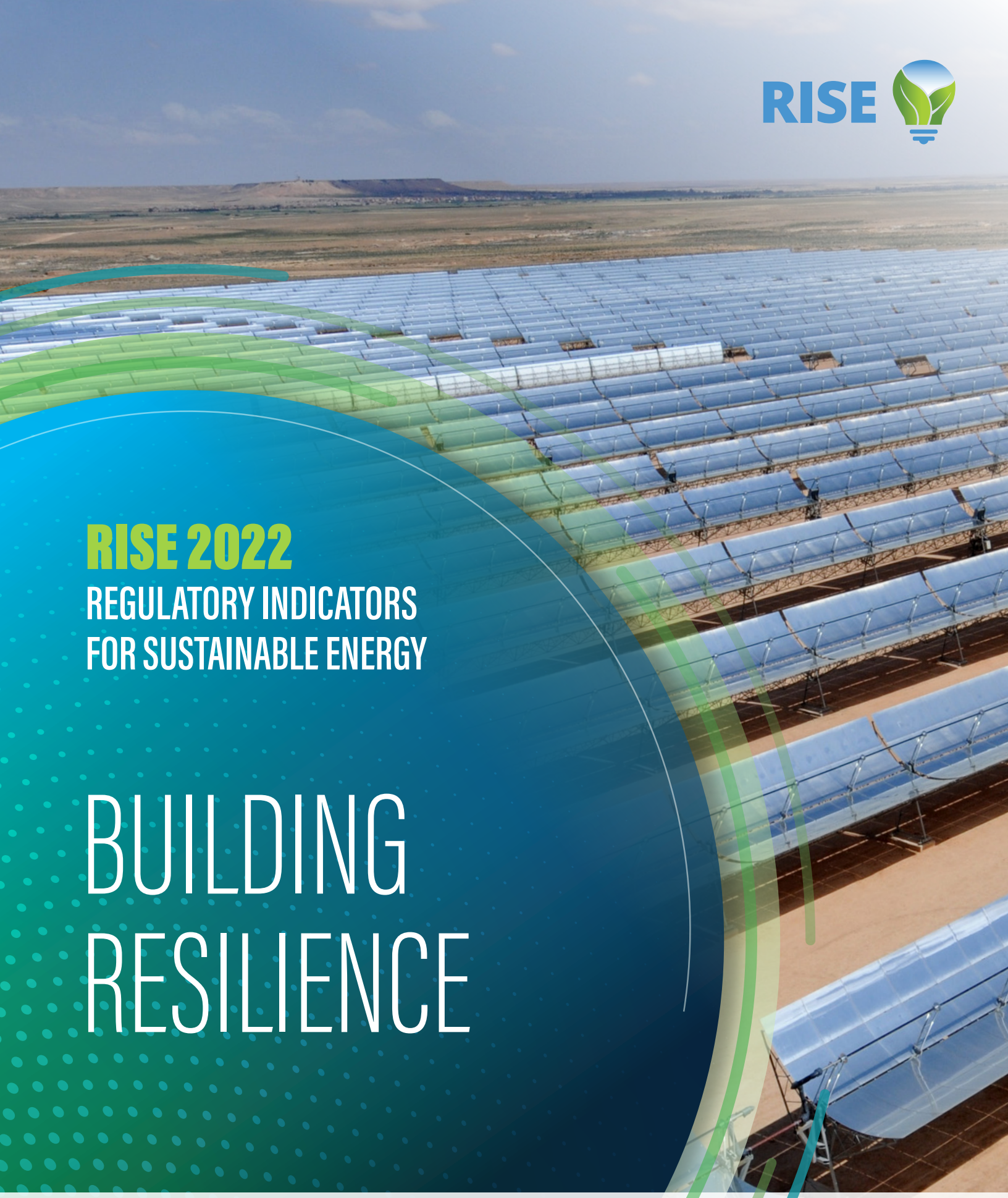
RISE

RISE 2022

REGULATORY INDICATORS FOR SUSTAINABLE ENERGY

BUILDING RESILIENCE



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ESMAP
Energy Sector Management Assistance Program

ABOUT ESMAP

The Energy Sector Management Assistance Program (ESMAP) is a partnership between the World Bank and 24 partners to help low- and middle-income countries reduce poverty and boost growth through sustainable energy solutions. ESMAP's analytical and advisory services are fully integrated within the World Bank's country financing and policy dialogue in the energy sector. Through the World Bank Group (WBG), ESMAP works to accelerate the energy transition required to achieve Sustainable Development Goal 7 (SDG 7) to ensure access to affordable, reliable, sustainable, and modern energy for all. It helps to shape WBG strategies and programs to achieve the WBG Climate Change Action Plan targets. Learn more at: https://esmap.org

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ACRONYMS AND ABBREVIATIONS

AfDB	African Development Bank
DRC	Democratic Republic of the Congo
EAP	East Asia & Pacific
ERI	Electricity Regulatory Index
FCV	Fragility, Conflict & Violence
GDP	Gross Domestic Product
GERI	Global Electricity Regulatory Index
GNI	Gross National Income
HVAC	Heating, Ventilation, and Air Conditioning
IDCOL	Infrastructure Development Company Limited
IEA	International Energy Agency
IRENA	International Renewable Energy Agency
LAC	Latin America & Caribbean
Lao PDR	Lao People's Democratic Republic
LPG	Liquefied Petroleum Gas
MENA	Middle East and North Africa
NGOs	Non-government organizations
OECD	Organization for Economic Co-operation and Development
PV	Photovoltaics
RISE	Regulatory Indicators for Sustainable Energy
RPSR	Rethinking Power Sector Reform
SA	South Asia
SSA	Sub-Saharan Africa
SDG 7	Sustainable Development Goal 7
UNSD	United Nations Statistics Division
WB	World Bank
WHO	World Health Organization

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The financial support of ESMAP is gratefully acknowledged. ESMAP is a partnership between the World Bank and 24 partners to help low- and middle-income countries reduce poverty and boost growth through sustainable energy solutions. ESMAP's analytical and advisory services are fully integrated within the World Bank's country financing and policy dialogue in the energy sector. Through the World Bank Group, ESMAP works to accelerate the energy transition required to achieve Sustainable Development Goal 7 (SDG7) to ensure access to affordable, reliable, sustainable and modern energy for all. It helps to Qshape the Bank Group's strategies and programs to achieve its Climate Change Action Plan targets.

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RISE BY THE NUMBERS

RISE's 4th edition covers

12 years of data on **30 indicators**
across 4 pillars: **electricity access**, **clean cooking**, **renewable energy**, and **energy efficiency**

RISE analyzes

140 economies that now account for

98 percent of the world's population

In 2019,

60 countries
had built advanced policy frameworks; by the end of 2021, 68 countries had done so

80 percent of countries
surveyed globally improved their overall RISE scores

Global Progress on Sustainable-Energy Regulation:
Global Average

2017: 52/100
2019: 57/100
2021: 60/100

Utility Creditworthiness Lags Behind:
Global Average

2019: 34/100
2021: 30/100

Mechanisms of Support During Covid-19, Globally:
% of Surveyed Countries

41% mechanisms for end users
39% financial support to service providers
44% electrification of public institutions

Regional Differences in Covid-19 Support:
Most Prevalent Mechanism and % of Countries in the Region

EAP: Financial support to utilities, mini grids and off-grid companies (48%)
LAC: Electrification of, and access to, public institutions (60%)
S. Asia: Financial support to end users (38%) and utilities, mini grids, and off-grid companies (38%)
SSA: Financial support to end users (37%)

Evolution of RISE Scores for Electricity Access
Global Average

2010: 16/100
2017: 36/100
2019: 48/100
2021: 53/100

2021 Regional Differences in RISE Scores for Electricity Access
Regional Averages

LAC: 54/100
SSA: 54/100
EAP: 53/100
S. Asia: 50/100

2021 Differences Across RISE Pillars for Electricity Access
Global Averages

Electrification planning: 58/100
Scope of electrification plan: 51/100
Grid electrification: 52/100
Mini grids: 45/100
Off-grid systems: 57/100
Consumer affordability: 71/100
Utility transparency: 68/100
Utility creditworthiness: 30/100

Evolution of RISE Scores for Clean Cooking
Global Average

2010: 6/100
2017: 22/100
2019: 27/100
2021: 32/100

2021 Regional Differences in RISE Scores for Clean Cooking
Regional Averages

LAC: 28/100
SSA: 32/100
EAP: 31/100
S. Asia: 42/100

2021 Differences Across RISE Pillars for Clean Cooking
Global Averages

Clean Cooking National Plan: 47/100
Scope of planning: 37/100
Standards and Labeling: 18/100
Financial Incentives: 26/100

Evolution of RISE Scores for Renewable Energy
Global Average

2010: 19/100
2017: 45/100
2019: 51/100
2021: 55/100

2021 Regional Differences in RISE Scores for Renewable Energy
Regional Averages

EAP: 44/100
ECA: 51/100
LAC: 55/100
MENA: 57/100
OECD: 81/100
S. Asia: 43/100
SSA: 44/100

2021 Differences Across RISE Pillars for Renewable Energy
Global Averages

Legal framework: 75/100
Planning for expansion: 65/100
Incentives and regulatory support: 46/100
Attributes of incentives: 47/100
Network connection and use: 49/100
Counterparty risk: 54/100
Carbon Pricing and monitoring: 51/100

Evolution of RISE Scores for Energy Efficiency
Global Average

2010: 16/100
2017: 38/100
2019: 43/100
2021: 46/100

2021 Regional Differences in RISE Scores for Energy Efficiency
Regional Averages

EAP: 44/100
ECA: 49/100
LAC: 40/100
MENA: 50/100
OECD: 75/100
S. Asia: 41/100
SSA: 26/100

2021 Differences Across RISE Pillars for Energy Efficiency
Global Averages

National EE Planning: 73/100
EE Entities: 70/100
Commercial & Industrial EE Incentives: 51/100
Public Sector EE Incentives: 44/100
Energy Utility EE Incentives: 41/100
Financing Mechanisms: 21/100
Performance Standards: 47/100
Energy Labeling: 45/100
Building Energy Codes: 36/100
Transport Sector EE: 33/100
Carbon Pricing & Monitoring: 48/100

Top 5 Countries Making Fastest Improvements in **Electricity Access**:
1. Guatemala
2. Nigeria
3. Angola
4. Honduras
5. Kenya

Top 5 Countries Making Fastest Improvements in **Clean Cooking**:
1. Rwanda
2. Congo, Dem. Rep
3. Burundi
4. Bangladesh
5. Guatemala

Top 5 Countries Making Fastest Improvements in **Renewable Energy**:
1. Côte d'Ivoire
2. Mozambique
3. Saudi Arabia
4. Lebanon
5. Vietnam

Top 5 Countries Making Fastest Improvements in **Energy Efficiency**:
1. Côte d'Ivoire
2. Saudi Arabia
3. Chile
4. Senegal
5. Zambia

KEY MESSAGES

1. **Content of the fourth edition of the RISE survey and report.** Data were collected at the end of 2021, so the RISE scores reflect important policy trends in the recent aftermath of the COVID-19 pandemic. Major impacts on the energy sector that occurred during the 2022 calendar year, such as the effects of the war in Ukraine, will not be reflected in the RISE 2022 data, but will be captured in the next edition of RISE which will span the 2022-2023 calendar years. On the RISE website, users may select the specific indicators and timelines they would like to view for subsets of countries or regions. The customization feature has been added and refined in the Analytics section of the website over the last two years to enable different types of important analyses that might not necessarily be captured in a high level summary report.

2. **The global average RISE score across all countries and indicators improved consistently, from 57 in 2019 to 60 in 2021, and all energy pillars have shown continued growth since 2019.** Global efforts have focused on developing sustainable energy policies and regulations in the energy transition. Recovery efforts for the COVID-19 pandemic have also strengthened access to electricity priorities worldwide.

3. **In addition, all regions saw advances in comprehensive policy and regulatory frameworks in the 2019-2021 period, but progress was uneven.** All regions have now improved their average overall scores from the red zone into the yellow zone by the end of 2021, including Sub-Saharan Africa. On overall policy development, two regions (Sub-Saharan Africa and Latin America and the Caribbean) made the greatest progress during the 2019-2021 cycle, with Ecuador, Kenya, Panama, and Rwanda having made the leap in scores into the green zone by the end of 2021.

4. **A notable exception to these positive trends is utility creditworthiness, which has deteriorated across several regions.** Policy support for utilities is lacking, especially in access-deficit countries, as scores for utility creditworthiness actually regressed on average over the past two years—possibly because of the impacts of COVID-19. Even among countries with universal access to electricity, nearly a quarter of the surveyed distribution utilities struggled with substandard performance of creditworthiness. The global drop in the utility creditworthiness score was driven largely by the countries in South Asia and Sub-Saharan Africa.

5. **Globally, energy policies on electrification plans, off-grid access, and utility transparency have improved the most since 2010, but none of these indicators has reached the green zone in the RISE score.** Frameworks for the grid and minigrids have also advanced steadily in the past decade. Only the consumer affordability of electricity indicator has reached the green zone on a global average. Africa's electrification framework has caught up with global leader LCR surpassing Asia. In addition, a systematic neglect of four key policy areas has held back their progress over time. These are: financing mechanisms for energy efficiency; regulations addressing variability and integration of renewables; enforceable standards and labelling for clean cooking products and fuels; and, transport sector energy efficiency.

6. **Off-grid access policies remain a key priority for the large majority of countries with electricity access deficits.** Mini grids and solar home systems are now widely viewed as viable alternatives for grid extension in targeted geographical areas, provided that adequate regulations and incentives are in place to build an enabling environment to attract investments in off-grid solutions. Accord-

ingly, development of the off-grid electrification framework exceeds that for the main grid in most countries with an electricity access deficit, especially in Africa.

7. **In clean cooking, different regions have advanced at different paces over the past 12 years.** Although the Africa region has the lowest regional average, since 2010 it has shown a consistent uptick, albeit from a lower starting point. On average, South Asian countries are leading on policy and regulatory frameworks for clean cooking. In three out of four access-deficit regions—East Asia and Pacific, South Asia, and Sub-Saharan Africa—RISE scores range widely from 0 to 79. Among the 35 countries in the Sub-Saharan African region, only Kenya and Rwanda score in the green zone.

8. **Renewable energy policies demonstrate market maturity but still have room for improvement.** Tax reduction was the most prevalent renewable energy fiscal incentive in place in 2021 to attract large-scale corporate investments. Renewable technologies have become cost-competitive with traditional baseload energy sources over the past decade, and many countries have phased out incentives that compensate renewable energy production. However, 29 countries still score in the red zone, and renewable energy integration regulations remain lacking.

9. **Energy efficiency policies are not receiving adequate attention amid unprecedent energy price hikes.** Despite little noticeable global improvement in energy efficiency scores between 2019 and 2021, the unprecedented energy crisis now faced in Europe and globally should prompt more countries to recognize the cost-effectiveness of energy efficiency measures in managing energy demand.

EXECUTIVE SUMMARY

RISE: RIGOROUS, ADAPTIVE, AND COMPREHENSIVE

RISE—Regulatory Indicators for Sustainable Energy—is a set of indicators intended for use in comparing the policy and regulatory frameworks that countries have put in place to support the achievement of Sustainable Development Goal 7 (SDG7) on universal access to clean and modern energy. This fourth edition of the index captures policy and regulatory support that enhances sustainable energy in the form of 30 indicators and 85 subindicators distributed among four pillars: electricity access, clean cooking, renewable energy, and energy efficiency. The RISE indicators, scored on a 0–100 scale, can be used to compare 140 economies that now account for 98 percent of the world's population. Cross-pillar comparisons must be nuanced, however, so the RISE online platform provides an opportunity for deeper analysis: https://rise.esmap.org.

To capture recent changes in the energy sector over the last two years, RISE 2022 has refined the indicators for all pillars, recalculating the entire time series dating back to 2010 for all countries, to better reflect recent changes in the energy sector. RISE scores in this edition reflect the status of policies and regulations in each country in the recent aftermath of the COVID-19 pandemic. Major impacts on the energy sector that occurred during the 2022 calendar year, such as the effects of the war in Ukraine, however, are not included in this edition and will be included in the next edition.

The global economic crisis brought on by the COVID-19 pandemic affected sustainable energy policies, in both negative and positive ways. In many countries where utilities were already under financial duress, the pandemic exacerbated utilities' ability to provide essential services. However, sustainable energy policies have now been embedded in recovery stimulus packages to help minimize market disruptions in the energy sector.

The RISE score is not the only precursor or indicator of SDG7 progress or investment, and measuring the quality and enforcement of policies remains challenging. RISE provides a record of laws, regulations, and policies that countries enact to support sustainable energy. Still, by measuring the level and ambition of policy adoption in countries, the indicators can help policy makers benchmark their own national energy framework against those of regional and global peers.

GLOBAL PROGRESS: MOVING FORWARD, BUT SLOW AND UNEVEN PACE

Globally, since 2019, the number of countries with advanced policy frameworks for sustainable energy has continued to grow, even during the Covid-19 pandemic. Over the past two years, more than 80 percent of countries surveyed globally improved their overall RISE scores. Improvements in off-grid policies, affordability, renewable energy planning and target setting, and several energy efficiency incentives were most evident. These initiatives have been embedded in many countries' COVID-19 recovery plans. Indeed, a new RISE survey module focusing on electricity access policies during the COVID-19 pandemic revealed that many countries in each region included considerations in their COVID-19 recovery packages to minimize disruptions to electricity access, quality, and affordability, for both households and public institutions, and most significantly in sub-Saharan Africa.

However, the pace of improvement from 2019 to 2021 was slower than during the previous two-year cycle of 2017–19, and progress has been uneven. Across all dimensions of sustainable energy, average global scores still show room for improvement, particularly in clean cooking. All regions saw advances in comprehensive policy and regulatory frameworks in the 2019-2021 period, but progress was uneven. On overall policy

development, two regions (Sub-Saharan Africa and Latin America and the Caribbean) made the greatest progress during the 2019-2021 cycle. Utility creditworthiness, in particular, lagged behind despite its importance for enabling sustainable energy access.

ELECTRICITY ACCESS: CONTINUED IMPROVEMENT OVER THE PAST TWO YEARS DESPITE EXTERNAL ECONOMIC SHOCKS

Despite a slowdown in the global economy, many governments have made significant progressed on their RISE electricity access scores in 2019–21. Electrification planning, frameworks for mini grids and off-grid systems, and utility transparency and monitoring were the indicators that mainly contributed to the continued increase in electricity access scores in 2019–21. During the period, however, the electricity access pillar experienced a slower rise than in 2017–19. The average growth rate was 5.8 points per year between 2017 and 2019, but the pace almost halved in 2019–21, to 2.6 percentage points.

As of 2021, more than half of the population without access still lived in countries where an enabling policy environment is at the early and middle stages. Although consistent progress has been made since 2019, 409 million people lacking electrification of the surveyed countries, mostly in Sub-Saharan Africa, did not yet benefit from plans for advanced policies and regulations in 2021. On the positive side, the two largest access-deficit countries—Nigeria and Ethiopia—showed a noteworthy progress and have reached the green zone in their overall scores between 2019 and 2021, thanks to the well-established policy and regulatory measures, including electrification planning, frameworks for mini grids and off-grid systems, and consumer affordability of electricity.

Electricity access scored the highest in Sub-Saharan Africa and Latin America and the Caribbean, outpacing the global average in 2021. These two regions made the greatest advancement in 2019–21, reaching a RISE score of 54 each in electricity access. In contrast to other regions, the evolution of the scores in South Asia was relatively sluggish because of low scores on the utility creditworthiness indicator, which can be partly explained by the fiscal constraints of COVID-19 recovery across regions.

CLEAN COOKING: SLOW GROWTH AFTER A DECADE OF SUSTAINED PROGRESS

Progress in clean cooking regulatory frameworks slightly increased during the 2019–21 period, but progress in clean cooking policies nearly flattened in all regions in the period 2019-2021, except in the East Asia Pacific and Latin America and Caribbean regions. On average, South Asian countries are leading on policy and regulatory frameworks for clean cooking, but only India among them scores in the green zone. In three out of four access-deficit regions—East Asia and Pacific, South Asia, and Sub-Saharan Africa—RISE scores range widely from 0 to 79.

Globally, the highest improvements in RISE scores over the last two years have been achieved by Rwanda, the Democratic Republic of Congo, and Burundi, but none of these countries have managed to improve their access to clean cooking rate above 5 percent. Rwanda was the only country that improved its clean cooking score from the yellow zone into the green zone between 2019 and 2021, while Burundi, Niger, and Nigeria were the only countries to improve their scores from the red zone to the yellow zone.

Among the countries surveyed, 2.4 billion still people do not have access to clean cooking, yet less than half of them is in countries that now score in the red zone. In particular, clean cooking policies tailored to target beneficiaries, ensure quality and provide financial incentives lag behind. Last mile distribution also remains overlooked in the majority of countries surveyed, and the indicator on financial incentives for suppliers clearly shows more room for improvement, particularly with respect to end user incentives for low-income consumers.

RENEWABLE ENERGY: MARKET MATURITY IS EVIDENT IN RECENT POLICY TRENDS

Renewable energy policy and regulation has been increasing at a slower pace, with the period from 2019 to 2021 experiencing 33 percent less average annual growth than the 2017–19 period. Since 2010, only the Legal Framework for Renewable Energy indicator has achieved an average score in the green zone. Tax Reductions were the most prevalent renewable energy fiscal incentive in place in 2021. COVID-19 created economic downturns, supply chain constraints and prioritization shift for governments that may have reduced the growth of Renewable Energy policies and regulation.

Although the OECD region has retained the highest RISE average score since 2010, each region of developing countries has narrowed the gap over the last 12 years, with several notable standouts at the country level. Côte d'Ivoire made the most progress of any country between 2019-2021, increasing its renewable energy RISE score 47 points from 11 to 58. Mozambique made the second most progress of any country between 2019 and 2021, increasing its renewable energy RISE score by 30 points from 29 to 59. Notable standouts among the most improved regions include Jordan in the Middle East and North Africa and Ecuador in Latin America and the Caribbean. Among African countries, Kenya stands out in terms of its improvement in RE policies and corresponding increase in modern renewable energy consumption. Among Asian countries, a standout improvement took place in Vietnam where modern renewable energy consumption is now 75 percent higher since 2010 and its RISE RE score increased to 84 in 2021 from only 22 in 2010.

ENERGY EFFICIENCY: LACK OF IMPROVEMENT AMIDST ENERGY DEMAND

The energy efficiency pillar, despite overall progress in all regions in the period 2019–21, has experienced a slower increase compared to 2017–19. Among the 11 energy efficiency indicators evaluated in RISE, planning indicators typically score highest across the 140 countries surveyed worldwide. In terms of end-use sectors, heating and cooling energy efficiency standards were the most prioritized globally. However, building energy efficiency measures need more focus on heating and cooling in energy performance.

