KPMG

Turning the tide in scaling renewables

Addressing the barriers and opportunities to accelerate the global energy transition

Executive Summary

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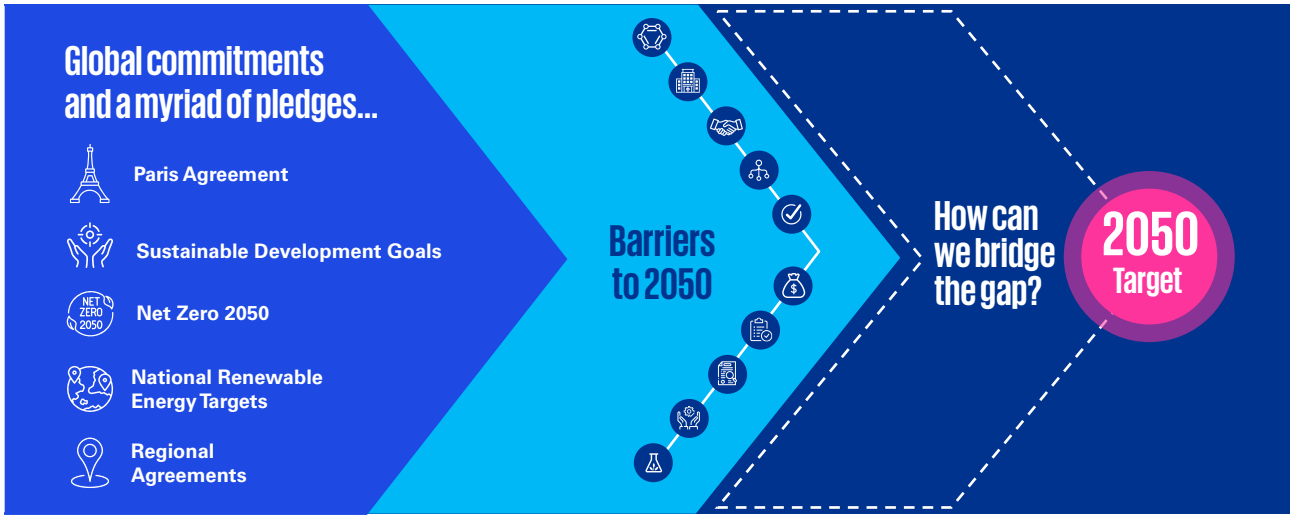
The global renewable energy industry has an impressive track record of achievements over the past decade. Once seen as expensive and appropriate only for niche applications, renewables like wind and solar have emerged as cost-competitive mainstream energy sources through policy support, technology innovation, manufacturing scale, and consumer demand.

According to the Energy Institute's 2023 Statistical Review of World Energy, which was produced in collaboration with KPMG and Kearney, our extensive research showed that 2022 saw record deployments of renewables, with double-digit growth all over the world.[1] Record-breaking years of renewable deployments are now the norm, with the International Energy Agency (IEA) forecasting potential additions of 440 gigawatts in 2023 and 550 gigawatts in 2024.[2]

In many countries, the proportion of electricity provided by renewables is considerable. In Ireland, for example, the nation's wind farms delivered 32 percent of the island's electricity over the first eight months of 2023.[3] When wind supplies a significant proportion of electricity in Ireland, overall prices for electricity drop. Globally, the growth of renewables is forecast to decrease demand for coal. In its recent World Energy Outlook 2023 report, the IEA said it expected demand for coal to peak before 2030 due to momentum and growth in clean energy.[4] The IEA also said growth was especially notable given high interest rates, inflation, geopolitical conflict, and unsettled energy markets.

The only realistic approach to scale renewables quickly and dramatically is to clearly identify the barriers preventing projects from being built and the specific actions and strategies to overcome them.

