



How to accelerate the pace of renewable energy deployment

Energy Transition Taskforce
Pace Workstream



Sustainable
Markets
Initiative

Pace CEO Introduction



Duncan Clark - Head of Region UK, Senior Vice President

We need to increase the pace of the energy transition to net-zero

The world we live in can easily be defined by borders and has been built upon our ability to extract and trade natural resources. It is easy to lose sight of what transcends those lines on a map: vision; ambition; compassion; the wind blowing through the trees and the sunrise each morning. To achieve net-zero by 2050 we face a daunting challenge that requires us to rethink what connects us to one another and how we are connected to the world around us. How we produce our energy and ensure that it is available to all, is fundamental to the transition. The benefits this can bring will reach far beyond simply reducing our emissions; we will redefine how we live each day and our relationship with the world around us.

The energy challenges we face are well known: climate change; energy security and cost – and right now all three of these require us to move further and faster than we ever have before. The most recent IPCC report made this point forcefully and urgently. However, there was also a positive message: we are not yet out of time to take the actions we need to reach our goal. But we must significantly increase the pace if we are to deliver in time.

Building a resilient, renewable energy system is vital to ensuring security of supply and reducing carbon emissions. The Energy Transition Taskforce (ETTF) has been brought together under the auspices of the Sustainable Markets Initiative (SMI) to drive progress and accelerate the energy transition to a resilient and sustainable low carbon future. With the valued support of industry colleagues, I have been honoured to lead the Pace workstream, where we have focused on accelerating the scaling of renewable and low carbon energy projects through more effective rapid deployment processes: transmission, regulation and the right enabling environment.

If the global community is to meet the required net-zero targets, clean affordable renewable energy must be deployed at greater speed and scale across all parts of the world. This represents a significant challenge as at today's pace, we will fall short. We are not yet out of time, and we hope this report will play its part in highlighting some of the guiding principles required to transition the global energy sector at greater pace.

Pace Members

Executive Summary



The Sustainable Markets Initiative (SMI) was set up by His Royal Highness the Prince of Wales to create a global coalition of partners who believe that progress to a sustainable future must be accelerated to address the increasing threats from climate change. Within the SMI's Energy Transition Taskforce, a Pace work stream was initiated to identify ways in which the pace of deployment of renewable and low-carbon energy projects could be accelerated. The work stream brought together a group of senior executives from companies across the energy sector and other industries. This group focused on sharing best practice and experiences and analysing key risks and barriers to identify ways in which deployment pace can be increased. The work was carried out between July 2021 and May 2022, and this report provides a summary of the output and results.

The group concentrated on three main renewable energy sources: offshore wind, onshore wind, and solar. Such projects face many different barriers and challenges during the feasibility and development phase, which typically lasts 6-10 years for offshore wind, 3-5 years for onshore wind, and 2-3 years for solar. If we are to stand any chance of meeting net-zero goals, the rate of deployment of this type of project needs to be accelerated significantly.

The objective of the work was to identify ways in which the pace of deployment could be accelerated by removing barriers in the feasibility and development phase. This phase is where risks are highest due to uncertainty over scope, schedule and cost. Reducing risk and uncertainty can significantly shorten the duration of this phase as well as reducing the rate of attrition.

The intention was to identify principles that could be applied globally. Every country faces different challenges, but there are common principles that can be applied across projects, geographies, environments, political regimes, and economic markets. The work identified a set of 11 guiding principles, grouped into three key areas of regulation, enabling grid, and enabling environment:

REGULATORY BEST PRACTICES

1. Competition and collaboration should be balanced to accelerate project developments
2. Streamlining both the resource rights and the planning and consent process will expedite project development and remove unnecessary delays
3. Experienced multi-laterals can help close the knowledge gap around regulatory frameworks for renewables
4. Regulatory frameworks should incentivise system balancing capabilities to facilitate the accelerated deployment of wind and solar while maintaining grid reliability and affordability

ENABLING GRID

5. Price control regimes should incentivise innovation, encourage investment, and incorporate broader stakeholder objectives
6. Implement a structured and consistent long-term planning process to support longer-term strategic objectives
7. Lighter regulatory regimes can offer an opportunity to deliver more innovative, cost-effective renewable solutions
8. Regulatory regimes should recognise the need for anticipatory investment to enable the development of grid infrastructure ahead of demand

ENABLING ENVIRONMENT

9. Top-down approaches (e.g., policy, etc.) must be balanced with bottom-up (e.g., community) buy-in for all markets
10. In countries with limited access to capital, blended finance vehicles that combine public and private finance should be used to target the early project stages where the risk is the greatest
11. Governments must adapt their own regulations and insurance capacity to both develop the local insurance sector while also giving investors access to international insurance markets

Guiding principles were identified to help to simplify regulations, enable implementation of grid infrastructure, and unlock access to capital and insurance. International finance is available today for bankable renewable projects, but many projects, especially in developing markets, struggle to meet the criteria required to be considered bankable. The guiding principles identify some ways in which potential projects, governments, and the finance industry can make changes that will enable the increase of capital flow to renewable projects.

The main body of the report describes each of these eleven principles in more detail, providing background and key points, with a case study and/or best practice to illustrate the principle in action.

Pace

The acceleration of pace needed requires a step change in terms of regulation, grid, and enabling environment and it needs to be properly thought through and resourced upfront. The principles in this report must be considered together to give the right framework and regime in which governments and the private sector can work in partnership to deliver acceleration.

Governments can take a lead by setting ambitious targets and developing detailed plans on how to achieve those targets. They can send strong market signals by committing to targets, and to develop plans to achieve those targets. They should establish clear frameworks and simple regulatory regimes, balancing national and local needs, and enabling the right levels of investment in grid infrastructure within the necessary timeframes. This level of clarity and commitment will provide strong market signals to encourage private sector developers and suppliers to invest and scale up to meet the anticipated demand.

Public and private sector organisations must work together to develop ways to unlock the financial flows needed to provide capital and insurance for initial projects, and to promote the development of domestic financial markets in emerging economies. The pace of change required means that initial projects may need to be financed and delivered by non-local organisations with sufficient capability to deliver today. These initial projects can then be used to promote and develop local capacity and capability over the medium and longer term. The energy transition should be a just transition, stimulating local economies, green jobs and market development at the same time as transitioning to renewable and sustainable energy supplies.

Time is running out in terms of making changes to keep temperature rises below 1.5C. We are not yet moving fast enough to meet the declared net-zero targets or to rapidly increase the stability and resilience of energy supply. We hope that this report and its guiding principles can contribute towards addressing barriers, reducing risk, and unlocking the investment required to accelerate the pace of deployment.

Introduction & Scope

A NET-ZERO FUTURE

The challenges facing the world with respect to climate change and the need to cut greenhouse gas (GHG) emissions rapidly are well understood. Countries and organisations are setting targets to reduce emissions, with the COP26 pact declaring that over 90% of world gross domestic product (GDP) emissions are now covered by net-zero targetsⁱ. Meeting these commitments represents an unprecedented challenge across all sectors, but particularly for energy, which accounts for about three quarters of total anthropogenic GHG emissions and is by far the biggest source by sectorⁱⁱ. To reach net-zero goals, the energy industry needs to be transformed, switching to clean energy sources, deploying renewable energy at scale across the globe as well as reducing energy consumption where possibleⁱⁱⁱ.

In addition to making a significant contribution to the Energy Transition and net-zero commitments, renewable energy will also facilitate many of the UN Sustainable Development Goals (SDGs). Goal #7 speaks directly about energy ("Affordable and Clean Energy"), but many of the other goals will be enabled by renewables, not only environment goals such as Climate Action, Life Below Water and Life on Land, but also society and development goals that include Clean Water and Sanitation, Sustainable Cities and Communities, and Responsible Consumption and Production^{iv}.

If the global community is to meet both the net-zero targets and progress towards meeting the UN SDGs, clean affordable renewable energy must be deployed at greater speed and scale across all parts of the world. This represents a very significant challenge: today's pace is simply not fast enough. Governments, public organisations, private sector companies and local communities are all looking at ways in which they can work together more effectively to deliver the acceleration needed.

And that acceleration is greatly needed. To meet the Paris 1.5C target, the International Energy Authority (IEA) estimates that a rapid scaling up of solar and wind power is required in this decade, to reach annual additions of 630 Gigawatts (GW) of solar and 390GW of wind by 2030, which is four times the record levels set in 2020^v.

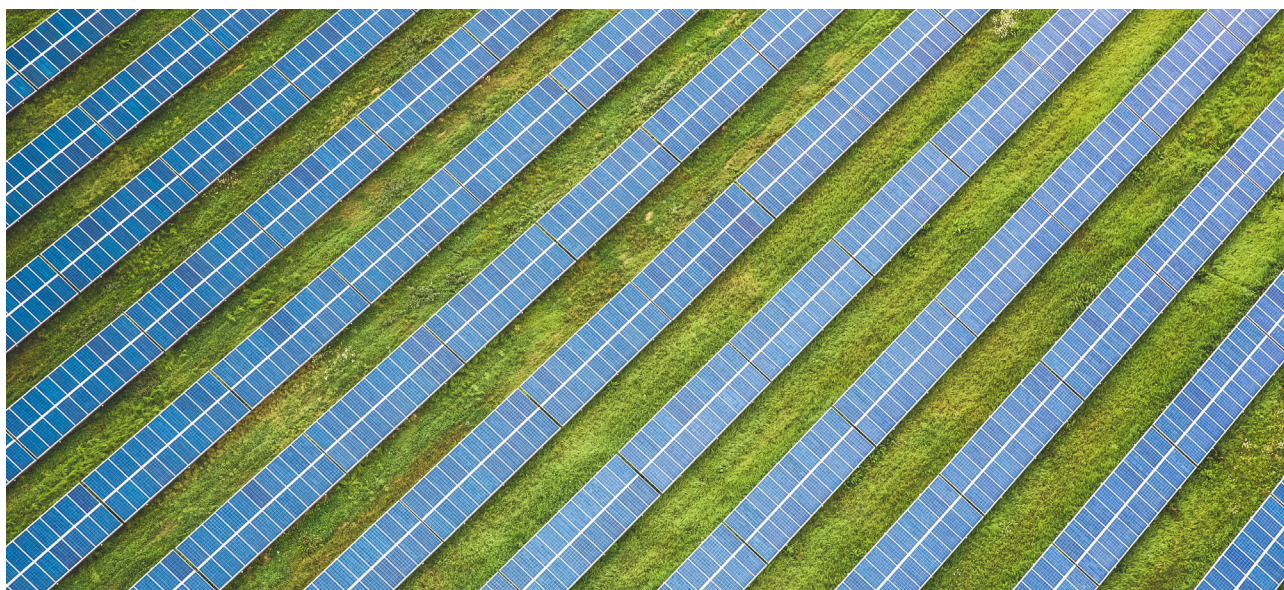
SMI OVERVIEW

The Sustainable Markets Initiative (SMI) was formed at the invitation of His Royal Highness the Prince of Wales, at the World Economic Forum (WEF) Annual Meeting 2020, with the goal of creating a coalition of parties who share his view that progress towards a sustainable future must be accelerated. The Energy Transition Task Force is a sub-group of the SMI made up of CEO-level executives from a variety of companies active in the energy transition space.

The objective of the SMI Energy Transition Task Force is to drive progress as a group and accelerate the transition of the energy industry to a resilient, low carbon, and sustainable future. Within this Task Force, three work streams have been set up with specific objectives to address key questions:

- **Greening.** To define and create support for the role of companies in transition ('greening companies') from energy-intensive to net-zero carbon as part of a transformation of the energy system in support of the world meeting the goals of the Paris Agreement.
- **Pace.** To accelerate the scaling of renewable and low carbon energy projects through speeding up deployment processes and sharing best practice between industries and geographies.
- **Customer.** To build positive momentum towards a customer-centric (and just) energy transition that helps people and businesses across the globe benefit from more affordable, greener energy and play a part in achieving net-zero.

This report is a key deliverable from the Pace work stream. It provides a summary of the analysis of the current state and lessons learned from renewable deployment to date, and identifies ways to accelerate the pace of deployment of renewable energy.



WORKSTREAM SCOPE – TECHNOLOGIES AND GEOGRAPHIES

The Pace work stream has focused on three main renewable energy sources: offshore wind, onshore wind, and solar. We recognise that these three alone will not deliver the full energy transition needed, but together these sources will need to form a significant proportion of world energy supplies if the net-zero 2050 target is to be met. Two other important focus areas for a successful Energy Transition are hydrogen and carbon capture and storage, and within the SMI there are Task Forces looking at opportunities and challenges relating to each of these. With that in mind, the Pace group has focused on the three areas of offshore wind, onshore wind, and solar, leveraging the considerable expertise in these areas represented by members of the Pace committee.

We have deliberately taken a global remit when looking at challenges and opportunities. Climate change is fundamentally a global issue and eliminating emissions from one country is of limited value if another country's emissions are increasing. There is therefore a need to understand how we can accelerate deployment globally rather than just in selected geographical pockets. The global landscape when it comes to these types of renewable technologies varies. There are relatively mature markets such as offshore wind in Northern Europe or solar in parts of the US, and developed countries that rely almost completely on fossil fuels. There are also developing countries with rapidly growing energy demands and large sections of the population with no access to reliable energy of any kind.

