail sales	Yes – 12.5, No – 0	
26. Public annual reports		If the score X is: x≥ 67 33 < x < 67 33 ≤ x
26.1 Are the following metrics published in a primary official document (by the utility, regulator or ministry and/or government)?		
a) Generation - Electricity available for sale to end-users	Yes -- 25, No -- 0	
b) Transmission - Transmission loss rate	Yes -- 25, No -- 0	
c) Distribution - Distribution loss rate	Yes -- 25, No -- 0	
d) Retail Sales – Bill collection rate	Yes -- 25, No – 0	
27. Usage of outage recording system		
27.1 Is the utility operating an incidence/outage recording system (or SCADA/EMS with such functionality)?	Yes -- 100, No – 0	
28. Public reliability measurements		
28.1 Is the utility measuring the SAIDI and SAIFI or any other measurements for service reliability?	Yes – 33.3, No -- 0	
28.2 Are the measurements reported to the regulatory body?	Yes – 33.3, No -- 0	
28.3 Are the measurements available to public?	Yes – 33.3, No -- 0	

INDICATOR 8. UTILITY CREDITWORTHINESS

Questions	Scoring	Traffic light
Time stamping is from - to 2017. Indicate "0" for "no" and "1" for "yes".	*Sum*	
29. Current ratio	<1 -- 0 in between -- scale >= 1.2 -- 25	If the score X is: x≥ 67 33 < x < 67 33 ≤ x
30. EBITDA margin	<0 -- 0in between -- scale >= 15% -- 25	
31. Debt service coverage ratio	<1 -- 0in between -- scale >= 1.2 – 25	
32. Days payable outstanding	>180 -- 0in between -- scale <=90 – 25	

CLEAN COOKING SOLUTIONS

INDICATOR 1. PLANNING

Questions	Scoring	Traffic light
	Sum and divide by 3	
1. Tracking		
1.1 Does the government track household level data on cooking solutions1?	Yes – 33.3, No – 0	
(time stamping) If yes, please indicate the year in which the tracking began		
1.2 Is the data publicly available?	Yes – 33.3, No – 0	
1.3 Is the data gender disaggregated?	Yes – 33.3, No – 0	
2. Existence of plan		
2.1 Is there a national or regional plan to scale up access to clean cooking solutions, or is access to clean cooking solutions covered as a part of any other government plan (regardless of the sector)?	Yes – 33.3, No –0	
2.2 Has the plan gone through public consultation?	Yes - 33.3, No – 0	
2.2.1 Have consultations taken the gender of participants into account?	Yes - 33.3, No – 0	
3. Institutional Capacity		
3.1 Are there agencies dedicated to the following functions? If so, for each agency, indicate whether it is a government agency or an independent body, has a dedicated budget or funding line, and the name of the agency: i. Setting clean cooking strategy/action plan ii. Setting, monitoring and enforcing standards for clean cooking solutions iii. Tracking access and adoption of clean cooking solutions (time stamping) If yes, please indicate the years in which each institution was given the responsibility(-ies).	For each agency: Yes – 33.3, No – 0	

If the score X is:

- $x \geq 67$
- $33 < x < 67$
- $33 \leq x$

INDICATOR 2. SCOPE OF PLANNING

Questions	Scoring	Traffic light
	Sum and divide by 3	
4. Aspects of the plan		
4.1 Does the plan take into account geographical and demographical considerations to prioritize the most vulnerable consumers2?	Yes – 50, No – 0	
4.2 Does the plan include considerations and action items for involving women throughout the supply chain of clean cooking solutions?	Yes – 50, No – 0	
5. Awareness strategy		
5.1 Is there a targeted awareness raising strategy to drive adoption of clean cooking solutions? Select any of the following that apply: • Training programs for new stove technologies • Cooking competitions with stove technologies • Nationally-sponsored educational campaigns for new stove technologies • Private sector advertising campaigns for new stove technologies • Partnerships with CSOs and community-based organizations • Other	Yes to one or more - 50, No to all - 0	If the score X is: x≥ 67 ● 33 < x < 67 ● 33 ≤ x ●
5.2 Does the awareness strategy include targeted messages to both men and women?	Yes – 50, No – 0	
6. Last mile distribution		
6.1 Is there a last mile distribution strategy3 in place for cooking fuels?	Yes – 50, No – 0	
6.2 Is there a last mile distribution strategy in place for cooking technologies?	Yes – 50, No – 0	

