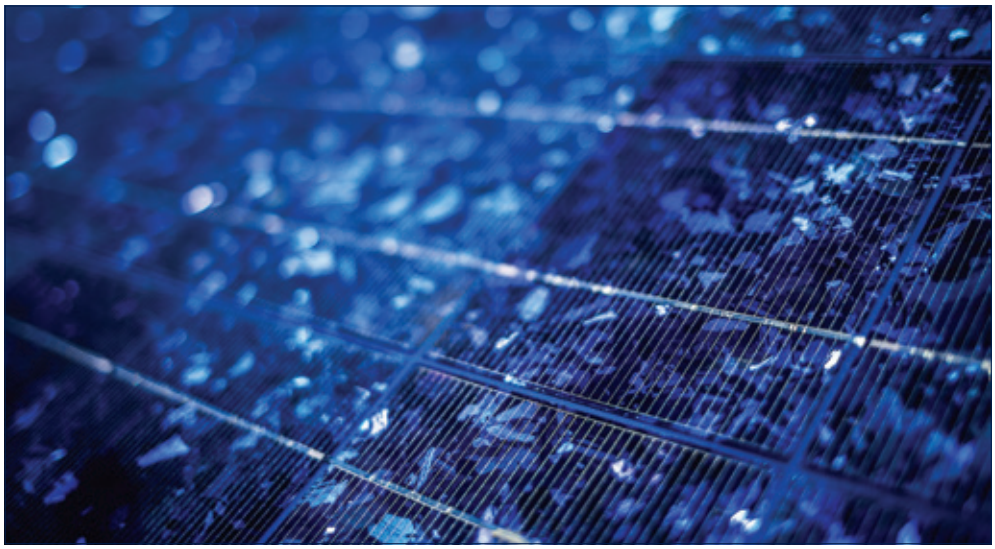
LCTPi
Led by wbcsd

Low Carbon Technology Partnerships initiative

Action plans

Scaling up renewables



LCTPi
Led by wbcsd

Action plan 1: Integration into grids and energy markets

Background

Integration of renewable energy into electricity grids and markets is necessary to deploy larger volumes of renewables in the most efficient manner. Renewable operators and aggregators can now manage single plants collaboratively to provide flexible generation. As such, renewable energy can be an active player in electricity markets, including in dispatch and provision of grid services – if the market rules and incentives allow.

From a technical point of view, progress has been made on the capability of wind and PV generators to provide various system services. Inverters, converters and power electronics interfaces in most cases have the capabilities to provide some degree of grid services or support, while forecasting of renewable generation is becoming more precise at the day-ahead stage on increasingly fine timescales and remote monitoring and control is improving considerably.

Harnessing the opportunities renewable technologies offer – in particular, the ability to vary output at short notice - is needed to unlock its full potential. The deployment of smart technologies at distribution level can generate opportunities for distributed energy to participate in the provision and trade of ancillary services within an enabling market design, e.g. via commercial aggregators. Regulatory and market reform for grid integration will generally come at a much lower cost than investment in other technologies, such as storage[1)].

However, grid codes and market rules in most countries and lack of commercial aggregators currently limit the potential for wind and solar PV to participate in ancillary services. As such, there is a need to adapt regulatory and operational frameworks to facilitate a truly integrative approach and establish future-proof grid codes proactively rather than implementing these requirements retroactively. In essence, traditional paradigms need to change.

Considering the above factors, two key action areas will be developed to address issues associated with grid and market integration as renewable energy penetrations increase:

1 An engagement platform to address integration into the grid and electricity markets;
2 Address planning and permitting barriers to the development of long distance HVDC and UHVDC transmission lines as part of the Global Energy Interconnection (work in progress).

[1)] Cochran, et al. 2014b. Flexibility in 21st Century Power Systems. 21st Century Power Partnership. Technical Report, National Renewable Energy Laboratory.

Engagement platform to address integration into the grid and electricity markets

We will, in partnership with a global partner, develop a lasting and structured engagement platform to address key issues relating to grid integration and electricity market design as penetration of renewable energy increases.

This will bring together stakeholders including governments, regulators, distribution system operators (DSOs) and transmission system operators (TSOs), renewable investors and owners, lenders and other private financiers, equipment manufacturers and EPC contractors. While regulators are key in this process, participation of the private sector is critical in maximising technology transfer and sharing of global best practices. The platform will seek to overcome some of the challenges associated with coordinating the needs of TSOs, DSOs, businesses and other stakeholders.

The general framework will be established at global level, for application and implementation at local/regional level, in selected areas – with a focus on emerging and less mature markets. In India e.g. there is a strong interest in lessons learned in other markets and knowledge transfer based on best practice.

Critical success factors for the platform are:

- A targeted platform with a clearly defined objective and content focus;
- Partnership with a highly credible organisation with strong global and regional networks and the ability to host the platform;
- Committed resources from action plan participants to ensure the future operation of the platform;
- Resources and programs to ensure continuity between conferences /workshops and adequate feedback and monitoring processes;
- Representation of/engagement with all stakeholders across the value chain.

Objective of the platform

The main objective of the platform is to facilitate in depth direct dialogue and collaboration between private sector and policymakers, regulators, TSOs and DSOs to accelerate the evolution of grid codes and market rules by providing guidelines, best practices and learnings.