These different situations will require different solutions. It is important to recognise that approaches from one area may not be easily or directly transferrable to another area, which may have very different characteristics and challenges that must be considered when designing and delivering an effective renewable energy strategy. At the same time, there are lessons learned from today's experience (both positive and negative) that can be used to transfer best practice and identify common principles that will help new areas to accelerate their rate of development and deployment.

To identify common guiding principles, we have focused our attention on three cornerstones that we believe are essential to an effective renewable energy strategy and form the foundation upon which an accelerated development and deployment plan can be delivered. The key questions addressed for each cornerstone were as follows:

- **Regulatory.** What are the critical pace-limiting factors in key geographies for major renewable technologies? What regulatory best practices exist that can be shared?
- **Enabling Grid (transmission and interconnection).** What opportunities and challenges are there to delivering efficiencies within the grid? What benefits can be secured through leveraging best practice?
- **Enabling Environment.** What areas can be unlocked and accelerated through best practice, collaboration, and co-existence? How can private sector investment offers be leveraged to deliver public sector enablers?

The Project Lifecycle

The project lifecycle provides a good starting point to identify opportunities to accelerate deployment. A simple representation of the lifecycle is shown in Figure 1, with three main phases:

Figure 1: Simple Project Lifecycle



	Feasibility & Devt	Construction	Operations
Offshore wind	6-10 years	2-3 years	40 years
Onshore wind	3-5 years	1-2 years	35-40 years
Solar	2-3 years	1-2 years	35 years

Renewable energy projects take years to move through the feasibility and development phase of this lifecycle, even in established markets, and some end up being dropped or parked mid-way through the process. Duration varies by energy source, with offshore wind taking the longest, followed by onshore wind and solar photovoltaic (PV), as shown in the table above. According to a recent World Bank report^{vi}, establishing frameworks and building operating projects can take 10 years (or longer), and not all of these operating projects will be successful. If we are to accelerate deployment, we need both to improve the rate at which projects move through the lifecycle and to reduce the attrition rate of projects failing to reach operations.

The opportunities to accelerate are not equal across the lifecycle. The operations phase starts after deployment is completed, so clearly does not impact the rate of deployment. Construction does take time, but opportunities to accelerate are limited by the physical nature of the construction phase – equipment needs to be manufactured, delivered to

site, and installed. Construction is also governed by contracts with clear deliverables and timeframes, and parties are financially incentivised to perform. Inefficient construction may cause delays of months, but optimising construction alone will not give the degree of acceleration required. It is the development phase that is usually both the longest and the most uncertain. A complex network of policies, frameworks, stakeholder engagements, requirements and barriers need to be negotiated at the same time as finance is secured, assessments undertaken, designs produced, supply chains engaged, construction plans agreed, operating models developed, and risks managed.

The development phase therefore offers the greatest opportunity for acceleration, so this study has focused on barriers, delays and challenges across the development phase, including the following key questions:

- **Project viability.** There are many excellent resources available to help projects once they have reached a certain point in the lifecycle (usually some way through development). The World Bank Scaling Solar^{vii} and Scaling Wind^{viii} programs, for example, provide resources, expertise and funding for bankable projects, and have already delivered some successes in deployment of renewable projects to developing countries^{ix}. However, the challenge for many is to meet the criteria of a “bankable project”. How can potential projects navigate through the sea of uncertainties at the start of a development phase to deliver a viable bankable project and take advantage of these programs?
- **Project mortality.** Some projects are stopped for valid reasons, such as an environmental impact analysis showing that they are not economically feasible, or that they will be unable to secure the necessary environmental permits. But others may be stopped for other reasons such as political uncertainty, issues associated with land or sea access, lack of a robust grid to transport the energy to the customer, inability to secure appropriate levels of insurance, etc. These are projects that on paper can deliver cost-effective renewable energy but are blocked due to other factors. What can be done to address those factors and reduce this type of project attrition?

- **Development phase finance.** Although construction is the capital-intensive phase, the risks have generally reduced to the extent that once a project reaches construction, there is funding available. The funding challenges are more acute in the early phases, as although capital requirements are much lower, it is much harder to secure enough funding for long enough to sustain a project in the development phase. At this point, it is usually several years before any potential returns can be realised, and there remains considerable risk and uncertainty on scope, schedule and cost. Projects can then stall or collapse due to lack of funding through the development years. This is particularly true for onshore projects, which are typically smaller and can attract smaller developers with limited financial resources. The cost of arranging financing for a smaller project is higher relative to the equity ticket; although the amount of funding is required is lower, the overhead costs such as due diligence, legal documentation and permitting can require similar levels of effort as a larger project, eating away at the returns more quickly. How can this model be changed to reduce risk and help unlock finance and accelerate deployment?
- **Delays impacting project success.** Delays impact project economics, potentially to the extent that a project no longer makes commercial sense. Licences granted early in the process may expire, or technology planned is no longer competitive or even supported by manufacturers. Decision-makers may change, leading to re-examination or reversal of previous decisions. How can unnecessary delays be reduced or eliminated?

One way to examine these questions is to use a risk lens. The risk profile of a project reduces as it moves through the development and subsequent phases. Reducing risk is a key mechanism by which deployment can be accelerated:

- Reduced risk increases attractiveness – more parties are willing to participate, more investment is available, the challenges of failure are reduced, and confidence increases.
- De-risking development will unlock potential barriers in future phases – the supply chain vendors will ramp up ready for construction if they have the right level of certainty on demand.
- One common area of risk is uncertainty in requirements, consent agreements, planning processes, financial reward models and success measures due to poor, incomplete or non-existent frameworks. Consistent and

straightforward frameworks guide stakeholders through a process and set out the parameters by which projects will be managed and measured. They provide clarity to developers, who can identify and quantify risks and plan accordingly.

Looking at ways to reduce risk provides important insight into how to accelerate. For each of the three key cornerstones, we incorporated the experience of the committee members as well as wider learnings from others in the industry to examine areas that could help to reduce risk, and therefore accelerate progress towards deployment:

- **Regulatory.** How can regulatory frameworks provide the right level of certainty to allow the private sector to manage risk and invest at the same time as delivering the best deal for the community and customer? How should governments encourage innovation and competition without sacrificing value or speed, or compromising suitable levels of environment and community protection?
- **Enabling Grid (transmission and interconnection).** What is the best way to plan and deliver the necessary levels of infrastructure to help mitigate risk and deliver net-zero? What lessons can be learned from countries with significant experience that can be applied to help other countries accelerate their own capacity expansion?
- **Enabling Environment.** How can international finance be attracted into new regions, and how should that be balanced with the development of local finance and insurance markets? What new models and structures need to be put in place to reduce risk in developing markets and attract more investment earlier in the project lifecycle?

Our approach has been to look at the major barriers and delays during the development phase, and understand what we have learned from experience to date. We have looked at lessons learned and case studies to identify guiding principles that can help governments, non-profit organisation (NPOs), private sector companies and local communities work together to progress renewable energy projects more rapidly through the development phase to construction and operations and accelerate the transition to renewable energy that is necessary to meet net-zero goals.

Section 5 below lays out the 11 guiding principles identified, explaining each in detail and providing some case study examples to illustrate the value of each principle.

A customer-centric energy transition should be prioritised

While the pace of renewable deployment needs to be accelerated, it must be done with and for energy customers. And while there is no single customer perspective, energy companies can ensure that the energy transition is customer-centric by making it attractive, easy, and affordable for its customer base.

To make it desirable, energy companies should consider what matters to people. People care about the services offered, and they care about reliability and energy security. Energy companies should recognise and work with external influencers such as banks, investors, appliance manufacturers, media, and social networks to make the services desirable to the customer. Gamification of services can also help provide behavioural insights that allow for optimised service offerings for the customers.

To make the energy transition affordable, energy companies should work to avoid price shocks by implementing time-of-use tariffs, which will help to motivate change while avoiding these price shocks. And while there is still upfront cost for certain renewable adoption like residential solar, energy companies can work with financing partners on offering loans and leasing to help manage these upfront costs. Collaboration with innovators in this space can also help to reduce cost. Additionally, large businesses have an important role to play in this effort, both through their energy purchasing but also through their supply chains and wider influence.

To make the energy transition easy for customers, energy companies first need to reduce the complexity for the customer, explaining the options using simple language. These companies also need to provide solutions that help solve for the barriers that many residential and corporate customers face. Technical integration for smart home solutions can help residential customers overcome the digital barriers that many of these customers face. Corporate customers face challenges when looking to decarbonise their energy supply and are often reliant on expert advisers to manage the solution. Building and operating solutions for these businesses can be a huge step to helping businesses advance towards their net-zero goals.

For a detailed breakdown of how to ensure that the energy transition is customer-centric, please visit the Energy Transition Taskforce section of the SMI website, found [here](#).

Guiding Principles

OVERVIEW

No two countries or projects are the same, so attempting to create a set of fixed rules for renewables deployment is neither feasible nor realistic. Instead, through a series of workshops, interviews, and discussions we have worked to identify key principles that can be applied in different situations; both in mature and developing markets, with a focus on solar and wind, both onshore and offshore.

Best practices and experiences from established markets are valuable, but not necessarily directly transferrable to newer markets with different characteristics and requirements. What was effective in the previous decade will also undoubtedly need to be refined and adapted to handle the pace of renewable deployment required to achieve net-zero 2050 ambitions.

We have examined our combined experiences and have reached out to other organisations such as the World Bank, IFC, Global Wind Energy Council (GWEC), and IRENA to learn from their experiences as well. We identified a set of guiding principles that can be used by governments, non-governmental organisation (NGOs), private and public sector organisations, and stakeholders to help to accelerate renewables development and deployment globally.

These eleven guiding principles, listed below, are grouped into the three cornerstone areas that we identified for our focus:

- **Regulatory Best Practices**
- **Enabling Grid**
- **Enabling Environment**

This section of the report discusses each in more detail, providing background and key points as well as case study examples to further illustrate the principle in action.

REGULATORY BEST PRACTICES

1. Competition and collaboration should be balanced to accelerate project developments

2. Streamlining both the resource rights and the planning and consent process will expedite project development and remove unnecessary delays
3. Experienced multi-laterals can help close the knowledge gap around regulatory frameworks for renewables
4. Regulatory frameworks should incentivise system balancing capabilities to facilitate the accelerated deployment of wind and solar while maintaining grid reliability and affordability

ENABLING GRID

5. Price control regimes should incentivise innovation, encourage investment, and incorporate broader stakeholder objectives
6. Implement a structured and consistent long-term planning process to support longer-term strategic objectives
7. Lighter regulatory regimes can offer an opportunity to deliver more innovative, cost-effective renewable solutions
8. Regulatory regimes should recognise the need for anticipatory investment to enable the development of grid infrastructure ahead of demand

ENABLING ENVIRONMENT

9. Top-down approaches (e.g., policy, etc.) must be balanced with bottom-up (e.g., community) buy-in for all markets
10. In countries with limited access to capital, blended finance vehicles that combine public and private finance should be used to target the early project stages where the risk is the greatest
11. Governments must adapt their own regulations and insurance capacity to both develop the local insurance sector while also giving investors access to international insurance markets

REGULATORY BEST PRACTICES: GUIDING PRINCIPLE #1

Competition and collaboration should be balanced to accelerate project developments

BACKGROUND

Competition has been an important tool in helping to deliver long-term cost reduction for renewable energy sources such as offshore windⁱ. However, low customer prices are not the only driver for energy strategies, as governments are also looking to accelerate deployment of renewables to meet their net-zero commitments and ensure system safety and security. In relation to natural monopolies such as the energy grid, competition will not always offer as efficient a solution in the longer term.

Experience from past decades suggests that both competition and collaboration can accelerate deployment and reduce costs, when deployed at the right time in the right way. Collaboration can be used to reduce uncertainty, complexity, duplication, and risk, enabling more compelling bids to be submitted with confidence.

Timing of competition in the project cycle can have a significant impact on the value it can deliver. If competition is held too early, bids will be heavily caveated to allow for unknowns, e.g., sea bed conditions or future licensing requirements.

It is important, therefore, for governments to consider how, and at what stage, to use competition and collaboration to balance the acceleration and price drivers, together with other factors such as the desire to create and develop local content and markets. Setting up competition where there is a large degree of uncertainty can lead to wildly different bids that are difficult to evaluate, or very high costs as bidders seek to offset high levels of risk.

Encouraging public and private sector organisations to collaborate at certain stages of the project lifecycle could deliver acceleration without reducing competition. For example, in bids for offshore wind development in the Netherlands in 2019-2021, some surveying, licensing and permitting work was done centrally and provided to all bidders, who then competed via auction. This accelerated the process without sacrificing competitionⁱⁱ.

A careful balance is needed, as too much centralisation or government intervention can reduce the ability of private sector player to leverage their unique intellectual property and expertise to generate innovative and competitive bids. The exact balance of competition and collaboration will vary according to project, but the right balance will help to reduce risk and accelerate deployment at the same time as encouraging competition.

