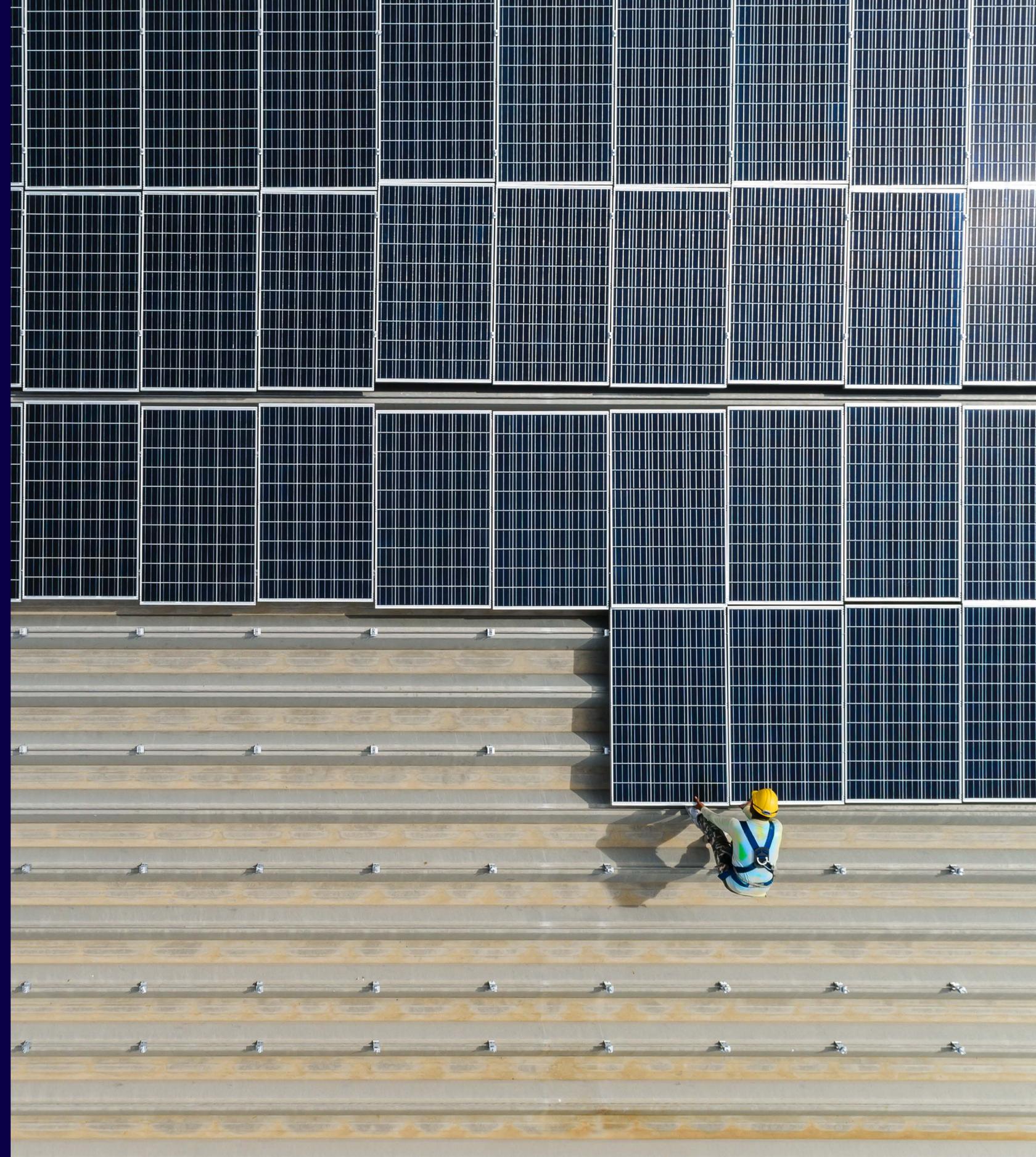


RENEWABLES CONUNDRUMS

Unlocking Net Zero: Why Renewables Conundrums are Key to Corporate Climate Action

November 2023



Contents	Foreword	3
	Executive summary	4
	What do we mean by “renewables conundrums”?	5
	The role of corporates in scaling renewables ambitions	6
	Where benefits and challenges intersect, renewables conundrums emerge	9
	Renewables conundrums: Understanding the benefits and challenges	16
	What’s next for renewables conundrums?	18
	Endnotes	19
	About and acknowledgements	21

Foreword

It will take a wholesale, no-holds-barred switch to renewable energy to keep the world below 1.5 degrees Celsius warming or close to it. Global progress on renewables has been promising: wind and solar capacity and electric vehicle (EV) sales have soared to heights that few deemed possible until recently, and governments are increasing investment in this critical area.

Now renewables progress needs to accelerate further to support the change required to stabilize both the climate and ecosystems. The challenge is unprecedented. It is not enough to rapidly increase the share of renewable energy – renewables must also do their part in meeting the 150 percent growth in energy demand anticipated by mid-century. If they do not, fossil fuels will fill the gap. So, how can we deliver this aggressive renewables growth, and what are the obstacles to achieving it? Those are the central questions that our Renewables Conundrums series will strive to answer. Digging into these conundrums now is crucial because renewable energy development is at a critical inflection point.