INDICATOR 3. STANDARDS AND LABELING

Questions	Scoring	Traffic light
	Sum and divide by 3	
7. Standards		
7.1 Are there standards for the following aspects of clean cooking solutions: i. Efficiency ii. Emissions i. If yes, what kind of standards? (eg: PM 2.5) iii. Safety	For each: Yes – 33.3, No – 0	
8. Monitoring and verification		If the score X is: x≥ 67 ● 33 < x < 67 ● 33 ≤ x ●
8.1 Is there a verification program in place for standards?	Yes – 25, No – 0	
8.2 Does the program work with a standards testing facility or lab?	Yes – 25, No – 0	
8.3 Does the stove testing facility or lab need to be accredited?	Yes – 25, No – 0	
8.4 Have the standards been verified through field testing?	Yes – 25, No – 0	
9. Labeling		
9.1. Have labeling schemes been adopted on clean cooking products for: i. Efficiency ii. Emissions (time stamping) Please indicate the year in which each labeling scheme was adopted.	For each: Yes – 50, No – 0 Yes – 50, No – 0	

INDICATOR 4. INCENTIVES AND ATTRIBUTES

Questions	Scoring	Traffic light
	Sum and divide by 2	
10. Financing mechanisms		
10.1 Are there specific financing facilities available to support suppliers/consumers to develop/purchase clean cooking solutions?	Yes – 50, No – 0	
Specify the aspects that apply: • Supplier or consumer • Type of fuel • Specific stove technology		
(time stamping) Please indicate the year in which each financing facility was first made available		
10.2 Are there specific financing or subsidy programs for clean cooking solutions targeted to low income consumers?	Yes – 50, No – 0	
Select the aspects that apply: • Supplier/consumer • Type of fuel • Specific stove technology		If the score X is: $x \geq 67$ ● $33 < x < 67$ ● $33 \leq x$ ●
(time stamping) Please indicate the year in which each program was first made available		
11. Supplier incentives		
11.1 Are there duty exemptions, tax benefits, and/or subsidies to support clean cooking solutions?	Yes – 50, No – 0	
Specify the aspects that apply: • Type of incentive • Type of fuel • Specific stove technology		
(time stamping) Please indicate the year in which each incentive was first made available		
11.2 Are there programs for commercial entities to invest in efficient, low-emission stoves? (time stamping) Please indicate the year in which each program was first made available	Yes – 50, No – 0	

CLEAN COOKING PILOT COUNTRIES

South Asia	East Asia & Pacific	Latin America	Sub-Saharan Africa
India	China	Haiti	Ghana
Nepal	Indonesia	Guatemala	Kenya
	Lao PDR		Madagascar
			Rwanda
			Uganda

B. QUESTIONS TO ASSESS POLICY ENFORCEMENT

ELECTRICITY ACCESS

- Is there a requirement for periodic progress reports tracking progress towards the defined energy access target?
- Does the reporting actually take place?
- Is there a provision for the plan periodic evaluation?
- Does the government specify standards of performance on reliability?
- Is there a periodic reporting system in place to ensure standards compliance?
- Are there publicly funded mechanisms to secure viability gap funding for operators?
- Are there duty exemptions and/or capital subsidies for mini grid systems and/or individual components?
- Are there specific financing facilities available to support operators?
- Is there a national program which aims to develop standalone systems or support stand-alone systems' development?
- Are there specific financing facilities to support operators/consumers to develop/purchase standalone home systems?
- Is there a mechanism to support low-volume consumers such as social or lifeline tariff?
- Is the utility operating an incidence/outage recording system (or SCADA/EMS with such functionality)?
- Is the utility measuring the SAIDI and SAIFI or any other measurements for service reliability?
- Are the measurements reported to the regulatory body?
- Are the measurements available to public?