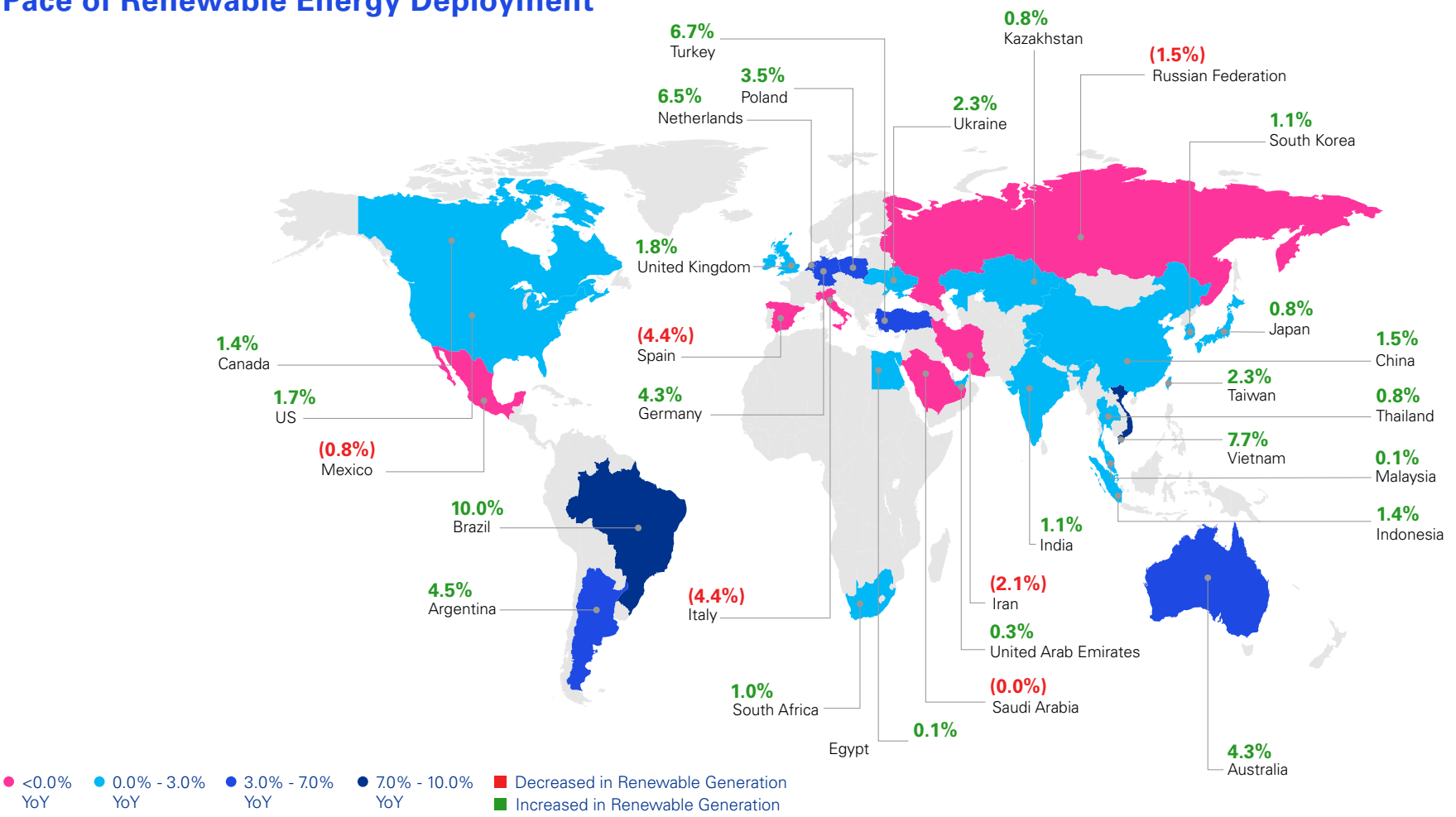
Why is renewable energy so difficult to scale?



[1] Energy Institute, "Energy system struggles in face of geopolitical and environmental crises," 2023
[2] International Energy Agency (IEA), "Renewable Energy Market Update: Outlook for 2023 and 2024," 2023
[3] Wind Energy Ireland (WEI), "New August record set for electricity generated by wind," 2023
[4] International Energy Agency (IEA), World Energy Outlook 2023, 2023

But these successes obscure a more extensive, less celebratory truth: The pace of renewable deployments is not enough to contribute significantly to achieving the Paris Agreement's ambition to limit the rise in global temperatures. In fact, when China is removed from calculations about the market size of renewables, growth the IEA argues that deployments of renewables must triple from 2022 levels by 2030,[5] which translates into clean energy additions reaching over 1,200 gigawatts each year by the end of the decade, or two to three times the current rate of deployment.