After a period of rapid growth, renewable energy is no longer niche. It has matured to a scale where real-world constraints ranging from infrastructure bottlenecks and access to critical resources to human rights issues and community pushback affect the speed of its expansion. And the impact of these obstacles is too often overlooked.

Only if we are clear-eyed about the hurdles that impede the renewable growth trajectory required can we start the complex, multi-pronged process of navigating them. Our Renewables Conundrums series will explore renewable constraints in depth, with an emphasis on how these constraints affect the net zero journey of companies and what they can do to overcome them. We hope you enjoy this first paper in the series and welcome your feedback.

Todd Hall

ERM Global Lead, Renewables



Executive summary

As efforts to fight climate change intensify and the costs of renewable energy platforms decrease, renewable energy is transforming the global energy landscape.



The percentage of renewables in global electricity generation grew from 19.8 percent in 2010 to 30 percent in 2022.¹ This growth in renewable energy capacity is helping to fuel the scale of corporate climate ambitions. In October 2023, 985 of the world's largest 2,000 publicly traded companies had net zero goals.² But ambition has yet to fully translate to action, as numerous analyses have found that most companies are well short of the progress needed to achieve their climate goals.

While overcoming this corporate action gap will require transformations tailored to the circumstances of individual companies' businesses, there is no doubt that renewable energy will be at the center of the corporate decarbonization effort. Despite the rapid growth of renewables in recent years, much more progress must be made if the world is to achieve the almost 90 percent share of renewables in global electricity generation by 2050 needed for net zero.³

Private sector investment will be essential to expanding the share of renewables in global electricity generation, but that will not be enough on its own. Governments will play a key role in creating an action-enabling policy and regulatory environment. Specifically, governments are well-placed to incentivize corporate renewable energy investment, turn investments into reality through project siting and approvals reforms, and ensure the energy generated by these projects is efficiently connected to the grid.

Even with government support, corporate renewable energy pursuits face many factors that will bring benefits and challenges – the intersections of which we call “conundrums” – that will shape their actions.

In this first report in a series, we outline and provide examples of what renewables conundrums are. In the reports that follow, we will explore specific conundrums central to the success of renewables growth and corporate climate action where ERM's experience and expertise are such that we can help interpret them. The upcoming papers will:

- Consider how human rights and geopolitics complicate corporate decarbonization efforts by intersecting with supply chains critical to renewable energy.
- Explore why the potential adverse environmental and socioeconomic impacts of renewable energy must be considered alongside their positive impacts and how companies balance these elements.
- Study how renewable energy developments can be sited and permitted to avoid or minimize local community opposition and generate benefits for these communities.

The forthcoming reports will outline best practices for companies to manage the conundrums based on insights from ERM experts. We look forward to you reading and reacting to the report series.

What do we mean by “renewables conundrums”?

Renewable energy development has undergone a dramatic evolution because of rapid technological advances that have made systems such as solar photovoltaics (PVs) and wind turbines much more efficient and cost-effective and because of the growing necessity to combat the climate crisis. This evolution and subsequent growth of renewables have put these low-carbon energy options at the center of the global energy landscape.

Companies support accelerated renewable energy growth when they increase the amount they purchase or directly generate to meet climate goals, save money, and decrease energy security risks. However, accelerated corporate renewable energy adoption is affected by factors beyond procurement, production, and consumption of energy. We call these factors and the dilemmas associated with them “renewables conundrums”, as they both benefit and pose challenges to companies’ renewable energy pursuits.

This briefing and the series it launches will examine what renewables conundrums are and why they matter to successfully addressing the climate crisis by:

- Defining and illustrating what renewables conundrums are.
- Exploring the benefits and challenges associated with renewables conundrums and how effectively addressing conundrums can help to maximize the benefits and overcome the challenges.



The role of corporates in scaling renewables ambitions

State of corporate climate ambitions

In recent years, the number of companies that have set advanced climate goals has grown exponentially. In December 2020, 417 of the world's largest 2,000 publicly listed companies had set net zero goals.⁴ By October 2023, the number of these companies with net zero goals had more than doubled to 985.

The growing number of companies with net zero goals is welcome, especially considering recent warnings from the Intergovernmental Panel on Climate Change's Sixth Assessment Synthesis Report that "global warming is more likely than not to reach 1.5°C" under very low greenhouse gas (GHG) emissions scenarios.⁵ However, setting long-term goals is only one piece of the net zero puzzle. Companies must also do the work necessary to achieve them - and many have significant room for improvement.