Intended outcome and value added

The adoption of new transmission and distribution grid codes that facilitate further penetration of renewable energy, and market design that allows an active participation of renewables. The platform's members will benefit from collaboration in producing guidelines and best practices that incorporate the viewpoints of different industry stakeholders including policymakers, regulators, TSOs and DSOs.

Content focus

The focus of the platform spans technical and market considerations:

- **Facilitating development of evolutionary grid code requirements** at both transmission and distribution levels with a consideration on the evolving role of DSOs:
  - The role of DSOs is becoming more important as these operators are managing increasing proportions of renewable energy (RE) in the distribution grid;
  - We will develop recommendations for evolutionary grid code requirements for markets at varying levels of RE penetration and communicate these to regulators and policymakers through the platform. This will be based on our collective, extensive experience in a broad range of markets;
  - In order to promote the adoption of evolutionary grid code requirements with the support and input of relevant stakeholders, we will pursue a fully integrative approach between industry, regulators, utilities and system operators and policymakers;
  - We will develop and promote minimum equipment standards for renewable energy to provide grid support functions.
- **Promoting market design** that allows full participation of RE in electricity markets:
  - Many market designs across the world are still based around centralised, dispatchable and reliable thermal plants. These have low capital costs and comparable, high short-run marginal costs, so that current market designs are often remunerating generation (and not capacity) on a short-run marginal costs basis. With a low RE penetration, RE are unlikely to be price-setting units in many hours a year and can therefore earn a reasonable (though often still not sufficient) revenue from electricity sales. As large amounts of renewable capacity start to dominate the market and RE become the price-setting technology in many hours of the year, electricity prices decline strongly in those hours of excess generation. This cannibalisation effect on revenue streams is a threat to RE operators and financing parties. In such markets, renewable technologies cannot operate without a form of subsidy. We will engage in the national / regional discussion on adapting the current market design to enable development and participation of commercially viable RE generation, and specifically consider markets with high shares of renewable penetration;
  - Market rules are necessary to enable RE to participate in selling their electricity on the market. These rules also define the balancing responsibility for RE and therefore manage some of the RE volatility and contribute to grid stability. We will provide recommendations to improve market rules for participation of RE technologies.

- **Accelerating deployment of smarter solutions** through provision of guidlines, best practices and case studies/learnings to enable greater integration of RE:
  We will explore new technologies and commercial opportunities that can help smarten the grid, and make recommendations for their deployment in different national contexts. In particular:
  - Storage: Storage devices can help address the variability of RE generation and can be better integrated if regulation and market design allows the value of flexibility to be priced in the market. The integration of storage devices is becoming more attractive as costs decline;
  - Smart grids: Smart grids can help maintain power balance with increasing renewable generation. This includes the implementation of smart meter programs to monitor voltage profile and bi-directional flows of energy, as well as the implementation of advanced communications and control systems to enable load and generation control;
  - Demand response: Support and integrate demand response programs to help individuals, communities or industry to optimally dispatch their flexible load in accordance with renewable generation.
- **Promoting deployment of new business models** that facilitate greater RE participation:
  - Business models include aggregation into virtual power plants and provision of ancillary services (discrete and/or aggregated assets) as well as combined generation and storage solutions;
  - Through this platform, we will develop, discuss and communicate recommendations for technical and market design requirements to facilitate the uptake of new business models.

Platform structure and organisation will be defined in conjunction with partner

The organisational structure of the platform will be set up to enable a proactive, industry-driven engagement with regulators, TSOs and DSOs and other stakeholders. Knowledge sharing will feature strongly, in two main areas: the benefits of investing in evolutionary grid codes and smart grid technologies and other distributed resources, and the benefits of establishing appropriate market rules in the early stages of market development.

To ensure that the platform works effectively, we set out the following principles for its organisational structure:

- The platform should have specific technical working groups addressing different topic areas;
- The chosen organisational structure needs to ensure continuity between meetings and define suitable monitoring processes;
- Companies respect a charter of behaviour, especially on transparency for sharing information and knowledge, except direct commercial information;
- The platform will not be used for lobbying or direct marketing of company products.

Proposed deliverables

Deliverables will comprise guidelines, learnings and best practices. These will cover topics such as:

- Key success factors for renewable energy integration in different environments or different jurisdictions,
- Operation of different renewable technologies in various environments,
- Sharing of best practices from more advanced markets with emerging markets and project governance.

One of the first deliverables will be a mapping of the most pressing renewable integration challenges and their potential solutions.

All deliverables will be aimed to increase knowledge among stakeholders along the renewable energy supply chain to ultimately improve the business model for renewable energy and as such foster an increase in build out rates in the future.

Proposed partner: The Clean Energy Ministerial

We have identified complementary activities on renewable energy integration under the Clean Energy Ministerial (CEM)[1], including its relatively new Power System Challenge campaign, and aim to establish the platform described in this action plan as an affiliate of the CEM. While a formalised partnership requires approval of the CEM governments and, thus, take time to establish, an informal collaboration at working levels can likely start quickly.