Still, all regions successfully increased their adoption of policy and regulatory frameworks for energy efficiency between 2010 and 2021. MENA and Sub-Saharan Africa were the fastest improving regions in the adoption of efficiency policies between 2019 and 2021, with Côte d'Ivoire advancing the most among Sub-Saharan Africa countries. Several standout examples among low-income countries – including Bangladesh, India, Rwanda, Senegal, Zambia – demonstrate that effective energy efficiency policies do not require substantial fiscal outlays.

WHAT IS RISE: METHODOLOGY AND UPDATES

RISE—Regulatory Indicators for Sustainable Energy—is a set of indicators intended for use in comparing the policy and regulatory frameworks that countries have put in place to support the achievement of Sustainable Development Goal 7 (SDG7) on universal access to clean and modern energy. This fourth edition of the index captures policy and regulatory support that enhances sustainable energy in the form of 30 indicators distributed among four pillars: electricity access, clean cooking, renewable energy, and energy efficiency. Each of RISE's four pillars rests on a set of indicators (Figure 1). Data for RISE 2022 was collected between September and December 2021, therefore RISE scores reflect the status of policies and regulations in each country as of December 31, 2021, which reflects important policy trends in the recent aftermath of the COVID-19 pandemic. Major impacts on the energy sector that occurred during the 2022 calendar year will not be reflected in the RISE 2022 data, but will be captured in the next edition of RISE which will span the 2022-2023 calendar years.

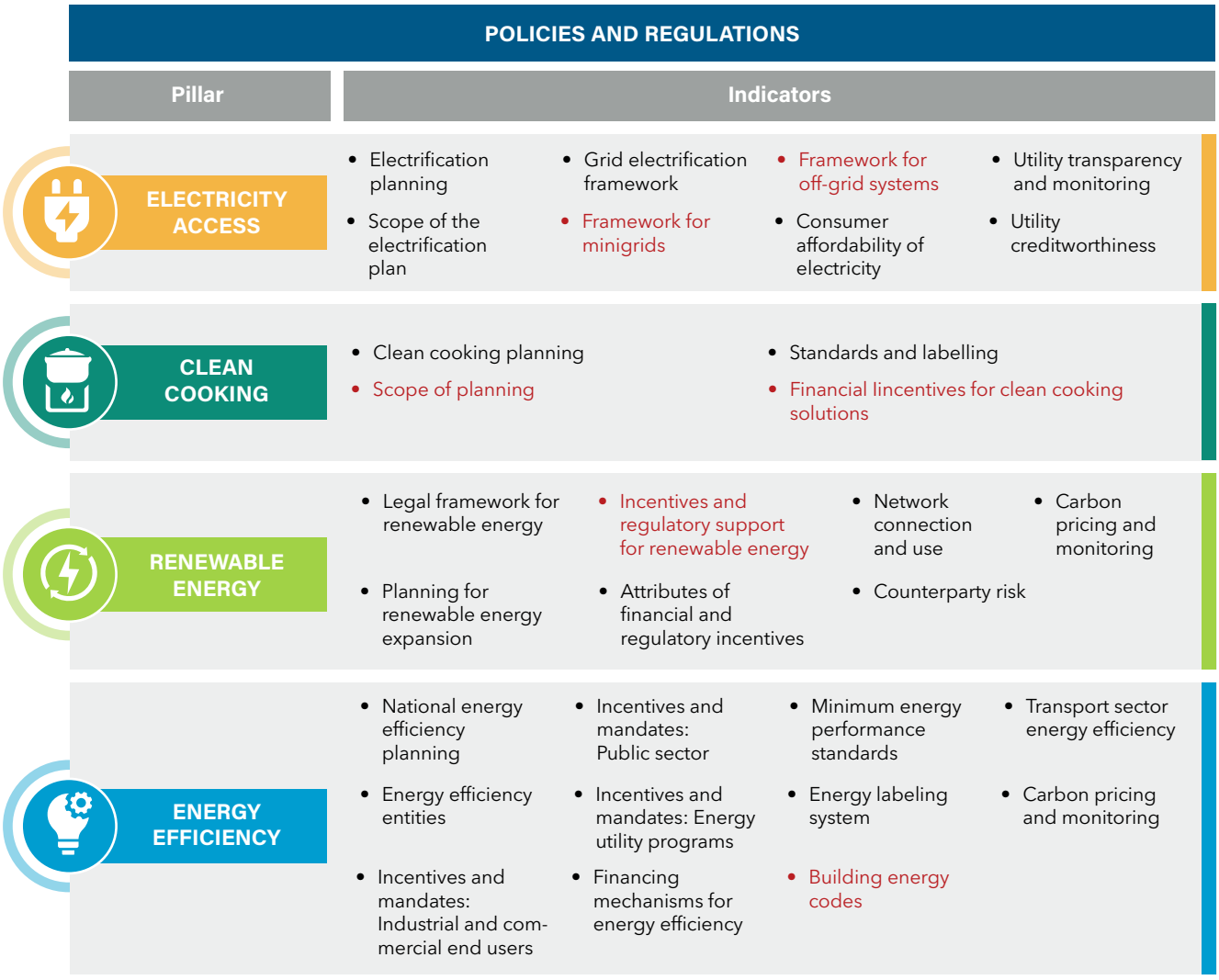
The RISE indicators, scored on a 0–100 scale, can be used to compare 140 economies that now account for 98 percent of the world's population. A country's overall score is an average of its scores for the electricity access, renewable energy, and energy efficiency pillars (the electricity access and clean cooking pillars are only scored for 54[1] and 55[2] access-deficit countries, respectively). 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 environment, albeit with room for improvement; yellow for the middle range (33–67), indicating that the country has begun serious efforts to develop a policy framework but still has room for improvement; and red for the lowest scores (0–33), indicating that policy adoption remains at an early stage.

To capture recent changes in the energy sector over the last two years, RISE 2022 has refined the indicators for all pillars, recalculating the entire time series dating back to 2010 for all countries. Indicators that were updated for the RISE 2022 are highlighted in red in Figure 1. The survey methodology for the electricity access pillar now captures more nuances in off-grid access, specifically regarding minigrids and stand-alone systems. The questionnaire was updated to yield a more holistic picture of regulatory incentives for minigrids and off-grid systems, including targeted approaches to low-income households. Good practices for developing institutional capacity, community engagement, training, and geospatial planning specifically for the fast-expanding minigrid industry have also been added. For the clean cooking pillar, RISE 2022 has added questions to evaluate the sources of public and private funding for good-practice regulatory programs and incentives in each indicator. More specific information on last-mile distribution strategy is now being collected, particularly for geographically remote and rural areas and for poor segments of the population. Additionally, more categories of possible financing incentives for clean-cooking consumers are being considered in the indicator on financing mechanisms. For clean energy indicators, the eligible fiscal incentives for renewable energy generation have been updated and expanded, and more good-practice regulations for building energy efficiency have been added.

1 Fifty-four countries were surveyed for electricity access in 2021. "Access-deficit" countries refer to those where access rates are under 90 percent or where over 5 million people lack access to electricity. Countries with no electricity access deficit were scored 100.

2 The clean cooking pillar is scored for 55 access-deficit countries (as identified in IEA, IRENA, UNSD, World Bank, and WHO 2021) and is averaged into the overall score for those countries only.

FIGURE 1. THE RISE FRAMEWORK: RISE'S SUSTAINABLE ENERGY PILLARS AND CORRESPONDING INDICATORS



Source: World Bank, RISE 2022.
Note: Indicators that were updated for the RISE 2022 survey are highlighted in red

Measuring the quality and enforcement of policies remains challenging. As a result of the aforementioned RISE survey updates, the overall stringency of each pillar's questionnaire has increased, and scores from previous RISE reports should not be directly compared with those in previous editions. RISE 2022 has recalculated scores from previous years (dating back to 2010) according to the most recent questionnaire to facilitate historical comparisons and trend analysis. It should be noted that RISE aims to provide a record of legislation, policies, and strategies prevailing in a country over a specified timeline. As policies and regulations may exist without being enforced, a country's RISE score reflects laws that have been enacted, without making a judgment on whether they are being implemented. RISE cannot fully capture the quality of the content of policies and regulations, which is highly context-specific and may produce subjective assessments. Some policies may not be completely relevant for all countries given country-specific strategies and political choices.

Cross-pillar comparisons must be nuanced, and the RISE 2022 Summary Report is only a snapshot of select comparisons and analysis. The RISE online platform provides an opportunity for deeper analysis, customizable according to each audience's interest and focus areas. The

indicators included under the four pillars are meant to yield a holistic view of the state of regulation and policy making within each pillar. Online, users can also choose to compare specific indicators across different pillars at the global, regional, and national levels throughout the data's entire timeline dating back to 2010. Comparing results across pillars reveals differences in the relative maturity of, say, electricity access versus clean cooking or renewable energy versus energy efficiency. The RISE online platform also includes a comprehensive library of policies and regulations on sustainable energy in 140 countries. It highlights global, regional, and national best practices spanning the gamut of sustainable energy policy making and offers regional profiles and country policy profiles. Detailed information on the scoring methodology is also available on the website (http://rise.esmap.org/).

The RISE score is not the only precursor or indicator of SDG7 progress or investment. RISE is intended to provide a record of laws, regulations, and policies that countries enact to support sustainable energy. The policy environment alone is insufficient, however, to attract investment or ensure progress toward SDG7. It must be backed by strong institutions, open markets, access to finance, an open flow of information, and a strong private sector. Nevertheless, RISE can help explain trends in sustainable energy investment and SDG7 outcomes.

By measuring the level and ambition of policy adoption in countries, the indicators can help policy makers benchmark their own national energy framework against those of regional and global peers. By providing empirical evidence of the support provided by policy frameworks, the RISE database helps countries attract investment in their sustainable energy sector. RISE is also a valuable resource for private investors and developers, who use the index to carry out due diligence related to new projects, products, and services. RISE scores are intended to illustrate how close or far a country is from offering an attractive policy environment. They should not be construed as investment advice.

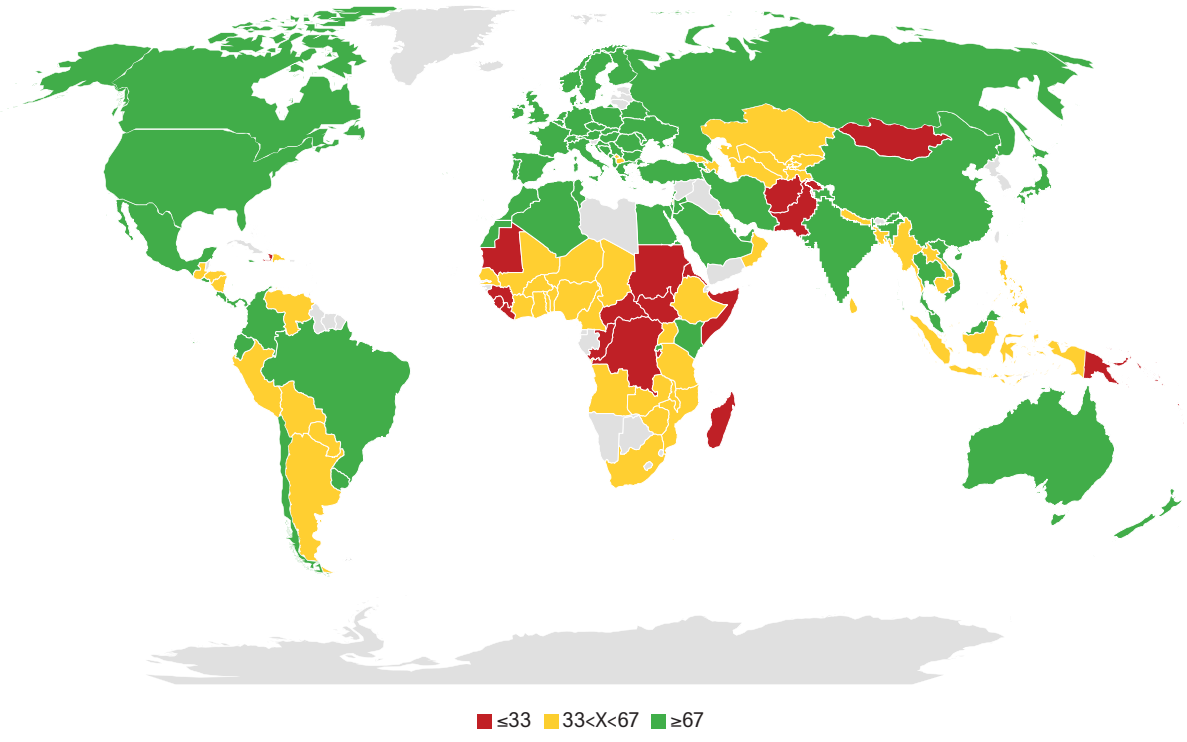
Except where otherwise noted, the figures in this report are based on RISE project data.

GLOBAL DEVELOPMENTS SINCE RISE 2020

Since RISE 2020, the number of countries with advanced policy frameworks for sustainable energy has continued to grow. As of the end of 2019, 60 countries had built advanced policy frameworks for sustainable energy into their regulatory systems. By the end of 2021, 68 countries had done so, including score improvements into the green zone from many emerging markets and developing economies such as Bosnia and Herzegovina, Ecuador, Kenya, Rwanda, and Saudi Arabia (figure 2).

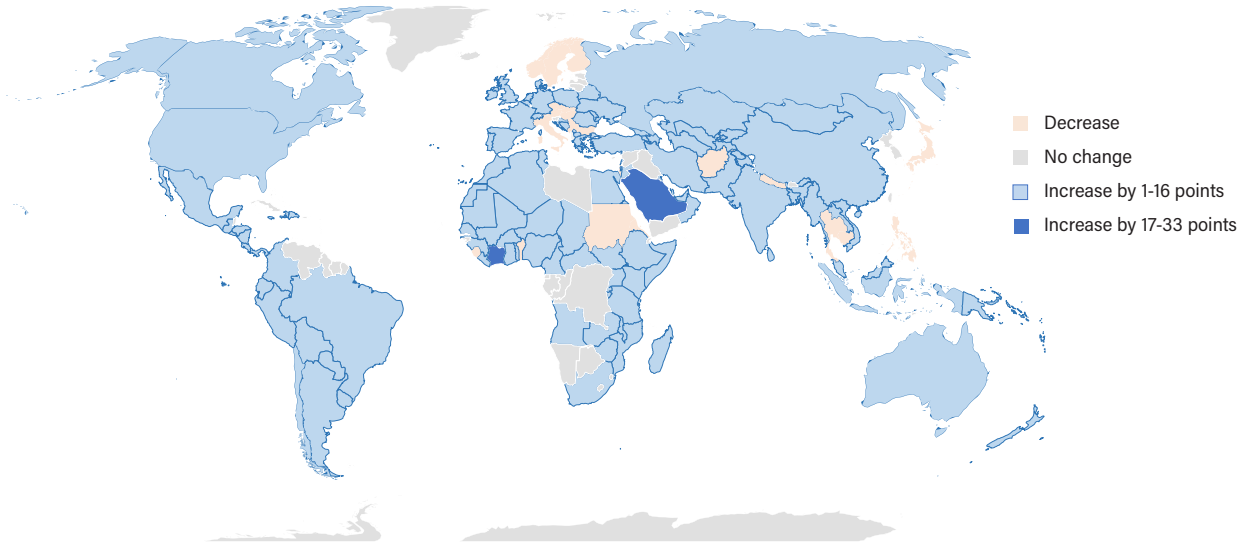
Over the past two years, more than 80 percent of countries surveyed globally improved their overall RISE scores. Côte D'Ivoire and Saudi Arabia were the only two countries to improve by over 20 points (figure 3). Improvements in off-grid policies, affordability, renewable energy planning and target setting, and several energy efficiency incentives were most evident over the past two years. These initiatives have been embedded in many countries' COVID-19 recovery plans to improve energy independence and minimize energy costs for populations struggling with the pandemic's economic impacts.

FIGURE 2. RISE SCORES WORLDWIDE IN 2021



Source: World Bank, RISE 2022.

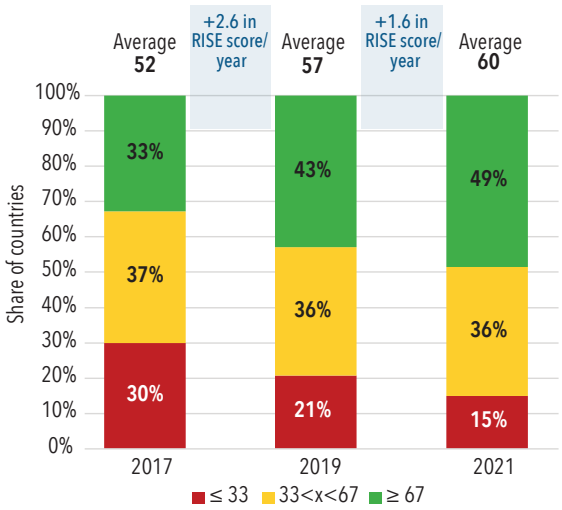
FIGURE 3. CHANGE IN COUNTRIES' RISE SCORES, 2019–21



Source: World Bank, RISE 2022.

However, the pace of improvement from 2019 to 2021 was slower than during the previous two-year cycle of 2017–19. The global average RISE score has improved by less than two points per year in the 2019–21 cycle, whereas in the previous two-year cycle, the annual average growth was nearly three points per year (figure 4). The number of countries improving into the green zone also grew more slowly than before. In 2019, about 10 percent of the countries surveyed entered the green zone compared with 2017, whereas in 2021, only 6 percent of the countries had made a similar improvement. Nonetheless, in 2021 nearly half of all 140 countries surveyed scored in the green zone, and the share of countries scoring in the red zone had dropped below 20 percent. These 21 countries, over half of which are in Sub-Saharan Africa, remain in the beginning stages of building a sound policy environment for sustainable energy. If these countries continue the same pace of improvement as in previous years, only 12 percent of countries are expected to remain in the red zone in the next RISE edition. On a global level, despite the grave external economic pressures countries have faced in recent years, it is encouraging that sustainable energy policy has improved in countries at all stages of regulatory frameworks—whether beginning (red zone), intermediate (yellow zone), or advanced (green zone).[3]

FIGURE 4. GLOBAL PROGRESS ON SUSTAINABLE-ENERGY REGULATION, WITH PACE OF GROWTH IN RISE SCORES, 2017–21



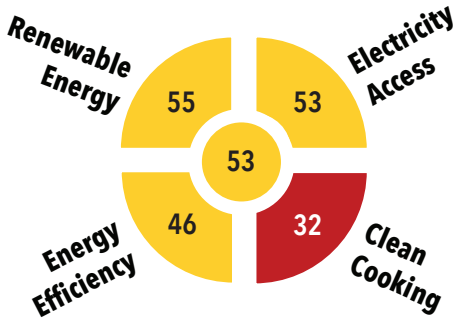
Source: World Bank, RISE 2022.

Across all dimensions of sustainable energy, average global scores still show room for improvement, particularly in clean cooking. The overall 2021 RISE score

3 As noted, the RISE 2022 index updates countries' RISE results from December 31, 2019, until December 31, 2021. The effects of the COVID-19 pandemic were globally prevalent during this two-year cycle. Major events in 2022, such as the war in Ukraine, began after the January 1, 2022, cutoff date for RISE 2022 data and thus are not considered in the most recent RISE results.

of 60 was based on the performance on four pillars of sustainable energy: electricity access; clean cooking; renewable energy; and energy efficiency. As of 2021, the global average score did not exceed 55 in any of these areas (figure 5). The renewable energy and electricity access pillars now have global average scores over 50, while the energy efficiency pillar is also in the yellow zone with an average score of 46. The clean cooking global average score remains just on the cusp of the yellow zone with a score of 32.

FIGURE 5. GLOBAL AVERAGE RISE SCORES, OVERALL AND BY PILLAR, 2021



Source: World Bank, RISE 2022.

Note: Global scores for electricity access and clean cooking reflect the average scores for only the access-deficit countries surveyed. Such countries are identified in "Tracking SDG7: The Energy Progress Report" (IEA, IRENA, UNSD, World Bank, and WHO 2021). The clean cooking pillar is scored for 55 countries whose populations have deficits in access to clean cooking, based on the latest SDG7.1.2 results in the Tracking SDG7 report. The electricity access pillar is scored for 54 access-deficit countries. China is the only access-deficit country among the 55 countries surveyed for clean cooking that did not have an electricity access deficit.

If the world continues to improve at the pace of growth achieved between 2019 and 2021, the average global RISE score will not reach the green zone until 2027. Policies are often a prerequisite for desired actions and outcomes to follow; therefore, this rate of policy progress globally would leave little time achieve the global SDG7 targets by 2030. Policies beyond those considered in RISE 2022 will be contemplated in future RISE editions as energy markets evolve and new technologies mature. Emerging areas such as energy storage, distributed energy, and digitalization of networks provide policy makers with opportunities to support low-carbon development if regulated and incentivized appropriately. RISE will continue to evaluate indicators based on globally accepted best practices in sustainable energy.

All regions saw advances in comprehensive policy and regulatory frameworks in the 2019-2021 period, but progress was uneven. At the regional level, OECD countries continue to lead in building robust policy and regulation frameworks for sustainable energy, and almost all of them have achieved advanced (green) policy frameworks (figure 6). On the lower extreme of regional scores, it is encouraging to see all regions have now improved their average overall scores from the red zone into the yellow zone by the end of 2021, including Sub-Saharan Africa. On overall policy development, two regions (Sub-Saharan Africa and Latin America and the Caribbean) made the greatest progress during the 2019-2021 cycle, with Ecuador, Kenya, and Rwanda having made the leap in scores into the green zone by the end of 2021.

Utility creditworthiness is critical for enabling sustainable energy access, yet policy support for utilities is lacking, especially in access-deficit countries, as scores for utility creditworthiness actually regressed on average over the past two years—possibly because of the impacts of COVID-19. Even among countries with universal access to electricity, nearly a quarter of the surveyed distribution utilities struggled with substandard performance of creditworthiness. The global drop in the utility creditworthiness score was driven largely by the countries in South Asia and Sub-Saharan Africa (figure 7). The aforementioned South Asian countries of Afghanistan, Bangladesh, and Nepal had score decreases of more than 30 points in the utility creditworthiness indicator between 2019 and 2021, while Angola, Benin, Chad, Senegal, and South Africa in the Sub-Saharan African region also declined by more than 30 points. As energy prices continue to increase globally in 2022, this trend could continue or even deteriorate in the next two-year cycle.