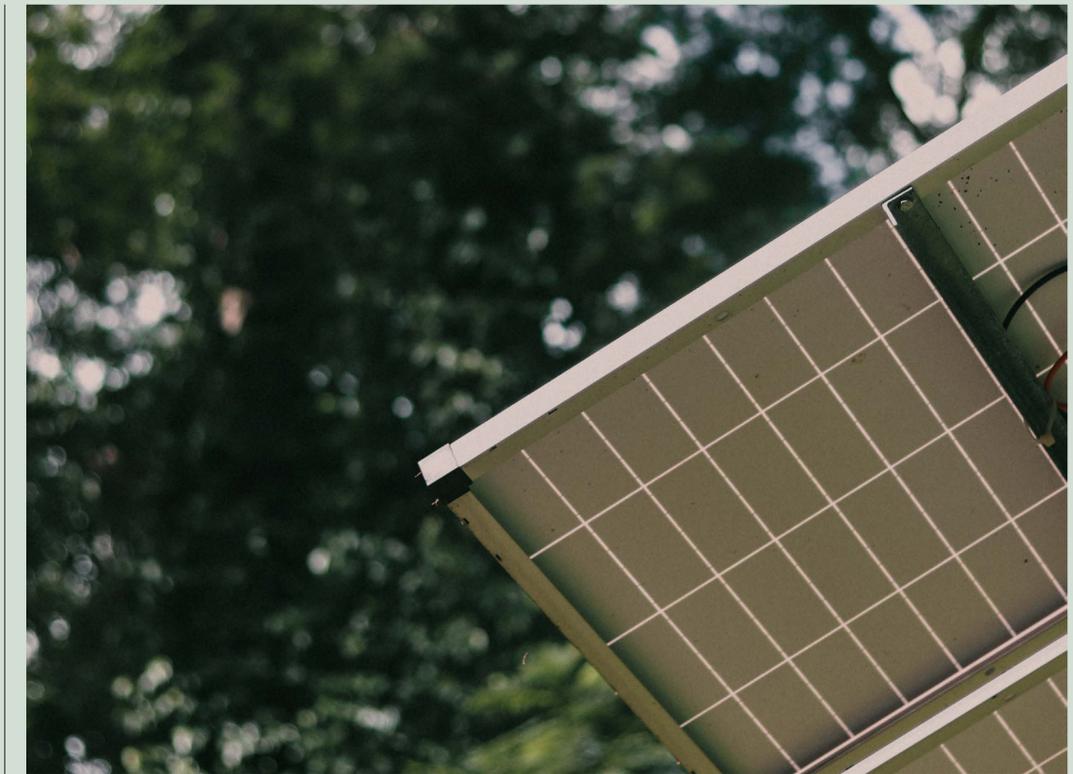
Only four percent of companies with net zero goals presently meet all six of the United Nations' Race to Zero Campaign's Starting Line 3.0 criteria to ensure net zero integrity and accelerate progress.^{6,7} Another study from 2022 analyzed the net zero goals of the 2,000 largest public and private companies by revenue and found that 93 percent will not achieve their targets by 2050 based on their current emissions trends.⁸

With significant gaps between ambition and action, companies must accelerate renewables implementation.

How renewables fit into the net zero puzzle

Renewables – from wind and solar to biomass and geothermal – accounted for 30 percent of global electricity generation in 2022, up from just 19.8 percent in 2010.⁹ This is good news for companies planning to increase their use of renewables. However, renewable energy availability and use must rise considerably to keep up with forecasted global electricity demand growth if renewables are to continue to play their necessary role in helping deliver a net zero world.

Electricity demand is expected to grow rapidly as the world electrifies and as energy demand in emerging markets increases. The International Energy Agency's (IEA) Net-Zero Emissions by 2050 (NZE) scenario forecasts



that electricity demand will be 150 percent higher in 2050 than in 2022.¹⁰ The IEA also projects electricity's portion of energy consumption to grow markedly. Under the NZE scenario, electricity accounts for 53 percent of global final energy consumption in 2050, up from just 20 percent in 2020.¹¹

If projected electricity demand and consumption increases are met primarily with renewables, global GHG emissions will significantly decrease. However, there is a risk that renewable energy may not expand fast enough to keep pace and that the world continues to use fossil fuels to meet a substantial portion of its electricity needs.

How much does renewable energy capacity need to grow to ensure rising electricity demand is not met with a significant fossil fuel component? In the IEA's NZE scenario, annual renewable capacity additions grow from 336 GW in 2022 to over 1,250 GW by 2030, thereafter

averaging 1,050 GW per year from 2031 to 2050.¹² Under this scenario, renewables' share of electricity generation rises to 60 percent by 2030 and to almost 90 percent in 2050, with most of this growth coming from solar and wind.

Global renewables investment must rise substantially if the world is to achieve enough renewable energy capacity growth. According to BloombergNEF, global renewables investment reached a record \$495 billion in 2022.

However, this total is still much lower than the estimated \$1.18 billion per year on average needed between 2023 and 2030 to achieve net zero by 2050.¹³

While overall renewables investment is currently falling short of what is needed to achieve net zero, companies' renewable energy efforts are growing exponentially.

In 2021, corporate power purchase agreements (PPAs) reached a record 36.7 GW globally, up from just 0.3 GW a decade ago; since 2008, corporates have executed 148 GW of PPAs overall, more than France's total power generation capacity.¹⁴

The role of governments

While companies are expanding their use of renewables, they have significant work to do if renewable energy capacity is to reach the level required to achieve their net zero emissions goals. Additionally, corporate ambitions alone are not enough to accelerate global renewable energy development to the required pace. Government action is needed for the world to scale renewables to the level required to limit global warming to the Paris Agreement's 1.5°C target.