CEM provides an active forum for RE integration work that spans thought leadership, knowledge sharing and peer-to-peer dialogue, policy and technical assistance, capacity building, and skills training. The CEM is actively seeking private sector involvement in its work, both in high-level policy discussions and in more technical working groups. At the seventh Clean Energy Ministerial (CEM7) in May 2016, private sector representatives are expected

[1] The Clean Energy Ministerial is a global forum to share best practices and promote policies and programs that encourage and facilitate the transition to a global clean energy economy. Their organisational structure is established, funding for their work secure and their network global with a weighting on developed and major emerging markets. The existing links of CEM with the Low Emission Development Strategies (LEDS) Global Partnership could be used to connect with developing electricity markets.

to be invited to participate at various roundtables, side events, and other public-private forums. There is also an opportunity to arrange a RE LCTPi grid integration event (eventually the first platform meeting) in advance of CEM7.

On a working level, the CEM is already engaged in various activities that support RE integration through its year-round initiatives (e.g. 21st Century Power Partnership[1], Clean Energy Solutions Center, International Smart Grid Action Network, Multilateral Solar and Wind Working Group). In addition, CEM and its initiatives already maintain several relevant cross-initiative programs and partnerships to facilitate coordination with regulatory agencies, financial institutions, and other partners.

CEM recently launched a Power System Challenge (PSC)[2] campaign that focuses on eight principles of Power System Transformation, many of which are directly connected to RE grid and market integration. The PSC is intended to provide a single, near-term focal point for CEM's external engagement on power system-related topics, and to facilitate transparency and better coordination with external organizations. The implementation working group of the PSC is a suitable point of contact to engage with the LCTPi to coordinate near-term partnership opportunities. The PSC Working Group is chaired by the U.S. Department of Energy.

Through its existing structures, the CEM offers direct channels to engage policymakers as well as TSOs and DSOs working within the CEM. Discussions with those entities are critical for achieving the objectives of this action plan.

Proposed partner for the engagement platform

CLEAN ENERGY MINISTERIAL
Accelerating the Transition to Clean Energy Technologies

The Global Energy Interconnection (work in progress)

Developing high and ultra-high voltage transmission networks that cross national borders can address location and flexibility gaps across wide regions. Wide geographic dispersion of RE generation can overcome variability issues and interconnections across borders or regions can have smoothing effects while connecting resource rich areas with load centres.

The proposed Global Energy Interconnection (GEI) envisions a globally interconnected smart grid with ultra-high voltage (UHV) grid as the backbone. A future GEI would consist of transnational and intercontinental backbone grids and national smart grids covering power transmission and distribution at various voltage levels. It has the potential to link large energy bases in different continents, integrate various distributed power sources and transmit renewable energy to key load centres. Any proposed GEI would have a powerful allocation capability, high safety and reliability and low carbon footprint.

The major technologies for the GEI network, such as UHV AC/DC transmission technology and smart grid technology, are proven technologies. These technologies have been deployed in a number of markets globally. There are nine UHV AC/DC transmission projects in operation in China, with more than ten additional projects under construction or due to begin construction in the near term. Meanwhile, the 500kV interconnection between East Russia and China has been in operation since 2012 and the 800kV Belo Monte UHV DC transmission project is under construction in Brazil.

The proposed action plan

Such interconnections can play a critical role in scaling RE deployment by connecting remote areas of strong RE potential to load centres. However, one of the key barriers in scaling this type of grid infrastructure development is the complicated and time consuming planning, permitting and approvals procedures involved.

This action plan is currently a work in progress and will be further developed in 2016. It will involve member companies working together to proactively engage with regulators and policymakers to address key planning and permitting barriers for this type of transmission infrastructure development. Recommendations for streamlining planning and permitting procedures will be developed, based on a broad range of international experience.

The engagement will be targeted to high potential markets – such as China and broader East Asia, Europe and Latin America.

[1] The 21st Century Power Partnership also maintains a private sector advisory group.

[2] www.cleanenergyministerial.org/portals/2/pdfs/CEM6-CEMPowerSystemChallenge-JointStatement.pdf

Action plan 2: Scaling green bond finance for Renewable Energy

Background

The renewable energy investment landscape is changing. Renewable energy (RE) is no longer a niche market but mainstream investors are participating and a growing range of investment vehicles are available. These new instruments have the potential to reduce the cost of capital and access a greater volume of funds from a wider pool of investors.

Institutional investors present a huge potential source of funding for RE projects. Current assets under management are estimated to exceed USD 90 trillion[1)], however, only a small fraction of such funding is invested in RE or green infrastructure projects. Renewable energy assets are generally appealing to such investors, providing a steady revenue stream, matching long-term pension liabilities and providing a hedge against inflation. But crucially, projects must be appropriately de-risked to meet the risk-return profiles of this investor group.

The scale of investment required to deliver the headline commitment is significant and new investment models and financing approaches are necessary. At approximately USD 3.5[2)] trillion, business as usual investment will not deliver the required volume (and cost) of capital needed. Not only must typical constraints to infrastructure finance be overcome, but also significant investment must be redirected from conventional to renewable generation and a lack of suitable investment vehicles has been cited as an issue in terms of scaling RE investment from this investor group. To this end, green bonds present a promising opportunity given the relatively simple and liquid nature of this instrument.