RENEWABLE ENERGY

- Is there an institution responsible for tracking progress in renewable energy development?
- Is there any periodic reporting mechanism for renewable energy progress?
- Is current policy environment conducive to renewable energy deployment?
- Is the compensation due because of curtailment actually given out?
- Is there a pre-qualification process to select bidders?
- Are there provisions to ensure full and timely project completion (e.g. bid-bonds, project milestones)

- Do the connection procedures meet international best practices?
- Are dispatch operations being carried out in real time?
- Are standard PPAs bankable?
- Are the measurements reported to the regulatory body?
- Is there a monitoring, reporting and verification system for greenhouse gas emissions in place?

ENERGY EFFICIENCY

- Is there a requirement for periodic progress reports tracking data related to the efficiency target(s)?
- Are energy efficiency programs developed based on market analyses with plans open to public consultation and periodic evaluation?
- Is there a requirement for periodic reporting of energy consumption in order to enforce and/or track progress of energy efficiency in large consumers' facilities?
- Is there a reporting mechanism to track and enforce energy savings in public sector facilities (either in-house or by a third party)?
- Are there penalties in place for non-compliance with EE requirements? Generation, T&D and DSM
- Are energy savings or other target indicators measured to track performance in meeting EE requirements? Generation, T&D and DSM
- Are the requirements measured/validated by an independent third party? Generation, T&D and DSM
- Is there a requirement for periodic reporting to verify compliance with standards? Refrigerators, HVAC, lighting equipment, industrial electric motors, transport vehicles, other industrial equipment
- Is the verification of standards compliance carried out by a third party? Refrigerators, HVAC, lighting equipment, industrial electric motors, transport vehicles, other industrial equipment
- Is there a penalty for non-compliance with energy efficiency standards? Refrigerators, HVAC, lighting equipment, industrial electric motors, transport vehicles, other industrial equipment
- Is there a periodic update of standards to reflect technological advances and changes in best practices for energy efficiency labels? Refrigerators, HVAC, lighting equipment, industrial electric motors, transport vehicles, other industrial equipment
- Is commission testing for energy efficiency required for final building acceptance documentation?
- Is there a requirement for periodic reporting to verify compliance with building energy efficiency requirements?
- Is verification carried out by a third party?

C. THE 133 COUNTRIES IN THE 2018 EDITION OF THE RISE REPORT

REGIONAL AND INCOME CLASSIFICATION (WORLD BANK, JUNE 2017)

Economy	Code	Region	Income group
Afghanistan*	AFG	South Asia	Low income
Algeria	DZA	Middle East & North Africa	Upper middle income
Angola*	AGO	Sub-Saharan Africa	Lower middle income
Argentina	ARG	Latin America & Caribbean	Upper middle income
Armenia	ARM	Europe & Central Asia	Lower middle income
Australia	AUS	OECD High Income	High income
Austria	AUT	OECD High Income	High income
Azerbaijan	AZE	Europe & Central Asia	Upper middle income
Bahrain	BHR	Middle East & North Africa	High income
Bangladesh*	BGD	South Asia	Lower middle income
Belarus	BLR	Europe & Central Asia	Upper middle income
Belgium	BEL	OECD High Income	High income
Benin*	BEN	Sub-Saharan Africa	Low income
Bolivia	BOL	Latin America & Caribbean	Lower middle income
Brazil	BRA	Latin America & Caribbean	Upper middle income
Bulgaria	BGR	Europe & Central Asia	Upper middle income
Burkina Faso*	BFA	Sub-Saharan Africa	Low income
Burundi*	BDI	Sub-Saharan Africa	Low income
Cambodia*	KHM	East Asia & Pacific	Lower middle income
Cameroon*	CMR	Sub-Saharan Africa	Lower middle income
Canada	CAN	OECD High Income	High income
Central African Republic*	CAF	Sub-Saharan Africa	Low income
Chad*	TCD	Sub-Saharan Africa	Low income
Chile	CHL	OECD High Income	High income
China	CHN	East Asia & Pacific	Upper middle income
Colombia	COL	Latin America & Caribbean	Upper middle income
Congo, Dem. Rep.*	COD	Sub-Saharan Africa	Low income
Congo, Rep.*	COG	Sub-Saharan Africa	Lower middle income