While a significant portion of renewable energy expansion is likely to be driven by corporate investments, government has a key role to play in enabling these investments. Three areas of governmental action stand out as particularly critical:

- Incentivizing corporate renewable energy investment.
- Enabling project siting and streamlining approvals.
- Ensuring sufficient energy grid infrastructure and connectivity.

Incentivizing corporate renewable energy investment

Despite growing corporate net zero ambitions, corporate renewable energy investments still need to scale significantly over the next decade. Government action in the form of both carrots and sticks will be essential to incentivizing investment and accelerating corporate build-out.

Starting with carrots, governments must incentivize renewable energy investments via fiscal instruments such as tax credits and subsidies. Perhaps the most notable carrot of recent years has been the U.S.' Inflation Reduction Act. Passed in 2022, this law made numerous renewable energy-related tax provisions available,



including investment and production tax credits that enable taxpayers to deduct a portion of renewable energy costs from federal taxes.¹⁵ Other countries are also incentivizing renewable energy. India, for instance, introduced production incentives for building out solar PV manufacturing capacity.¹⁶

Sticks are also key government tools. For example, placing a price on carbon emissions can incentivize companies to invest in renewable energy technologies that reduce emissions and compliance costs. The largest of these schemes is the European Union's (EU) Emissions Trading System (ETS), which sets a cap on emissions and requires companies to match each tonne of CO₂ they emit over this cap with an emissions allowance (essentially a carbon fee).¹⁷ Proceeds from carbon pricing can be used by

governments to support renewable energy expansion, as the EU does when it redirects ETS revenues to accelerate the development of low-carbon technologies.

Enabling project siting and streamlining approvals

Incentivizing renewable energy development is important, but without ways to ensure projects are efficiently sited and built, their development will lag. As we will cover in this series' project siting-focused report, issues such as community opposition and complicated permitting and review processes can make or break corporate renewable energy efforts. Government action here is central to private sector progress.

Given the competing factors often influencing land use, siting renewable energy developments is a universal challenge. From economic considerations to environmental- and community health-related concerns, competing land use issues can complicate project siting. One idea to accelerate siting is to designate certain areas for renewable energy development based on local land use, environmental sensitivity, and renewable energy resource availability. The Africa Clean Energy Corridor, an intergovernmental initiative supported by over 30 governments, put this idea into practice when it conducted a Zoning and Resource Assessment for renewable energy development within participating countries.¹⁸

Governments can also help enable efficient siting and construction through permitting reform. In many jurisdictions, energy permitting responsibility falls to separate governmental entities, complicating the process and extending development timelines. To overcome this, the state of New York established the U.S.' first renewable energy siting office to coordinate permitting and environmental reviews for renewable energy projects

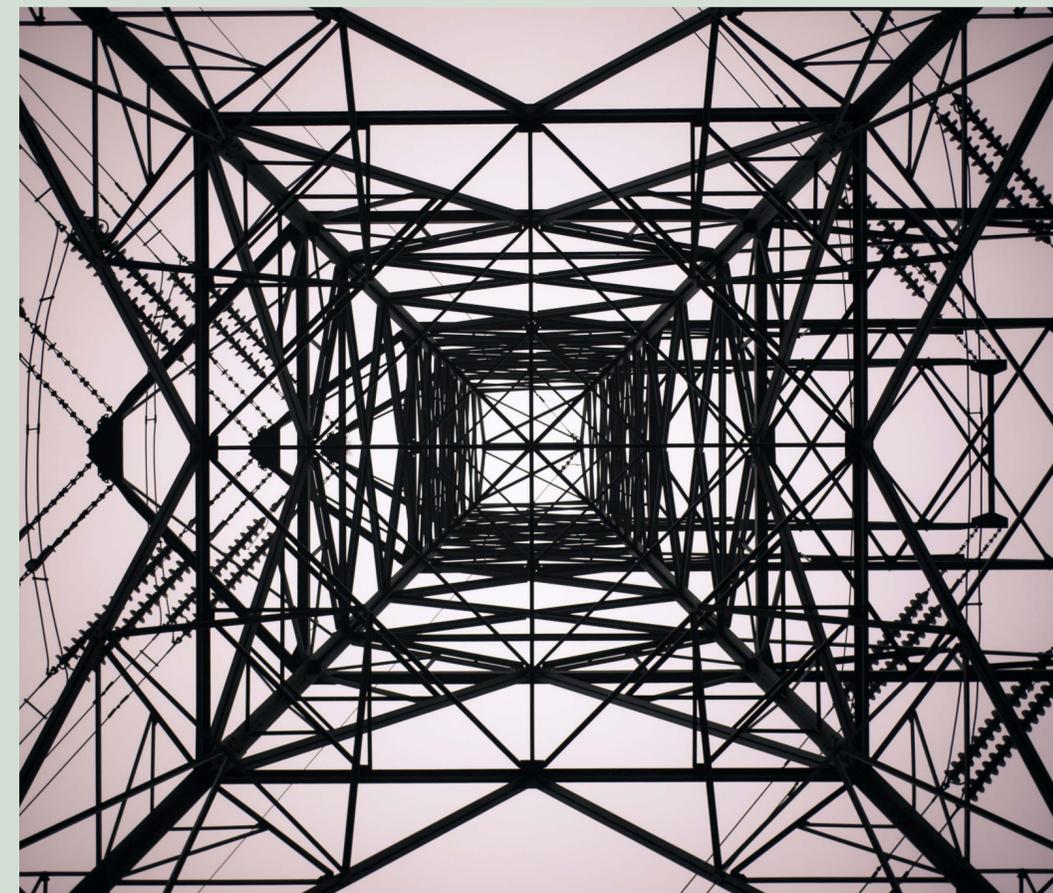
larger than 25 MW.¹⁹ Other governments are following suit in their efforts to speed up permitting. In September 2023, the European Parliament approved the revision of the EU's Renewable Energy Directive to ease permitting burdens.²⁰ The revisions will strengthen emergency measures put in place in 2022 by setting a one-year deadline for permitting new renewable projects and a six-month deadline for approving the repowering of existing renewable projects, down from two years and one year, respectively.²¹