Early trends in green bond issuance are promising, but significant scale up is now needed. Issuance of green bonds has grown dramatically in recent years - globally, in 2014, USD 36 billion of labelled green bonds were issued, compared with USD 11 billion in 2013, and the Climate Bonds Initiative (CBI) estimates the market could reach USD 100 billion in 2015[3)]. But these sums represent a mere fraction compared to the USD 100 trillion global bond market and a major step-up in scale of green bond issuance is now needed.

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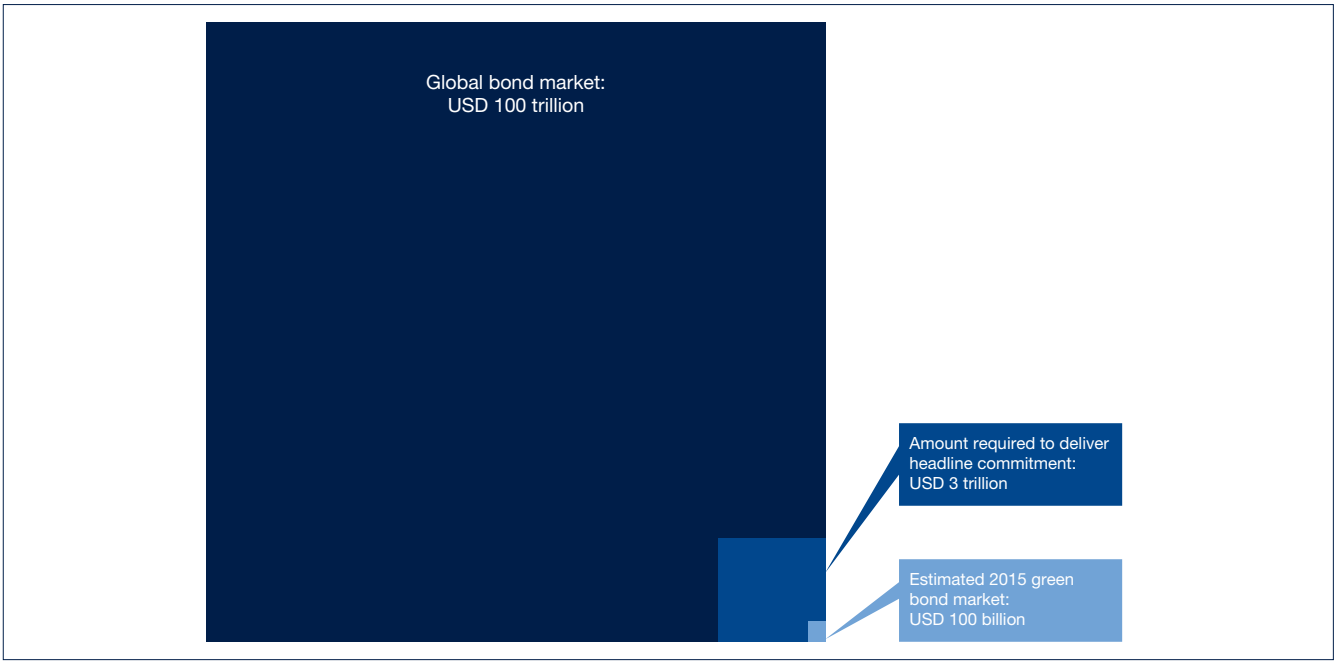
1) CBI, 2015, "Scaling green bond markets for sustainable development", accessed www.climatebonds.net/resources/publications/scaling-green-bond-markets-sustainable-development

2) IEA, 2015, "World Energy Outlook Special Report: Energy and Climate Change", accessed www.iea.org/publications/freepublications/publication/WEO2015SpecialReportonEnergyandClimateChange.pdf

3) CBI, 2015, "2014 Green Bonds Final Report", accessed at www.climatebonds.net/year-2014-green-bonds-final-report-0



Scale of finance needed to achieve headline commitment[1)]

With these issues in mind, this action plan aims to scale green bond finance for renewable energy. We recognize that key considerations in scaling this type of finance include the need for transparency, the need for scale in project pipeline and the need to de-risk underlying projects. To this end, the plan is comprised of four key areas:

- Commitment to verification of green bonds according to existing voluntary frameworks and implementation of additional measures to promote transparency and integrity in the early stages of this market;
- A series of workshops with private and public sector stakeholders to share knowledge, communicate recommendations and collaborate to facilitate the scaling of this type of finance;
- Working together with financial institutions in developing a pipeline of suitable projects for green bond issuance and in promoting credit enhancement mechanisms and risk sharing structures where appropriate; and
- An online portal to track the progress and outcomes of the green bond program.

This initiative is unique in convening a large group of major energy companies with operations across the globe to work together in this way.

[1)] Adapted from CBI, 2015, "Scaling green bond markets for sustainable development", accessed www.climatebonds.net/resources/publications/scaling-green-bond-markets-sustainable-development

Adopt measures to promote transparency and build investor confidence

Credibility and transparency are crucial in order to promote investor confidence and interest in this relatively new market. Indeed, investors are applying increasing scrutiny to what exactly constitutes a "green" asset and there is a need assure investors of the integrity of both the underlying assets and the use of proceeds.