Pace of Renewable Energy Deployment



Source: Energy Institute, in association with KPMG International and Kearney "2023 Statistical Review of World Energy", 2023

[5] International Energy Agency (IEA), "Tripling renewable power capacity by 2030 is vital to keep the 1.5 C goal within reach," 2023

When evaluating the prospects of achieving these ambitions, it is important to acknowledge the compounded challenges facing renewable energy scaling. As our report underlines, the amalgamation of longstanding and recent barriers presents a significant risk to maintaining, let alone accelerating, the momentum necessary for meeting the G20 commitment of tripling renewable capacity by 2030.[6] Such a shortfall would reverberate globally, severely jeopardizing the achievement of the Paris Agreement targets.

Additionally, our interconnected global society is facing an 'Energy Trilemma,' seeking energy that is secure, affordable, and sustainable. This report stresses that without rapid scaling of renewable energy sources, reliance on fossil fuels may persist longer than current strategies suggest. To shift towards low-carbon energy solutions, we must bridge the gap between societal energy demands and the capacity of the renewable sector to meet these needs.

There is no single solution to close the gap between the current pace of renewable deployment and the desired targets for global renewable energy growth. The challenge is immense. The only realistic approach to scale renewables quickly and dramatically is to clearly identify the barriers preventing projects from being built and the specific actions and strategies to overcome them.

That is the aim of this report: *Turning the tide in scaling renewables.* The report draws on the broad range of renewable energy expertise rooted in the KPMG global organization of member firms and survey feedback from clients, partners, and other organizations deeply involved with the day-to-day opportunities and challenges of the energy transition. What is clear from the input of the survey respondents — including individuals representing renewable developers, investors, utilities, and other stakeholders from across the globe — is an understanding of the imperative to quickly scale renewables and a recognition of the significant challenges that need to be overcome.

For example, over 80 percent of survey respondents either agreed or strongly agreed that significantly accelerating renewable deployments is the most pressing issue requiring attention to meet the Paris Agreement's targets. At the same time, 84 percent reported that current market challenges are causing substantial delays and, in some cases, even the abandonment of renewable energy projects.

By leveraging the experience, expertise, and insights of the KPMG global organization of firms and a broader network of renewable energy stakeholders, *Turning the tide in scaling renewables* pinpoints the ten barriers that will likely define the renewable energy era and provides recommendations for solving them. The challenges identified in the report and a sampling of the recommended solutions include the following:

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[6] ESG Today, "G20 Targets Tripling of Global Renewable Energy Capacity by 2030," September 2023

Barrier 01

Market structures

The flexibility needed to support a significant buildout of intermittent renewable generation is supported by only some current market structures and rules. Many power markets were designed to incentivize conventional power generation, like coal and natural gas, rather than flexible low-carbon resources like energy storage that can fill the gaps when wind and solar generation is low. Market designs in some regions, like the UK, are considering evolution to accommodate the growth of renewables by exploring emissions limits in capacity markets. Other measures, like more significant use of demand-side response measures, stronger carbon price signals, and incentives for long-duration storage, can help speed the transition to renewables.

Barrier 02

Access to capital

Funding the energy transition requires an enormous amount of capital. The International Renewable Energy Agency (IRENA) estimates that cumulative global investments required to achieve the Paris Agreement's climate targets are USD 5 trillion annually over 30 years.[7] High-interest rates and supply chain inflation recently have made attracting investments in some renewable projects and companies more difficult. In contrast, other renewable companies and projects have ample access to capital. Steps necessary to ensure adequate supplies of capital are available to support the scaling of renewables include increasingly integrating renewables with firm power and traded propositions to scaling floating offshore wind to drive down the levelized cost of capital.

Barrier 03

Investment in grid infrastructure

A grid capable of providing reliable electricity while integrating massive additions of intermittent renewable generation will differ from the grid societies have depended on for over a century. A renewables-dominated grid demands flexibility and intelligence to continuously balance supply and demand and maximize power system efficiency and utilization. Grid investments that enable rapid integration of renewables should facilitate the demand-side flexibility electricity customers can provide. They should also advance innovative technologies like artificial intelligence (AI) and machine learning and seek to maximize the myriad of expected benefits energy storage can deliver to a distributed grid with large amounts of renewables.