It is important to note that good-practice policies will not meet the SDG7 targets without sound enforcement and monitoring of policy implementation and sustained financial flows and investments in institutional capacity. Regulations based on good practice might be adopted in legislation, but these regula-

FIGURE 6. EVOLUTION OF RISE OVERALL SCORES BY REGION, 2010–21

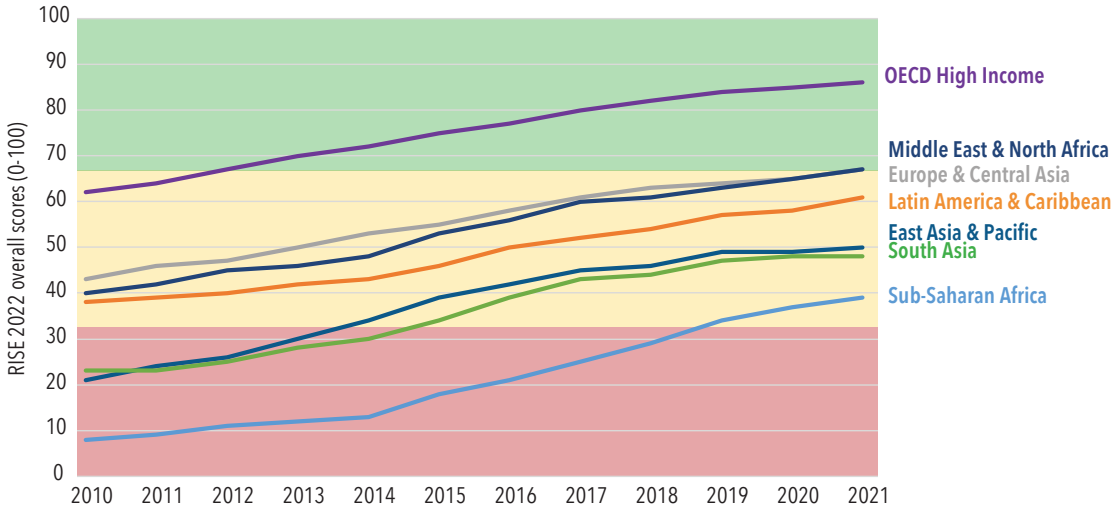
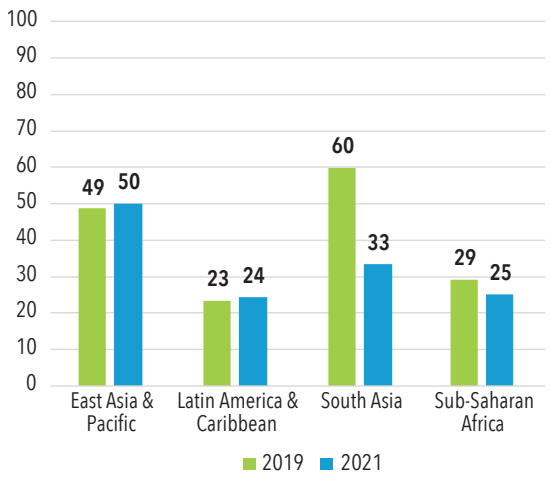


FIGURE 7. PROGRESS ON THE RISE UTILITY CREDITWORTHINESS INDICATOR, 2019–21

a. Global progress, by score category

b. Regional average score



Source: World Bank, RISE 2022.

tions can fail to make an impact if not accompanied by enforcement bodies and achievable mechanisms for implementation and compliance. RISE collects objective evidence that a policy is in place, but the RISE methodology does not allow for field verification to ensure that the policy is being enforced in practice. The Global Electricity Regulatory Index (GERI) complements the RISE index with de jure and de facto data on the structure and functioning of regulatory agencies (box 1).

BOX 1. THE 2022 GLOBAL ROLLOUT OF THE GLOBAL ELECTRICITY REGULATORY INDEX (GERI)

The Global Electricity Regulatory Index (GERI) now covers all RISE countries surveyed globally except for the Organisation for Economic Co-operation and Development (OECD) member countries. GERI measures the level of development of legal and regulatory frameworks in the electricity sector at the country level and assesses the basis on which regulatory authorities make decisions. GERI data are collected under a strategic partnership established in 2020 between the African Development Bank (AfDB) and the World Bank to combine the AfDB's Electricity Regulatory Index survey (ERI) with the Bank's RISE index. Merging these two platforms of methodologically consistent data has enabled the first global perspective on the state of electricity regulation in the developing world.

By measuring the adoption of regulatory best practices, GERI enables countries to Identify gaps in their regulatory framework and benchmark their performance against global peers. The index comprises two components—focusing on regulatory governance and regulatory substance, respectively.

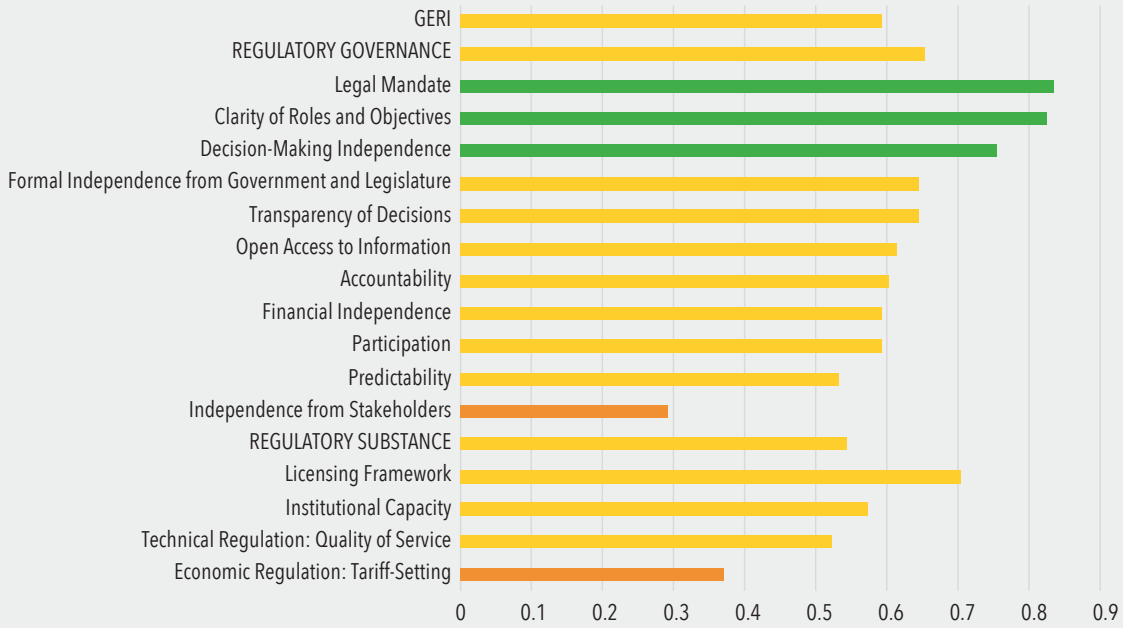
The *regulatory governance* pillar examines the institutional arrangements underpinning each country's regulatory regime to see whether it embodies best-practice design elements. Aspects covered include legal mandate, clarity of role, independence, accountability, transparency, predictability, stakeholder participation, and open access to information.

The *regulatory substance* pillar focuses on the actual content of regulation. Aspects covered are tariff-setting methodology, quality of service, licensing framework, and institutional capacity.

For 2021, AfDB collected data on 43 African countries, while the World Bank collected data on 39 non-OECD countries covering five regions. The average global GERI score was 59 percent. This was calculated as the average of the two pillar scores, which stood at 65 percent for regulatory governance and 54 percent for regulatory substance. Low scores on regulatory substance primarily reflect countries' poor performance on economic regulation for tariff setting. The most widespread deficiencies in regulatory governance related to independence from stakeholders.

At 59 percent, the GERI indicates an intermediate stage of development of regulations globally in the electricity sector, with much more room for improvements. Among the regions, Latin America and the Caribbean recorded the highest GERI score (average of 70 percent) followed by Sub-Saharan Africa (average of 67 percent). The forthcoming GERI Global Index report, to be published in November 2022, will present more detailed results.

FIGURE B1.1. GERI AND SUBINDICATOR SCORES: REGULATORY GOVERNANCE HIGHER THAN REGULATORY SUBSTANCE



Color Code	Score	Interpretation
	75–100%	Strong performers (top quarter of the 0–100 score range)
	50–74%	Good performers (second top quarter of the 0–100 score range)
	25–49%	Medium performers (third quarter of the 0–100 score range)
	0–24%	Weak performers (bottom quarter of the 0–100 score range)

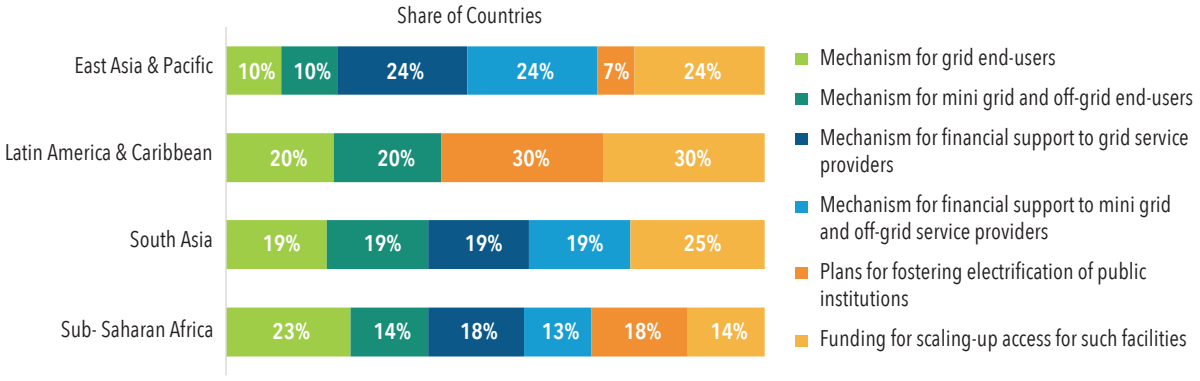
Source: Global Electricity Regulatory Indxxex (GERI) 2022

NEW COVID-19 ELECTRIFICATION SURVEY MODULE

According to the results of a new RISE survey module focusing on electricity access policies during the COVID-19 pandemic, many countries in each region included considerations in their COVID-19 recovery packages to minimize disruptions to electricity access, quality, and affordability. The COVID-19 module in RISE 2022 was developed as an additional tool to understand supportive mechanisms for all types of end users, suppliers, and public institutions. The results of the module were not included in the RISE scores. About 41 percent of the surveyed countries have mechanisms for end users, 39 percent have provided financial support to service providers, and 44 percent have backed the electrification of public institutions (figure 8). According to the recent World Bank's 2022 Global Indicators Briefs, power utilities continued establishing new electricity connections despite national lockdowns since 2020. Off-grid solar and minigrid companies were labeled "essential services" in numerous countries, allowing their businesses to continue operating even during lockdowns. Many countries also implemented measures to lower consumer tariffs and allow payment deferrals.

Across all regions, end users, service providers, and public institutions had opportunities for financial support for electricity consumption through grid, minigrid, and off-grid systems during the pandemic, but the most pronounced support was evident in Sub-Saharan Africa. In effect, many parts of Sub-Saharan Africa kept up with their pre-existing electricity access expansion plans, while most utilities in the world experienced delays in grid upgrades and maintenance work (Saltane et al. 2022). Also, the recent RISE survey showed the score of the Consumer Affordability indicator in the region bounced back in 2021, although the pandemic has caused some people in Sub-Saharan Africa unable to pay basic electricity services. Meanwhile, the allocation of dedicated funding has been made for public facilities worldwide, however it is apparent that more efforts are still needed to create sustainable business models for the electrification of public institutions, particularly in the health care sector. Nearly 60 percent of the health care facilities in Sub-Saharan Africa still lack access to electricity (USAID 2022).

FIGURE 8. THE RISE COVID-19 MODULE: SUPPORT FOR END USERS, SUPPLIERS, AND PUBLIC INSTITUTIONS, BY REGION



Source: World Bank, RISE 2022.

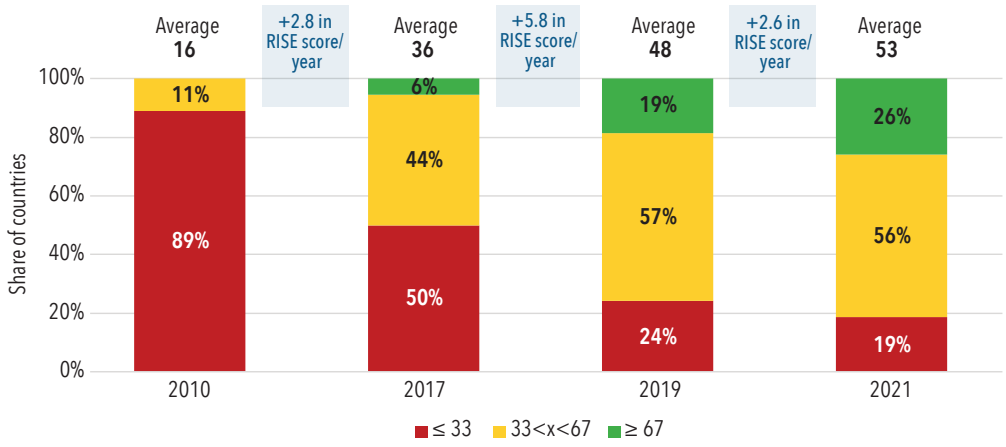
ELECTRICITY ACCESS HIGHLIGHTS:

CONTINUED IMPROVEMENT OVER THE PAST TWO YEARS DESPITE EXTERNAL ECONOMIC SHOCKS

Photo Credits: © Foad Al Harazi / World Bank

Despite a slowdown in global economy, many governments have progressed toward the green zone on their RISE electricity access scores in 2019–21. Electrification planning, frameworks for minigrids and off-grid systems, and utility transparency and monitoring were the indicators that mainly contributed to the continued increase in electricity access scores in 2019–21. During the period, however, the electricity access pillar experienced a slower rise than in 2017–19. The average growth rate was 5.8 points per year between 2017 and 2019, but the pace almost halved in 2019–21, to 2.6 percentage points (figure 9). As of 2021, a quarter of the access-deficit countries[4] reached the green zone in their electricity access scores, and about another half of them reached the yellow zone, setting the key elements for advanced policy and regulatory frameworks.

FIGURE 9. EVOLUTION OF RISE SCORES FOR ELECTRICITY ACCESS PILLAR, 2010–21

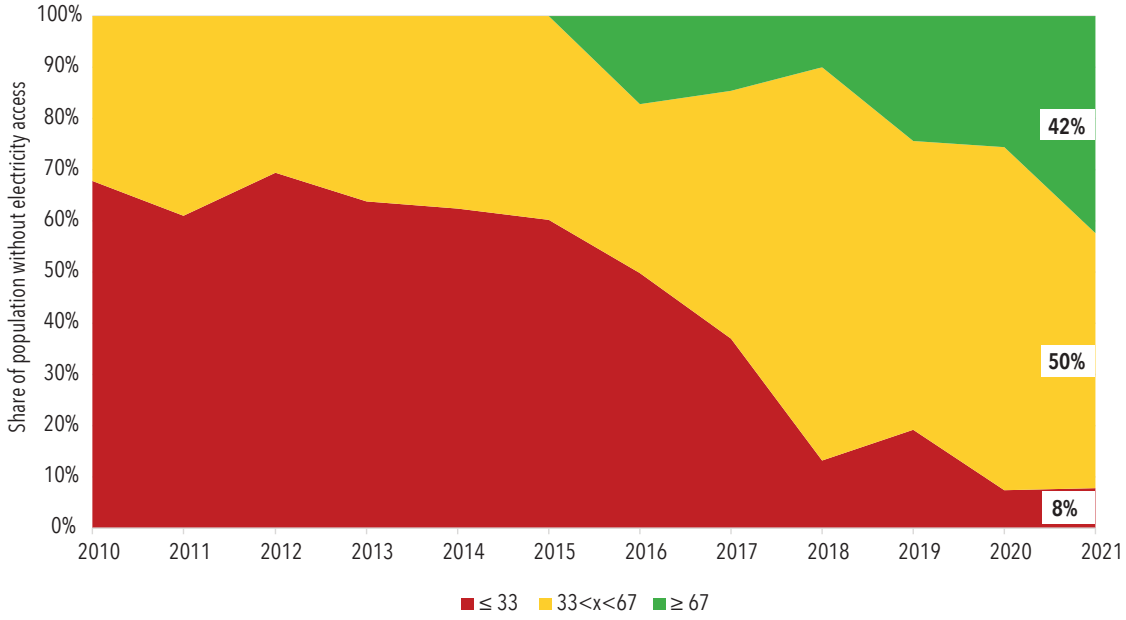


Source: World Bank, RISE 2022.

As of 2021, more than half of the population without access still lived in countries where an enabling policy environment is at the early and middle stages. Although consistent progress has been made since 2019, 409 million people lacking electrification of the surveyed countries, mostly in Sub-Saharan Africa, did not yet benefit from plans for advanced policies and regulations in 2021 (figure 10). On the positive side, the two largest access-deficit countries—Nigeria and Ethiopia—showed a noteworthy progress and have reached the green zone in their overall scores between 2019 and 2021, thanks to the well-established policy and regulatory measures, including electrification planning, frameworks for minigrids and off-grid systems, and consumer affordability of electricity. In addition, Nigeria committed to improve an utility transparency and monitoring system over the past two years.

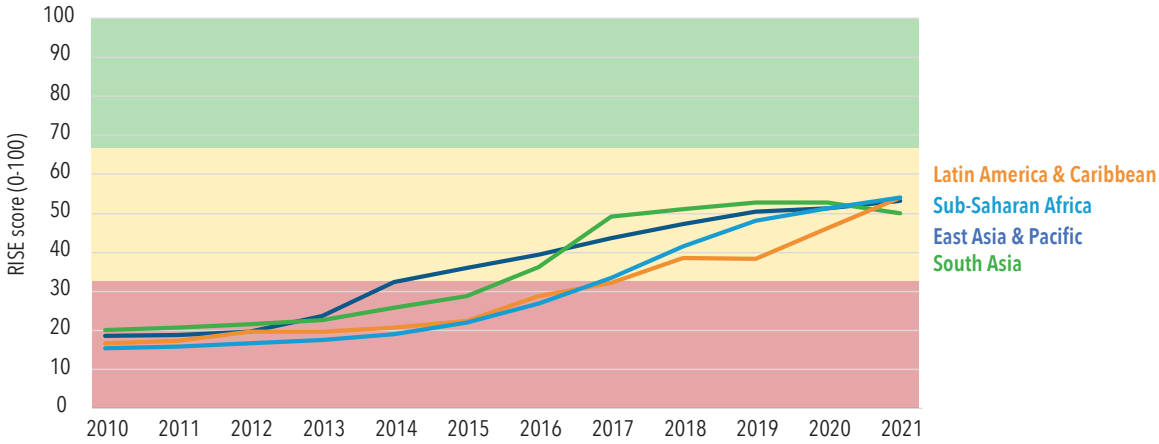
4 Access-deficit countries were selected for the survey if their access rates were under 90 percent or if the number of people without access in the countries totaled more than 5 million. Countries with no access deficits scored 100. In 2021, 54 access-deficit countries were surveyed regarding electricity access.

FIGURE 10. RISE ELECTRICITY ACCESS SCORES, WEIGHTED BY POPULATION WITHOUT ACCESS, 2010–21



Source: World Bank, RISE 2022.

FIGURE 11. EVOLUTION OF RISE ELECTRICITY ACCESS SCORES, BY REGION, 2010–21



Source: World Bank, RISE 2022.

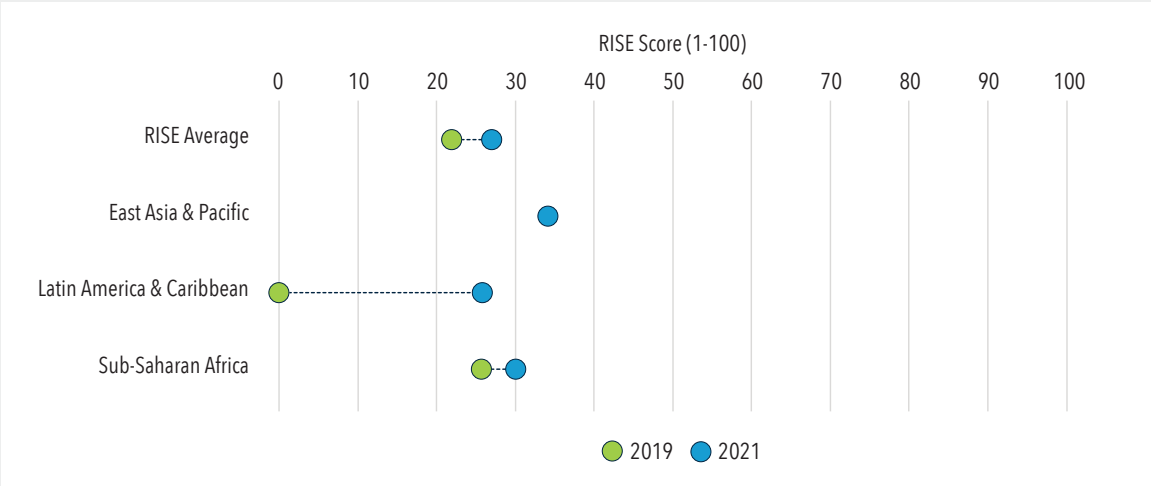
The electricity access scored the highest in Sub-Saharan Africa and Latin America and the Caribbean, outpacing the global average of 53 in 2021. These two regions made the greatest advancement in 2019–21, reaching a RISE score of 54 each in electricity access (figure 11). In Sub-Saharan Africa, frameworks for minigrids, off-grid electrification systems, and utility transparency and monitoring showed the most positive improvement among indicators. In the Latin America and Caribbean region, the fastest-improving indicators were grid electrification and utility transparency and monitoring indicators. Accordingly, the fastest progressing countries were in these two regions: Angola, Chad, Guatemala, Honduras, Kenya, and Nigeria had

BOX 2. SUSTAINABLE ENERGY AND GENDER PARITY

Gender diversity is still an important priority in the energy sector, particularly for achieving modern, clean, and affordable energy for all. Since women are often the driving force for inclusive energy system development, reducing the gender gap is critical for policy makers. Based on the recent RISE survey, inclusion of vulnerable groups and gender sensitivity considerations were considerably lacking from officially approved electrification plans in 2021, although there has been some progress over the past two years.