However, we also acknowledge that verification and reporting requirements must not be excessively onerous, as this may add unnecessary costs and deter issuers from participating in the market.

As such, there must be balance between these considerations. We emphasize the need to keep transaction costs and administrative requirements as low as possible to facilitate efficient and cost effective scaling up of green bond finance, while maintaining integrity and transparency to promote investor confidence and interest, particularly in the near term.

With this in mind, key features of the green bond plan to promote integrity and build investor interest and confidence are as follows:

- The group will certify green bonds issued according to existing voluntary frameworks – either the Green Bond Principles or the Climate Bond Standards (the latest version of which incorporates the Green Bond Principles).
- While this verification is crucial, feedback from the institutional investment community indicates that additional steps are needed in order to promote the growth of green bond issuance. To this end, under this action plan additional measures will be taken and will be determined in consultation with the investment community. These may include:
  - Describe management process for tracking proceeds and reporting impacts and communicating results to investors in a transparent manner;
  - Provide annual updates on use of proceeds and information concerning beneficial impacts;
  - Make impact reports publicly available and easy for investors to understand, and utilize a simplified set of indicators;
  - Disclose percentage of funds to be used for new projects versus refinancing of operational projects;
  - Engage auditors and ESG institutions to track bond proceeds, provide assurance about project benefits and provide assurance that issuers have appropriate governance structures to support the selection, assessment and monitoring of projects[1)].

Workshops and stakeholder engagement

A series of workshops with issuers, investors and ratings agencies will be held to facilitate the increased use of green bonds as a financing tool for renewable energy. These workshops will be co-managed by the WBCSD and Climate Bonds Initiative (CBI).

We recognize that mutual education and collaboration is necessary between issuers and investors. In addition, ratings agencies are a key stakeholder and will be engaged to promote efficient and effective and rating of RE investments.

Within the workshops, companies will share experiences and work together on solutions to scale green bond finance. Specifically, we aim to:

- Discuss the benefits of green bonds both for issuers and investors;
- Ensure there is an understanding amongst issuers about what is required for issuance;
- Share case studies and lessons learned from issuers. Within the group, some companies have yet to issue bonds, some have just begun to test the market, while others have been major green bond issuers to date and thus knowledge and experience exchange will be highly valuable;
- Discuss and explore potential measures to reduce transaction costs, including the potential to integrate ratings and verification processes for more cost effective outcomes;
- Expand the program beyond member companies.

These workshops will be locally/regionally relevant with country-specific issues elaborated and documented for focus markets.

We note that engagement with the public sector is critical to promote a favorable political and regulatory environment for green bond issuance and for renewable energy development more broadly. In partnership with CBI, discussions with policymakers will focus on the following key areas:

- Promotion of incentives in earlier stages of markets (for example, providing tax relief on green bond coupons for institutional investors);
- Encourage efforts to develop liquid and functioning bond markets in high potential countries;
- Promotion of public sector de-risking and credit enhancement mechanisms, to address key macroeconomic risks such as foreign exchange risk associated with PPAs priced in local currencies;
- Broader energy policy and regulatory frameworks to ensure a stable, reliable and clear policy framework for renewable energy development.

[1)] Principles are primarily derived from "Ceres Investor Network on Climate Risk, 2015, "A statement of Investor Expectations for the Green Bond Market, accessed www.ceres.org/press/press-releases/investors-encourage-further-transparency-standardization-to-spur-green-bond-market-growth

Develop a pipeline of suitable projects

While public sector initiatives will be crucial in de-risking renewable energy projects, it is critical to acknowledge that appropriate policy and regulatory frameworks alone are not enough to scale green bond finance for renewable energy.

There is a clear message from financial institutions and institutional investors that there is a lack of a strong pipeline of suitably de-risked assets to scale financing of this kind; that is, there is a need to increase the supply of projects with appropriate risk-return profiles.

To this end, companies will work together and with Development Finance Institutions (DFIs) such as the IFC and private banks on an ongoing basis to ensure that a suitable project pipeline is developed.

Many of the risks are commercial, political or macroeconomic in nature and not within the direct control of the companies. However, some can be addressed through project development and operational practices. Measures to de-risk projects to be undertaken by project developers may include:

- Regulatory and legal compliance;
- Best practice environmental standards;
- Best practice in construction processes and contracts;
- Bets practice in asset management and operations;
- Technology selection (e.g. minimum equipment standards);
- Corporate governance and management;
- Thorough technical, commercial and legal due diligence.

Standardization is also critical in reducing risk, achieving economies of scale, improving cost-effectiveness and ensuring project portfolios are marketable to institutional investors. As such, promotion and implementation of standardization will be a focus of collaborations with the financial services sector and is expected to include, where applicable:

- Loans;
- PPA structures;
- Project development procedures;
- Construction contracting and procedures;
- Operational asset management contracting and procedures.