Ensuring sufficient energy grid infrastructure and connectivity

Once renewable generation infrastructure is sited and built, it must be connected to the grid (unless used solely for on-site generation purposes). However, global grids are far from ready to support the required pace of renewable energy expansion. Achieving this generation growth within a net zero context will require the world to invest at least \$21.4 trillion to expand and update electricity grids, according to BloombergNEF.²²

To encourage corporate renewables investments, governments must speed up the pace at which new grid projects are approved and at which renewables are connected to existing grids. In the UK, Spain, and Italy, over 150 GW of renewables generation in each country is waiting to be connected to the grid due to lack of grid capacity; some projects in the UK face waits that are more than 10 years.²³

As with project siting, accelerating the grid connection process will require permitting reform. In many countries, the processes governing environmental protection (the focus of the third report in this series) – while critical – have consistently delayed grid expansion projects. To help speed up the process in the U.S., the



Fiscal Responsibility Act of 2023 set a two-year deadline for Environmental Impact Statements and a one-year deadline for less onerous Environmental Assessments.²⁴ Other countries are creating operating environments conducive to expanding renewable energy grid connections. For example, Uruguay helped employees at its state-owned utility learn how to better integrate renewables into the grid by funding renewable energy technology training.²⁵

Where benefits and challenges intersect, renewables conundrums emerge

With or without additional government support, we expect companies to increase integration of renewables. As they do, they are likely to face conundrums that reveal intersecting benefits and challenges to this integration. We outline a few of these conundrums and their benefits and challenges below.



Renewable energy benefits

The benefits of renewable energy are clear: they generate energy with a significantly lower carbon intensity than that derived from fossil fuels, benefit the environment, reduce compliance costs, and mitigate risks related to reputational damage. But you would be significantly underselling renewables if you stopped there. From energy variability, storage advantages, and energy security in the face of geopolitical hurdles, to contracting and sourcing solutions, renewable energy provides a wide range of benefits that transcends reduced carbon emissions.



A world of possibilities: Selected renewable energy benefits

Table 1: Environmental benefits

While lower GHG emissions and pollutant reductions may be the most obvious benefits of renewable energy, other environmental benefits can help make renewables attractive for companies.

Protecting the environment while building out renewable energy capacity	Renewables help mitigate climate change and improve air, water, and soil quality, thus bringing environmental, human health, and biodiversity benefits. Building renewable projects in areas of lower environmental and biodiversity value (e.g., brownfields) minimizes incremental environmental impacts associated with growing energy infrastructure.
Overcoming energy variability and storage concerns	Renewables can accelerate to full or partial generation capacity almost immediately compared to more traditional power sources, making it a useful energy reserve source. Renewable energy output can be managed to match energy demand, while holding additional capacity in reserve via storage, helping to increase energy reliability.
Turning resource scarcity into opportunity	Renewable energy provides a driver for recycling critical minerals and metals, offering potential for cost savings relative to virgin materials and increasing supply chain security. Innovative approaches (e.g., deriving metals from mine tailings) to address renewable energy-critical mineral and metal scarcity by reducing input needs presents financial opportunities in and of themselves.
Solving lifecycle waste issues	Recycling resource-rich renewable energy technologies such as solar PV panels presents both financial opportunity and the potential for reduced virgin resource demand. Redesigning renewable energy technologies for circular lifecycles is likely to generate new market opportunities and reduce the environmental and social externalities associated with virgin materials sourcing.



Table 2: Social benefits

The global energy transition will generate societal complexities that threaten to impede its progress. But managed correctly, renewable energy can balance social challenges with social benefits such as job creation and local economic growth.

Accelerating employment shifts and worker re-skilling

The rapid growth of renewable energy development has already created millions of jobs and will create more as the world accelerates its clean energy transition.

The clean energy transition will require many skills already relevant to fossil fuels and heavy industry, potentially limiting the social impacts associated with jobs lost because of the transition.

Navigating geopolitical challenges

Increased geopolitical competition is inspiring renewables-friendly industrial policy (e.g., the U.S. IRA) worldwide, increasing financial opportunities for companies who invest in countries where these policies are in place.

The widely available nature of renewables generation in comparison to the geographically concentrated presence of fossil fuels will lessen energy security risks, helping to reduce companies' exposure to energy-related geopolitical shocks.