Economy	Code	Region	Income group
Costa Rica	CRI	Latin America & Caribbean	Upper middle income
Côte d'Ivoire*	CIV	Sub-Saharan Africa	Lower middle income
Croatia	HRV	Europe & Central Asia	Upper middle income
Czech Republic	CZE	OECD High Income	High income
Denmark	DNK	OECD High Income	High income
Dominican Republic	DOM	Latin America & Caribbean	Upper middle income
Ecuador	ECU	Latin America & Caribbean	Upper middle income
Egypt, Arab Rep.	EGY	Middle East & North Africa	Lower middle income
El Salvador	SLV	Latin America & Caribbean	Lower middle income
Eritrea*	ERI	Sub-Saharan Africa	Low income
Ethiopia*	ETH	Sub-Saharan Africa	Low income
Finland	FIN	OECD High Income	High income
France	FRA	OECD High Income	High income
Germany	DEU	OECD High Income	High income
Ghana*	GHA	Sub-Saharan Africa	Lower middle income
Greece	GRC	OECD High Income	High income
Guatemala*	GTM	Latin America & Caribbean	Lower middle income
Guinea*	GIN	Sub-Saharan Africa	Low income
Haiti*	HTI	Latin America & Caribbean	Low income
Honduras*	HND	Latin America & Caribbean	Lower middle income
Hungary	HUN	OECD High Income	High income
India*	IND	South Asia	Lower middle income
Indonesia*	IDN	East Asia & Pacific	Lower middle income
Iran, Islamic Rep.	IRN	Middle East & North Africa	Upper middle income
Ireland	IRL	OECD High Income	High income
Israel	ISR	Middle East & North Africa	High income
Italy	ITA	OECD High Income	High income
Jamaica	JAM	Latin America & Caribbean	Upper middle income
Japan	JPN	OECD High Income	High income
Jordan	JOR	Middle East & North Africa	Lower middle income
Kazakhstan	KAZ	Europe & Central Asia	Upper middle income
Kenya*	KEN	Sub-Saharan Africa	Lower middle income
Korea, Rep.	KOR	OECD High Income	High income
Kuwait	KWT	Middle East & North Africa	High income
Kyrgyz Republic	KGZ	Europe & Central Asia	Lower middle income