Lastly, it is noted that new financial structures (for example, structures in which projects are aggregated across emerging and mature markets) have risk sharing/risk mitigation benefits. Companies will therefore proactively engage with banks and DFIs such as the IFC on an ongoing basis in developing and deploying new structures. This collaboration will focus on two key areas:

- De-risking projects: DFIs can work with issuers to de-risk projects more effectively when aggregated in this way – particularly important for financing projects in emerging markets;
- Criteria development: Companies will work together with financial institutions to develop criteria for projects to be included in such aggregation and risk sharing structures. This is expected to link closely with the work on de-risking and standardization outlined above.

Interactive online portal

An interactive online portal will be developed to track progress and communicate the outcomes of the green bond program. This is expected to include details of issuance, a register of underlying projects and details of workshops and engagements. Publicly available information will be communicated via this portal.

Partners

IFC International Finance Corporation WORLD BANK GROUP

Climate Bonds INITIATIVE

Action plan 3: Scale corporate procurement via PPAs

Background

Offtake risk is a key consideration for renewable energy financing. Power Purchase Agreements (PPAs) have been used in the power industry for decades and utilities have traditionally been the most common PPA counterparty. However, credit risk associated with weak utilities (and/or a lack of suitable offtakers) is problematic in some markets and mitigating this risk is important in unlocking additional and lower cost capital for renewable energy (RE). With growing cost competitiveness, strained public finances and increasing corporate interest to directly procure RE, there is both a need and an opportunity for alternative offtake approaches.

Indeed, businesses are actively increasing RE procurement. Corporate procurement for RE is growing as corporates substitute demand away from fossil fuels and towards RE. Preferred corporate procurement strategies include adding renewable energy capacity both onsite and offsite and entering into PPAs. Of note is that since power generation is generally not the core business of these companies, procurement via PPAs may be a preferable approach.

Encouraging corporate procurement via PPAs directly addresses offtake risk for RE projects, but challenges remain. Millions of megawatt hours are needed to meet existing corporate renewable energy goals however businesses face a variety of challenges in accessing cost-effective solutions on favorable terms. The need for greater choice in options for RE procurement and for transparency in costs are paramount. Simplifying and streamlining contractual and administrative procedures is also of major importance. In addition, buyers have indicated a preference to procure renewable energy from projects near operations. Lastly, major challenges associated with regulatory restrictions (for example, some jurisdictions prohibit non-utilities from signing PPAs) must be overcome[1)].

Meanwhile, risks for RE suppliers must also be addressed. Depending on the project and contract structure, risks may include delivery risk, risk of falling electricity prices, changing price dynamics arising from technological advancement or challenges associated with contract terms (for example, longer tenor is required to secure favorable financing terms while buyers may be reluctant to sign long term contracts). Certification or verification of the volume of clean energy delivered is needed and care must be taken to ensure the quality and integrity of any underlying Renewable Energy Certificates.

[1)] WRI, 2015, "Corporate Renewable Energy Buyers' Principles: Increasing access to Renewable Energy", May 2015.

To address the above issues and scale corporate procurement via PPAs, this action plan is comprised of two key areas:

- An RE 'marketplace', a forum bringing together buyers and sellers to share knowledge and work together on initiatives to facilitate the scaling of this business model;
- Stakeholder engagement with policymakers, regulators and system operators.

Of note, this initiative is likely to include direct engagement with other LCTPi work streams, in particular the cement and chemicals industries, to achieve mutually beneficial outcomes.

The RE marketplace

Working in partnership with RE100, we will establish a forum in which buyers and sellers work together to facilitate rapid scale up of corporate procurement via PPAs. This forum is unique in bringing together the buyer side and supplier side to work specifically on corporate RE procurement via PPAs. Other crucial private sector stakeholders, such as banks/investors and accounting firms, will also be engaged in discussion and workshops. The workshops will be co-managed by TCG and WBCSD.

In the marketplace, buyers and sellers will discuss, develop and implement initiatives that are required to scale this business model from within the private sector though a series of workshops. This will be done by first systematically identifying risks associated with this business model on both the buyer and seller side and will be followed by development of initiatives to address these risks and overcome associated barriers.

The agendas for these meetings will be structured in collaboration with the RE100 group of companies. While the agenda will be more specifically determined following the risk identification by respective stakeholders, key features of the forum are expected to include:

- Knowledge sharing and discussion on what works and what does not work for corporate procurement via PPAs. This will be undertaken via structured discussions of case studies and lessons learned in different markets, with a focus on local applications as well as boarder considerations. Companies from both the buyer and supplier side with experience in this type of procurement will lead discussions.
- Development of strategies to best communicate the benefits of this business model to procurers both within and beyond the existing buyer group. It is recognized that engagement is needed at higher corporate level as well as working level within organizations; strategies to communicate the broader value proposition at corporate level and the more specific practicalities of the approach at working level.
- Workshops to discuss potential project and contractual structures and configurations to meet both buyer and seller requirements and to address risks from both buyers and seller perspective.
  - From the supplier perspective, for example, this is expected to include addressing issues associated with contract tenor, delivery risk, integrity in REC use, underlying electricity price risk, challenges associated with available suitable sites and the potential need for a higher degree of decentralization in project development.
  - From the buyer perspective, flexibility in options and transparency in costs are crucial. There is a need for suppliers to be flexible in terms of project structure and business model to address, for example, the desire for power plants to be located close to procurer facilities, the desire to harness the benefit of falling renewable energy costs and the need to be protected from adverse movements in underlying electricity prices.
- Specific working groups to focus on simplifying, streamlining and standardizing contract structures and procedures. Over time, this could involve the development of standard deal structures, contract forms and key terms (where possible), acknowledging the need for flexibility for buyers while meeting the bankability requirements for sellers. This is expected to draw on and complement work already done (for example, by the Rocky Mountain Institute) and address specific issues in relevant markets - for example, accounting issues.
- Identification and discussion of key policy and regulatory barriers and development of recommendations to overcome these barriers. The outcomes of these discussions will be progressed via workshops and engagements detailed below.