KEY POINTS

- Governments need to balance multiple parameters when deciding how and where to apply competition. They want to secure a strong deal for the customer, but will also want to meet their net-zero commitments, and potentially create and expand local content in terms of jobs, finance, and insurance
- Too much focus on competition can increase costs and lifecycles (e.g., each potential bidder carries out their own Environmental Impact Assessment, duplicating effort and adding cost to their overall bids)
- Central authorities/governments can reduce costs and accelerate the process by commissioning appropriate work centrally and sharing
- Getting developers to collaborate could accelerate the pace of adoption, by bringing together ideas and solutions from different sources to address a particular problem and potentially creating a more optimal solution than would have been delivered by individual developers, both in terms of reduced emissions and lower costs
- Adding too many clauses associated with the development of local content can slow down deployment and increase overall cost, as evidenced by recent examples in France and Taiwanⁱⁱⁱ
- Competition can be an important tool to deliver customer value, but it needs to be applied correctly and in the right places and at the right stage of projects. It is not a question of compromising on leveraging competition, more about how and when to use competition to the best effect, which will deliver long term value for energy consumers

Competition can be less efficient for grid providers

Competition can offer significant value within parts of the industry and its value chain, particularly in the Offshore Electricity Transmission regime. However, for grid operators that exist in a complex environment, competition is often a less efficient model. For example, in the UK the existing grid providers already competitively tender many of their projects while existing as natural monopolies governed by regulatory bodies. They can do this at scale and in a coordinated manner that prioritises and focuses on achieving the best long-term outcome for its customers. As many grid assets are designed and built to last for over 45 years, it is inefficient to introduce competition where the revenues offered to the bidders are for shorter periods of time.

Not only will the competitor have less incentive to design their solutions and assets to stand the test of time, but they are less likely to have the dedicated resources to design the optimal schemes or obtain the relevant planning consents, as significant local grid knowledge is required. Because customers are so reliant on the grid, the security, safety, and reliability of the grid assets are key. Therefore, introducing many new players into what is a highly complex onshore grid regime can be inefficient and uneconomical in the longer term.



CASE STUDY: GUIDING PRINCIPLE #1

A multi-stakeholder approach incorporating government and industry can help introduce innovative and bankable bid constructs

Across India, the integration of Variable Renewable Energy (VRE) poses specific challenges to the balance of supply and demand as its share of power generation rises. To address this, the Indian government has been pushing its energy industry for the periodic and sustained bidding of renewable projects that are comprised of different technologies that provide solutions to the challenge. A key facet of this solution requires bid constructs to innovate and adapt to ensure the best performance for individual technologies and to take advantage of the geographic diversity of VRE across India to address the inherent challenges of variability presented by VRE.

In 2019, India's Solar Energy Corporation (SECI) introduced a "Round-The-Clock" auction for a 100% renewables tender (Solar + Wind + Storage), which was a bid construct that had never been tried before in India. The bid construct required that renewables demonstrated a better generation profile and a high-Capacity Utilisation Factor¹ (CUF). SECI also asked for the development of a new policy and regulatory framework that utilised a multi-point injection approach, another first for India. For the energy industry in India, this was an opportunity for its VRE stakeholders to challenge the existing bid models and constructs by successfully delivering on the request and achieving a significantly lower tariff rate.

To tackle this demand from the Indian Government, key industry players adopted a multi-stakeholder approach that collaborated to bring about the necessary changes to address the above requirements. The energy industry undertook an industry-wide consultation, bringing together the Government of India, Indian State Governments, Distribution Companies, Energy Companies, and Energy Industry Associations. This industry-wide consultation deployed the following key advocacy methodologies to achieve the targeted bid construct:

- **Policy Level:** In the pre-bidding stages, key energy companies worked with off-takers to agree on the required monthly obligations so that they could alter

the bid construct to achieve a lower tariff and make the bid structure more competitive. These companies then submitted the commercial and contractual inputs for the new bid constructs to both States and Distribution Companies to ensure alignment with their requirements.

- **Industry Strategy and Plan Development:** Key energy companies collaborated to identify critical regulatory interventions that would bring about multi-point connectivity to ensure the optimal technological performance while taking advantage of the geographical diversity of VRE across India. The energy companies then worked with the Ministry of Power, The Ministry of New and Renewable Energy, and the Solar Energy Corporation of India to identify steps and solutions to address the remaining issues in the new bid construct.
- **Advocacy:** Working alongside Energy Industry Associations, the Energy Companies helped to drive the industry to support and bring out the optimum bid construct.

The multi-stakeholder approach and the public and private collaboration proved to be a success. The winning bid price was \$38/MWh, which was nearly 33% lower than the off-takers expected. By collaborating across key public and private stakeholders and demonstrating the success of this innovative bid construct, VRE was able to break a barrier in India. As a result, now a major share of future capacity is to be allocated under these high CUF bids, which provides a pathway for adding considerable GWs of VRE moving forward. While further clarity on operational aspects for scheduling and transmission is needed, the demonstrated success of this bid construct is already yielding positive results, with SECI introducing another "Round-The-Clock" bid in October 2021 of 2.5GW that was oversubscribed by almost five times by energy industry stakeholders. Additionally, this bid also resulted in a solution where multi-point injection became possible, resulting in the development of the policy and regulatory framework required for actual implementation.

¹ Capacity utilisation factor is defined as the ratio of the actual output of a renewable asset over the year to the maximum possible output from it for a year under ideal conditions. The bid requirement was to achieve a high ratio, so to keep the assets generating as much as possible.

REGULATORY BEST PRACTICES: GUIDING PRINCIPLE #2

Streamlining both the resource rights and the planning and consent process will expedite project development and remove unnecessary delays

BACKGROUND

Wind and solar renewable projects and their associated grid infrastructure are highly complex, requiring interaction with a large group of stakeholders, from local communities to land and sea access rights holders, governments, regulatory bodies, planning authorities, and so on.

Timelines to engage with all necessary groups and secure all the appropriate levels of rights and consent are long and can be subject to frequent delays. Often there are no fixed timescales associated with different processes and approval stages.

Unclear or unexpected process stages add both uncertainty and risk to the project, delaying development, reducing investment attractiveness and having a negative environmental impact as deployment of renewable energy is delayed. For example, the refusal of a planning decision or the initiation of a public inquiry related to the proposed infrastructure development can add months or years to the project development lifecycle.

During the development of these proposals, there is a need to engage with multiple stakeholder groups who may be impacted by the proposed development (e.g., fishing, landowners, military, local communities). Whilst this can add time to the development of a proposal and can increase costs, there are significant benefits to the development proposal in addressing any concerns at the outset. This, however, will not necessarily always prevent objections to the development, causing delays through the consenting and approvals process.

While an increasing number of governments are committing to net-zero and setting specific long-term targets, fewer are focusing on establishing the right links between strategic goals, plans, frameworks, and regulatory requirements that are needed to accelerate development and meet the targets. Setting a target is not enough; governments need to deliver an integrated approach that streamlines and shortens planning and consenting processes and enables the necessary projects to be sanctioned, approved, and delivered more rapidly.

A shortage of regulatory and consenting expertise can also be a bottleneck. Increasing capacity of renewable energy means reviewing and approving more projects, which in turn puts an added burden on already-stretched regulators and planning authorities. Many countries will need to increase staffing levels and expand their regulatory and planning capacity to avoid delays due to lack of resources.

Finally, today's regulations may be fit for purpose for the infrastructure today but are unlikely to be the best solution for the future, if a rapid expansion of capability is required. Regulations need to adapt to consider the impact that future needs and anticipatory investment will have on developers and Transmission Operators.

KEY POINTS

- Governments should set a clear strategic direction with energy policies that establish specific capacity and generation targets for wind and solar, recognising the required grid infrastructure to facilitate them, with associated expected environmental benefits^{xiii}
- Regulators should streamline the planning and consent process to enable more rapid delivery of projects required to meet energy policy targets
- Clear roles and responsibilities and fixed timelines should be defined for each development stage, and decision-makers empowered with the right levels of authority and support to make decisions without delay
- Establishing agreed points of contact to manage stakeholder engagement will reduce cost and accelerate development by avoiding each developer having to engage separately with a complex network of stakeholders
- Governments should ensure that civil service and Local Authority staffing and funding is adequate to manage both the increasing volume of approvals and interactions with local stakeholders^{xiv}
- Regulatory recognition of the future power system design and its anticipatory needs will be crucial to appropriately recognise Transmission Owners' planning challenges

BEST PRACTICE: GUIDING PRINCIPLE #2

Supportive planning regimes are critical to ensure that the grid infrastructure keeps pace with accelerating demand.

Not since the development of the electricity network has there been so much focus on the electrification of society. However, considerable challenges exist across stakeholder groups regarding grid infrastructure development that could potentially impede its successful delivery:

- Transmission grid infrastructure remains one of the most controversial development types as it is often located on land and routed through communities who do not perceive its local benefit
- Public perception and, to an extent, perception from statutory bodies remain negative
- They require an extensive pre-application development stage and have lengthy and uncertain planning determination timelines
- The need for anticipatory design and investment (see Guiding Principle #8 for more detail)

A supportive planning system can help alleviate the above challenges, and Transmission Owner and Local Communities can exercise best practices to ensure that grid development maintains pace. The below detail the best practices for each stakeholder group.

Planning Regime:

- Regulatory recognition of future system design requirements and its anticipatory needs
- Providing certainty and collaboration amongst various stakeholders
 - Support for strategic grid infrastructure - with consenting processes that recognize national need
 - Flexible frameworks to allow for necessary changes
 - Link the grid infrastructure to the climate emergency and Government targets
 - Prioritise competing land use policies

Planning regimes need to balance the needs and interests of a complex network of stakeholders and requirements, and it is important to create simple and transparent processes that acknowledge the different perspectives, but do not allow progress to be delayed.

Transmission Owner:

- Work to engage the local communities at the earliest stages possible to ensure that the project balances the views of all stakeholders and communities with the relevant statutory obligations
- Educate the other stakeholders to build wider societal recognition of the critical role that the electricity network plays in fighting climate change
- Continue to balance the environmental and social considerations with the statutory duties

Local Communities:

- Engage with developers at the earliest stages of development to ensure that their views are communicated in a timely manner

Governments:

- At a regional and national level, governments should promote a national debate about the urgency and value of a renewable energy strategy. The public can be educated on the necessity and benefits of the energy policy and plans to help to build public support at a national and local level and build recognition and acceptance that some new infrastructure is critical to success

REGULATORY BEST PRACTICES: GUIDING PRINCIPLE #3

Experienced multi-laterals can help close the knowledge gap around regulatory frameworks for renewables

BACKGROUND

Emerging markets are set to account for the bulk of emissions growth in the coming decades unless much stronger action is taken to transform their energy systems^{xv}. At present, renewable developers in these economies are faced with an interlinked set of challenges that complicate the rollout of renewables: incomplete regulatory frameworks; long, unclear development processes and fragmented decision-making; lack of precedent and experience with renewables and bankable documentation; weak credit ratings of off-takers as well as sovereign guarantors.

The fragmented geographic landscape also necessitates tailored approaches and when each approach begins from scratch, it extends the development timelines. These timelines are often further lengthened because incomplete regulatory frameworks and decision processes can leave developers uncertain as to which government entity has the authority to approve permits, which entity grants grid access, and what renewable energy targets they are trying to reach.

To address this, governments can proactively engage with experienced multilaterals to access additional expertise. In recent years, multi-laterals such as the World Bank, African Development Bank (AfDB) and IFC have been working to leverage lessons learned from combined decades of successful projects for wind and solar to put together programs and resources that can help accelerate and simplify renewable development in emerging markets.

One-stop shops created to accelerate early development projects in countries like Bangladesh, Morocco and Oman are providing a central point for project information, contract management and permits and approvals, as well as mobilising and attracting finance^{xvi}. Resources are available to help with engaging and stimulating the local economy. Incentives can be provided to local businesses to get involved in the sector (e.g., launch a Feed-in-Tariff (FiT) scheme for rooftop/distributed solar). To help develop the local talent pool and to have immediate positive contributions to the local economy, industry associations and NGOs can come in and launch training programs.

Development Finance Institutions such as the IFC, European Bank for Reconstruction and Development (EBRD), and AfDB can work also with governments to secure support for renewables program (see Guiding Principles #10 and #11 for further guidance on financial and insurance support).

KEY POINTS

- Incomplete regulatory frameworks around foreign investor rights, land ownership restrictions, grid access and grid access fees create onerous requirements for renewable developers
- What has worked in current mature markets may not be appropriate for emerging markets. Characteristics and requirements are different, and the need to deploy and at scale is more significant than 10-15 years ago, when some of these mature frameworks were developed. Experience can be leveraged but approaches and frameworks must be tailored to the local environment and conditions
- Experienced international developers can help clarify processes, procedures, requirements, authorities, roles, and responsibilities
- Helping to simplify the permitting process via coordination across different regulatory bodies (e.g., federal, state, local) and providing a one-stop shop for permitting that contains all required approvals will help alleviate bottlenecks and accelerate the pace of renewable deployment^{xvii}
- To help establish precedent and build out experience with renewables and bankable documentation, multilaterals like IRENA can help provide standardised contract packages to help prepare for bankability requirements
- Development banks are working with governments to provide both financial and insurance support as well as expertise on how to develop and fund renewable projects

CASE STUDY: GUIDING PRINCIPLE #3

IFC's Scaling Solar program is a one-stop-shop offering investment and advisory services to governments in Africa to accelerate a pipeline of solar projects

Many countries have faced challenges in developing utility-scale solar plants for numerous reasons, including limited institutional capacity, lack of scale, lack of competition, high transaction costs, and high perceived risks. To address these challenges and help countries accelerate their solar power generation, the IFC has created a program titled Scaling Solar, which aims to create viable markets for solar power in its client countries in Africa. When the program was launched, there were several projects under development that were struggling to reach financial close^{viii}. These projects had difficulty attracting the interest of larger, more experienced developers and were reliant on unsolicited proposals and bilateral negotiations to implement the power projects.^{xix}

The approach that IFC took with Scaling Solar focused on the development of a public-private partnership model for a single deal that is easily replicable. This approach helps to spread costs, enhance impact, and encourage programmatic, competitive tendering that provides faster delivery and lower prices^{xx}. It also benefits project developers and the project sponsors by generating a pipeline of investible projects, which reduces development time and costs, and helps provide a foundation for establishing a clear and transparent procurement process^{xxi}.