Barrier 04

Planning and permitting

The energy transition is arguably the world's most ambitious and complex development project. The problem is that it takes far too long to build renewable energy projects and the supporting infrastructure they depend on. For example, a report by the National Academies of Sciences, Engineering, and Medicine in the US calculated that it takes about a decade to move from identifying the need for transmission infrastructure to lines transporting clean electrons.[8] Accelerating necessary permitting and planning approvals requires ensuring that officials responsible for making decisions have sufficient knowledge of renewables and their impacts and that developers provide community benefits that are tangible and clear. Designating geographic areas where renewable planning and permitting are streamlined can be an effective accelerator. Planning and permitting practices that lead to robust deployments of renewables can serve as models for renewable developers and regulators who seek to move faster.

[7] International Renewable Energy Agency (IRENA), "World Energy Transitions Outlook 2023, Volume 1," 2023

[8] The National Academies of Sciences Engineering Medicine, "Accelerating Decarbonization of the US Energy System," 2021

Barrier 05 Accelerating storage solutions

The importance of energy storage in accelerating the deployment of renewables is evident. Because the sun doesn't always shine and the wind doesn't always blow, energy storage is needed to help fill the gaps and keep reliable electricity flowing. To play that important role, energy storage must achieve scale, and storage technologies must provide electricity and other grid services for longer durations. Just as important, energy storage needs to be financially viable. This can be accomplished through long-term contracts that ensure predictable revenue streams that attract financing, state-backed capacity payments, income guarantees, grid codes and ancillary service rules that incentivize storage.

Barrier 06 Supply chain issues

The COVID-19 pandemic laid bare the challenges to scaling renewables that arise when supply chains are disrupted. Higher prices and lack of access to equipment and necessary skills have delayed or canceled many planned projects. Therefore, ensuring resilient and reliable supply chains is one of the foundations of scaling renewables quickly. Solutions to ensure renewable projects have what they need to be developed include geographic diversity of suppliers – critical minerals and equipment manufacturing is currently concentrated in too few countries – but also low-cost financing to encourage additional manufacturing capacity, a skilled workforce, and supply chain traceability and transparency.

Barrier 07 Access to critical raw materials

Scaling renewables requires cost-competitive access to a vast volume of raw materials, like cobalt, nickel, graphite, copper, and lithium. The IEA estimates that mineral requirements for clean energy technologies will need to quadruple by 2040 to meet the Paris Agreement's targets.[9] To make this possible, a lot will have to happen, including expanding mining capacity and diversifying where critical raw materials are sourced. Other steps should also be pursued, including developing supply chains and business models that promote a circular economy, designing products to last longer and be recycled and reused, and innovating to build renewable products using more readily available materials.

Barrier 08 Nature and biodiversity

Earth's growing population depends on healthy ecosystems and biodiversity. Climate change is already accelerating habitat loss and the rate of species extinction.[10] But while nature and biodiversity depend on a stabilized climate, and, therefore, a rapid expansion of technologies such as renewables to limit temperature increases, we also must acknowledge the potential negative impacts of renewable development on nature and biodiversity and take steps to alleviate or avoid them. This can be accomplished by proactively enlisting the guidance of environmental experts in siting projects, leveraging technologies that mitigate impacts on habitat and species, and integrating nature and biodiversity considerations at the earliest possible stages in all renewable developments.

Barrier 09 Social license to operate

Renewables will be scaled more quickly if renewable developers establish a social license to operate. Developers need to secure licenses to operate in the form of permits and government approvals, but they will also need to license the level of acceptance of a project among communities, stakeholders, and the public. While renewable developers often view the community engagement necessary to establish a social license as a barrier, renewables will scale more rapidly and equitably when communities are engaged early as project co-creators.

Barrier 10 Emerging markets

The world's ability to meet both the Paris Agreement's climate targets and individual net-zero commitments heavily relies on the rapid deployment of renewables in emerging markets. Without such accelerated deployment, the global community might find itself relying on fossil fuels for longer than anticipated, given the imperatives of energy security and affordability.