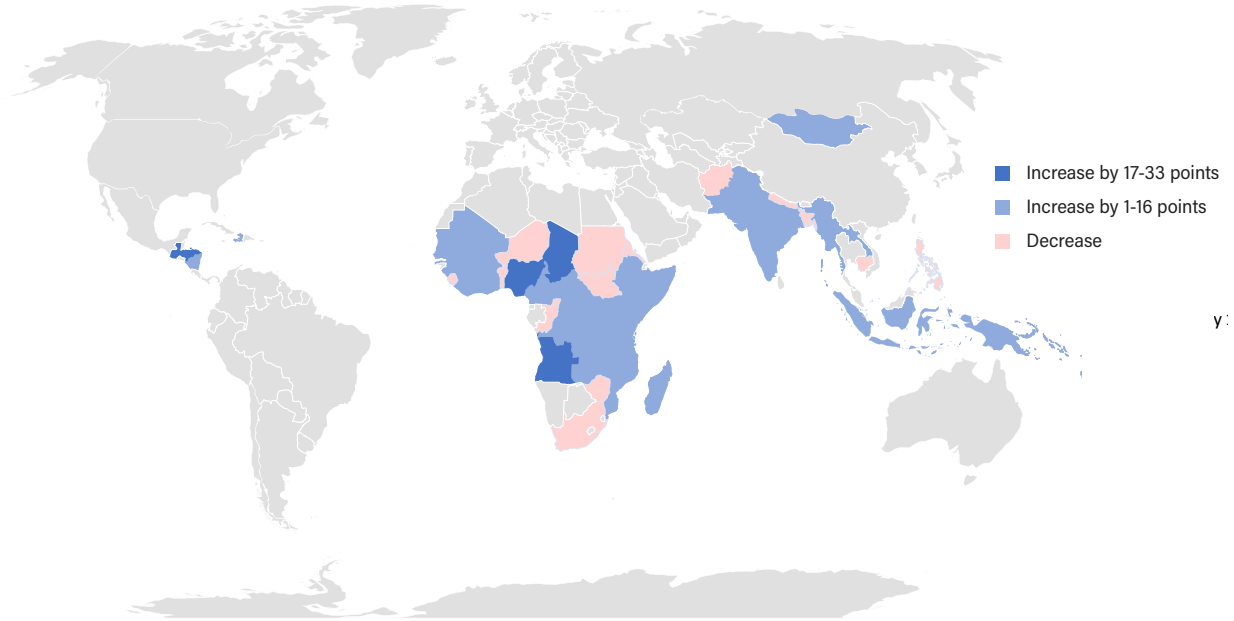
Among the regions which have enacted gender-specific regulations, the Latin America and the Caribbean region demonstrated the most rapid improvement during 2019–21 (figure B3.1). Guatemala stands out as a new country that introduced female-headed households as a distinct focus in its electrification plan. Also, gender inclusion grew consistently in Sub-Saharan Africa, thanks in large part to improvements in Nigeria's additions of gender considerations in electrification expansion planning. The East Asia and Pacific region remains with the highest gender score in electricity access among all access-deficit regions in 2019, although no progress has been made in recent years. Within the region, Myanmar, the Philippines, and Vanuatu reached the green zone on the sub-indicator related to gender in electrification plans, yet the other East Asian and Pacific countries surveyed have not adopted any gender-specific policies for electricity access.

FIGURE B2.1 PROGRESS ON INCLUSION AND GENDER SENSITIVITY SUBINDICATORS IN THE RISE ELECTRICITY ACCESS PILLAR, 2019–21



Source: World Bank, RISE 2022.

FIGURE 12. EVOLUTION OF RISE ELECTRICITY ACCESS SCORES IN 2019–21



Source: World Bank, RISE 2022.

the largest score increases, each improving by more than 17 points since 2019 (figure 12). Meanwhile, the electricity access score in the East Asia & Pacific region kept pace with the global average, mostly due to the rapid improvement in minigrids regulations and utility transparency and monitoring system.

In contrast to other regions, the evolution of the scores in South Asia was relatively sluggish because of low scores on the utility creditworthiness indicator, which can be partly explained by the fiscal constraints of COVID-19 recovery across regions.[5] The South Asia region's utility creditworthiness average score plummeted from 60 in 2019 to 33 in 2021, causing the region's overall average score to drop 3 points from 2019. The reason is that utilities suffered the most in countries such as Afghanistan, Bangladesh, and Nepal, which are publicly owned and typically rely on government budget support for electricity access expansion.

RISE 2022 updated the survey methodology for the electricity access pillar to better reflect recent changes in the energy sector. This pillar is scored by eight indicators (shown earlier in figure 1): (1) electrification planning, (2) scope of officially approved electrification plan, (3) framework for grid electrification, (4) framework for minigrids, (5) framework for off-grid systems, (6) consumer affordability of electricity, (7) utility transparency and monitoring, and (8) utility creditworthiness. The consumer affordability score reflects both policies and quantitative results, while the utility creditworthiness score only counts results from the financial statements of the distribution utilities. Scores for the other indicators present policy frameworks or plans. Compared to last year, the indicator for the framework for mini grids refined its subindicators substantially by adding new survey questions. Through the refinement, first of all, the minigrids indicator can now capture trends of hybrid minigrid technology, geospatial planning for investment, productive uses of electricity for minigrid customers, and the business environment. Secondly, the off-grid systems indicator better tracks private sector participation and financial incentives for low-income households and public financing available to

5 Utility creditworthiness is calculated for the selected utility in each country based on the four financial metrics: current ratio, debt-service coverage ratio, days payable outstanding, and earnings before interest, taxes, depreciation, and amortization (EBITDA). This indicator assesses the utilities' financial health.

companies. Thirdly, the scope of approved electrification plan indicator was modified to monitor the funding and private sector engagement. Lastly, RISE 2022 also tracks inclusive policy frameworks for electricity access by capturing gender sensitivity under indicator 2 and financing mechanisms for vulnerable groups, including low-income families, female-headed households, informally settled dwellers, and displaced people under indicator 6.

Globally, energy policies on electrification plans, off-grid access, and utility transparency have improved

BOX 3. A DEEPER DIVE INTO UTILITY CREDITWORTHINESS IN AFRICA

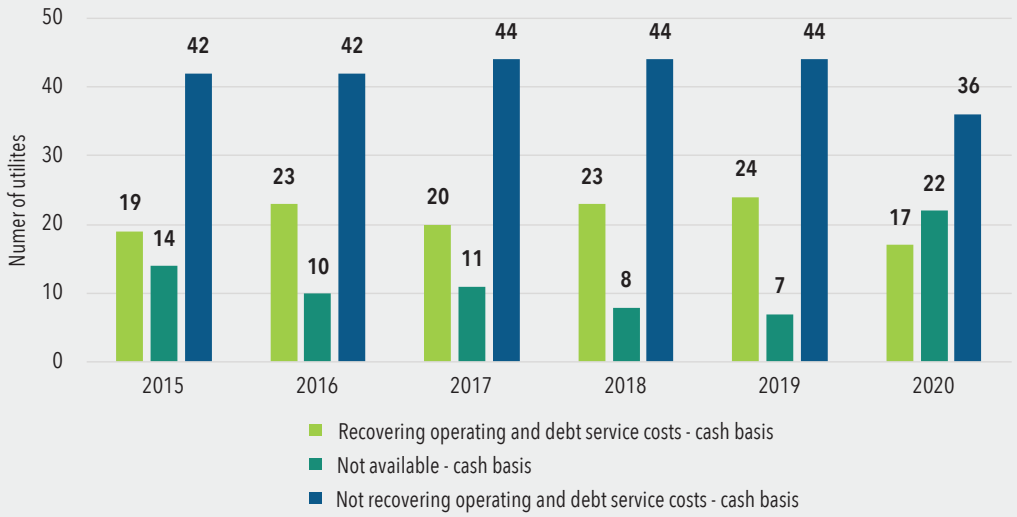
Financially healthy and creditworthy utilities play a crucial role in attracting the necessary investments for the sustainable energy agenda. Although the COVID-19 pandemic certainly affected utilities' financial performance, it remains a concern that the RISE utility creditworthiness indicator scores showed no significant improvement over the past two years. Nearly a quarter of the surveyed distribution utilities in RISE struggled with substandard creditworthiness ratios when benchmarked against RISE indicators. As a more detailed means of analysis for utilities in Africa, the UPBEAT (Utility Performance and Behavior in Africa Today) initiative was created, in partnership between the World Bank, ESMAP, the Association of Power Utilities of Africa (APUA), the African Development Bank, and Power Africa, to diagnose and benchmark utilities' performance regarding finance, operations, and accountability. The UPBEAT indicators provide an excellent complement to the RISE utility creditworthiness indicator with a holistic tracking of utility performance metrics, leveraging the existing utility data from the RISE Library of Documents. UPBEAT aims to build good practices of continuous and consistent monitoring of performance and to boost the ability of respective utilities and policy makers to correct course, when needed, in real time. With data performance measurement baselines in hand, utilities can improve how they diagnose problems and find solutions.

UPBEAT utility profiles were first published in 2021 for 75 utilities in 45 African countries. Three overarching takeaways emerged from the initial UPBEAT survey (Balabanyan, Semikolenova, Singh, and Lee 2021):

- The financial performance of most African utilities remains precarious, with the COVID-19 pandemic making it much more difficult for utilities to cover their costs. About one in three utilities surveyed recover their operating and debt-service costs, but if subsidies are excluded, the ratio is only one in four.
- Data on utilities' operational performance are generally scarce, particularly regarding service quality. But because there is a connection between better measurement and transparent reporting of service quality indicators and better operational performance, improving utilities' reporting of operational data is important for improving the quality of electricity services.
- Most utilities have significant room for improving transparency of their reporting and communication with their customers and stakeholders. There was a correlation between utilities' financial performance outcomes and the extent to which utilities reported the good-practice transparency and monitoring indicators tracked in RISE and UPBEAT. This provides some evidence that better financial performance is associated with better transparency and accountability, supporting the notion that good governance is important for utility performance.

As is evident from the most recent UPBEAT indicator analysis (in 2020), over half of the surveyed utilities in Africa are still not recovering operating and debt-service costs, even when operating subsidies are included (figure 6). That trend is gradually declining from a larger majority of utilities in years past, yet fewer and fewer utilities can recover costs, while more utilities are no longer reporting cost recovery data transparently. Lack of transparency and accountability significantly discourages investment in sustainable energy projects, as utilities are typically a key financial counterpart or, at the very least, an influential stakeholder in any new generation, transmission, or distribution investments.

FIGURE B3.1 UPBEAT UTILITY PERFORMANCE FOR AFRICAN UTILITIES, 2015–20



Source: Balabanyan, Semikolenova, Singh, and Lee 2021.

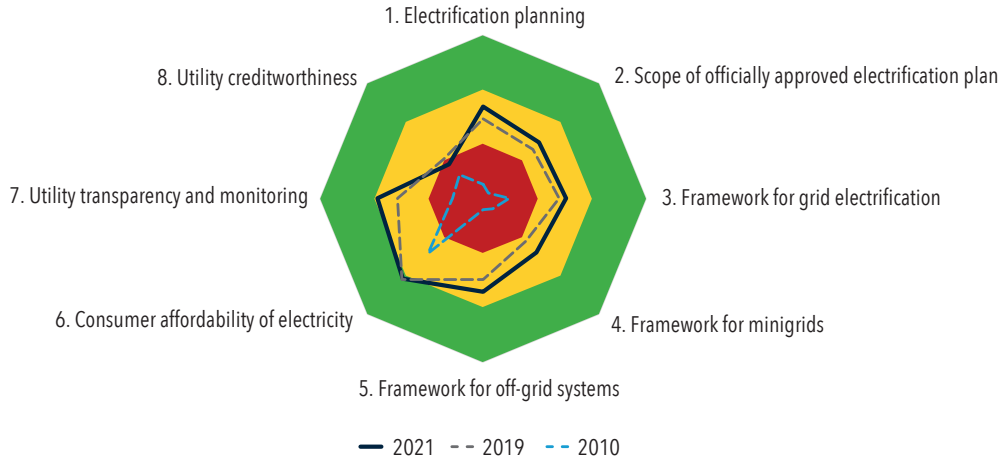
Note: The Utility Performance and Behavior in Africa Today (UPBEAT) survey profiled 75 utilities in 45 African countries.

The UPBEAT database is now being updated periodically to track changes in utility performance over time. Similar to RISE indicators, the annual UPBEAT data collection is based on facts and data that are publicly available or can be easily verified. This approach is meant to avoid metrics that require controversial assumptions that undermine confidence in an assessment. UPBEAT is meant to instill accountable behaviors in utilities and promote transparent data about financial and operational performance. Policy makers and utility managers can find more-detailed takeaways in a topical series of three additional papers published in 2021 based on UPBEAT and RISE data:

- "Analyzing Foregone Cash to Improve Utility Performance" (Balabanyan, Hankinson, Nash, and Singh 2021)
- "Catalyzing Utility Reform: Why Quick Wins in Improving Transparency and Accountability of African Utilities Matter" (Semikolenova, Driscall, and Lee 2021)
- "African Utilities during COVID-19: Challenges and Impacts" (Balabanyan, Semikolenova, Hankinson et al. 2021).

the most since 2010, but none of these indicators has reached the green zone in the RISE score. Frameworks for the grid and minigrids have also advanced fast in the past decade (figure 13). Only the consumer affordability of electricity indicator has reached the green zone on a global average. This indicator started at the highest baseline score in 2010 since affordability has typically been the first priority in most access-deficit countries. Among notable improvements in off-grid policies, Togo launched an end-user subsidy scheme to reduce the affordability gap for eligible households by covering their payments to off-grid solar companies (GOGLA 2022a). Kenya also extended off-grid solar into several underserved counties in collaboration with the private sector, targeting the poorest and most vulnerable people with a mix of results-based financing and local currency working capital financing (GOGLA 2022b).

FIGURE 13. GLOBAL PROGRESS ON THE RISE ELECTRICITY ACCESS PILLAR, BY INDICATOR, 2010, 2019, AND 2021



Source: World Bank, RISE 2022.

BOX 4. NOTABLE ADVANCES IN CREATING ENABLING ENVIRONMENTS FOR MINIGRIDS TO EXPAND ENERGY

Source: Image by vitranc, GettyImages.

A new publication by ESMAP's Global Facility on Mini Grids, "Mini Grids for Half a Billion People: Market Outlook and Handbook for Decision Makers," is the World Bank's most comprehensive and authoritative report on minigrids to date (ESMAP 2022). It delivers an overview of the global minigrid market, highlighting that at present, more than 48 million people worldwide are receiving electricity from minigrids. It also describes how minigrids are the least-cost solution to connect nearly 490 million people globally by 2030 provided that the correct enabling conditions exist to allow them to reach their full potential. The handbook then lays out a detailed, actionable road map for decision-makers on how to create these enabling conditions by putting in place 10 building blocks:

1) Reducing costs and optimizing design and innova¬tion for solar minigrids
2) Planning national strategies and developer portfolios with geospatial analysis and digital platforms
3) Transforming productive livelihoods and improving business viability
4) Engaging communities as valued customers
5) Delivering services through local and international companies and utilities
6) Financing solar minigrid portfolios and end user appliances
7) Attracting exceptional talent and scaling skills development
8) Supporting institutions, delivery models, and champions that create opportunities
9) Enacting regulations and policies that empower minigrid companies and customers
10) Cutting red tape for a dynamic business environment.

These building blocks also represent the 10 frontiers for innovation in the sector, where, with disruptive digital solutions across all 10 frontiers, the services to end users can reach a level substantially better than what would be possible with alternatives.

Over the past three years, the minigrid sector has made significant progress toward becoming a mainstream pathway to providing modern energy services to people who need it the most, particularly in Sub-Saharan Africa, alongside grid extension and stand-alone solar systems. The following data highlight both the progress and potential of modern minigrids:

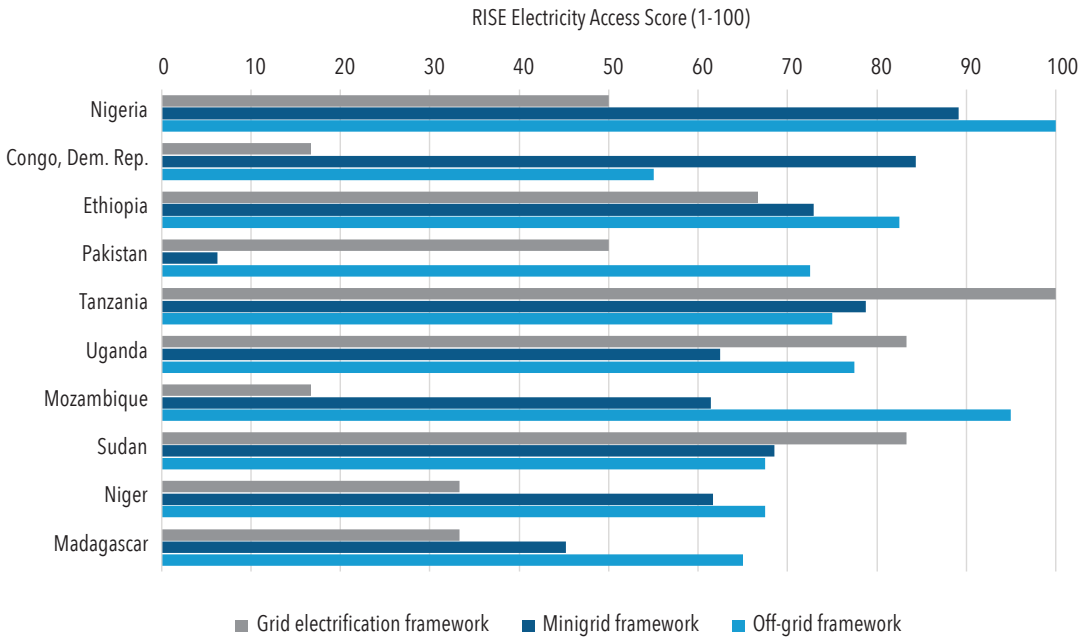
- *The pace of deployment has tripled*, accelerating from less than 50 per country per year in 2018 to 150 per country per year in 2021.
- *The unsubsidized levelized cost of energy (LCOE)* has fallen by a third, from US$0.55 per kilowatt-hour (kWh) in 2018 to US$0.38 per kWh in 2021, which is on pace to be less than US$0.20 per kWh by 2030.
- *The cumulative required investment* cost is approximately US$98 billion to connect 490 million people to minigrids by 2030, down from an estimate of US$190 billion in 2018, as a result of faster-than-expected cost declines.
- *As a result of technology disruption* since 2018, when 79 percent of planned minigrids were expected to be powered by solar photovoltaic (PV) techology, more than 99 percent of planned minigrids were powered by solar PV in 2021.
- *Significant market potential for system standardization* is based on geospatial analysis:
    - 21,000 minigrids with capacity of less than 20 kilowatts (kW)
    - 58,000 minigrids with capacity of 20–80 kW
    - 46,000 minigrids with capacity of 80–200 kW
    - 35,000 minigrids with capacity of 200–500 kW
    - 17,000 minigrids with capacity of 500–1,000 kW
    - 24,000 minigrids with capacity of more than 1 MW.

The handbook also highlights successes and best practices from the key markets across the globe that have demonstrated significant advances in recent years in creating enabling environments for minigrid scaling-up. As such, it showcases that numerous countries—such as Bangladesh, Cambodia, Ethiopia, India, Kenya, Nigeria, Rwanda, Zambia, and others—have developed or are in the process of developing regulatory and policy frameworks for minigrids that address the five key issues that regulations must address: market entry (licensing, permitting, registration, and so on); tariffs; service quality standards; technical standards; and what may happen to a minigrid if and when the main grid arrives. The RISE indicators track regulations in these five areas as part of its comprehensive assessment of the minigrid framework in each country, and the "Mini Grids for Half a Billion People" handbook uses the RISE score for the minigrids framework as one of five "Key Performance Indicators" for the global minigrid sector, alongside pace of development, quality of service, access to finance, and cost of electricity. In 2020, the top 10 countries with the largest electricity access deficits had an average RISE score of 53 out of 100 on the minigrid framework indicator. At the beginning of 2022, this had risen to 63 out of 100, and if this pace continues, the average RISE score for minigrid framework for this cohort of 10 countries could be higher than 80 out of 100 by 2030.

Recognizing that even though each country's own unique context requires an appropriate regulatory and policy framework to support minigrids, the handbook makes the case that the role of any enabling regulatory framework for minigrids should be to promote the best possible service at the lowest cost-recov¬ery tariffs. Pursuit of this goal throughout the stages of development of a country's minigrid sector—taking into account subsidies and the broader national electrification strategy—requires a regulatory framework that is predict¬able but flexible enough to evolve as the market does.