Defending human rights during material sourcing

Thorough human rights due diligence during materials sourcing is likely to generate reputational benefits among stakeholders increasingly concerned about the social impacts of the clean energy transition.

Collaborating with local companies, governments, and stakeholders during materials sourcing will help ensure that human rights are protected, that local communities benefit, and that supply sources remain accessible.

Siting renewable energy projects effectively

Siting renewable energy projects on brownfields can minimize local opposition to developments by turning an underutilized space into an economically productive one. Brownfields may also already have existing infrastructure that can be used to bring developments online faster.

Strategically siting renewable energy projects in areas that will maximize local economic development and job creation can help minimize local opposition and provide new revenue streams for local governments.

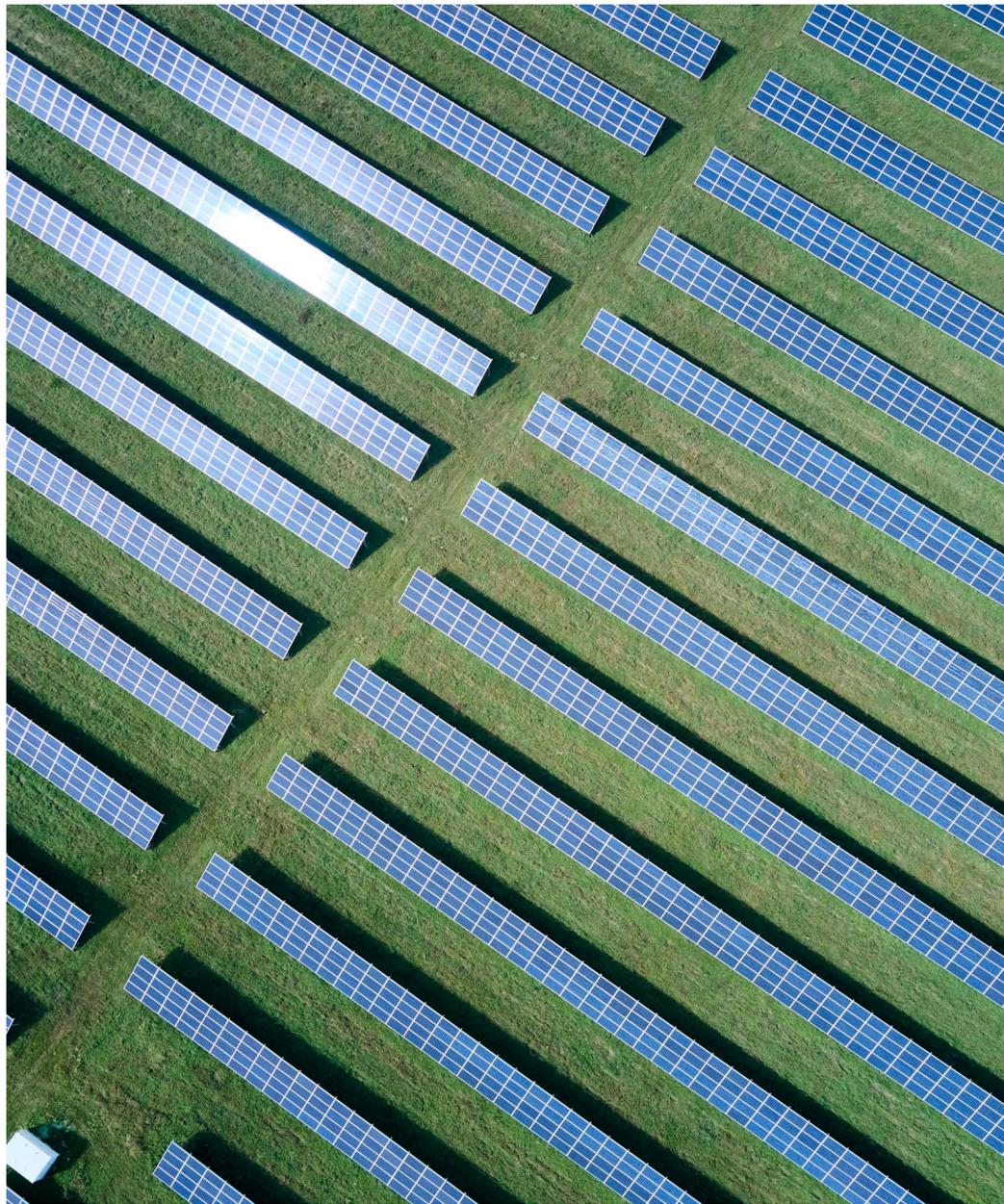


Table 3: Governance benefits

Renewable energy offers potential benefits to corporate governance-related efforts such as renewable energy credit generation and sustainability disclosure.

Capitalizing on renewable energy

Renewables create significant financial opportunities due to their ability to scale exponentially and generate carbon credits and renewable energy credits (RECs), which can be sold for profit.

By generating their own renewable energy, purchasing it directly from a utility, or sourcing it through power purchase agreements (PPAs), companies can help ensure their energy strategies add renewable capacity to the grid.

Communicating what matters

By publicly disclosing the contributions of renewable energy to their overall energy consumption and GHG emissions reductions, companies are likely to gain reputational and financial benefits given the increasing focus stakeholders and investors place on climate action.