Stakeholder engagement: Policymakers, regulators and operators

The business case for PPAs for RE technologies is influenced by a combination of provincial and national policies and broader engagement in the public and private sector is therefore required.

Engagement with policymakers is needed to promote clarity and transparency in energy sector policy and regulation, while engagement with regulators and operators is crucial to ensure necessary permitting and regulatory arrangements can be made and at a viable cost. For example, regulatory restrictions related to the ability to sign PPAs (in some provinces in India and the US, for example, non-utilities cannot sign PPAs), difficulties with/cost of wheeling arrangements and lack of grid capacity may be major barriers.

The engagements will comprise workshops with buyers, sellers, financiers and policy makers and regulators to communicate key regulatory barriers. Recommendations will be developed based on private sector experience in a range of contexts, which will be communicated directly to policymakers, regulators and operators. It is noted that the strength of this initiative is in coordinated engagement across key private sector stakeholders to deliver a more comprehensive and powerful message to regulators and policymakers.

It is noted that policies are often highly state dependent and thus there is a need to engage at the provincial level; local chapters will be developed for key markets to address issues relevant to local contexts.

Partner

THE CLIMATE GROUP

Action plan 4: Low-carbon Microgrids

Background

The success in limiting climate change will also depend on the pathways chosen to electrify remote areas. Addressing the lack of access to clean, reliable and affordable energy for billions of people is one of the world's most critical development challenges. Lack of access to energy is a major barrier to economic and social progress and must be overcome to achieve the Sustainable Development Goals (SDGs).

The majority of existing, remote electricity supply is based on diesel. Continuing business-as-usual for remote electrification will cause a significant increase in greenhouse gas (GHG) emissions. As such, viable alternatives must be developed. In addition to solar home systems that have already proved to be adaptable solutions, microgrids are a key solution to providing electricity to remote areas and must contain a high penetration of renewables to stimulate the adoption of renewable sources of energy across the world.

A gap has been identified in current efforts to address remote electrification. Namely, in the provision of low-carbon energy solutions for customer demand profiles characterised by medium or large energy demand in contexts where the centralised electricity grid is either not available or does not meet customer needs. The companies and partners of this action plan believe that low-carbon microgrid solutions will be an essential solution in these contexts.

Business is a critical actor in addressing remote electrification. Business is a primary solution provider, bringing to the table innovative products and services, efficient service delivery, essential technologies, management and technical capabilities, and financial resources. Companies and partners of this action plan are some of the leading innovators in the main solution areas for delivering microgrid solutions: distributed and/or renewable energy components and systems, relevant appliances and project delivery or investment. Their actions in partnerships with governments, communities and other stakeholders are increasing access to energy.

Focusing on this challenge now fits well with global developments. In April 2014, the United Nations Decade of Sustainable Energy for All (2014-2024) was launched to the business community. Kandeh Yumkella, the Special Representative of the UN Secretary–General and chief executive of SE4All, called on business to seize the opportunity by innovating and investing to help achieve the initiative's objectives. This action plan aims to be a critical enabler to doing so. From a technical point of view, the cost of key technologies and their components, such as photovoltaic (PV) solar, have and will continue to decline as a result of the economies of global scale and innovation. This enables microgrids to be a very cost-efficient technology in comparison with diesel generation.

Low-carbon microgrids offer a vast growth opportunity for business active along the electricity supply chain. The IEA estimates that achieving their Energy for All Case would require an increase in global electricity generation of around 840TWh by 2030 of which around 300TWh would be supplied via microgrid solutions[1]. Development and deployment of microgrids is already underway globally, though a scale up in deployment is now needed.

The primary objective of this action plan is to accelerate the adoption of low-carbon microgrids globally. There are two key areas that pursue complementary aims:

- "Business case for microgrids": This report will evaluate case studies for microgrids using the business model canvas and identify economically sustainable business models already existing today. As such it will illustrate the viability of microgrids in the medium-sized segment.
- "Decision support toolkit": The toolkit aims to help stakeholders identify suitable microgrid solutions by streamlining the decision process using a decision tree. One of main barriers to commissioning of a microgrid is the long time span from idea to project design. The toolkit shall enable faster decision-making for a microgrid design fit for the local circumstances and serve as a form of assurance for financing and permitting stakeholders in their project screening process.