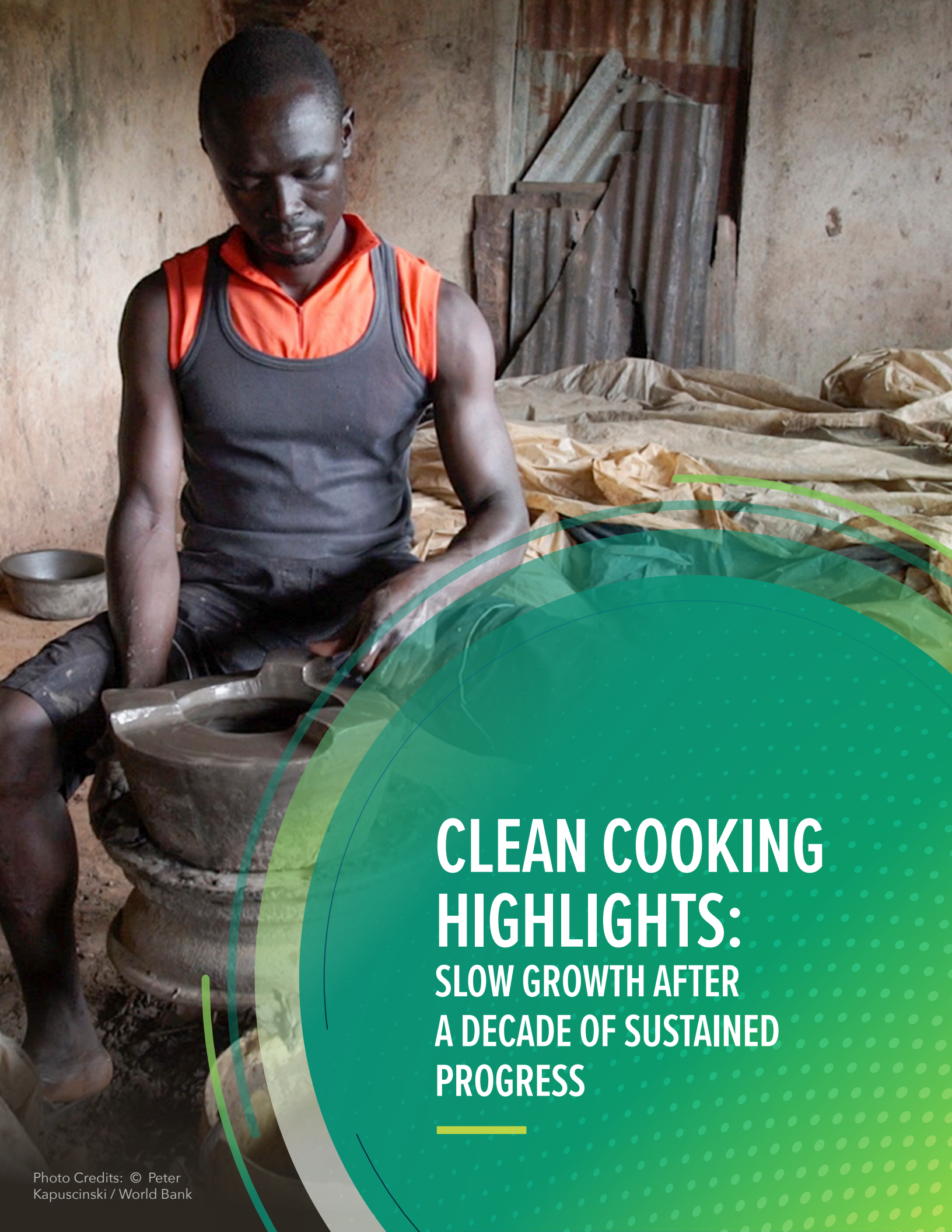
Among the countries with the largest access-deficit populations, frameworks to support minigrids and off-grid systems have been dominant relative to frameworks for grid expansion in 2021. Regarding minigrids, the Democratic Republic of Congo, Ethiopia, Nigeria, Sudan, and Tanzania reached the green zone in 2021 (figure 14). In December 2020, the Ethiopian Energy Authority board approved a new minigrid directive, which constitutes a crucial step in developing a solid and coordinated regulatory review procedure that would aid in fostering private sector investment in minigrids and consumer connections (NARUC 2021). In Nigeria, the Rural Electrification Agency resumed its work on the country's Electrification Project at the start of 2021.[6] The implementation improved electricity connections through minigrids and Solar Home Systems (SHS). In contrast, Pakistan has a weak minigrid framework, lagging behind the other large access-deficit countries. In relation to the off-grid system framework, most countries entered the green zone, thanks to their efforts to develop the off-grid market with private sector participation and the digitalization of payment methods, while Madagascar and the Democratic Republic of the Congo were in the yellow zone in 2021. For grid expansion, Tanzania stands out as a result of its policy on funding support and the introduction of enhanced standards of performance on quality of supply.

FIGURE 14. COMPARISON OF RISE SCORES ON THE GRID, MINIGRID, AND OFF-GRID FRAMEWORK INDICATORS FOR THE 10 LARGEST ACCESS-DEFICIT COUNTRIES, 2021



Source: World Bank, RISE 2022.

6 The Nigeria Electrification Project is an initiative of the federal government scheme created in 2018, in collaboration with the World Bank, the African Development Bank, and other partners underserved and unserved communities with electricity access using renewable sources.



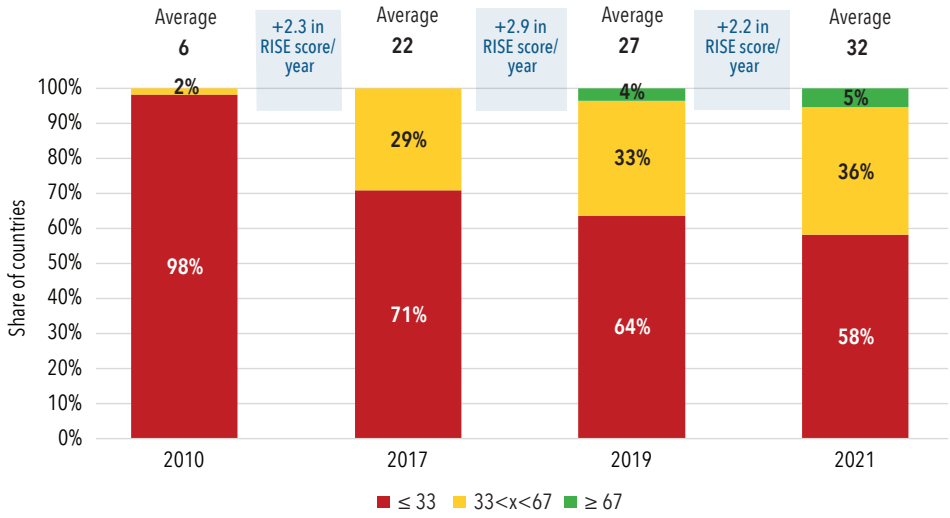
CLEAN COOKING HIGHLIGHTS:

SLOW GROWTH AFTER A DECADE OF SUSTAINED PROGRESS

Photo Credits: © Peter Kapuscinski / World Bank

Progress in clean cooking regulatory frameworks slightly increased during the 2019–21 period. Most improvements in countries' clean cooking overall scores were by less than 10 points, while a handful of countries saw no change in score. Globally as of the end of 2021, more than half of the countries surveyed still fall in the red zone, while 36 percent fall in the yellow zone. This is a slight improvement from the 2020 edition where only one-third of countries worldwide scored in the yellow zone (figure 15).

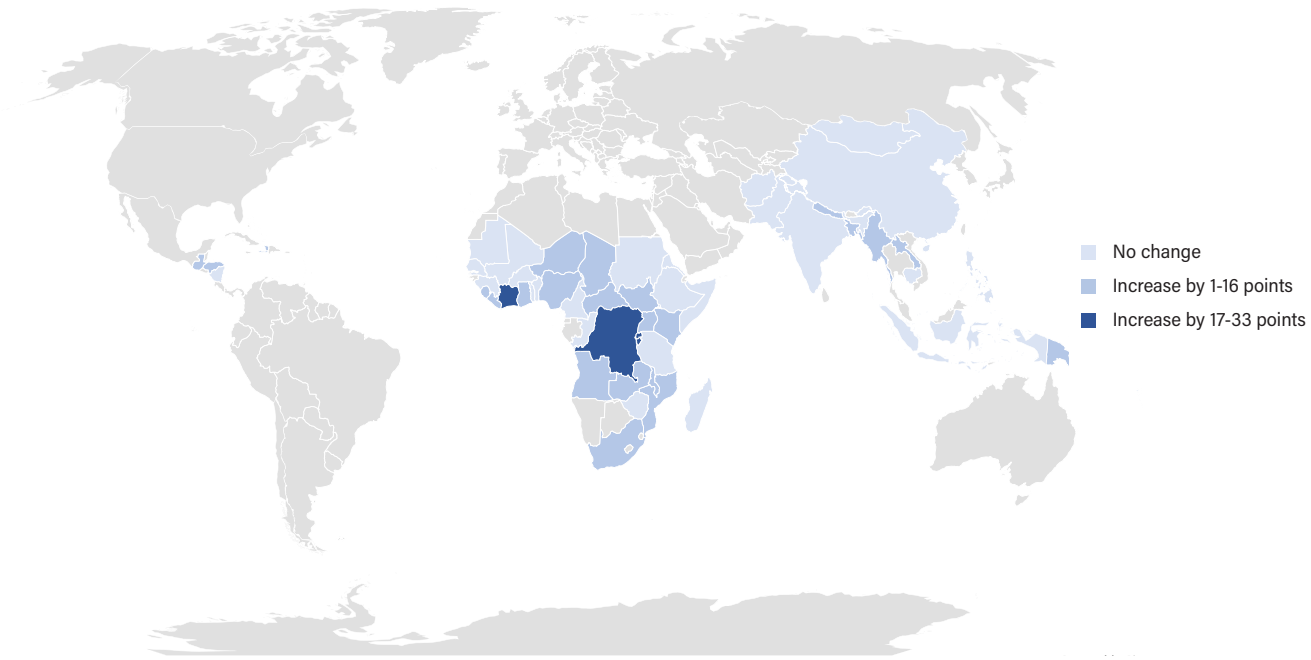
FIGURE 15. CLEAN COOKING: PROGRESS IN RISE SCORE FOR PILLAR, 2010–21



Source: World Bank, RISE 2022.

Rwanda was the only country that improved its clean cooking score from the yellow zone into the green zone between 2019 and 2021, while Burundi, Niger, and Nigeria were the only countries to improve their scores from the red zone to the yellow zone. Altogether, there are only three countries among all 55 countries surveyed that scored in the green zone: India, Kenya, and Rwanda (figure 17). More than half of the countries surveyed remain in the red zone, suggesting that they have yet to make major advances on policy frameworks for clean cooking.

FIGURE 16. RISE CLEAN COOKING PILLAR SCORES, 2019–21 (ADJUSTED SCORE AS PER NEW SURVEY)

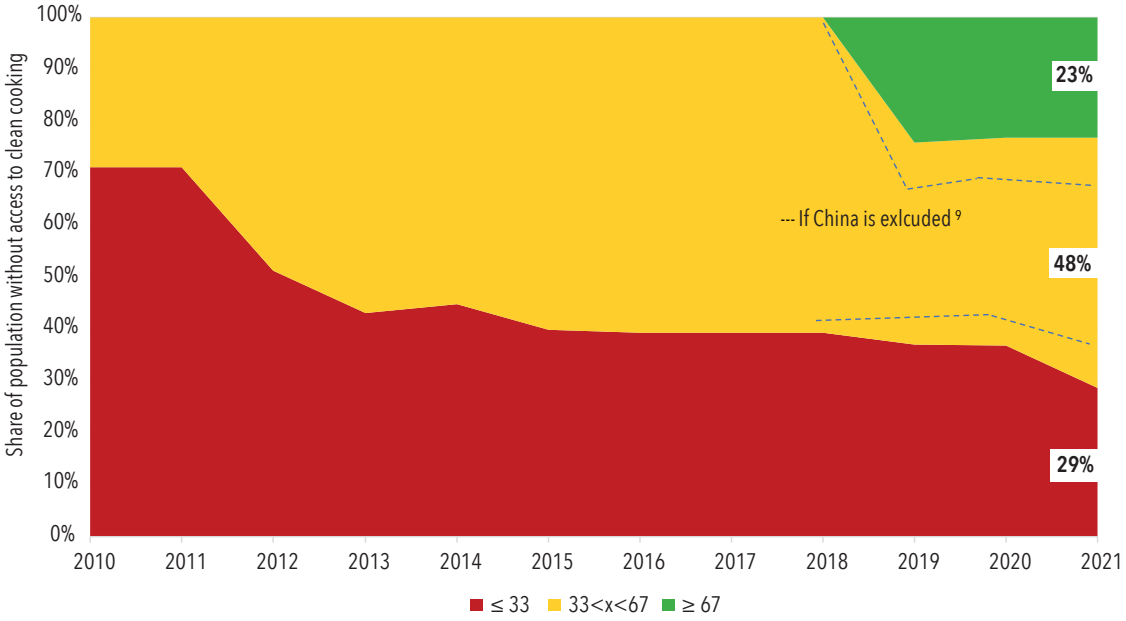


Source: World Bank, RISE 2022.

Note: The clean cooking pillar surveys a total of 55 countries that have deficits in access to clean cooking among their populations, based on the latest SDG7.1.2 results in "Tracking SDG7: The Energy Progress Report 2021" (IEA, IRENA, UNSD, World Bank, and WHO 2021). The countries surveyed include all 54 electricity access-deficit countries. China is the only country clean cooking access-deficit country included among the 55 countries surveyed which does not have an electricity access deficit.

Among the countries surveyed, 2.4 billion still people do not have access to clean cooking, yet less than half of them is in countries that now score in the red zone. About one third of the population with clean cooking access deficit are in countries that score in the green zone (figure 17). Nigeria's improvement from the red zone to the yellow zone since 2019 made a major difference, given its large population without access to clean cooking. Grants and targeted funding to Nigerian clean cookstove suppliers have been made available thanks to Clean Cooking Alliance (CCA) such as the Catalytic Small Grant (Roshan Global confirmed being a beneficiary), Spark+ and Women's Empowerment Funds. These funds provide financing incentives and deferred payment programs with a special focus on LPG Stoves, ethanol stoves, biomass briquettes stoves, and efficient wood stoves. The goal of the program is to enable 80 percent of the population to cook with modern stoves by 2030, which would make a major improvement to the global access deficit. Improving the score of China, the most populated country in the yellow zone, will significantly increase the percentage of the population with advanced policy framework. Since 2010, the share of the population with access to clean cooking rose more than 12 percent to now cover nearly two-thirds of the entire population. Many commercial stoves were on the market long before quality and efficiency standards were put in place in 2009, which has led to a large variation in performance and quality of stoves. There is still a considerable demand opportunity in China for durable quality stoves in the lower income provinces. Targeted incentives and regulations with last mile distribution and gender considerations can help the commercial market meet this demand and improve China's overall score.

FIGURE 17. CLEAN COOKING: RISE SCORE WEIGHTED BY POPULATION WITHOUT ACCESS, 2010–21[7]



Source: World Bank, RISE 2022.

Progress in clean cooking policies nearly flattened in all regions in the period 2019-2021, except in the East Asia Pacific and Latin America and Caribbean regions. On average, South Asian countries are leading on policy and regulatory frameworks for clean cooking, but only India among them scores in the green zone. In three out of four access-deficit regions—East Asia and Pacific, South Asia, and Sub-Saharan Africa—RISE scores range widely from 0 to 79 (Figure 18). Among the 35 countries in the Sub-Saharan African region, only Kenya and Rwanda score in the green zone. Although this region has the lowest regional average, since 2010 it has shown a consistent uptick, albeit from a lower starting point. While Latin America and the Caribbean has shown the greatest gains since 2010, with Guatemala accounting for most of the improvement in regional average over the last two years. The consumer market in Guatemala has grown since a 2014 partial subsidy was introduced to cover 70% of the stove cost for low-income consumers, yet a recent 2021 tax deductible incentive for clean cooking suppliers as part of the updated national clean cooking plan has made a significant impact on the cookstove market.

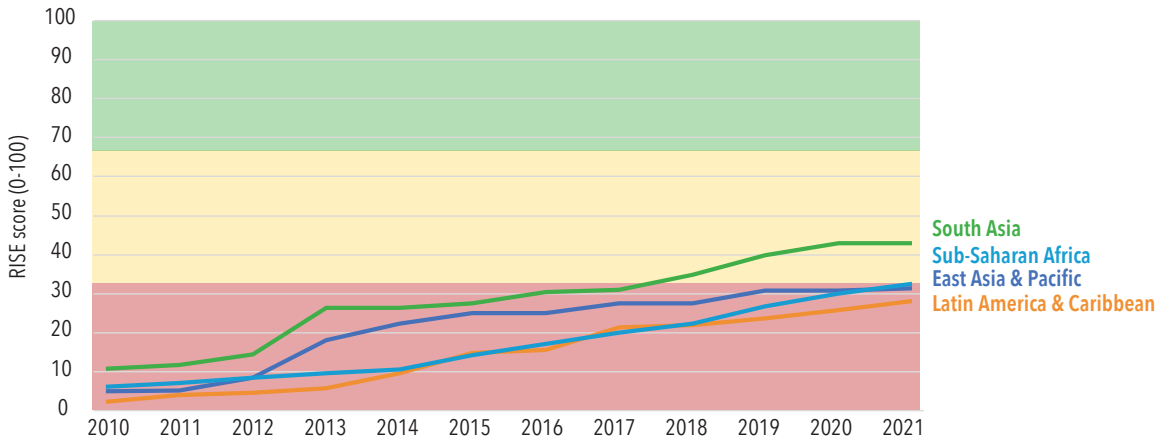
Globally, the highest improvements in RISE scores over the last two years have been achieved by Rwanda, the Democratic Republic of Congo, and Burundi, but none of these countries have managed to improve their access to clean cooking rate above 5 percent. Only 10 of the 55 countries surveyed have access rates that exceed half their respective populations. Among these ten

7 It should be noted that the RISE clean cooking score of 62/100 for China accounts does not account for a significant proportion of the 48% total population without access to clean cooking in the chart as of 2021. If China is excluded in this analysis, as noted by the dotted line, the percentage of the rest of the world's access deficit population in the green zone of RISE scores in 2021 increases to 27%, while the percentage decreases to only 40% in the yellow zone and increases to 33% in the red zone. Although there is yet to be universal access to clean cooking throughout China, the share of China's total population without access to clean cooking has been reduced significantly over the last decade. According to the SDG7 Tracking Report, as of 2021, 79% of China's population has access to clean cooking solutions. The majority of the access deficit is concentrated in the provinces of Shanxi, Hubei and Guizhou, where access to heating in homes is also a major issue. Most policies and regulations that focus on access to clean cooking and heating have been adopted at the provincial level as opposed to the federal level. RISE results evaluate policies primarily at the federal level. Relevant provincial policies and/or programs that apply to RISE indicators are taken into consideration only if there is an absence of any relevant regulations at the federal level.

countries, only India (68 percent access rate) scores in the green zone. Most countries that have already achieved access to clean cooking for a majority of their populations are not focusing on good practice clean cooking policies. On the other hand, the ten countries with the lowest access rates among the 55 countries surveyed—the bottom 10—have all achieved RISE score improvements of over 10 points, indicating that low access rates can motivate policy makers to focus on clean cooking reforms. There have not been noticeable increases in the access rates of these bottom 10 countries yet, but there are other good examples to acknowledge. The aforementioned Guatemala is one example, having increased its access to clean cooking rates nearly 10 percentage points to now cover just under half of its population. Kenya is another good example: its RISE score has improved into the green zone while its access rate increased from below 5 percent two years ago to now cover nearly 20 percent of its population.

Clean Cooking policies tailored to target beneficiaries, ensure quality and provide financial incentives lag behind. Over the past decade, the countries have typically scored better year-on-year when it comes to the initial building blocks of clean cooking policy frameworks—namely, institutional capacity, tracking progress, and initial awareness strategy. Most of this progress was achieved up to 2018-2019, with little reforms made over the past two years. The improvement has been less steady with the more mature market regulations that enable

FIGURE 18. CLEAN COOKING: EVOLUTION OF RISE SCORES BY REGION, 2010–21



Source: World Bank, RISE 2022.

TABLE 3. CLEAN COOKING: FASTEST IMPROVERS, BY REGION, 2019–2021
(RISE score on CC pillar in 2019, 2021)

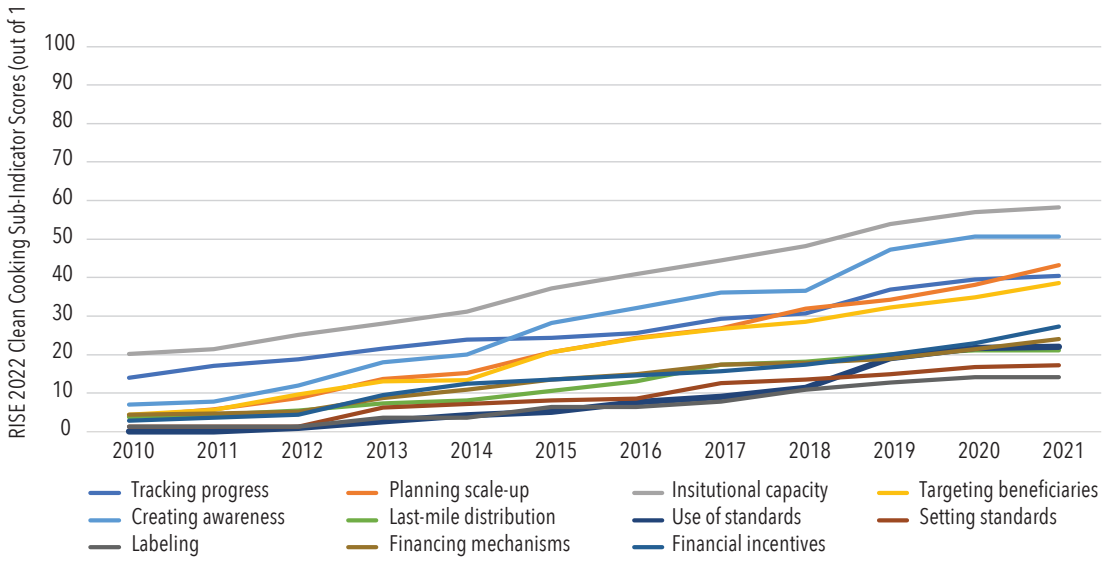
East Asia & Pacific (10)	Latin America & Caribbean (4)	South Asia (5)	Sub-Saharan Africa (35)
3- Papua New Guinea (0,3)	13- Guatemala (15,28)	14-Bangladesh (45,59)	32-Rwanda (46,78)
2- Lao PDR (58,60)	3- Honduras (25,28)	2-Nepal (54,56)	28-Congo, Dem. Rep. (4,32)
	2- Haiti (36,38)		25- Burundi (18,43)

Source: World Bank, RISE 2022.

clean cooking expansion, such as financial incentives for consumers and suppliers, standards and labeling (figures 19 and 20). India is a notable exception, having introduced standards and labeling programs for clean cookstoves since 2009 and a widespread LPG subsidy program since 2015. Over the last two years, efficiency and emissions standards have been updated as part of the 2019 Roadmap for Access to Clean Cooking Energy, and the LPG subsidy program has been modified to target the poorest household segment of the population.

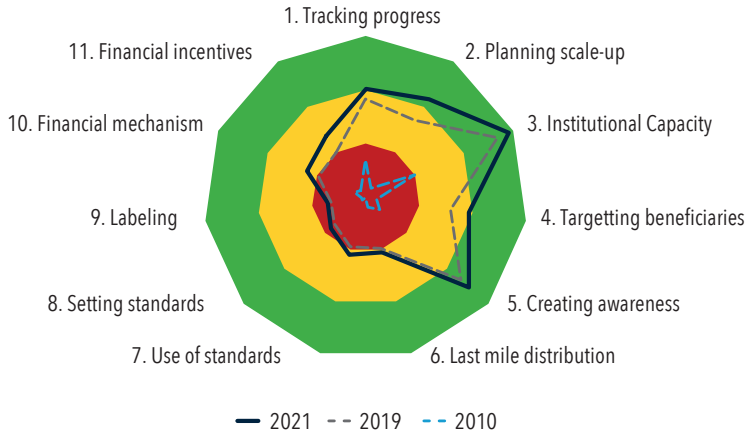
Last mile distribution remains overlooked in the majority of countries surveyed. Understandably, last mile distribution regulations are missing in most countries with low access rates, as these countries need to first prioritize achieving access in all cohorts of their

FIGURE 19. RISE CLEAN COOKING SUB-INDICATORS SCORES, 2010 – 2021



Source: World Bank, RISE 2022.