The program provides a one-stop shop to make privately funded grid-connected solar projects operational within two years with competitive tariffs^{xxii}. The program offers a package that helps to address the challenges listed above by including:

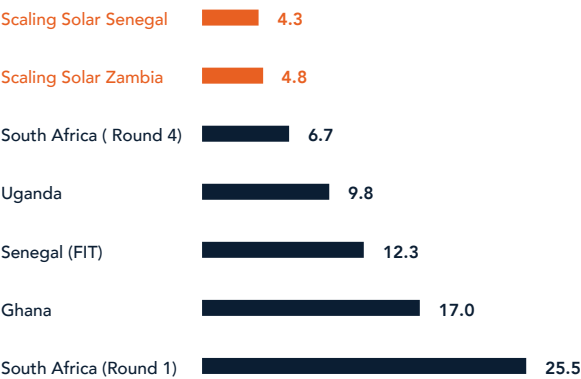
- **Expert advice** that helps to assess the right size and location for the country's solar PV power plants and how to connect it to the country's grid
- **Simple and rapid tendering** that ensures strong participation and competition from committed industry players
- **Fully developed templates** that provide bankable project documentation to eliminate negotiation and help to speed up financing. These templates are standardised and quickly tailored to local needs and accelerate the pace of project development
- **Competitive financing and insurance** attached to the tender and available to all bidders, helping to deliver competitive bidding and ensuring a rapid financial close
- **Risk management and credit enhancement** that lowers financing costs and helps deliver power at lower tariffs

As demonstrated in the below graphic, the program not only helps to shorten the time from the start of procurement to when the project begins construction, it also does so at a cheaper per kilowatt hour (kWh) rate than its peers.

The program has now executed projects in seven countries over two continents and provides a great example for how experienced multi-laterals can help bridge the knowledge gap in countries that are relatively inexperienced but looking to build out their renewable industry.

CHEAPER SOLAR

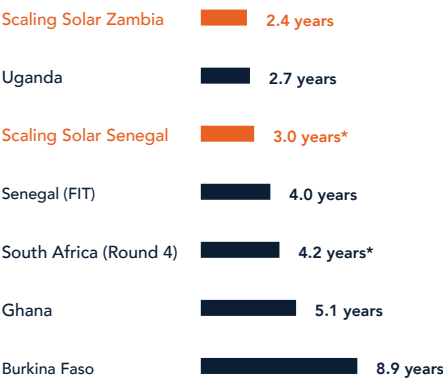
Cost per kWh of electricity from solar power in US cent*:



* Based on publicly available information and adjusted for indecation and inflation to allow for comparison.

FASTER SOLAR

Time from start of procurement to start of first construction:



* Estimated time to contruction as of May, 2018



REGULATORY BEST PRACTICES: GUIDING PRINCIPLE #4

Regulatory frameworks should incentivise system balancing capabilities to facilitate the accelerated deployment of wind and solar while maintaining grid reliability and affordability

BACKGROUND

Increasing energy generated from renewable sources brings new challenges in balancing demand and supply across energy systems. Wind and solar are variable power sources with much more intermittency than traditional fossil fuel energy generation. To ensure that solar and wind generation continue to accelerate, the power market design needs to incentivise system balancing capabilities for all sectors of the energy system. Flexibility must be harnessed from power generation to transmission and distribution systems, storage, and demand^{xxiii}.

The optimal strategy for integrating higher shares of VRE is country- and context- specific^{xxiv}, and will need to use a blend of different solutions to support complex energy networks. These solutions include, but are not limited to, transmission strengthening, interconnected and extended balancing areas, and energy storage^{xxv}. These can be utilised to integrate larger shares of solar and wind into the mix, while maintaining system reliability and affordability^{xxvi}. These sources will be critical for systems to address the following three types of systems balancing challenges^{xxvii}.

- **Daily balancing:** between hours, and day to night
- **Predictable seasonal:** supply or demand cycles over month to month
- **Unpredictable week-by-week:** variations that cannot be reliably forecasted, such as unseasonal weather patterns, or unplanned equipment failure

Energy storage is a key element of system balancing as it enables shifting the wind and solar power from times when it can be generated but is not needed to times when the power generated is lower than demand^{xxviii}. Lithium-ion battery pack costs have fallen 85% in the last decade and at current prices, batteries are increasingly being used to provide frequency response and short-term balancing services^{xxix}.

Demand management also has a part to play, with options like time-of-use pricing (where customers pay less for energy at times of low demand), and the development of distributed

prosumer networks (allowing customers with generation capacity to buy and sell power into the grid). Effective demand management processes can help to smooth demands and facilitate system balancing.

A well-planned transmission grid enables the integration of increasing levels of wind and solar by accommodating diverse VRE locations and locations far from loads^{xxx}. As will be discussed below in Guiding Principle #6, providing certainty for strategic transmission infrastructure investment is imperative to meet 2050 net-zero targets and to ensure that the grid can maintain the pace of accelerated wind and solar.

Interconnection across networks gives the overall system greater access shared reserves, a larger balancing area, and a more diversified generation that helps increase the system's flexibility^{xxxi}. For example, Denmark expanded its balancing area by connecting to Nordic power markets, allowing VRE resources to access pumped hydro storage in the Nordic markets to store surplus power^{xxxii}.

KEY POINTS

- The intermittent nature of wind and solar power generation means more complex demand and supply balancing issues
- Sources of high and reliable levels of wind and solar power generation are often located away from existing transmission networks, necessitating grid expansion, upgrading and re-balancing
- Power sectors have different options to introduce increased flexibility on the grid
- Energy storage is increasingly cost-effective and together with demand management, will be integral to solving balancing challenges
- Bid constructs comprising of VRE + Storage will be integral in helping accelerate wind and solar generation to meet net-zero targets
- Regulators should ensure their frameworks allow for and incentivise increased flexibility to accommodate requirements from increased VRE

CASE STUDY: GUIDING PRINCIPLE #4

Governments should adapt their regulatory frameworks to incentivise different technologies that improve their grid's system balancing capabilities.

Corumbau and Cumuruxatiba are two beach villages in the south of Bahia, Brazil. Both villages are supplied by 13.8kV networks from substations over 50 kilometres away. These locations supply over 1,500 customers and average 25 hours of outages each year. The two villages are surrounded by national parks, preservation areas, and indigenous tribes, which bar any networks from passing through those locations. This makes it very challenging to construct traditional network solutions. Because of these challenges, the average time for reconnection for faults is nearly 8 hours.

To address these outages, Iberdrola set out to improve the grid reliability with a proposed solution of a new 138kV circuit, replacing a medium voltage supply fed from a source many kilometres away with a high voltage and substation placed nearer the load. This solution was primarily designed to increase the reliability of supply but would also increase available capacity should that be needed in the future. The circuit would run for 39 kilometres and cost around R\$28M with a 4-year project construction phase. Iberdrola then looked at alternative solutions and understood that these

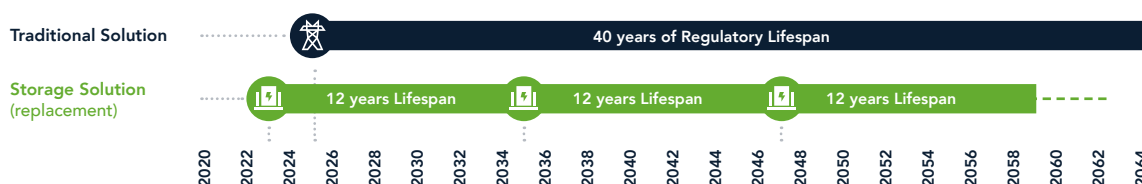
locations were potentially eligible for a Battery Energy Storage System (BESS), which entailed the network operator stationing batteries along the grid to be used when any grid outages occurred. Upon completion of its analysis, Iberdrola realised that the BESS was a more feasible solution.

Not only could Iberdrola deploy the solution two years quicker than the traditional solution, but the cost for customers was also 45% less than the traditional solution, even taking into the account the fact that the storage solution has a 12-year lifespan and would need to be replaced three times during the projected lifetime. Building all these costs into the business case still delivered a 45% reduction for the customer, demonstrating the ability that innovative and cost-effective solutions have on improving grid reliability. It is worth noting that in Brazil, battery storage is permitted to be owned by network operators, but this is not always the case globally. In the UK, network operators are not permitted to own or operate battery storage despite some of these advantages.

COST FOR CUSTOMERS (NVP)



INFRASTRUCTURE IMPLEMENTATION TIME MAP



Cost for Consumers (NVP) of the Storage Solution are 45% less than the Traditional Solution

Regulatory frameworks should recognise and adapt to the level of maturity of clean energy technologies as they grow

This report focuses on wind and solar renewable technologies, which have matured globally in recent years. The support frameworks for deploying these technologies have changed as industries have grown. This should be seen as a natural response to a developing industry: an agile approach to regulation that supports clean technologies and industries with what they need at the various stages of their growth.

There are more clean energy technologies, such as hydrogen, that need to grow to maturity in the next decade to make a material contribution to decarbonisation. Regulatory frameworks should recognise and adapt to the level of maturity of clean energy technologies as they grow. It is important for financing that investor confidence is maintained by clearly stating that as support frameworks evolve, earlier projects will have their regulation 'grandfathered' alongside newer projects under the new regime.



ENABLING GRID: GUIDING PRINCIPLE #5

Price control regimes should incentivise innovation, encourage investment, and incorporate broader stakeholder objectives



BACKGROUND

Appropriate price control regimes will be critical to ensure delivery of the grid infrastructure to support accelerated deployment of wind and solar generation. To maintain the pace and scale of this change, price control regimes need to adjust their frameworks to incentivise innovation along a longer timescale and to deliver broader stakeholder objectives (e.g., net-zero commitments, customer satisfaction, decarbonisation).

Most transmission network assets have a 40-year life, so decisions taken now will have a material influence in 2050. While a focus on economic efficiency is of course important, the timescale that this efficiency will be measured on should be in decades instead of years^{xxxiii}. The scale, shape, location, and flexibility of the networks could be one of the most important factors that affects whether new low carbon generation can be transported to customers in the required timescales^{xxxiv}. As discussed in Guiding Principle #2, it is crucial to prevent network delays or inefficiencies from being a bottleneck for renewable energy.

While many existing frameworks were sufficient to incentivise grid development and investment over the previous decades, they may not be effective to ensure the investment that the networks will require between now and 2050. Renewable resources are often in different locations from legacy fossil generation, requiring more significant grid upgrades in shorter time periods. Existing frameworks also generally lack incentives to decarbonise, which need to be a key element of energy strategy in the future.

For instance, the prevalent RPI-X framework² has tended to incentivise improvements in the short run rather than the long run^{xxxv}. Whereas previously companies would focus on five-year regulatory cycles, now an outlook towards 2050 needs to be prioritised. The generally risk-averse nature of this framework has contributed to low rates of innovation and an aversion to new ideas.^{xxxvi} A strong focus on short-term cost minimisation for customers can reduce investments for long-term growth,^{xxxvii} as well as increase cost to the customer in the long term. Regulatory requirements can require finan-

² RPI-X is a pricing framework in which the price automatically adjusts based on a combination of the previous year's retail price index (RPI) inflation and for expected efficiency improvements (X) during the specified time period

cial commitment from all projects in a region before starting development of shared infrastructure. Greater allowance for anticipatory investment can help to reduce grid delays, as discussed in Guiding Principle #8.

Price control frameworks can and should incorporate customer needs beyond short term cost minimisation. Measures such as interruption frequency and duration, customer satisfaction, and long-term cost should be considered when frameworks are being designed. In the UK, the energy regulator introduced a new form of regulatory regime called “RIIO”. This new form of price control ensures that companies are incentivised to deliver exceptional performance. This has resulted in significant improvement in network operators’ performance and delivered globally enviable customer service KPIs.