Economy	Code	Region	Income group
Lao PDR*	LAO	East Asia & Pacific	Lower middle income
Lebanon	LBN	Middle East & North Africa	Upper middle income
Liberia*	LBR	Sub-Saharan Africa	Low income
Madagascar*	MDG	Sub-Saharan Africa	Low income
Malawi*	MWI	Sub-Saharan Africa	Low income
Malaysia	MYS	East Asia & Pacific	Upper middle income
Maldives	MDV	South Asia	Upper middle income
Mali*	MLI	Sub-Saharan Africa	Low income
Mauritania*	MRT	Sub-Saharan Africa	Lower middle income
Mexico	MEX	Latin America & Caribbean	Upper middle income
Mongolia*	MNG	East Asia & Pacific	Lower middle income
Morocco	MAR	Middle East & North Africa	Lower middle income
Mozambique*	MOZ	Sub-Saharan Africa	Low income
Myanmar*	MMR	East Asia & Pacific	Lower middle income
Nepal*	NPL	South Asia	Low income
Netherlands	NLD	OECD High Income	High income
New Zealand	NZL	East Asia & Pacific	High income
Nicaragua*	NIC	Latin America & Caribbean	Lower middle income
Niger*	NER	Sub-Saharan Africa	Low income
Nigeria*	NGA	Sub-Saharan Africa	Lower middle income
Norway	NOR	OECD High Income	High income
Oman	OMN	Middle East & North Africa	High income
Pakistan*	PAK	South Asia	Lower middle income
Papua New Guinea*	PNG	East Asia & Pacific	Lower middle income
Panama	PAN	Latin America & Caribbean	Upper middle income
Paraguay	PRY	Latin America & Caribbean	Upper middle income
Peru	PER	Latin America & Caribbean	Upper middle income
Philippines*	PHL	East Asia & Pacific	Lower middle income
Poland	POL	OECD High Income	High income
Portugal	PRT	OECD High Income	High income
Qatar	QAT	Middle East & North Africa	High income
Romania	ROU	Europe & Central Asia	Upper middle income
Russian Federation	RUS	Europe & Central Asia	Upper middle income
Rwanda*	RWA	Sub-Saharan Africa	Low income
Saudi Arabia	SAU	Middle East & North Africa	High income
Senegal*	SEN	Sub-Saharan Africa	Low income

Economy	Code	Region	Income group
Serbia	SRB	Europe & Central Asia	Upper middle income
Sierra Leone*	SLE	Sub-Saharan Africa	Low income
Singapore	SGP	East Asia & Pacific	High income
Slovak Republic	SVK	OECD High Income	High income
Solomon Islands*	SLB	East Asia & Pacific	Lower middle income
Somalia*	SOM	Sub-Saharan Africa	Low income
South Africa*	ZAF	Sub-Saharan Africa	Upper middle income
South Sudan*	SSD	Sub-Saharan Africa	Low income
Spain	ESP	OECD High Income	High income
Sri Lanka	LKA	South Asia	Lower middle income
Sudan	SDN	Sub-Saharan Africa	Lower middle income
Sweden	SWE	OECD High Income	High income
Switzerland	CHE	OECD High Income	High income
Tajikistan	TJK	Europe & Central Asia	Lower middle income
Tanzania*	TZA	Sub-Saharan Africa	Low income
Thailand	THA	East Asia & Pacific	Upper middle income
Togo*	TGO	Sub-Saharan Africa	Low income
Tunisia	TUN	Middle East & North Africa	Lower middle income
Turkey	TUR	Europe & Central Asia	Upper middle income
Turkmenistan	TKM	Europe & Central Asia	Upper middle income
Uganda*	UGA	Sub-Saharan Africa	Low income
Ukraine	UKR	Europe & Central Asia	Lower middle income
United Arab Emirates	ARE	Middle East & North Africa	High income
United Kingdom	GBR	OECD High Income	High income
United States	USA	OECD High Income	High income
Uruguay	URY	Latin America & Caribbean	High income
Uzbekistan	UZB	Europe & Central Asia	Lower middle income
Vanuatu*	VUT	East Asia & Pacific	Lower middle income
Venezuela, RB	VEN	Latin America & Caribbean	Upper middle income
Vietnam	VNM	East Asia & Pacific	Lower middle income
West Bank and Gaza	PSE	Middle East & North Africa	Lower middle income
Yemen, Rep. *	YEM	Middle East & North Africa	Lower middle income
Zambia*	ZMB	Sub-Saharan Africa	Lower middle income
Zimbabwe*	ZWE	Sub-Saharan Africa	Low income

*Countries included in the electricity access analysis. Electricity access policies were not assessed in countries with less than 10% of the population and fewer than 1 million people lack access to electricity

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RISE report, customized analyses, datasets, and library of legal and regulatory documents are available in:

http://RISE.esmap.org