FIGURE 20. PROGRESS BY RISE CLEAN COOKING SUB-INDICATOR, 2010, 2019 AND 2021



Source: World Bank, RISE 2022.

population (figure 21). However, it is concerning that many countries with access rates that cover most urban and densely populated areas have not initiated necessary last mile distribution strategies. The private sector can succeed in expanding clean cooking access commercially in urban centers in most countries, but geographically remote and poor areas require the most active presence of public agencies for effective last mile delivery. A notable example among the highest improved scoring countries is in Burundi, where last mile distribution to geographically remote areas, rural settlements and poor households was a focal point of the government's new clean cooking awareness strategy promoting off-grid solar cookstoves and improved biomass cookstoves. The next step in expanding access through this strategy is providing the private sector with incentives to invest in accessible clean cookstoves for the most vulnerable last mile beneficiaries, which the government of Burundi is incentivizing through the Light Program. Nepal, under its sustainable energy subsidy policy, is providing additional subsidy to the target beneficiaries from the disadvantage groups such as single mothers, disaster victims, people living in geographically remote districts and endangered marginalized ethnic groups. To allow efficient tracking of the users, Nepal also maintains national database which has disaggregated records in terms of gender, ecology and ethnicity.

The indicator on financial incentives for suppliers clearly shows more room for improvement, particularly with respect to end user incentives for low-income consumers (Figure 22). Only 13 percent of the surveyed countries have such provisions while only 15 percent of them have targeted incentives to purchase higher tier cookstoves or fuels. Kenya and Rwanda provide good examples of recent financial incentive reforms to support disadvantaged groups and financial incentives for suppliers. In Rwanda, a new incentive was implemented

FIGURE 21. LAST-MILE DELIVERY MECHANISM IN ACCESS-DEFICIT COUNTRIES, 2021

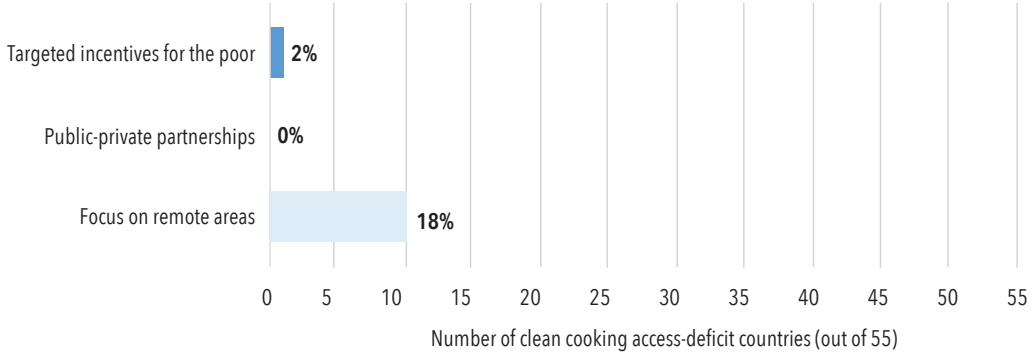
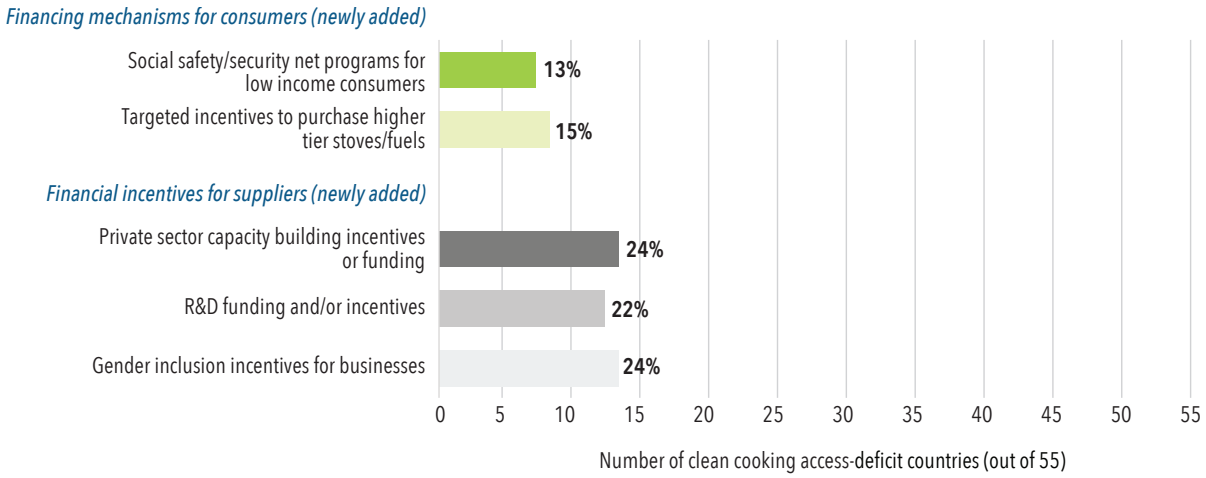


FIGURE 22. FINANCIAL INCENTIVES FOR CONSUMERS AND SUPPLIERS



as of 2020 which allowed value-added taxes to be waived for LPG importers on all cookstoves and cookstove accessories to be sold in the local marketplace. In the past two years in Kenya, concessional financing and incentives for clean cookstove has been made available to manufacturers, wholesalers, retailers and last-mile distributors through a results-based financing facility as part of the World Bank's Off-Grid Solar Access Project (KOSAP). Yet, when observing global results on the supply side of the market, only a quarter of the countries surveyed provide financial incentives to companies to assist them with capacity building and R&D on clean cooking solutions.

BOX 5. GENDER-DISAGGREGATED DECISION MAKING FOR CLEAN COOKING CONSUMERS – A DETAILED CASE STUDY FROM NEPAL

In 2021, with the support of the Nepalese government, ESMAP's Modern Energy Cooking Services (MECS) program collaborated with ENERGIA to implement a research study focused on gender-specific decision making with respect to electric cooking (Energia 2021). Given the volatility of supply of fuels, many countries including Nepal are prioritizing electric cooking as a clean cooking solution.

As cooking is typically a task that women engage in, understanding the barriers to and opportunities of a transition to electric cooking from a woman's perspective provides important insights for the uptake and use of electric cooking appliances. Decision-making around purchase and use of electric cooking appliances was analyzed by disaggregating between men and women as both customers and users of electric cooking appliances. The following findings and recommendations from the study revealed important policy considerations for women's access to clean cooking:

- Women were not reached to the extent men were by official information channels for electric cooking products, indicating that gender responsive approaches are needed both to enhance uptake and to optimize the use of induction stoves by women, who are the main cooks.
- Loans were taken by lower middle income group households to purchase electric induction stoves. Only women affiliated with a savings and credit group took loans. The savings and credit groups or women's self-help groups supported access to finance and experience sharing on the use of the system.
- Women have a higher level of control over smaller budget, day-to-day spending decisions for cooking fuels rather than one-time larger budget purchases such as electric stoves.
- Men use electric cooking appliances more frequently than traditional stoves, and even LPG, suggests that electric cooking may be a step towards changing gender roles and norms - implying that information and awareness activities should consciously target both men and women.
- Time saving is the highest in areas where cooking is highly dependent on fuelwood combined with scarcity of fuelwood. In these areas, the provision of alternative fuel for cooking is essential to achieve development impacts, especially compared to areas where electric cooking replaces LPG.

These findings are generally aligned with the good practice policies implied in the RISE clean cooking subindicators on targeting beneficiaries, last mile distribution, creating awareness, and financial incentives. Nepal's score improvement into the yellow zone in its clean cooking overall score is a reflection of well-informed regulatory reforms as a result of studies like this. Clean cooking research studies that focus on findings disaggregated by gender are a valuable resource to inform policy makers' clean cooking regulatory decisions. Recommendations and suggestions for further research from ENERGIA's research study are applicable to a majority of the countries surveyed globally with access to clean cooking deficits.

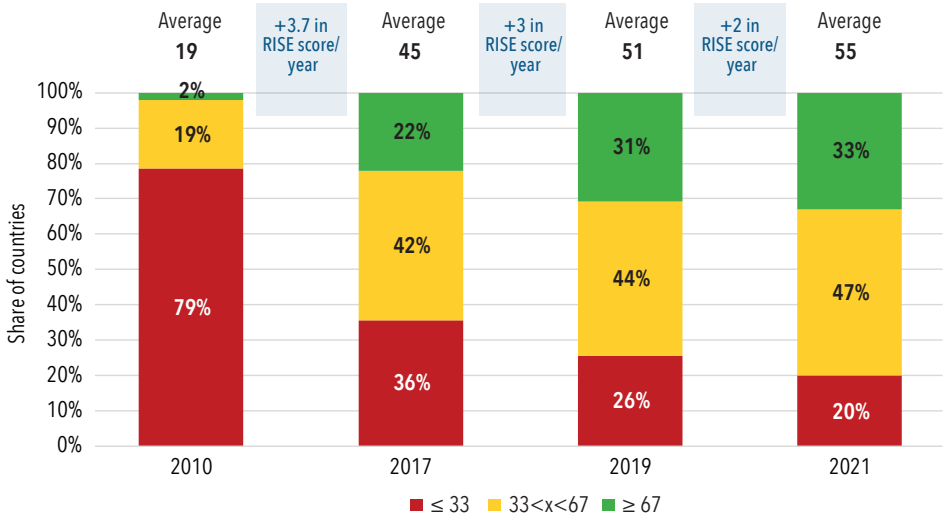
RENEWABLE ENERGY HIGHLIGHTS:

MARKET MATURITY IS EVIDENT IN RECENT POLICY TRENDS

Photo Credits: © Dominic Chavez/World Bank

Renewable Energy policy and regulation has been increasing at a slower pace and the period from 2019 to 2021 experienced 33 percent less average annual growth than the 2017–19 period. The global pandemic and focus on national health emergencies in the period 2019-2021 may account for the slight 6 percent of countries that shifted from the red zone into the yellow zone and a marginal 2 percent growth in the green zone. Between 2010 and 2017, 43 percent of countries, largely high and middle income, had moved out of the red zone into the green and yellow zones (figure 23). In 2021, 66 countries fall in the yellow zone, while 46 countries have moved into the green zone and 28 are still in the red.

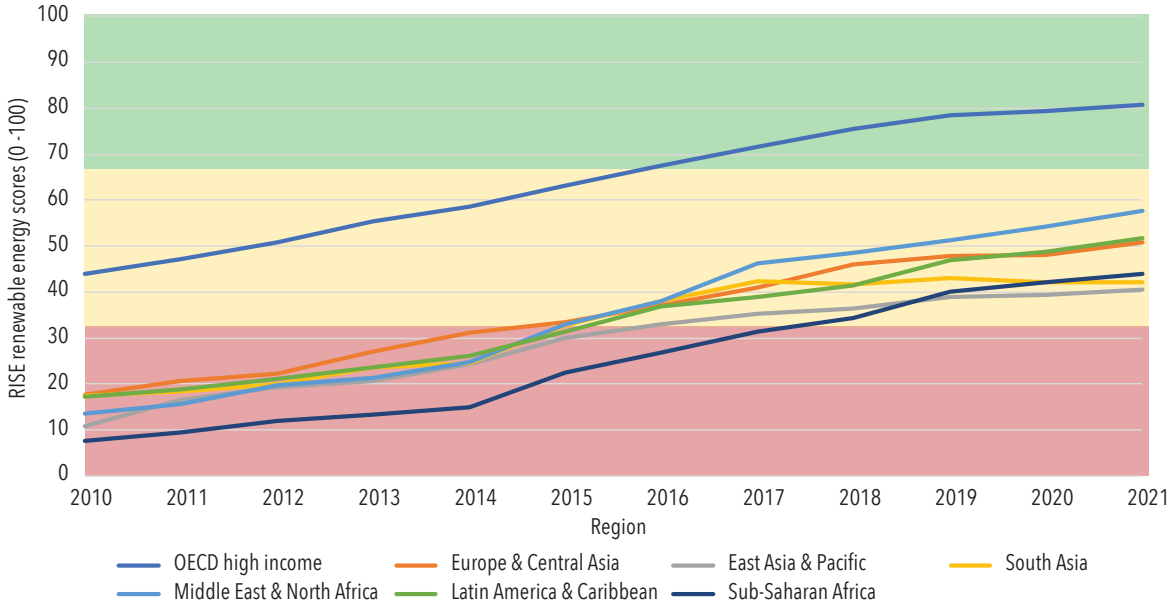
FIGURE 23. RENEWABLE ENERGY: PROGRESS IN RISE SCORES FOR PILLAR, 2010–21



Source: World Bank, RISE 2022.

Although the OECD region has retained the highest RISE average score since 2010, each region of developing countries has narrowed the gap over the last 12 years. Since the RISE 2020 edition, the Middle East and North Africa and the Latin America and Caribbean regions both improved their RISE renewable energy scores by an average of 6 points (figure 24). Ecuador and Nicaragua lead improvements in the Latin America and the Caribbean region from 2019 to 2021 as each country made significant commitments to policy change, rising 24 and 20 points respectively. Ecuador implemented policies in the intervening years that address broad topics from financial transparency of utility companies to greenhouse gas monitoring and auctions from investors. Nicaragua adopted policies focusing on financial incentives for Renewable Energy including both investment and production tax credits as well as support for public and privately owned electric/hybrid vehicles. The MENA region is bolstered by Saudi Arabia's 30-point improvement since 2019. Between 2020 and 2021 Saudi Arabia made significant steps integrating RE variability regulations into its grid code and offering long term PPAs for both large- and small-scale (under 10MW in capacity) electricity producers.

FIGURE 24. RENEWABLE ENERGY: EVOLUTION OF SCORE BY REGION, 2010–21



Source: World Bank, RISE 2022.

TABLE 4. RENEWABLE ENERGY: FASTEST IMPROVERS, BY REGION, 2019–2021

(RISE score on RE pillar in 2019, 2021)

East Asia & Pacific (14)	Europe & Central Asia (22)	Latin America & Caribbean (19)	Middle East & North Africa (15)	OECD high Income (28)	South Asia (7)	Sub-Saharan Africa (35)
17- Vietnam (67, 84)	17- Russian Federation (49, 67)	24 – Ecuador (36, 59)	30 - Saudi Arabia (21, 51)	18- France. (70, 88)	3- India (85, 88)	47 - Côte d'Ivoire (11, 58)
11-China (61, 72)	12 – Romania (63, 75)	20 – Nicaragua (31, 51)	15- Lebanon (49, 64)	17 - Chile (70, 87)	1 - Maldives (24, 25)	30 - Mozambique (29, 59)
6- Malaysia (43, 49)	9 – Croatia (58, 66)	11 - Peru (43, 55)	15 - Bahrain (28, 43)	13 - Australia (71, 84)	1 – Pakistan (40, 41)	13 - Uganda (53, 66)

Source: World Bank, RISE 2022.

Côte d'Ivoire made the most progress of any country between 2019-2021, increasing its renewable energy RISE score 47 points from 11 to 58 (Table 4). Historically, biomass has been the primary means of energy consumption for Côte d'Ivoire, representing nearly three quarters of total final energy consumption (TFEC) in 2010, yet the share of modern renewables in TFEC (excluding traditional biomass) has grown by over 8 percent since 2010. In 2020, the government in Côte d'Ivoire implemented significant financial policies towards renewable energy growth including tax reductions, dispatch priority and compensation for project losses. Private sector participation in renewable energy capacity investments—bolstered by a partial guarantee of US$240 million from the World Bank in 2018—helped the country expanded its electricity access from 34 percent of the population in 2013 to 94 percent in 2022. The IFC's Scaling Solar program, which is closely aligned with the best practices of the RISE auctions subindicator, supported Côte D'Ivoire in developing appropriate auction mechanisms to enable private sector participation in its grid capacity expansion.

Mozambique made the second most progress of any country between 2019 and 2021, increasing its renewable energy RISE score by 30 points from 29 to 59. In September of 2021, the government of Mozambique passed significant regulatory and policy reforms

that addressed renewable energy targets, institutional reforms, GHG monitoring, as well as financial incentives for producers. A major focus of the policy changes centers on advancing off-grid energy resources. Solar mini grids, rooftop solar and other solar powered home appliances are incentivized through lower transaction costs and inclusive provisions for private sector installers to diverge from the standard national tariffs. (Brookings 2022). As of 2021, modern renewables power 15 percent of Mozambique's total final energy consumption.

Historic hydroelectric and biomass usage in Sub-Saharan African countries may account for the perceived divergence between higher SDG7 scores and a lack of any measurable advances in modern RE policies. As of 2019, the average global renewable energy share of total final energy consumption (TFEC) was 17.7 percent with Sub-Saharan Africa as the region with the highest percentage use at 68.1 percent (Figures 25-27), largely from solid biofuels (IEA, IRENA, UNSD, World Bank, and WHO).

FIGURE 25. RISE RENEWABLE ENERGY PILLAR SCORE, 2019

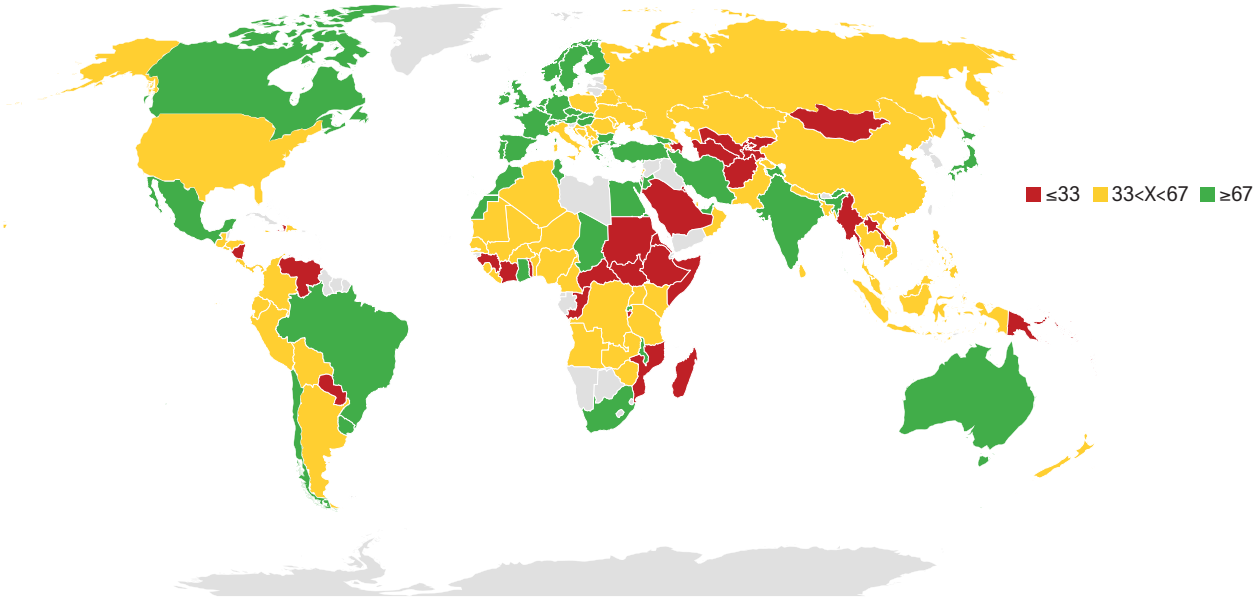


FIGURE 26. RISE RENEWABLE ENERGY PILLAR SCORE, 2021

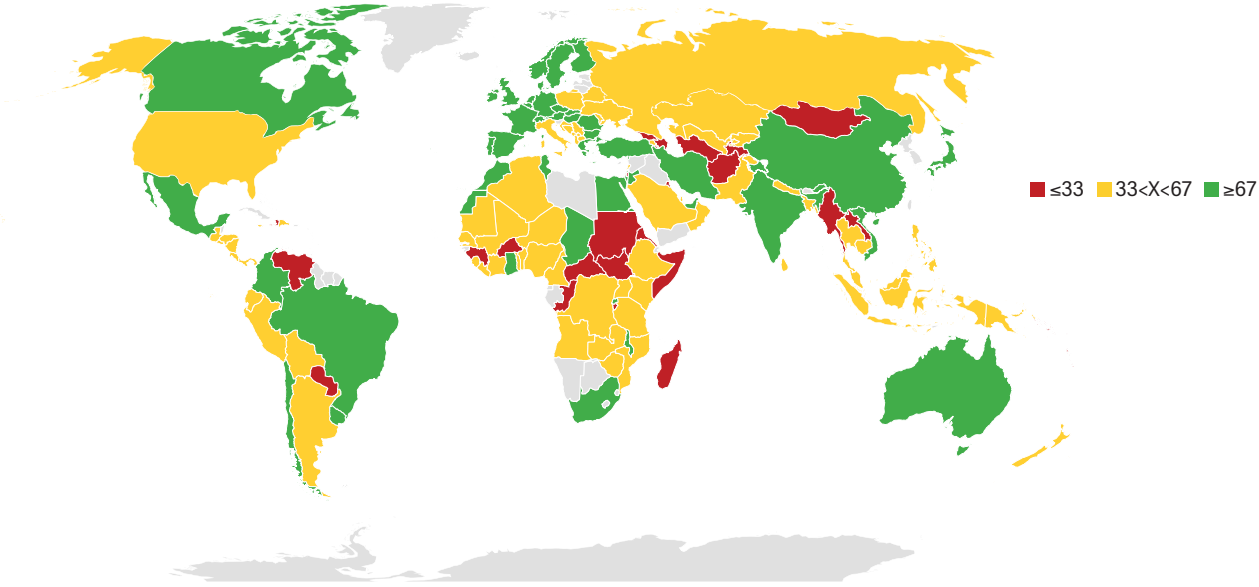
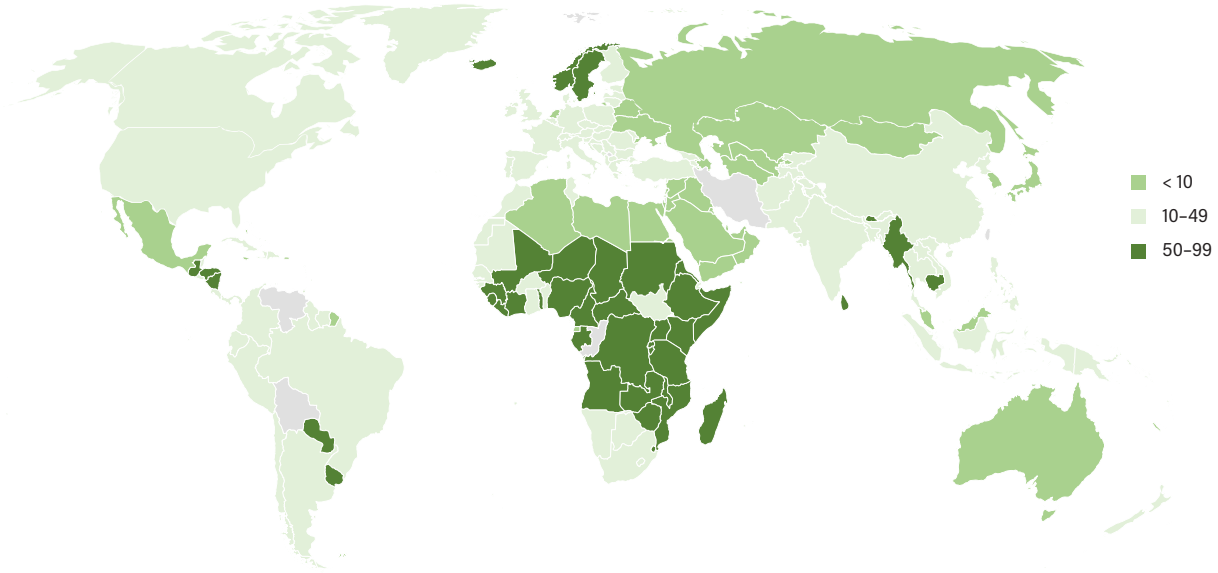


FIGURE 27. SDG7.2 – RENEWABLE ENERGY SHARES OF TOTAL FINAL ENERGY CONSUMPTION



Notable standouts among the most improved regions include Jordan in the Middle East and North Africa and Ecuador in Latin America and the Caribbean. In Jordan, the share of modern RE consumption is now more than triple what it was in 2010. Jordan's RISE RE score improved into the green zone over the last two years, a considerable improvement from where it started in the red zone as of 2010. Three rounds of solar PV auctions for above 1 MW installations have been carried out successfully since 2015, thanks in large part to government support for geospatial planning, production tax credits to utility scale project developers, and compensation mechanisms if projects are behind schedule due to permit delays or other public sector issues. Most recently, the Jordanian government has started to prioritize solar thermal generation for the industrial sector in an effort to cut national emissions by 10 percent between 2021 and 2030. In Ecuador, modern RE consumption increased by over 80 percent since 2010. Wind and solar energy auctions that started in 2011 were bolstered by legislation allowing power purchase agreements (PPAs) with preferential dispatch for RE generation and payments guaranteed in US dollars to account for inflation risks. In order to avoid RE variability issues as more capacity comes onto the grid, the Electricity Master Plan of Ecuador was updated in 2020 to incorporate solar, wind, geothermal, and tidal energy in long-term transmission planning.