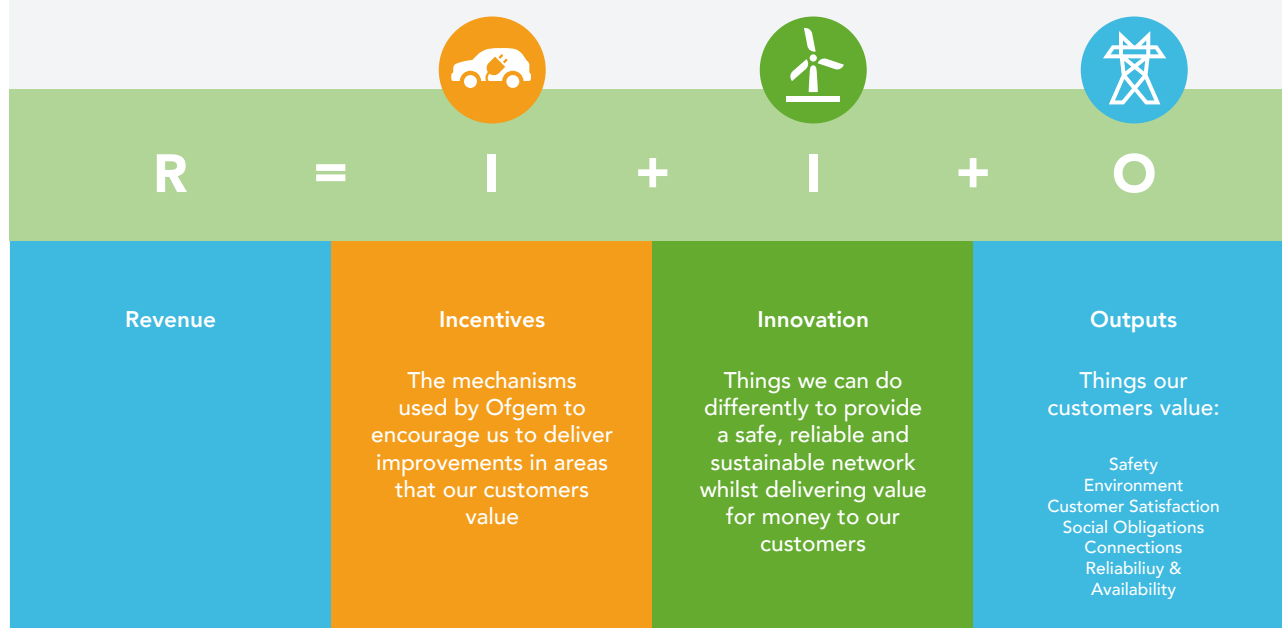
It is imperative that a longer-term strategic view is incorporated into the pricing framework, and that regulators are allowed to operate the framework process without government interference. At a time of rising prices, it is tempting for governments to want to change price control and regulatory regimes to ease pressure on customer bills, but this will not deliver value in the long term and presents a serious threat not only to the effective continued operation of transmis-

sion systems as they stand today, but also to delivering the transmission infrastructure necessary to support acceleration of renewable energy deployment.

KEY POINTS

- Price control regimes make a significant difference to what a grid operator can deliver, and how quickly
- The best regimes can encourage and reward innovation at the same time as delivering a fair price for customers
- Regimes need to move away from focusing primarily on short-term cost to the customer. A longer-term, strategic view needs to be adopted, taking multiple factors into account including long-term value, innovation and impact on emissions
- Customer outputs should also be incorporated into the pricing framework
- Rates of return are critical to incentivise investment. Suppliers of sufficient experience and capability will understandably choose to allocate their capital and capacity in more profitable geographies and projects, which could further drive inequality
- Incentives can be used to deliver environmental objectives and targets, by looking at ways to reward operators for reducing emissions as well as reducing costs.

THE RIIO FRAMEWORK HAS DELIVERED REAL VALUE FOR CUSTOMERS FROM IMPROVED NETWORK PERFORMANCE, BETTER CUSTOMER SERVICE, AND IMPROVED INNOVATION



ENABLING GRID: GUIDING PRINCIPLE #6

Implement a structured and consistent long-term planning process to support longer-term strategic objectives

BACKGROUND

In developed countries that have seen slow-growing or flat electricity generation demand over the last few decades, the regulatory approach has evolved to include: short-time planning horizons, long periods between identification of need and delivery of upgrades and additions, and a strong focus on short-term cost minimisation for today's customers that potentially comes at the expense of investments required for long-term growth and cost minimization^{xxxviii}. These existing regulatory approaches work well in a stable environment with limited change, however they are not optimal for the rapid expansion of capacity and rate of change needed to deliver net-zero goals.

Significant increases in renewables generation are required, often in locations with low or no existing transmission network, which means rapid and massive extension and expansion is needed. Scotland and its offshore wind development highlight this reality, as detailed in the case study below, large amounts of energy need to be generated from offshore Scotland, then transmitted down to major populations centres in England.

Material step changes in requirements are occurring on an increasingly frequent basis, which further complicates the long-term outlook and investments of network operators. The network investments are often lumpy and heavily front-weighted. A country's grid will require transmission investment around 3-5 years ahead of its need to connect remote VRE resources and to bolster existing key connections between VRE generation and load centres, although both planning and consenting delays can extend this significantly^{xxxix}. Thus, to ensure that new VRE capacity can come online without facing bottlenecks, investments in transmission and distribution need to be made ahead of generation growth.

Long-term capacity targets should be the starting point for grid planning and investment, understanding the additional VRE that will come onto the grid over the next decade or more, and using this to drive firstly the design and secondly the planning, implementation and incentivisation of grid expansion required. The more certainty that can be provided on projects that will be implemented to meet the targets, the

more network operators can plan with confidence for both short and long term.

Up-front capacity provision can help to accelerate renewable deployment. Early investment could result in an initial period of low utilisation, but this is a much more preferable situation than delayed investment resulting in projects coming on-line with no availability within the grid network. Clearly defined capacity targets and supporting policies send strong signals to developers, investors, and the supply chain, allowing them to move forward with confidence and accelerate deployment.

KEY POINTS

- Existing approaches work well for stable environments with low rates of change but are much less effective in more dynamic environments where significant change is required quickly
- The short-term planning horizons of today's processes do not align with the strategic development of the system needed for net-zero, and can hinder the country's long-term development strategy
- Longer-term outlooks need to be incorporated into the planning and incentivisation process to ensure that the necessary investments can be made to develop and progressed to deliver the grid upgrades needed
- Effective design, approval, and implementation integrated power market designs can reduce future cost and support rapid renewable development^{xl}
- Setting clear, quantitative targets will send strong long-term signals to the market and supply chain and help reduce future bottlenecks. The UK's commitment to build 40GW of offshore wind by 2030 is a prime example of this kind of target
- Planning and permitting processes should account for legitimate local concerns but shouldn't obstruct the deployment of renewables in line with the country's strategy (see Guiding Principle #9 below)

CASE STUDY: GUIDING PRINCIPLE #6

The planning process should incorporate decisions across longer time horizons with strategic goals, constraints, and requirements in mind instead of optimising just for the year ahead

To achieve net-zero by 2050, a significant increase in VRE generation is required. In Scotland, much of this increase in generation will be in locations of low or no existing transmission network as it increases its offshore wind development. Material investment is needed for access to these future resources, and existing networks need to be reinforced to accommodate the increasingly high levels of transfer to demand centres.

The figures above are based on 2021 Future Energy Scenarios, but since this analysis was done, an updated target of 50GW by 2030 has been issued by the UK government, further increasing the pressure on upgrading transmission capacity between Scotland and England. Even at current levels, the existing infrastructure needs to be considerably reinforced. And with increasing levels of VRE coming on the grid in the coming years, predominantly offshore wind,

system operability issues must also be managed. Thus, major energy networks projects in Scotland are being driven by the need to:

- Deliver new connections, both onshore and offshore
- Reinforce the main electricity transmission system
- Modernise the existing assets
- Ensure security and operability

In Scotland, investments in these projects are determined annually under a process referred to as the Network Options Assessment, or NOA. Under NOA, the National Grid Electricity System Operator (NGESO) identifies the required levels of network capability, the Transmission Operators identify options available to meet this capability, and the Electricity System Operators (ESOs) indicates their preferred options for further development. While these options are laid out,

BASED ON 2021 FUTURE ENERGY SCENARIOS (FES):

In Scotland

23.33 GW

of onshore and offshore wind by 2030

52 GW

Up to 52 GW by 2040

15-23 GW

requirement by 2030 between Scotland and England (existing transfer capability is 'only' 6.6 GW)

30 GW

Up to 30 GW by 2040

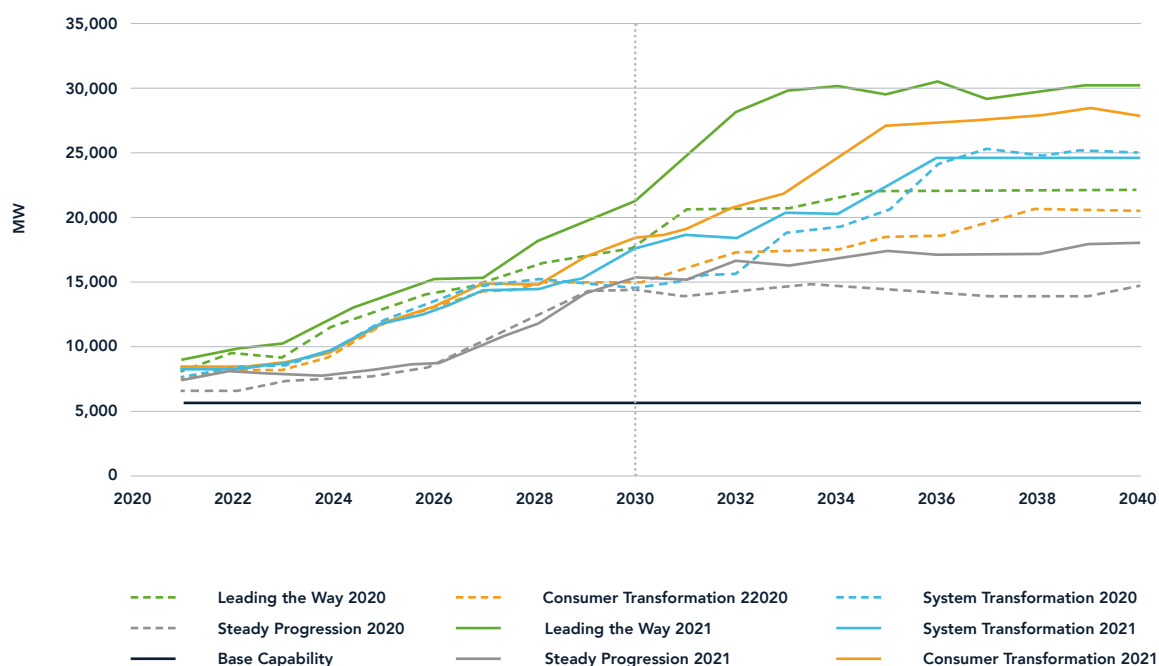


including what the ESO prefers, any investment decisions are made by the Transmission Owners and are done so on an annual basis. This process has worked well during periods where there was a minimal rate of change in the generation background and even helped provide a steer on investment requirements, but at the same time, it has not enabled anticipatory investment for the future, leading to the current state of significant constraint costs and a need for urgent upgrades. However, it is apparent that the coming years will provide anything but minimal rates of change as considerable VRE will need to be developed to reach net-zero 2050 targets.

To illustrate this point, the below chart details the Required System Capabilities for the Scotland and England Boundary Transfer Capability based upon Future Energy Scenarios (FES) published annually by NGESE. It is used to provide transmission boundary requirements for a range of possible future outcomes. The chart highlights that as net-zero ambitions grow, there will be significant step changes in the requirements over this network boundary.

With net-zero 2050 ambitions in mind, NOA needs to evolve to align with the long-term strategic development of Scotland's grid infrastructure. By aligning with longer-term strategy and capacity targets, recognising the timescales involved in the development and delivery of any large transmission reinforcement project, TOs can extend their investment horizons instead of simply optimising for the year ahead. By identifying needs far in advance against a consistent background of achieving the net-zero targets, consistent messages can be provided to key stakeholders, the wider supply chain, and local communities who will be impacted by the grid infrastructure development. Most importantly, it will help to accelerate the grid development to accommodate the increased VRE while reducing bottlenecks and helping the UK to realise its net-zero 2050 ambition.

REQUIRED SCOTLAND/ENGLAND (B6) BOUNDARY TRANSFER CAPABILITY



ENABLING GRID: GUIDING PRINCIPLE #7

Lighter regulatory regimes can offer an opportunity to deliver more innovative, cost-effective renewable solutions

BACKGROUND

Emerging and developing economies are set to account for the bulk of emissions growth in the coming decades unless much stronger action is taken to transform their energy systems^{xi}, but the falling costs of wind, solar and storage mean that renewable solutions can be the cheapest approach to power generation^{xiii}. However, generation and storage frequently need to be combined to deliver the most efficient and reliable solutions.

In developing countries where the electrical grid faces reliability issues, the intermittency of wind and solar can have a negative impact on the voltage and frequency of the systems.^{xiii} Power grids are real-time systems, meaning they must balance supply and demand at any given point in time. This means intermittency can present a significant issue in constantly matching supply with demand. Energy storage can help smooth out the issues from intermittency while also helping meet demand peaks, e.g., in the evening when more power is typically needed.^{xliv}

For these daily balancing needs, lithium-ion batteries are one of the technologies that can help meet the challenge and do so at competitive costs. Lithium-ion battery pack costs have fallen 85% in the last decade and are on track to fall still further^{lv}. These batteries are modular, easy to deploy in almost every location, and can be added to renewable energy generation to make the renewable power more dispatchable.^{xlv}

There are therefore some considerable advantages to combine storage with generation in emerging markets with grid reliability issues. However, many regulatory regimes in established markets specifically prevent energy generators from operating storage as part of their contracts. This is one area where examples from established markets may not provide the best template to use when setting up regulatory frameworks in developing markets. Allowing more flexibility within the regulations though combined generation and storage models will enable more innovative solutions to the different challenges of generation and transmission in different parts of the world. Special commercial arrangements are needed for batteries as a distinct type of asset that is neither demand nor generation and provides a system service. For example, until 2020 batteries on the UK system paid both demand and generation use of system charges, significantly impacting their commercial viability.