According to the Global Energy Alliance for People and Planet (GEAPP), if emerging economies remain reliant on fossil fuels and developed economies hit their net-zero goals by 2050, the world will be on course to warm by 2.5 degrees Celsius.[11] Catalyzing investments in emerging markets is critical to accelerating renewable development and providing millions of people with life-transforming access to energy. This can be accomplished by facilitating private investment through innovative financing instruments, expanding the role of multilateral

[9] International Energy Agency (IEA), "Critical Minerals Market Review 2023," 2023
[10] Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services, "Nature's Dangerous Decline 'Unprecedented': Species Extinction Rate 'Accelerating,'" 2019
[11] Global Energy Alliance for People and Planet (GEAPP), "Powering People and Planet 2022," 2022

development banks, and working with local partners able to mitigate project risks. Emerging markets can also help by establishing clear renewable targets in their Paris Agreement Nationally Determined Contributions (NDCs) and developing policies and regulations that support their goals.

Renewable developers will need to act decisively to overcome these barriers. In this report, we provided detailed insights on each of these pressures and share potential ways organizations can take action. The importance of collaboration is common across many of these recommendations. It is an imperative that will determine the success of the energy transition, which represents a fundamental reordering of how companies, governments, regulators, communities, and individuals interact.

The importance of collaboration across sectors, including industry, academia, and government, is becoming increasingly evident. Such collaborations may involve understanding policies, promoting research, and working towards shared standards. The energy transition is a sprawl of interconnected challenges and opportunities that look different to different stakeholders. Only by collaborating and partnering can renewables reach the scale the world needs. Building those partnerships should start now.

Methodology

The survey data included in this report is based on the results of an anonymized online survey conducted by KPMG International in September and October of 2023. In total, 110 respondents from over 24 countries across the globe answered questions about the need to accelerate renewable deployment, current market challenges, and policy effectiveness. The majority of respondents hold senior leadership positions at both public and privately held companies, including executive vice president, managing director, director, and senior vice president, as well as C-Suite titles. Survey respondents represent stakeholders across the renewable energy industry, including developers, utilities, investors, service providers, government, and the public sector. The technology focus of respondents covers a swath of renewables, ranging from solar, wind, and energy storage to hydropower, biomass, geothermal, and tidal energy.

Survey respondents are based in these nations: Australia, Bolivia, Brazil, Canada, Denmark, France, Germany, India, Indonesia, Ireland, Japan, Malaysia, Mexico, Nigeria, Norway, Peru, Rwanda, Singapore, South Africa, Turkey, Uganda, United Kingdom, United States and Venezuela.

How we can help

In an evolving energy landscape marked by significant challenges and opportunities, KPMG stands at the forefront as a beacon of insight, strategy, and actionable guidance. We understand the intricacies of the renewable energy sector and the necessity for businesses to adapt and thrive amidst these complexities.

Local knowledge, global experience

At KPMG, our strength lies in harmonizing local expertise with a vast global perspective. We understand the nuances of local markets, so we can tailor solutions that resonate with specific regional needs while drawing upon international best practices from our extensive operational footprint. This ensures that the advice provided is both locally relevant and global in scope, allowing organizations to navigate their unique challenges while staying on top of global trends.

Integrated services

An in-depth understanding of technical, financial, and regulatory aspects is necessary to navigate the renewable energy landscape. To provide integrated services that capture the entire renewables ecosystem, KPMG leverages its expertise across Tax, Audit, Risk Consulting, Deal Advisory, and Management Consulting. We provide solutions that reflect the multifaceted nature of renewable energy challenges and opportunities by ensuring close collaboration between our specialists in technologies, financing, supply chain optimization, and regulatory compliance.

Whether you're facing obstacles to scaling renewables or looking to explore emerging markets, our seasoned professionals can provide insights and strategies that align with your commercial objectives.

About the KPMG global energy transition practice

The energy transition stands as the defining challenge of our era. Every sector faces mounting pressure to power human progress in a way that is reliable and affordable but also, critically, more sustainable and equitable.

KPMG firms are here to help guide you through this increasingly complex landscape, enabling you to deliver on your ambitions for your business, people and the planet.

KPMG energy professionals include over 1,500 partners and staff in over 50 hubs around the world, working closely with institutions and companies to help them understand the ebb and flow of energy transition, identify growth opportunities and develop and execute their strategic plans.

Visit kpmg.com/energytransition

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