Among African countries, Kenya stands out in terms of its improvement in RE policies and corresponding increase in modern renewable energy consumption. Kenya's RISE RE score has increased from the red zone in 2010 to just below the cutoff of the green zone with a score of 65 in 2021; meanwhile, the country's modern renewable energy consumption has also increased over 30 percent since 2010. Feed-in tariffs introduced in 2012 and utility scale RE auctions since 2015 have helped scale up RE capacity installations. Most recently, the 2021 VAT Act offers exemptions on value-added tax and import duties for solar and wind equipment. Kenya's 2021-2030 Least Cost Power Development Plan (LCPDP) included a requirement for regular assessments of the flexibility of the electricity grid with respect to RE variability.

Among Asian countries, a standout improvement took place in Vietnam where modern renewable energy consumption is now 75 percent higher since 2010 and its RISE RE score increased to 84 in 2021 from only 22 in 2010. Attractive feed-in-tariffs for solar and offshore wind have helped scale up investment in RE generation over the past decade, while new investments are being planned in large-scale solar and battery storage as part of Vietnam's coal transition strategy. Vietnam's Grid Integration Series passed in 2017 included a requirement for the assessment Impact of Variable Renewable Energy on System Operations which was carried out in 2020 to take account for renewable energy integration in long term system planning.

BOX 6. ECONOMETRIC ANALYSIS OF RISE RENEWABLE ENERGY INDICATORS AND DECARBONIZATION OUTCOMES

While countries' outcomes cannot always be directly attributed to causation or even correlation with the adoption of good practice policies, historical analysis of the timing of regulations and relevant outcomes can still be informative for policymakers. Galeazzi, Steinbuks, and Anadon (2022) used RISE indicators to offer the first comprehensive and systematic assessment of how renewable energy policies have shaped the evolution of the energy mix globally.[13] Analysis was done 3 to 7 years after policy adoption across more than a hundred developing countries, tracking their respective energy mixes over the course of four decades.

Historical RISE RE indicator scores from all geographic regions of the world were used to construct three different methods of statistical indexes. The first index weighed policy groups equally, which aligns with the RISE indicators' scoring system. The second index prioritized the depth of reforms by summing up the enacted policies at each time, while the third index reduces dimensionality by dropping highly collinear policies to avoid potential double-counting issues.[14] **The authors found no statistically significant differences across the three constructed indices, confirming the robustness of the methodology behind the RISE scoring system**.

All in all, the study found that renewable energy policies counterintuitively result in the same or even higher share of fossil fuel sources in the developing countries' energy mix in the short term, yet the impact of these policies improves five and/or seven years after they have been first adopted. These findings are supportive of the Sailing Ship Effect hypothesis15, wherein incumbent fossil fuel technologies dampen the short-term effects of renewable energy policies. **The limited impact of climate policies could be driven by many interrelated factors leading to difficulties securing finance in these countries.** This explanation regarding difficulties securing finance resonates with one finding of the study, namely, that the policies to address counterparty risk are more consistently associated with increases in the renewables in developing countries' energy mix three years after implementation. The importance of addressing counterparty risk supports the rationale for policies that make projects bankable for private investors, including government guarantees for electricity auctions.

Regulatory and Policy Indicators for Renewable Energy are grouped into seven indicators: (1) Legal framework for renewable energy, (2) Planning for renewable energy expansion, (3) Incentives and regulatory support for renewable energy, (4) Attributes of financial and regulatory incentives, (5) Network connection and use, (6) Counterparty risk and (7) Carbon Pricing and monitoring. Figure 28 shows the average score across the 140 countries analysed in RISE as well as examples for each indicator. **Since 2010, only the Legal Framework for Renewable Energy indicator has achieved an average score in the green zone.** In total, 47 countries scored in the yellow zone for the Legal Framework for Renewable Energy indicator- 33 of which scored 60 or slightly higher- and only 3 scored in the red zone. Planning for Renewable Energy Expansion continues to improve with an average score across all countries of 65 in 2021, a single point away from the green zone. As noted, the scoring methodology in RISE 2022 for Indicator 3: Incentives and Regulatory Support for Renewable Energy was expanded to include a sub-indicator for governments offering direct financial incentives for renewable electricity. The sub-indicator includes five types of financial incentives: (1) Capital Subsidies, (2) Grants or Rebates, (3) Investment Tax Credits, (4) Tax Reductions and (5) Production Tax Credits.

FIGURE 28. RENEWABLE ENERGY: PROGRESS OF RISE SCORES BY INDICATOR, 2010, 2019 AND 2021

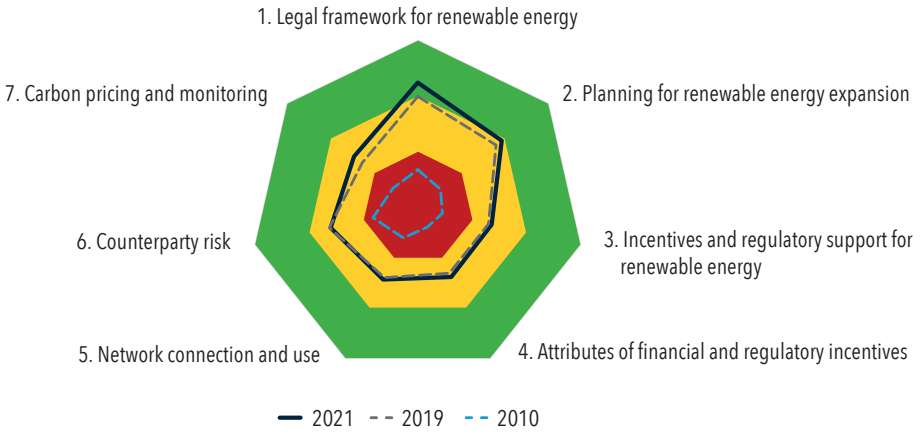
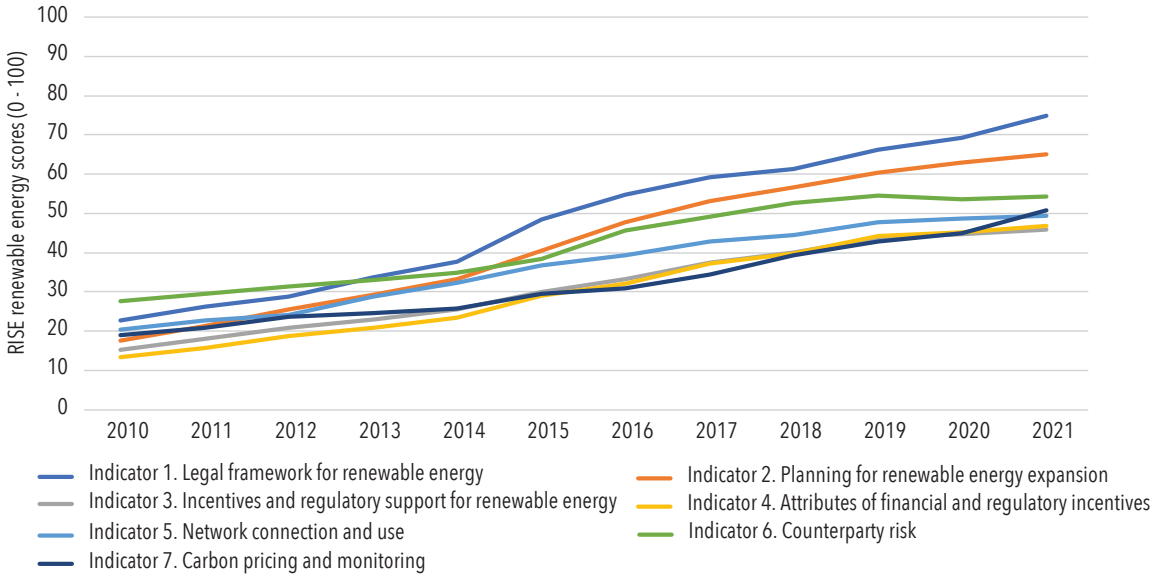


FIGURE 29. TIMELINE OF RISE RENEWABLE ENERGY INDICATORS



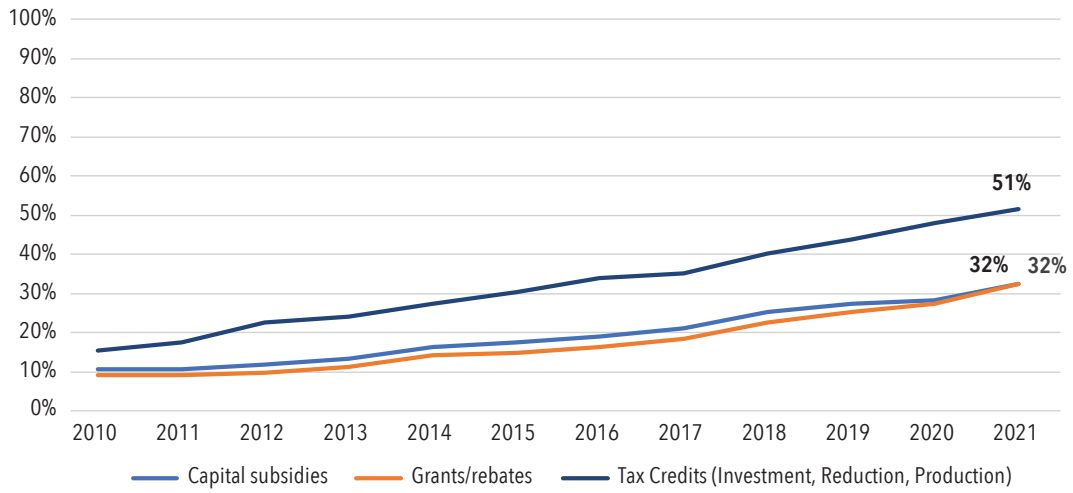
Source: World Bank, RISE 2022.

Tax Reductions were the most prevalent renewable energy fiscal incentive in place in 2021. The comparison of fiscal incentives reveals the evolution of market maturity for renewables in the energy sector. Many countries have phased out incentives that compensate renewable energy production, as renewable technologies have become cost-competitive with traditional baseload energy sources over the last decade. As a result, grants, rebates, and capital subsidies are less prevalent than earlier in the decade (figure 30). Tax incentives are still in place, however, with tax reductions being most widely used in order to attract large-scale corporate investments in RE.

COVID-19 created economic downturns, supply chain constraints and prioritization shift for governments that may have reduced the growth of Renewable Energy policies and regulation. Although the price of electricity generated from renewables is increasingly cost competitive with most fossil fuel sources, the upfront costs and logistics for material acquisition, installation, siting, permitting, and other administrative needs may still represent a significant hurdle for governments interested in advancing renewable energy capacity.

Governments during 2020–21 focused on the financial needs of their healthcare and human service ministries may not have considered projects with a more substantial cost such as hydroelectric dams, offshore wind turbines or any type of infrastructure development as an essential use of resources. Similarly, new financial incentives for renewable energy such as tax reductions, greenhouse gas emission taxes or tariff changes may not have been prioritized.

FIGURE 30. TIMELINE OF RE FISCAL INCENTIVES



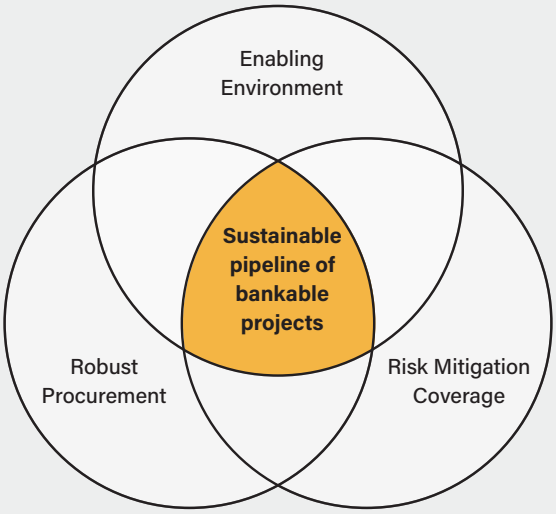
Source: World Bank, RISE 2022.

BOX 7. SUSTAINABLE RENEWABLES RISK MITIGATION INITIATIVE (SRMI) - A FRAMEWORK FOR DEVELOPING, FINANCING AND IMPLEMENTING SOLAR ENERGY PROGRAMS

By 2025, 950 gigawatts (GW) of solar photovoltaic (PV) and 580 GW of wind capacity will need to be installed in developing countries to meet climate goals outlined in the Paris Agreement. In new solar PV generation alone, this represents an investment of more than US$500 billion. To reach this objective, large amounts of private funding will have to be unlocked to complement the limited public financing available from governments in low- and middle-income countries. ESMAP's Sustainable Renewables Risk Mitigation Initiative (SRMI) provides a toolkit for these countries to methodically address critical risks perceived by the private sector while minimizing risks for the public sector.

The technical and financial support provided by the SMRI aim to produce outcomes of (1) Attracting affordable private investments in optimized conditions for grid-connected and off-grid projects. (2) Reducing reliance on public finances - limited to critical public investments. (3) Maximizing socio-economic benefits such as job creation and gender equality. Three principle components are embedded in the framework for developing countries to reach these outcomes (figure B6.1).

FIGURE B7.1 SMRI COMPONENTS FOR A SUSTAINABLE PIPELINE OF BANKABLE PROJECTS



In the RISE Renewable Energy scoring framework, two indicators strongly align with the technical assistance priorities in the SMRI framework: Network Connection & Use and Counterparty Risk. Extensive network connection policies- including the scoping, assessments, measures and standards for the grid's code and integration of Variable Renewable Energy (VRE)- are implemented by 34% of surveyed RISE countries globally, with only 4 middle- or low-income countries (Ghana, Kenya, Brazil and Mexico) achieving a full score. For counterparty risk, regulatory mechanisms to determine credit worthiness and government guarantees or underwritings have only been implemented by one fifth of middle- and low-income countries.

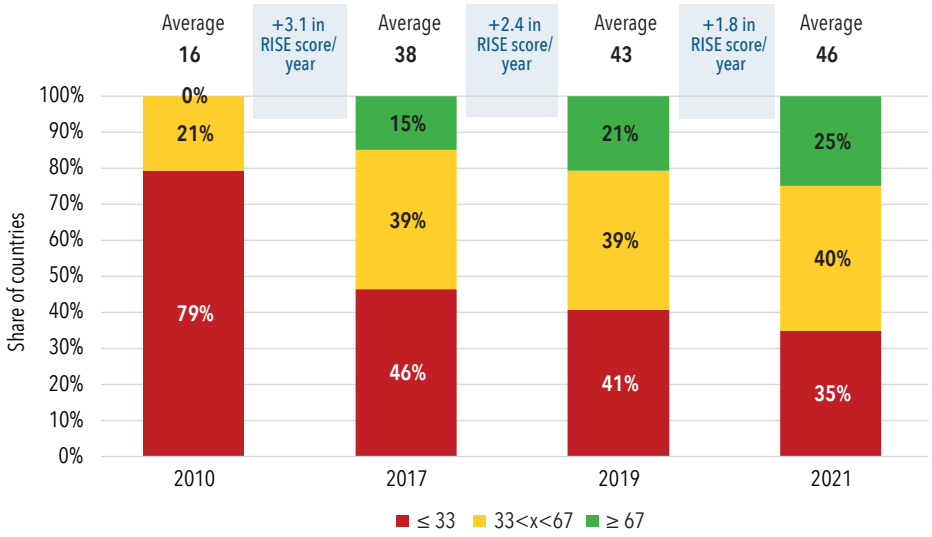
Since 2019, with the support of the SMRI program, Kenya has successfully improved its RISE scores into the green zone for renewable grid integration, network usage and pricing, and connection and cost allocation - the three aspects of the Network Connection & Use indicator. This achievement is critical for Kenya's electric grid to adequately absorb the expected VRE capacity installations expected to come online by 2025 as part of the SMRI project pipeline. Kenya is a prime example of the impact of the SMRI program on providing the scaffolding for countries to increase renewables in their generation mix. In the future, as energy storage technologies gradually mature and become cost competitive globally, RISE indicators will also align with the energy storage best practices that are included in SMRI technical assistance programs.

ENERGY EFFICIENCY HIGHLIGHTS:

LACK OF IMPROVEMENT AMIDST ENERGY DEMAND

The energy efficiency pillar, despite overall progress in all regions in the period 2019–21, has experienced a slower increase compared to 2017–19. The average growth rate for the energy efficiency pillar was 1.7 points per year between 2019 and 2021, less than third the growth rate between 2019 and 2021 (figure 31). This is understandable for the 2019-2021 cycle, given that energy demanded experienced a major slowdown during the initial phases of the COVID pandemic. The pace of renewable energy and clean cooking policy reforms also generally regressed worldwide in 2020, while electricity access—particularly affordability—became a higher priority for policymakers. As policymakers began planning for economic recovery, energy efficiency incentives were included in most countries' recovery packages. Encouragingly, by the end of 2021, the percentage of countries achieving a RISE score in the green zone increased almost twenty-five-fold since 2010. The percentage of countries in the red zone with few or no meaningful energy efficiency policies in place declined by more than half, from 79 percent to 35 percent. The global average, however, remains below 50.

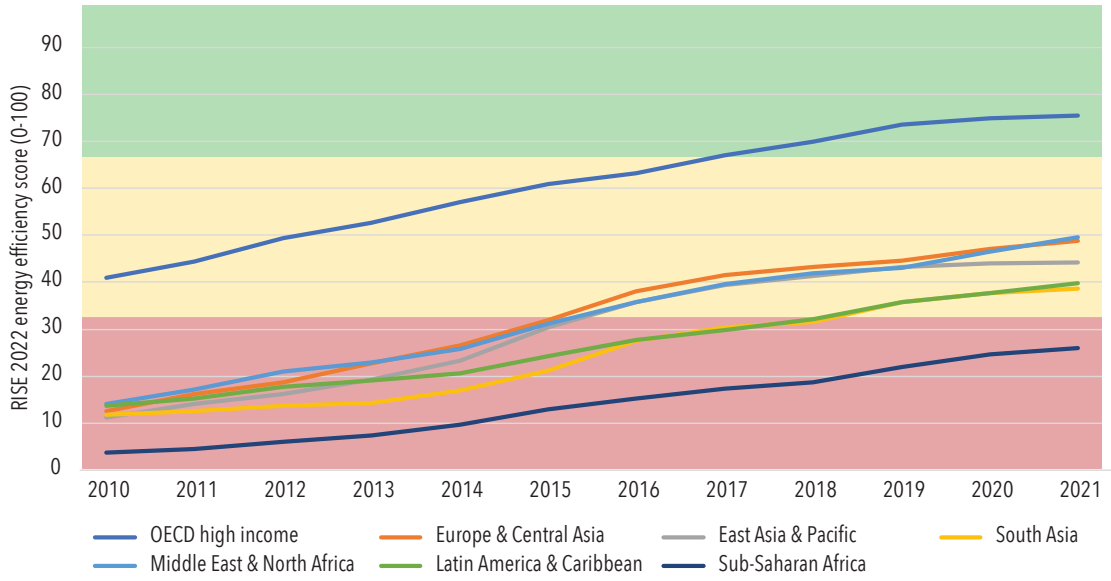
FIGURE 31. ENERGY EFFICIENCY: PROGRESS IN RISE SCORES FOR PILLAR, 2010–21



Source: World Bank, RISE 2022.

All regions increased their adoption of policy and regulatory frameworks for energy efficiency between 2010 and 2021 (figure 32). The observed trend reveals a global emphasis on meeting higher standards for energy efficiency. Across the 140 countries covered in RISE 2022, the higher standards align closely with RISE best practices for legislation, policies, and strategies on energy efficiency. By the end of 2021, over 95 percent of the countries surveyed had adopted legislation planning for energy efficiency. However, with respect to policies targeting sectors that have a major impact on energy consumption (e.g., buildings and transport), a great deal of room remains for improvement. OECD (high-income) countries are leaders in policy and regulatory frameworks for energy efficiency, chalking up an average score of 75 in 2021. South Asia and Sub-Saharan Africa have the lowest regional average scores but continue to improve at a steady annual pace.

FIGURE 32. ENERGY EFFICIENCY: EVOLUTION OF RISE SCORES BY REGION, 2010–21



Source: World Bank, RISE 2022.