There will still be an important role for governments and authorities to play in terms of communication and coordination, providing advice and guidance to ensure that requirements are understood without being overly prescriptive in terms of regulations. Combining storage with renewable generation is already being used in locations around the globe. As discussed in the case study for Guiding Principle #1, SECI ran a “round-the-clock” auction in the spring of 2020 for 400MW of renewable power utilising Solar + Wind + Battery Storage, a combined approach that had never been tried before. And in Thailand, a wind hydrogen hybrid project combined 22MW of wind power with a 1MW electrolyser to provide ten hours of storage.^{xlvii}

KEY POINTS

- Falling costs of renewables and storage provide a great opportunity for countries with lighter regulatory regimes to chart a new, lower-emissions pathway for growth and prosperity^{xlviii}
- The inclusion of storage can provide cost-effective solutions to the challenges of transmission and distribution across grids with reliability challenges
- In locations where a robust grid is not in place, batteries are a viable solution to address short-term supply interruptions. They can also be combined with solar PV in mini-grid systems, and to support systems that are predominantly characterised by daily, rather than seasonal, fluctuations in demand^{xlix}
- When combining storage and renewable generation, designs should also look at options for using multiple sources for generation (e.g., wind and solar), as these blended solutions can be more flexible, efficient, and cost-attractive
- Governments should ensure that their regulations in this area are appropriate for local markets and conditions. Overly prescriptive regulations such as those preventing storage being part of energy generation contracts could reduce innovation and remove cost-effective options for renewable energy
- Use of system charges should be appropriate to batteries, recognising their system benefit and the broad ranges of grid services batteries offer
- Regulators can also consider incentivisation of battery investments through capacity payments, frequency modulation contracts etc.

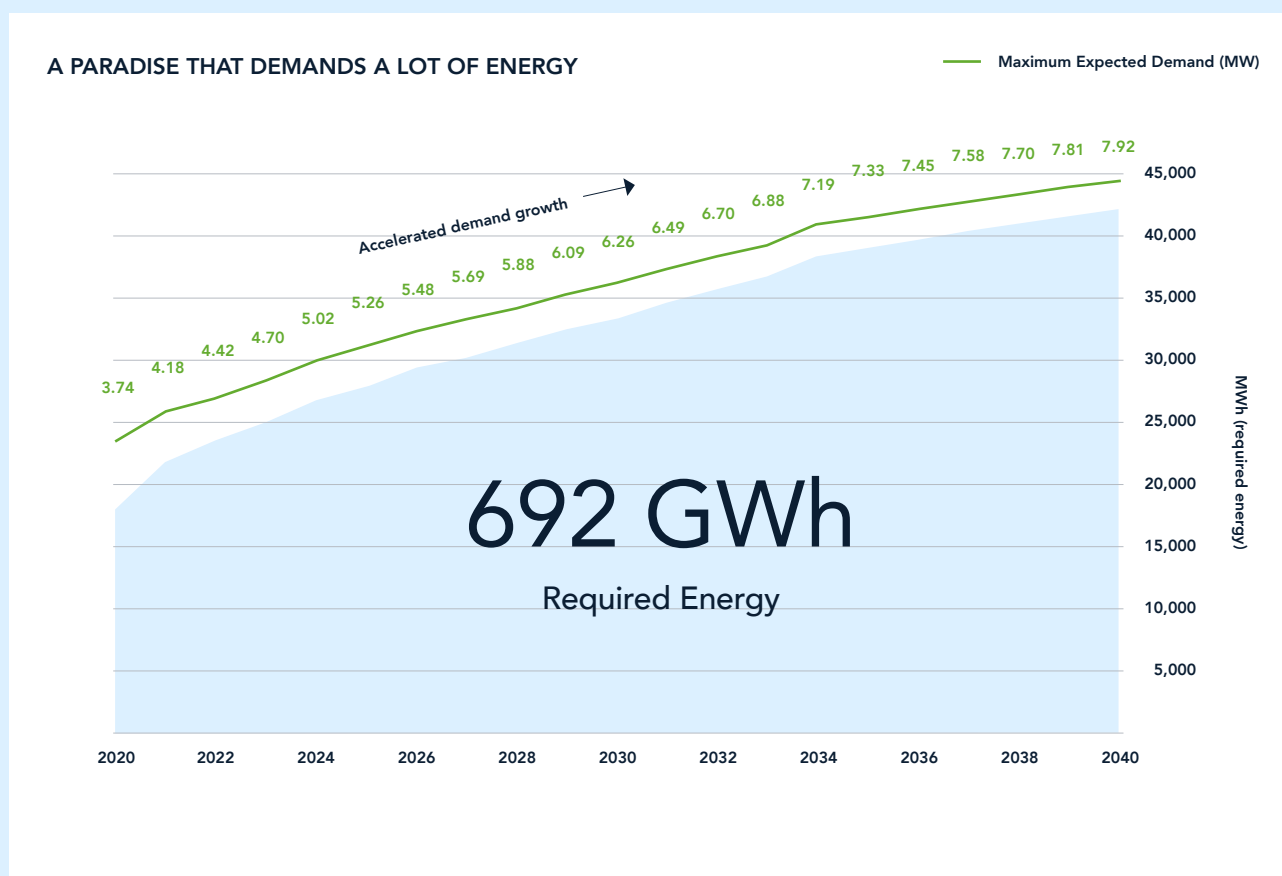
CASE STUDY: GUIDING PRINCIPLE #7

In less mature markets with infrastructure challenges and lighter regulatory regimes, clean energy solutions can be more cost effective whilst lowering emissions

On the Brazilian island of Noronha, Iberdrola was faced with a challenge to address accelerating energy demand over the coming decades. Powered historically by diesel generation, Iberdrola was faced with supply logistics challenges, increase in diesel generation costs and the climate implications of continuing to use diesel, all while facing a near doubling of the projected energy demand through 2040.

To address possible solutions for this problem, Iberdrola partnered with Massachusetts Institute of Technology (MIT) to look at feasible sources to either supplement or replace the diesel usage. These sources included solar, onshore wind, and storage. The results of the analysis showed the below results:

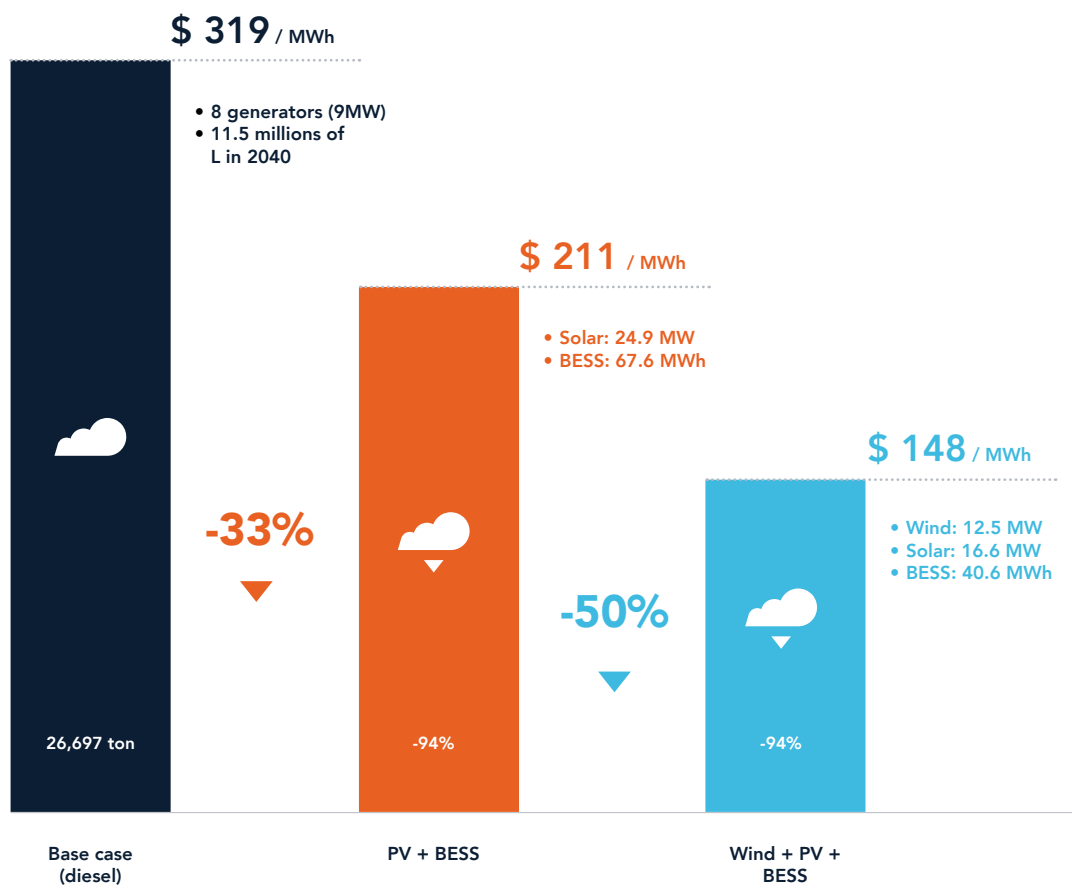
- **Solar:** a mature alternative at a competitive price; ease of installation and modular
- **Onshore Wind:** a mature alternative at a competitive price and with low land usage; with Iberdrola's in-house expertise, the projects could be developed and run in an optimal manner
- **Battery Storage:** a reliable technology that provides power regulation capacity with low land utilisation



With the reduction in the prices of the above alternative sources, Iberdrola concluded that a combination of the renewable sources was more efficient and cheaper than the base case of diesel generation, as shown below. It is worth noting that although solar generation was a better solution than the diesel base case, an even more attractive option was developed by combining energy generation from both solar and wind.

This shift towards a green solution allowed Iberdrola to develop a solar, wind, and battery option with the existing diesel generation transitioned to a peaker plant for when VRE is unable to meet demand. Notably, the updated energy supply is projected to reduce the island's CO₂ emissions from energy by 94% through 2040.

A PRICE COMPARISON OF POSSIBLE SOURCES FOR ENERGY SUPPLY TO NORONHA



ENABLING GRID: GUIDING PRINCIPLE #8

Regulatory regimes should recognise the need for anticipatory investment to enable the development of grid infrastructure ahead of demand

BACKGROUND

As discussed in Guiding Principles #5 and #6, the existing regulatory approaches are often not structured to handle the grid infrastructure requirements needed to achieve net-zero by 2050. With the increased demand for rapid electrification, these more traditional approaches have the potential to discourage investments required for long-term growth and future cost minimisationⁱ. Further, regulation approaches that are overly focused on minimising short-term cost can mean that the timelines for building the required future grid infrastructure can be negatively impacted, resulting in the risk that the energy networks act as a bottleneck towards achieving net-zero goals.ⁱⁱ

Therefore, network operators will need to consider investing earlier to meet future system needs. However, the process for investing in future demand is rife with uncertainty, as there is no guarantee that the future demand will materialise. Indeed, even if successful, these investments will experience an initial period of low utilisation before the usage rises to fill the capacity and justify the investmentⁱⁱⁱ. Regulatory regimes should also acknowledge that there will be a risk that some of these future assets are rarely used and that these underutilised assets could still be paid for by customers for a considerable length of timeⁱⁱⁱ. To mitigate this particular risk, regulatory and political strategies will need to support investment approval processes that support development well ahead of system needs while recognising the investment risk that network operators are undertaking by doing so.

In the UK, the NGESO recommends the following anticipatory investment mechanism to enable solutions to help achieve net-zero 2050 ambitions:^{iv}

- **Criteria:** define when anticipatory investment is in customers' interest
- **Need case:** establish what circumstances trigger a pre-agreed investment approach
- **Whole system of outcomes:** stakeholder collaboration to ensure optimal, whole system outcomes are delivered
- **Funding:** how companies can recover their efficient costs
- **Risk Sharing:** appropriate customer user commitment, customer protection, and reward for value created
- **Monitoring:** provisions to provide regulatory and stakeholder oversight of projects

The UK government has responded to these recommendations in the Energy Security Strategy published in April 2022, which has an aim of halving the time taken to build necessary network infrastructure^v. Part of this strategy includes a recognition that the cheapest option over the long term may mean paying more in the short-term for an asset that isn't effectively utilised immediately. This approach of 'building ahead of need' enables the necessary acceleration of infrastructure and sends strong signals to operators on the intention and pace of the renewable policy.