Because renewable energy plays a key role in corporate climate strategies, companies disclosing information on their renewable energy activities are likely to be better prepared for forthcoming regulations that will require disclosures.

Renewable energy challenges

While benefits are often top of mind when considering renewable energy in a business context, renewables pose challenges ranging from lifecycle waste issues and human rights risks to data tracking complications. While the challenges do not typically outweigh the many benefits of renewables, companies must not overlook their potential to slow down their renewable energy pursuits.



Not to be overlooked: Selected renewable energy challenges

Table 4: Environmental challenges

While viewed as an answer to many environmental issues, renewable energy has its own environmental concerns.

Protecting the environment while building out renewable energy capacity	Manufacturing the equipment needed to support renewable energy platforms (e.g., solar panels and wind turbines) generates environmental impacts from aspects such as GHG emissions and waste products.
	Renewable project development generates a degree of adverse environmental impacts such as increased soil erosion and habitat loss.
Overcoming energy variability and storage concerns	Many renewables projects do not generate energy 24/7 because of input variability and thus require storage systems to ensure energy supply reliability.
	Corporate facilities may not be in areas ideally suited to renewable energy production, potentially requiring lengthy transmission or transportation networks.
Turning resource scarcity into opportunity	Critical mineral and metal supplies may not be able to keep up with renewable energy demand growth, limiting renewable energy uptake.
	Increased demand for critical mineral and metals mining drives additional mineral extraction development, which generates adverse environmental impacts at the site level, as well as increased global GHG emissions.
Solving lifecycle waste issues	Renewable energy technologies create waste disposal issues at end of life as limited recycling options and designs not optimized for circularity mean decommissioned project materials may end up in landfills.
	The accelerated pace of renewable energy technology development reduces the useful lifespan of previous-generation infrastructure, thus increasing end of life waste.



Table 5: Social challenges

Renewable energy is likely to upset existing socioeconomic structures established by the fossil fuel economy as jobs change and markets shift. At the same time, issues such as extraction-related human rights abuses may create problems for the clean energy economy.

Accelerating employment shifts and worker re-skilling

While some transferable skills will help limit job losses, the clean energy economy is likely to leave at least some fossil fuel and heavy industry workers behind unless adequate focus is placed on re-skilling for new roles.

The rapid expansion of renewable energy is likely to create expertise shortages, challenging companies' ability to build out renewables-related capacity and placing further onus on re-skilling.

Navigating geopolitical challenges

China's dominant position in the critical mineral value chains essential to renewable energy technologies may limit the scale at which renewable energy grows.

Potential shortages of renewable energy-critical semiconductors could hamper the expansion of renewable energy resources.

Defending human rights during material sourcing

The presence of significant shares of renewable energy-critical materials in countries with poor human rights records could expose companies to controversies if they do not take mitigative actions when sourcing these materials or products produced using them.

Opaque renewable energy-critical materials supply chains make it difficult for companies to confirm where these materials come from and the potential human rights abuses that may be involved in their sourcing.

Siting renewable energy projects effectively

Growing frequencies of local community pushback to renewable energy projects is delaying corporate renewables developments and increasing costs, requiring companies to expand their stakeholder engagement strategies to get projects off the ground.

A complex regulatory environment coupled with regulatory uncertainty and complex and/or lengthy permitting processes in many countries complicates companies' ability to plan and execute their renewable energy strategies.



Table 6: Governance challenges

The need for profit and business certainty looms over corporate renewable energy pursuits, threatening to slow down progress, while a lack of renewables-focused disclosure recommendations and metrics make it difficult to communicate progress companies make.

Capitalizing on renewable energy

Short-term profit pressures complicate companies’ ability to commit to long-term generation and sourcing of renewable energy given start-up and planning costs and the low-cost operations of existing fossil fuel energy sources.

The rapid advance of certain renewable energy technologies puts companies at risk of entering into long-term contracts based on technologies that could soon be obsolete.

Communicating what matters

Compiling complete and accurate renewable energy-related data for disclosure may be difficult given the numerous methods used to source renewables (e.g., on-site generation, contracting, etc.).

A lack of standardized renewable energy focused ESG disclosure recommendations and metrics is likely to complicate company initiatives to integrate their renewable energy strategies into their broader ESG disclosure initiatives.

Renewables conundrums: Understanding the benefits and challenges

As stated, companies must rapidly scale renewable energy use if they are to meet their climate ambitions and for the world to achieve net zero emissions by 2050. However, like any business initiative, renewable energy integration comes with a mix of benefits and challenges – what we call “conundrums”.

This ERM Sustainability Institute series will focus on three impactful conundrums where the experience and expertise of ERM’s teams provide insight. The renewables conundrums this series will explore are:

- Defending human rights and navigating geopolitics in renewable energy supply chains
- Protecting the environment and society while building out renewable energy capacity
- Siting and permitting renewable energy projects effectively

Trends such as the increasing focus on sustainably sourcing energy transition-critical materials and the geopolitical tensions endangering global commerce make these conundrums issues companies must manage now. Furthermore, these conundrums overlap with two of COP28’s guiding themes – Technology & Innovation and Inclusion – putting them squarely in the focus of global decarbonization efforts.²⁶

In the forthcoming reports on these issues, we will examine the benefits and challenges associated with each conundrum and outline best practices for managing them. The reports will inform corporate practitioners on the intricacies of renewable energy development - beyond carbon emissions reduction - that could either accelerate or disrupt corporate decarbonization efforts.