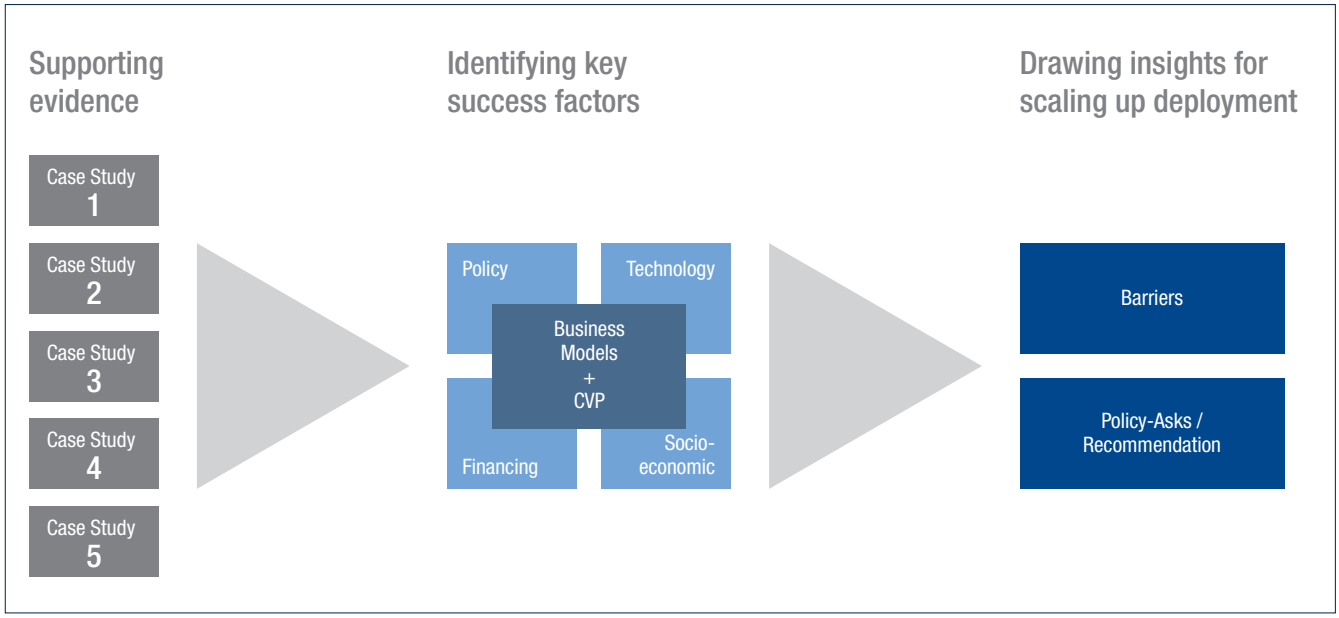
This participating companies and partners of this action plan will produce a report and a toolkit that provides compelling arguments for the implementation of microgrids, assurance to decision-makers and potential customers of the suitable solution for their needs and finally policy recommendations to further accelerate deployment. The toolkit in particular will help governments, businesses, financing institutions and communities to quickly identify suitable microgrid solutions and make the case for including higher proportions of renewable energy.

It is important to highlight that although the work will be technology neutral, the report and toolkit will clearly show the benefits of incorporating higher shares of renewable generation capacity across all microgrid projects. The action plan will identify a range of scenarios demonstrating that microgrids are an attractive solution. This includes both brown- and green-field sites as well as grid-connected and isolated systems. We will include both developed and developing country contexts. The action plan will focus on microgrids characterised by medium or large energy demand (size ~ 100kW-2MW).

Business case for microgrids

This key area will highlight business models which are economically sustainable. Participating companies recognize that commercially viable businesses are more likely to be scaled up in their deployment.

The structure of the report is visualised in the following diagram:



Structure of the "Business Case for Microgrids" report

[1] IEA, World Energy Outlook 2011, Energy for All

Decision support toolkit

In a first phase we aim to showcase the logic of the decision support toolkit and the decision tree by means of a concept note.

While all microgrid projects have individual requirements in their technical design, there are common features to many of them. The decision tree will define a set of scenarios via key criteria, such as power demand, natural resources available, etc. The scenarios and their solutions will be based on company`s experience either implemented or planned and could e.g. include:

- Resource-rich islands;
- Remote villages;
- Low-income neighbourhoods in big cities.

To compile the concept note, participating companies and partners of this action plan will

1. Identify a range of relevant scenarios via a decision tree approach where microgrids are an attractive solution to meeting customer needs;
2. Recommend scalable technology options and sustainable business models that are relevant to each scenario.

In the longer term, it is the aim to leverage a critical mass of companies and partners to scale up implementation of low-carbon microgrid solutions. The expected deliverables include:

- Create a web-based application out of the decision tree toolkit;
- Create a web portal to support stakeholders in knowledge sharing, identification of solutions and identifying potential partners;
- Create an online marketplace for posting tenders and creating partnerships for bids and projects.

Stakeholder engagement: key institutional investors, development banks and governments

As end users and other stakeholders will be key in judging the merits of the toolkit to be developed, the participating companies and partners will actively seek feedback to their work, including

- Engage in dialogue with key institutional investors to try to get their feedback and backing for applying the decision support toolkit to their project screening process;
- Increase the number of participating companies and organisations;
- Leverage a coalition of partner organisations to augment the profile of the work at key events and in publications / communications;
- Work with partner organisations to share knowledge and support their deliverables where possible;
- Gather insights at selected WBCSD organised regional events.

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