MENA and Sub-Saharan Africa were the fastest improving regions in the adoption of efficiency policies between 2019 and 2021. As shown in table 5, Saudi Arabia improved the fastest among MENA countries, with an annual score increase of 15.1 points, which is attributed to putting in place robust financing mechanisms to support EE retrofitting of public buildings covering water supply, wastewater services, municipal solid waste, street lighting, transportation, and heat supply. Côte d'Ivoire advanced the most among Sub-Saharan Africa countries, with an annual score increase of 16.8 points, by mandating minimum energy performance standards for refrigeration, HVAC, and industrial electric motors' sectors. Zambia, Senegal and Niger round out the rest of the top 5 highest improvements during the most recent two year cycle. Bahrain also improved its score by 15 points to move from the red zone into the yellow zone.

While South Asia flatlined its improvement since 2019 and remains among the lowest scoring regions on average, notable exceptions include India, which now scores in the green zone, and Bangladesh and Sri Lanka which improved from the red zone to the

TABLE 5. ENERGY EFFICIENCY: FASTEST IMPROVERS, BY REGION

(RISE score on pillar in 2022, annual rate of improvement in RISE score 2019–21)

East Asia & Pacific	Europe & Central Asia	Latin America & Caribbean	Middle East & North Africa	OECD High Income	South Asia	Sub-Saharan Africa
Singapore (76, 78)	Moldova (50, 65)	Colombia (43, 56)	Saudi Arabia (38, 68)	Chile (56, 74)	Pakistan (29, 36)	Côte d'Ivoire (24, 57)
China (70, 72)	Russian Federation (41, 52)	Mexico (54, 64)	Bahrain (31, 46)	France (61, 69)	Sri Lanka (37, 42)	Zambia (18, 37)
Lao PDR (13, 14)	Belarus (48, 58)	Guatemala (5, 13)	Iran (61, 69)	Poland (51, 55)	India (81, 85)	Senegal (21, 39)

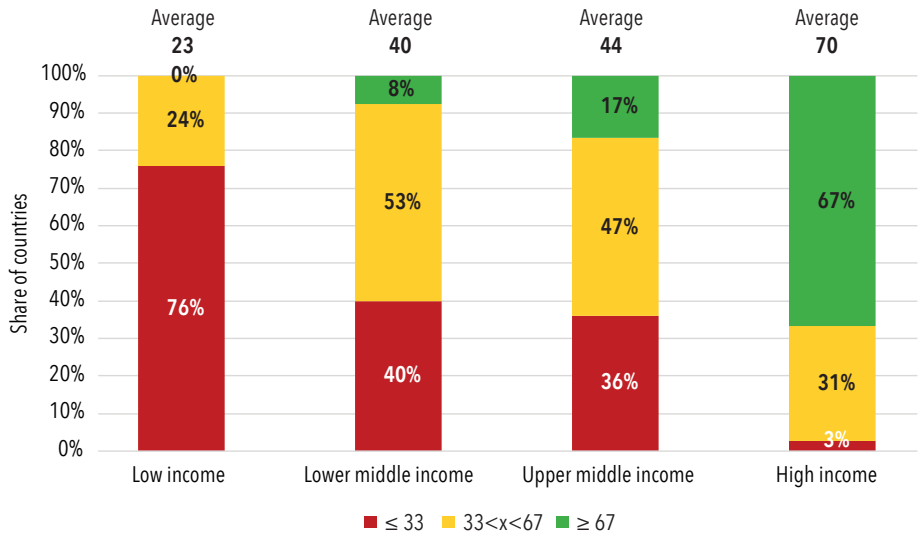
Source: World Bank, RISE 2022.

yellow zone in the last five years. All three countries also improved their energy intensity by over 2percent per annum since 2015. Regulatory efforts in each country to update building energy codes and set standards and labels for HVAC equipment in all three countries have made a positive impact on their energy intensity.

On average, energy efficiency scores tend to rise with income levels, but there is a weak correlation when examining individual countries, with many notable outliers. As has been consistent in years past, higher-income countries with more advanced policy frameworks cluster mainly in the green zone. Yet only about half of low and lower middle income countries are clustered in the red zone (figure 33), as many exceptions have improved into the yellow zone. Among the lowest income group of countries, in addition to the aforementioned Sub-Saharan African recent improvements in Cote D'Ivoire, Niger, Senegal, and Zambia, a notable low income country example is Rwanda. The recent introduction of binding Minimum Energy Performance Standards (MEPS) for public facilities has effectively limited energy consumption from some of economy's the largest consuming sectors. Rwanda also recently introduced a provision for building carbon trading capacity within the private sector to harness innovative funding opportunities provided by the Clean Development Mechanism (CDM) and voluntary carbon markets in its Green Growth and Climate Resilience National Strategy for Climate Change and Low Carbon.

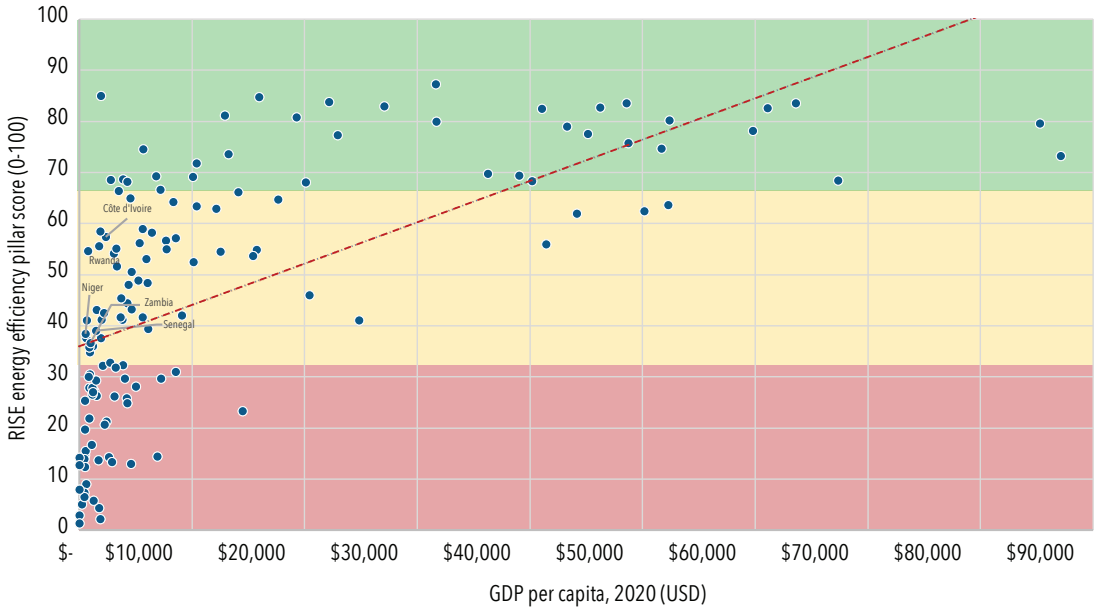
The standout examples among low-income countries demonstrate that effective energy efficiency policies do not require substantial fiscal outlays. Sector-wide blanket subsidies which were typically introduced to promote clean energy scale up in premature markets (for example, feed-in-tariffs for all solar/wind/geothermal installations) are not necessary to incentivize energy efficiency investments. Fiscal constraints need not discourage policy makers from energy efficiency initiatives based on the good practices embedded in RISE energy efficiency indicators.

FIGURE 33. ENERGY EFFICIENCY: RISE SCORES BY INCOME GROUP, 2021



Source: World Bank, RISE 2022.

FIGURE 34. ENERGY EFFICIENCY: RISE SCORES AGAINST GDP PER CAPITA, 2021



Source: World Bank, RISE 2022.

BOX 8. POWER MARKETS, GRID CONNECTIVITY, AND REGIONAL TRADE

Well-functioning electricity markets are a crucial factor for encouraging investment needed to meet low-carbon and power security targets at a low cost in a fast-paced energy transition. ESMAP's new Power Markets, Grid Connectivity, and Regional Trade (MARCOT) program supports the efforts of client countries to design and implement energy sector reforms. Primarily, the initiative focuses on: (1) establishing competitive and transparent electricity trading markets, (2) increasing interconnectivity across regions, and (3) scaling up electricity trade.

While there is no lack of power market information for OECD countries, information on the state of electricity markets and trade in developing countries remains scarce and mostly unreliable. The MARCOT survey therefore was conducted as part of the RISE 2022 data collection and aims at partially filling this knowledge gap. The MARCOT database includes four pillars - Electricity Market, Regional Trade and Markets, Sector Regulation, and Power System Structure and Composition – covering a total of 75 indicators across 106 countries.

Most developing countries' markets have limited competition constrained by the absence of open access and competitive trading arrangements. Most of the countries surveyed remain either in a vertically integrated model [36 out of 106 countries, including 17 in sub-Saharan Africa] or at various stages of a single buyer model [also 36 out of 106 countries], which constrain them in ensuring affordability of supply, increasing grid flexibility, and managing demand response. Nevertheless, some countries [27 out of 106 countries[a]] have managed the process of transition to markets and enjoy a healthy level of competition and significantly increased level of transparency of price formation. Preliminary data collected for the MARCOT database indicates that national day-ahead power markets are prevalent in ECA [62% of countries in the region], and intra-day markets are most common in LAC [60% of countries in the region], reflecting more advanced level of liberalization of markets in these regions.

FIGURE B8.1: SHARE OF COUNTRIES IN EACH REGION WITH A NATIONAL DAY-AHEAD POWER MARKET

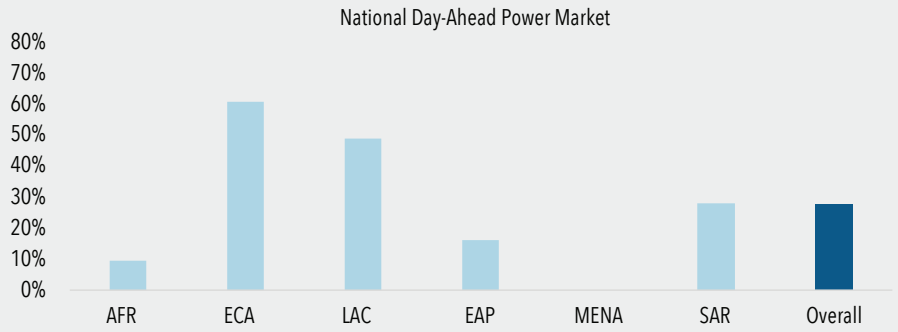
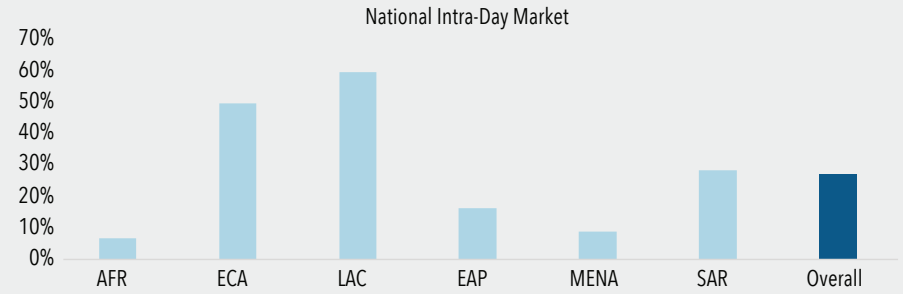
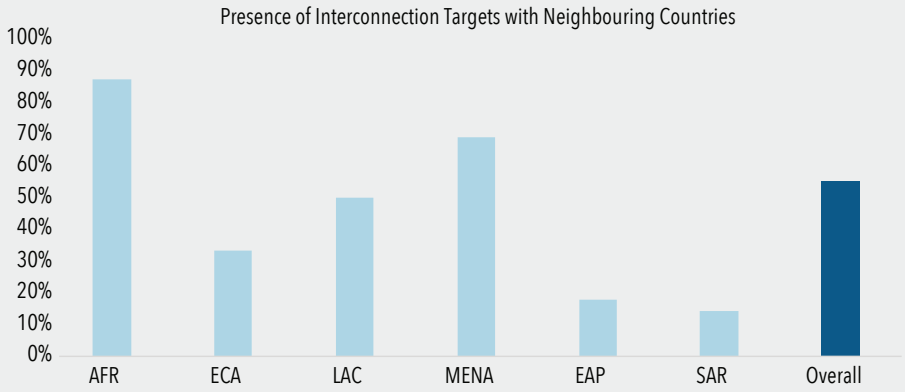


FIGURE B8.2: SHARE OF COUNTRIES IN EACH REGION WITH A NATIONAL INTRA-DAY MARKET



The MARCOT survey revealed that small-size national power systems are most prevalent in sub-Saharan Africa. These countries tend to often rely on expensive domestic or imported fuel. This combination is commonly seen as a challenge for establishing a domestic wholesale market. Therefore, regional cooperation of the national electricity companies and regional electricity markets can be essential for managing prices and ensuring supply security. The survey reveals that many countries – especially in the Africa [88% of countries] and MENA [69% of countries] regions – share this vision and have targets of interconnection with neighbors (see the chart below).

FIGURE B8.3: SHARE OF COUNTRIES IN EACH REGION WHICH HAVE INTERCONNECTION TARGETS WITH NEIGHBORING COUNTRIES



The global market database, based on the MARCOT/RISE survey will become available by the end of FY23, following detailed verification of the data.

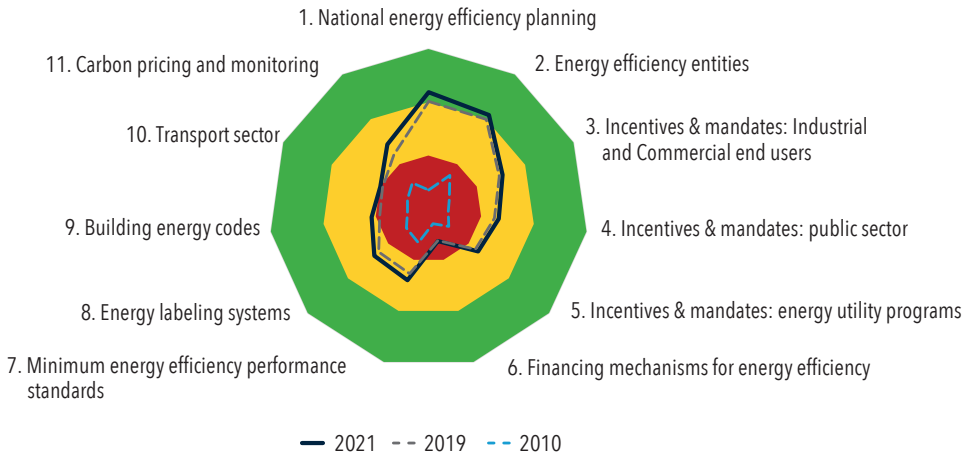
[a] Seven countries out of 106 were designated as "other" as they were difficult to place under any of the three categories above

Among the 11 energy efficiency indicators evaluated in RISE, planning indicators typically score highest across the 140 countries surveyed worldwide. At the upstream planning level, National Energy Efficiency Planning and Energy Efficiency Entities indicators take into account policymakers' commitments and capacity building efforts on energy efficiency. Sectorally, regulatory incentives and/or mandates are tracked with indicators for Industrial and Commercial End Users, Public Sector, Energy Utilities, and the Transport Sector. Financing Mechanisms for EE are analysed for residential, commercial, and industrial energy consumers. Minimum Energy Performance Standards (MEPS), Energy Labelling Systems, and Building Energy Codes indicators are meant to gage the implementation and monitoring of quality assurance across a range of products. Carbon Pricing and Monitoring indicator is also important to track in each country since carbon pricing mechanisms can have a net positive impact on energy efficiency.

The indicators showing the greatest improvement since 2010 are National Energy Efficiency Planning, followed by Energy Efficiency Entities, and Incentives/mandates for Industrial and Commercial End Users (figure 35). Meanwhile, the indicator on financing mechanisms for energy efficiency showed the least improvement, as countries appear to have been slow to adopt discounted green mortgages, green or energy efficiency bonds, and partial risk guarantees. In most countries surveyed, the residential sector lacks financing mechanisms that are more available to the commercial and industrial sectors.

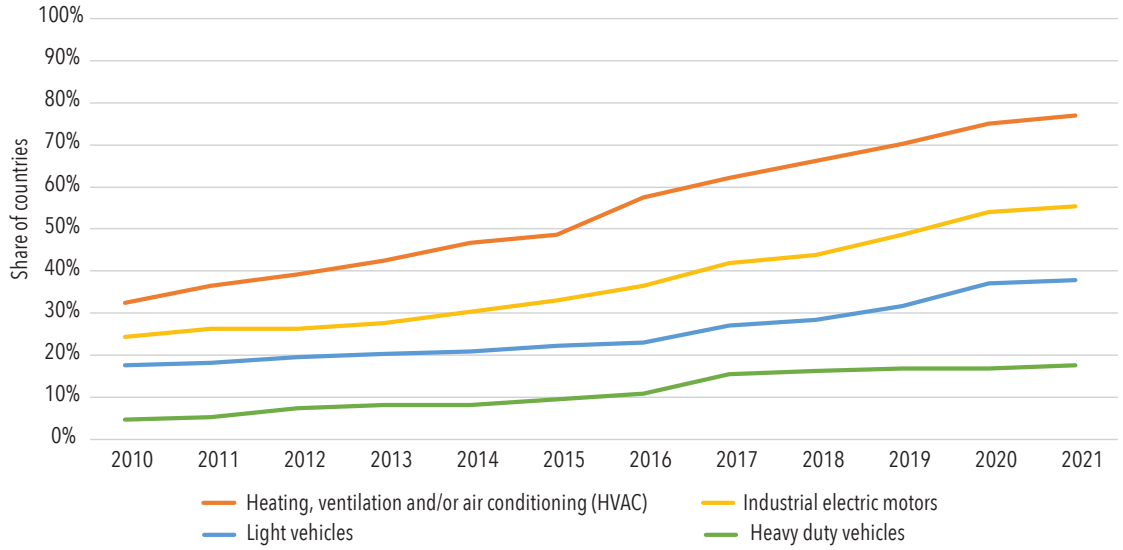
In terms of end-use sectors, heating and cooling energy efficiency standards were the most prioritized globally. Over three quarters of the countries surveyed across all regions now have minimum HVAC energy performance standards and labelling measures in place (Figure 36). The transport sector scored the lowest at the consumer (light duty) and industrial and commercial (heavy duty) sectors. The recent flatlining in the transport

FIGURE 35. ENERGY EFFICIENCY: PROGRESS BY RISE INDICATOR, 2010, 2019, AND 2021



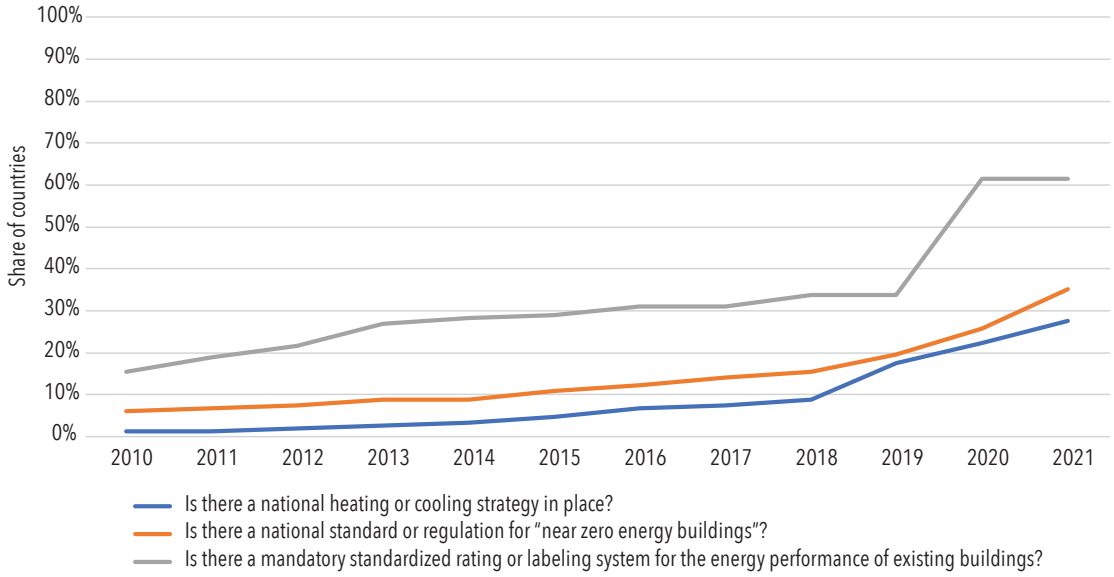
Source: World Bank, RISE 2022.

FIGURE 36. EVOLUTION OF MINIMUM ENERGY EFFICIENCY STANDARDS BY PRODUCT CATEGORY, 2010–21



Source: World Bank, RISE 2022.

FIGURE 37. EVOLUTION OF BUILDING ENERGY EFFICIENCY MEASURES, 2010–21



Source: World Bank, RISE 2022.

energy efficiency standards generally reflects a lack of energy efficiency programs to address transport energy demands as most countries are now opting to instead focus on electric vehicles in their efforts to decarbonize the transport sector. In the industrial sector, the adoption of efficiency standards for industrial motors has grown consistently but dropped off since 2020 as energy demand slowed during the COVID pandemic and global supply uncertainties continue to affect industrial production.

Building energy efficiency measures need more focus on heating and cooling in energy performance. Over as 60 percent of countries surveyed have a mandatory building EE rating and/or labeling system, yet only less than 30 percent of countries have established a heating and/or cooling strategy to guide building energy performance aspirations (figure 37). RISE 2022 also included a new survey on high performance energy buildings in each country. It is evident that achieving 100% net-zero energy

across individual buildings (a building using 0 kWh/square meter in primary energy demand from off-site sources) is not yet a realistic policy ambition, even if new build or renovation costs were subsidized, especially in countries with little or no building energy efficiency requirements in place historically. As context-neutral comparison, regulations and/or incentive programs that were deemed to be for "nearly-zero energy buildings" (NZEB) were evaluated in each surveyed country. Since the statistical definition of "nearly-zero" can vary across jurisdictions depending on country context, no specific numerical evaluations can be applied to standardize building energy demand targets. The initial assessment in RISE 2022 evaluates whether countries have started to define a NZEB target and adopted regulations accordingly, such as the EU's target range of between 0 and 160 kWh/square meter for residential buildings' primary energy consumption from the electric grid in order to incentivize a "very low amount of energy required, which should be covered to a very significant extent from sources produced on-site or nearby[8]. As of the end of 2021, only about one third of countries have a regulatory measure for NZEBs. As building energy performance methods evolve and mature globally, RISE will continue to monitor new good practices for NZEBs that policymakers can use to incentivize higher energy performance in new construction and building renovations.

8 https://ec.europa.eu/energy/eu-buildings-factsheets-topics-tree/nearly-zero-energy-buildings-and-their-energy-performance_en

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RISE

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http://RISE.esmap.org

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