KEY POINTS

- Anticipatory design and development are crucial for any country to achieve its net-zero 2050 ambition. These investment costs will vary greatly depending on the environmental choices that countries select but will be necessary to ensure that the grid doesn't act as a bottleneck to new VRE deployment
- Coordinating across the siting of generation projects and network design, anticipatory investment can help optimise how the system design connects future generation in the best renewable regions and allow for the optimised network infrastructure to serve a greater number of future VRE developments^{vi}
- As VRE accelerates in deployment, greater pressure will be placed on the local and regional grid infrastructure and in many instances, particularly with offshore wind, new grid infrastructure and capacity will need to be built prior to minimise the risk of power export constraints
- Concerns regarding stranded assets should not risk delayed deployment of strategic infrastructure, jeopardising net-zero targets. The lost opportunity of untimely investments should always be assessed as these will more likely significantly outweigh any risk of underutilised assets
- Networks need clear signals for investment out to 2030 and beyond. Without certainty now, projects with long lead times will not be delivered fast enough and will both significantly increase the constraint cost paid by the customer and delay the achievement of net-zero targets

ENABLING ENVIRONMENT GUIDING PRINCIPLE #9

Top-down approaches (e.g., policy, etc.) must be balanced with bottom-up (e.g., community) buy-in for all markets

BACKGROUND

Rapid transition to renewable energy is not a top priority for everyone. Access to a safe and reliable energy supply may be more important than the source of that energy. Price is frequently a major issue and initiatives to reduce price may be more welcome than those to reduce emissions. Even for areas where emissions reduction has widespread public support, there can still be local communities who object to infrastructure in their neighbourhoods, particularly if that infrastructure is not benefitting them directly, for example, transmission pylons carrying energy to other parts of the country.

In some cases, these interests go beyond national borders, with transmission between and across countries requiring even more complex stakeholder management and clear decision-making.

Governments will face a complex network of stakeholders and competing priorities and demands with respect to energy transition, infrastructure location and local content development. These need to be balanced to accelerate the development and delivery of renewable energy projects.

Early engagement of local communities is essential for success. Understanding local perspectives and concerns as well as tapping into local expertise can facilitate a positive dialogue with locals, ensuring that potential benefits from projects including reduced emissions, local content and green jobs are communicated and understood.

At the same time, local objections must not be allowed to over-ride all other concerns. Upsetting timelines by initiating additional public reviews or delays in local permitting and licensing adds uncertainty and risk. The private sector needs clarity on projects and schedules to secure finance, implement projects and deliver the associated environmental benefits.

There can be a strong positive local message associated with the potential for 'green jobs', or the development of local industries for renewable equipment, but this needs to be carefully managed alongside demands for speed and cost. Adding too many clauses associated with the development of local content can slow down deployment and increase overall cost, as evidenced by examples in France and Taiwan^[vii].

Market arrangements need to be sufficiently flexible to allow benefits to reach local communities. Customers can be incentivised to host or invest in renewables in return for reduced energy prices. For example, Ripple Energy in the UK allows customers to invest in a wind farm, providing them with green energy, a more stable power pricing, and potential savings.

Governments must integrate different requirements into energy strategy, policy, and plans to provide clarity for all stakeholders and enable more rapid delivery of strategic aims, to the benefit of all communities.

KEY POINTS

- It should not be assumed that climate change and renewable deployment is always the top priority. In developing countries, we need to find a way to enable economic growth at the same time as reducing GHG emissions
- A top-down approach should not be allowed to steam-roll over community concerns, but neither should local communal interests stall deployment nor delay the national strategy
- A national energy strategy can't be a stand-alone document. National renewable energy targets must be quickly translated and adopted at a regional or local level to facilitate a faster roll out of solar and renewable projects
- Local buy-in is key to success and local communities need to be engaged early to communicate benefits and listen to concerns. Local community engagement should be done in consultation with government and local authorities, and focus on positive messages about emissions reduction, environmental and economic benefits as well as listening to local concerns
- Development processes, roles and responsibilities, escalation procedures, communication channels and timelines should be agreed as early as possible between authorities, developers, local points of contact and other stakeholders
- Decisions will need to balance competing priorities including local impact, strategic objectives, climate change and cost to customer. Decision-makers should focus on providing benefits to the community in a fair and balanced manner, taking different perspectives into account but not being overly influenced by the loudest stakeholder groups

CASE STUDY: GUIDING PRINCIPLE #9

How local interests can over-ride a national strategy

In the UK, a significant amount of the renewable energy needed to meet net-zero commitments is, or will be, generated from windfarms off the coast of Scotland, while most of the demand for that energy comes from densely populated cities in England. Upgrading the link capacity between Scotland and England to allow the transmission of power from generation point to demand centres is an essential element of a successful renewable energy strategy.

Several national infrastructure upgrade projects are in development, including subsea links down the East and West coast of the UK and upgrades to the transmission lines that cross from Scotland to England over land. Multiple different entities are involved in various planning and consent processes, from local landowners and councils to national governments. Crossing the border between Scotland and England requires consent to be granted by two different regimes. In Scotland, local authorities, as a statutory consultee, have a key role to play in the decision-making process. In England, the development proposal is examined in public by an inspector, through a set of hearings which examine a range of representations including by the local authority. The inspector provides a recommendation, and the government decides on the proposals within a set timeline. This single examination process is perhaps better able to balance national need and local issues and to provide more certainty on outcomes within the pre-determined timeline.

For example, a recent transmission land link upgrade has met uncertainty in its delivery schedule. Despite an extensive engagement programme with stakeholders and communities, coupled with support from the UK and Scottish governments, the Scottish local council rejected the plan. This has resulted in a public appeal and a potential delay of 1-2 years, with associated uncertainty over the future of the project and those renewable developments waiting to connect to the upgraded link. This in turn means a potential deceleration of renewable deployment, by delaying the increased capacity transmission needed to meet UK renewable energy targets.

There are other examples of national priorities and local concerns pulling in different directions across the UK, where different laws apply in England, Scotland, and Wales. In England in 2015, the planning policy regime was changed for onshore wind, effectively adding a requirement to demonstrate community support and a local plan allocation. Despite a growing desire within the general public for more renewable energy, including onshore wind, the uptake of sites for new onshore wind farms has been insignificant. In another example in Wales, the planning policy restricts the use of what is considered 'best and most versatile land' for solar unless there is an overriding case for development and lower grade land is not available. This provides considerable barriers to the acceleration and uptake of solar development.

These case study examples illustrate different ways in which consenting regimes operate. Attempts to balance local concerns with national need can result in delays in the implementation of national strategies. Planning delays, inappropriate land use policies and inefficient resolution processes for conflict all increase uncertainty and reduce confidence in the ability of the authorities to drive through the stated energy strategy.

Land use policy and wider strategic government objectives should be aligned, with a clear strategic and national framework, along with supportive, clear and transparent planning processes, to ensure that the wider national requirements for development are met in a coordinated and efficient manner. Stakeholder and community interests must be considered at the earliest stages of development, allowing the subsequent consenting process to determine the correct balance between local concerns and national priorities.

ENABLING ENVIRONMENT: GUIDING PRINCIPLE #10

In countries with limited access to capital, blended finance vehicles that combine public and private finance should be used to target the early project stages where the risk is greatest

BACKGROUND

There is no shortage of global capital to invest in renewable asset deployment when the risk profile of an investment has the right characteristics. In developed economies, renewable technology is considered mature, the financing is easier to obtain, and the associated risks easier to underwrite.^{lviii} However, despite the ample supply of global capital, many developing economies struggle to access the necessary capital to invest in their renewable asset deployments.

The barriers to capital deployment vary by country, but general unfamiliarity with project finance requirements, incomplete regulatory frameworks, lack of technical know-how, currency risk, and underdeveloped local capital markets provide reasons for why global capital is hesitant to invest. Further, many local banks have limited capacity to conduct due diligence to value the projects^{lix}.

While the long-term end goal is for these economies to fund clean energy transitions with low-cost domestic sources of capital^{lx}, in the near-term there will be a large dependence on multinational development banks and development finance institutions to help finance renewable projects. The Multi-lateral Development Banks (MDBs) and Development Financial Institutions (DFIs) can provide blended finance products targeted at de-risking the earliest stages of project development where risk is the highest.^{lxi}

MDBs and DFIs are needed in the early stages to provide additional risk coverage (e.g., first loss tranche) to help the creation of a project pipeline that can more easily be re-financed during later project development stages when risks are lower^{lxii}. At the enterprise and project level, investments from these organisations help to facilitate other private sector investments and increase the amount of invested capital once there is a proof of concept.^{lxiii} Countries should be able to slowly reduce dependence on MDB and DFI capital and rely more on commercial lenders, both international and domestic, as their markets mature.

These organisations can also push for the blended finance instruments to prioritise development impact instead of bank-

ability. Actual project implementation will help develop the renewable industry in these economies, help to build jobs, and provide zero-carbon energy. Investing in projects that impact wider development and sustainability goals can help to accelerate progress by providing finance to projects that are struggling to secure finance through conventional routes.

A broad-based shift towards clean energy transitions requires structural policies supporting domestic financial market developments and regulation. This will help provide price signals to foster the development of project pipelines to incentivise the investment from international capital.^{lxiv}

KEY POINTS

- There is no shortage of global finance available for bankable renewable energy projects, but many initiatives in developing countries struggle to meet the criteria required to be considered bankable
- Factors such as a lack of local capabilities and infrastructure, being the first renewable project in a region, and underdeveloped financial and insurance markets all add considerable risk to projects and can make them unattractive for global finance
- There are few short-term solutions to many of the challenges around bankability. Instead, governments, MDBs and DFIs should work together to provide new blended finance products to provide funding for early-stage, high-risk projects
- New financial models will enable the development of local markets and capabilities, facilitating financing of future projects as capacity increases and risks reduce
- A different set of criteria should be developed for these new financial products, looking not just at bankability but also taking wider factors into account such as development impact, emissions reduction, and local capability development, in line with the goals of the financing bodies. Regulators should also try and ensure that there are no unnecessary disincentives on global investors to invest in one country over another

CASE STUDY: GUIDING PRINCIPLE #10

Blended finance can help de-risk projects and crowd in commercial capital

There is a major funding deficit in Asia for the long-term infrastructure needed to address the problems and opportunities posed by climate change. Many of the region's infrastructure projects face challenges around bankability, and private capital has an important role to play in helping to address financial challenges by closing funding gaps. With this need in mind, HSBC and Temasek launched a partnership with the aim to catalyse capital for sustainable infrastructure projects in Southeast Asia. HSBC and Temasek agreed to invest \$150M of equity to fund loans, working alongside their initial strategic partners, the Asian Development Bank (ADB) and Clifford Capital Holdings (CCH), to build a pipeline of projects to scale. The platform seeks to scale to up to \$1B of loans within the initial five years to support commercial development of Southeast Asia's sustainable infrastructure sector. The below table outlines the partnership and details the objectives of the Joint Venture (JV):

And while over the next decade, nearly \$2T in infrastructure investment is needed to support Southeast Asia's sustainable transformation, the \$150M investment is aiming to provide the catalyst to crowd in private capital. As stated by Noel Quinn, Group Chief Executive of HSBC:

"This innovative partnership aims to tackle some of the biggest barriers to financing sustainable infrastructure where it's needed the most. Neither private nor public sector can close the financing gap alone – but by working with Temasek, the ADB and Clifford Capital, we can deploy significant amounts of blended finance for projects in Southeast Asia that would otherwise go unfunded. Collaborations matter in the fight against climate change, and this partnership provides an impactful model for others to follow."

BRINGING TOGETHER COMPLEMENTARY STRENGTHS, NETWORKS, AND EXPERIENCE UNIFIED BY A STRONG COMMITMENT TO SUSTAINABILITY

Founding partners	<ul style="list-style-type: none"> • HSBC – Significant experience in Green Finance with global reach and access to institutional investors • Temasek – Patient capital with strong network and experience in investing across stages and setting up operating platforms • ADB – Deep expertise in infrastructure financing with operational infrastructure to support the initial conceptualisation and launch of the platform • CCH – Strong origination capability with demonstrated success
Objectives	<ul style="list-style-type: none"> • Portfolio approach with a meaningful portion of the portfolio targeted at marginally bankable sustainable infrastructure projects • Catalyse significant capital flows to the sustainable infrastructure space, working to unlock more marginally bankable projects and crowd in private and institutional investors
Operating Model	<ul style="list-style-type: none"> • Provide project development expertise, technical assistance, and blended finance solutions where needed • Localised assistance from ADB and CCH as needed • Apply internationally recognised ESG best practices to measure sustainability outcomes through the loans provided
Geographies	<ul style="list-style-type: none"> • Southeast Asia
Sectors	<ul style="list-style-type: none"> • Renewable Energy & Energy Storage • Water & Waste • Sustainable Transport

ENABLING ENVIRONMENT: GUIDING PRINCIPLE #11

Governments must adapt their own regulations and insurance capacity to both develop the local insurance sector while also giving investors access to international insurance markets

BACKGROUND

Renewable projects need to secure both finance and insurance in the development phase, but this can be challenging as markets are unproven and insurers lack suitable models for accurately pricing risk.

With the rapid acceleration of renewable energy projects in developing countries, the capacity of insurance available often lags behind the number of projects. This means less choice for the insurance buyer, leading to a higher cost of insurance and imposition of potentially onerous terms and conditions, affecting the overall bankability of the project. Market forces typically correct this over time; however, until this correction has completed, the lack of suitable insurance can slow the acceleration of renewable deployments.

There are other challenges facing projects looking to secure insurance. For many onshore renewables' initiatives, the size of the project is small, but the amount of due diligence required by the insurer remains high, making this type of project much less attractive to insure. There is an increasing trend amongst global reinsurers to push back against the specific insurance language (known as the lenders endorsements) required by lenders, even though these have remained mostly unchanged for many years. This can create issues for the lenders as these are required as part of the financing security package and without these endorsements, the projects do not achieve the same rating with their credit agencies, increasing the cost and reducing the availability of finance.

Early sight of potential projects allows insurers the opportunity to evaluate the risk and clarify uncertainties, but too often, projects only seek insurance towards the end of the development phase when they need it. This causes delays as it can take time for risks to be evaluated and priced by potential insurers, assuming that the capacity is even available.