Defending human rights in renewable energy supply chains

Renewable energy platforms rely on long, complex supply chains to source the inputs required to manufacture and repair them. While these global material flows are essential to scaling renewable energy capacity, they intersect with many human rights-related trouble points that threaten to slow down decarbonization. Companies must carefully manage these risks.

Benefit example:

Stakeholder awareness of human rights abuses in renewable energy-related supply chains is increasing. However, with heightened pressure comes opportunity for companies who appropriately manage human rights risks. For example, by adopting and disclosing strong human rights due diligence practices and engaging suppliers on human rights, companies can reduce their exposure to renewable energy supply chain controversies that could damage their reputation.

Challenge example:

Many renewable energy-critical materials are located in countries with poor human rights records. The Democratic Republic of the Congo (DRC) is perhaps the most notorious when it comes to mining and human rights challenges. The country is rich in critical materials including cobalt and copper, but it ranks as one of the most fragile countries in the world, and child and forced labor are rampant.²⁷ This creates an environment where supply chains that pass through the country are likely to be subjected to some sort of human rights risk.

Protecting the environment while building out renewable energy capacity

The transition to renewable energy will benefit the Earth's environment, but the journey will include potential adverse environmental impacts inherent to capital projects such as energy transmission projects that could slow its pace and generate further environmental challenges. Addressing these impacts, while also securing benefits such as air quality improvements that come from appropriate management, is paramount to the success of future renewables development.

Benefit example:

Climate change mitigation is the most heralded benefit of renewables given they produce substantially lower GHG emissions per unit energy than fossil fuels. That said, GHG emissions reductions are far from the only environmental benefit of renewables. Renewables also produce significantly lower emissions of criteria pollutants known to have potential human health impacts.

Challenge example:

Despite its environmental benefits, renewable energy development poses environmental challenges, particularly in regard to renewable energy platforms. According to one life cycle assessment, solar PVs generate just under 50 grams of carbon dioxide equivalents (CO₂e) per kilowatt-hour (kWh) over their useful life, while wind turbines generate just over 10 grams of CO₂e per kWh over their useful life.²⁸ Although these GHG emissions rates are significantly less than those from coal and natural gas technologies (between 400 and 1,000 grams of CO₂e/kWh), renewable energy users still must account for them in their emissions footprints.

Siting renewable energy projects effectively

Compared to most traditional fossil fuel-powered energy developments, renewable energy projects can have a considerably larger geographic footprint per unit of energy produced. On average, electricity generation from renewables requires ten times as much land as fossil fuels due to lower power density (i.e., the land area required to generate a certain amount of energy).²⁹ These large land requirements and related permitting hurdles complicate renewables project siting, requiring companies to balance the need for renewables with the views of local communities and potential environmental impacts. Conversely, companies who appropriately manage renewable energy project siting are likely to generate positive benefits for community members while minimizing environmental harm.

Benefit example:

From tax revenues to job creation, strategically siting renewable energy projects can bring broad benefits to local, regional, and national economies. Wind and solar projects projected to be built in rural areas in the U.S. between 2020 and 2030 are expected to produce up to \$220 billion in lifetime economic benefits.³⁰ These economic benefits include up to \$2.7 billion in annual local tax revenues, \$2.2 billion in annual land lease payments, and \$6 billion in annual wages.

Challenge example:

Renewable energy projects often run into pushback from community members who may support renewables in general but not close to where they live. For example, only 24 and 17 percent of Americans would want to live within one mile of a solar or wind project, respectively.³¹

This is despite 67 percent of Americans believing that the U.S. should prioritize developing alternative energy sources.³² Such local opposition, also known as the Not in My Backyard effect (NIMBYism), can impede the siting and build out of renewables by exposing projects to protracted community consultations and occasional court battles that chew up time and money.



What's next for renewables conundrums?

From record investment to growing governmental support, renewable energy is at the center of the global energy transition. For companies, renewables and the low-carbon energy they provide are critical to achieving net zero goals. The appeal of renewables is evidenced by the huge sums of money the private sector is investing in them. In the latest year for which separated data are available (2020), corporations accounted for 41 percent of the \$240 billion the private sector invested in renewable energy that year, with the rest coming from public sources.³³

Incorporating renewables is not as simple as just investing. Companies will face “renewables conundrums” as they scale their use of renewable energy – issues that will challenge their efforts but bring benefits if managed correctly.

We hope you have enjoyed this introduction to this topic and will follow the entire conundrums series. Over the coming months, we will explore the three conundrums introduced in the preceding section in depth, outlining their implications for companies. The first of these three reports will focus on the *Defending human rights and navigating geopolitics in renewable energy supply chains* conundrum, exploring how companies must balance human rights considerations and renewable energy expansion. Publications on the *Protecting the environment while building out renewable energy capacity* and *Siting and permitting renewable energy projects effectively* conundrums will follow.



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