A percentage of a risk should be retained locally, making use of local insurer capacity and experience – they will understand the local market and conditions better than international players. Development of the local market should be encour-

aged to take advantage of that experience and bring financial benefits to the local economy. However, it needs to be done in a way to enable acceleration rather than delay progress.

Governments can help to address these issues by providing clear, transparent and consistent regulation. This ensures that all potential players understand and can price the regulations and work together to provide effective insurance vehicles, leveraging both local and international capability and experience.

KEY POINTS

- Transparency and consistent regulatory frameworks from governments are essential tools to allow the inward investment necessary and give insurers confidence to insure projects
- Countries may want to limit the premium flow out of their economies, but they need to recognise that by adapting their insurance regulations to make inward investment easier, they can accelerate the development of their renewable energy generation base
- Active development of the local market should be encouraged, but local requirements should not be cumbersome and must be easy to administer so as to minimise potential delays
- Governments should consider allowing policies to be insured in US Dollars as well for any claims payments to be made in US Dollars. This helps alleviate currency fluctuation risks with regards to the insurances, increasing the overall bankability of the project
- Provision of easy access to clear and up to date information regarding specific country exposures (e.g., natural catastrophes) allows underwriters to know and understand the risks associated with each as much as possible, to allow them to price risks effectively

CASE STUDY: GUIDING PRINCIPLE #11

International developers and insurance brokers partner with local companies to grow the offshore wind and offshore wind insurance industries

In 2019, when Ørsted was looking to develop offshore wind farms in the region, it found that although Taiwan's economy and insurance industry were highly developed, its offshore wind supply chain and associated insurance market were less mature. This provided an additional challenge, as Taiwan had regulatory requirements that mandated local sourcing for the supply chain and domestic insurance market.^{16v} So even though the government support and climatic conditions provided a favourable environment for offshore wind developers, the regulation requiring local involvement, when the industry was in its nascent stages, presented difficulties to developers looking to enter the region.

To tackle this challenge and comply with local regulatory requirements, Ørsted partnered with an insurance broker to help train and build out the offshore wind supply chain and insurance market in Taiwan. The goal was for Ørsted to provide the technical expertise and training to Taiwan's local industry and for the insurance brokerage to provide their expertise and training to Taiwan's insurance industry. The partnership took a structured approach with the very clear agenda for Taiwan's offshore wind insurance market to take

on the risks within their own books as it developed and grew. Ørsted and the insurance broker took several trips to Taiwan and provided in-person training sessions to local insurers to educate them on the offshore wind market. The local insurers took guidance from the international insurance brokerage to build their understanding of the market, what processes they needed to develop, and how to incorporate their domestic offshore wind capacity into the international insurance markets.

The local insurance market in Taiwan has since grown and their ability to insure offshore wind has significantly increased as has their retention. Ørsted was able to include 11 local insurers in the program and they have nearly 17% of their offshore wind farms insured by the local market. Notably, with the growth in this new capacity, international brokers have seen a beneficial premium impact in Taiwan for the offshore wind farms. This development has helped contribute to the rapid expansion of Taiwan's offshore wind market and allowed many projects to be developed and executed.

CASE STUDY: GUIDING PRINCIPLE #11

Managing the new insurance risk as the green industry develops

Mainstream Renewable Power's mission is to lead and accelerate the transition to sustainable energy, or, in its founder Eddie O'Connor's words "to rid the world of CO2 and save the planet." Mainstream is a global pure-play wind and solar energy developer, with a total asset pipeline of 12.3GW in 13 countries on five continents. Its business model involves the early identification of greenfield sites in high growth markets (typically with high carbon intensity grids), which it then develops, builds and operates.

Everything Mainstream does is about de-risking its projects – taking the projects from concept to operational renewable generation plants. As Mainstream de-risks, it realises and optimises the value of its investments of time, expertise, and capital.

Mainstream entered Chile in 2008 as its first international market, lured by world class wind and solar resources, high power prices at the time, and a national mandate for energy independence. It had significant successive success in the technology neutral public procurement auctions of 2015 and 2016, winning 27%^{lxvi} or 3,366GWh^{lxvii} in the latter, displacing operational coal^{lxviii}. The incumbents declared that its pricing was too low, and that Mainstream's projects would never be built. However, backed by clubs of international commercial lenders, Mainstream's team proved the incumbents wrong – closing two major portfolio project finance deals: Condor (570MW) in November 2019 and Huemul (630MW) in August 2020, for a total of US\$1.25bn^{lxix} and a further US\$280m in

construction finance with AMP Capital^{lxx}. These were closed despite Mainstream facing significant hurdles such as the Senvion insolvency, which necessitated complete technology replacement on three of four projects in Condor, the 2019 Chilean social unrest kicking off two weeks before financial close, and, of course, COVID-19.

Construction of the first nine (1.2GW) wind and solar projects has progressed very well, with the last of the ten projects in the Andes Renovables platform having begun construction in 2021. Once operational, Andes Renovables will power one-sixth of Chilean homes. It has already contributed extensive foreign direct investment to the Chilean economy at a challenging time, permanently reduced the cost of power in the developing country,^{lxxi} and is contributing significantly to its decarbonisation goals, securing its leadership role in the region.

The significant COVID and related supply chain challenges facing the industry in 2020 were overcome by Mainstream's team through close management of its relationships with all stakeholders, who collaborated to mitigate delivery and financial risks. The insurance sector has proven to be a supportive partner covering the residual physical damage, natural catastrophe and liability risks, and allowing Mainstream's delivery teams to focus confidently on the business of making its regional renewable ambitions a reality.

GUIDING PRINCIPLES SUMMARY

These 11 guiding principles have been drawn from experience and lessons learned across the renewables industry globally. They have deliberately been framed to be applicable in as many situations as possible so that they can be used in a wide variety of projects and locations. Not every principle will apply to every renewable project, but many will apply across many different types of projects.

There are common themes that link across the set of principles: the need for flexibility, integration, innovation, and different approaches to tackle the challenges of accelerating

renewable deployment to help address climate change.

Different organisations representing different stakeholders need to be working together in new ways to find solutions to reduce risk and remove barriers to progress. The guiding principles can help governments, private and public sector organisations, and other stakeholders identify ways to avoid unnecessary delays, reduce risk, and accelerate the pace of deployment.



CASE STUDY

Leveraging integration to unlock renewable energy projects

One key challenge for the deployment of renewable energy projects at scale is securing offtake arrangements that provide revenue stability and sufficient returns to attract investors and financing partners. One success story that tackled this challenge was Impact Solar, which was a 260MWdc project in Texas. The project was undertaken by Lightsource bp, which is a 50/50 joint venture between bp and Lightsource, a global solar developer. Lightsource bp had developed the Impact project in Texas but required a suitable offtake agreement to secure financing to construct the project.

Lightsource bp was able to enter into a long-term offtake agreement with bp's trading business to provide a stable revenue stream. bp then used Renewable Energy Credits (RECs) from the project to provide renewable power for its Permian Basin hydrocarbon assets. This delivers environmental benefits as some of this power is being used to supply recently electrified drilling operations that were previously provided by diesel or natural gas generators. Deals have also been agreed with several cooperatives, municipalities, and utilities to offtake power from the Impact project, allowing other residential, commercial, and industrial customers in Texas to benefit from renewable power, reducing their emissions and environmental impact.

This integrated approach resulted in unlocking a 260MWdc solar project that required \$250m of investment and created 300 local jobs during construction. Impact Solar is expected to save 318,000 metric tons of CO₂ per annum, equivalent to the power for 41,000 US homes per year. In addition, there are benefits associated with increased capacity and reliability. For example, during winter storm Uri in February 2021 that resulted in blackouts across Texas, the solar farm was able to provide electricity to the grid to be used as needed to serve critical loads.

Lightsource bp has also developed and launched a comprehensive hail mitigation program for Impact Solar and other US projects, to help to minimise risk for projects, investors and insurers associated with hail damage. The approach utilises real-time weather insights to rapidly tilt the angle of the solar panel to deflect hail strikes.

This case study demonstrates the possibilities associated with taking a broader integrated approach to designing and financing renewable projects, which can bring benefits across several areas including emissions reduction, increased resilience during extreme weather events and local construction jobs.

Conclusions

We believe that by following the above principles and learning from the experiences expressed in the case studies that it is possible to accelerate the pace of renewable energy deployment around the globe. However, we won't be able to accelerate this deployment if key industry and government stakeholders don't come together to coordinate on how to address the challenges outlined in this report. We believe that to meet the growing demand for electricity with renewable power, the following matters should be prioritised in the near-term to allow for success in the long-term:

- Country alignment on clean electrification targets over medium to long-term timeframes: Setting these targets provides the certainty that will allow all parties to engage and accelerate to those targets. This is especially true for companies along the supply chain, who will be more likely to invest in manufacturing capacity with more long-term certainty about the projects and the work that is to be won.
- Unlocking the financial flows to invest in, and insure, renewable projects in both developing and developed economies: It is imperative that capital flows into developing economies not only to invest in the renewable projects and grid development, but also to help build the domestic financial and insurance markets in these countries. These investments should also work to ensure that the energy transition is just.

- Broader energy system integration approach across the various stakeholders in the energy industry and public sector: Planning and consenting processes can be lengthy and unpredictable and to accelerate renewable deployment, these processes need to be streamlined while also ensuring that local concerns can be raised and addressed. This applies to both the wind and solar projects as well as grid investment and development. This will help to improve the timelines, help to accelerate the pace of deployment of renewable assets, and to ensure that the grid infrastructure keeps pace with this acceleration.

As we opened with above, to meet our net-zero targets we need to move further and faster than we have ever done before. A key facet of this will be to increase the pace of renewable deployment and transmission investment across the globe. To meet this challenge, considerable effort and coordination is needed from and between the public and private sector to deliver the accelerated renewable deployment required. It's also important that the transition to a resilient and sustainable low carbon future is done in a just manner. Overcoming these barriers won't be easy, but efforts such as the SMI are a great start to making progress towards increasing the pace of deployment to achieve our net-zero 2050 targets.

Acronym Table

ADB	Asian Development Bank
AfDB	African Development Bank
BESS	Battery Energy Storage System
CCH	Clifford Capital Holdings
COP 26	The 2021 United Nations Climate Change Conference
CUF	Capacity Utilisation Factor
DFI	Development Financial Institution
EBRD	European Bank for Reconstruction and Development
ESO	Electricity System Operator
FES	Future Energy Scenarios
FiT	Feed-in-Tariff
GDP	Gross Domestic Product
GHG	Greenhouse Gas
GW	Gigawatt
GWEC	Global Wind Energy Council
IFC	International Finance Corporation
IP	Intellectual Property
IRENA	International Renewable Energy Agency
JV	Joint Venture

km	Kilometre
kV	Kilovolt
kWh	Kilowatt Hour
MDB	Multi-lateral Development Bank
MW	Megawatt
MWdc	Megawatt Direct Current
NGESO	National Grid Electricity System Operator
NGO	Non-Governmental Organisation
NOA	Network Options Assessment
NPO	Non-Profit Organisation
PV	Photovoltaic
REC	Renewable Energy Credit
RIIO	Revenue = Incentives + Innovation + Outputs
RPI	Retail Price Index
SDGs	Sustainable Development Goals
SECI	Solar Energy Corporation of India
SMI	Sustainable Markets Initiative
VRE	Variable Renewable Energy
WEF	World Economic Forum

List of references and places to go for additional information

- i. [COP 26 Pact](#)
- ii. [World Resources Institute](#)
- iii. [SMI Energy Transition](#)
- iv. [UN Sustainability Development Goals](#)
- v. [IEA Net Zero by 2050](#)
- vi. [World Bank Expanding Offshore Wind to Emerging Markets](#)
- vii. [World Bank Scaling Solar](#)
- viii. [World Bank Offshore Wind Acceleration](#)
- ix. [Scaling Solar Successful Project: Zambia](#)
- x. [Key Factors for Successful Development of Offshore Wind in Emerging Markets](#)
- xi. [Key Factors for Successful Development of Offshore Wind in Emerging Markets](#)
- xii. [Key Factors for Successful Development of Offshore Wind in Emerging Markets](#)
- xiii. [Energy Transitions Commission - Making Clean Electrification Possible](#)
- xiv. [Energy Transitions Commission - Making Clean Electrification Possible](#)
- xv. [IEA - Financing Clean Energy Transitions in Emerging and Developing Economies](#)
- xvi. [IEA - Financing Clean Energy Transitions in Emerging and Developing Economies](#)
- xvii. [Energy Transitions Commission - Making Clean Electrification Possible](#)
- xviii. [Scaling Infrastructure – Scaling Solar](#)
- xix. [Scaling Infrastructure – Scaling Solar](#)
- xx. [Scaling Infrastructure – Scaling Solar](#)
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- xli. [IEA - Financing Clean Energy Transitions in Emerging and Developing Economies](#)
- xl. [IEA - Financing Clean Energy Transitions in Emerging and Developing Economies](#)
- xl. [Atlantic Council - Developing countries offer enormous market potential for long-duration energy storage](#)
- xl. [Atlantic Council - Developing countries offer enormous market potential for long-duration energy storage](#)

List of references and places to go for additional information

- xliv. [Energy Transitions Commission - Making Clean Electrification Possible](#)
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