Renewables the frontiers towards low carbon resilience – Are they shaping the landscapes of Energy Markets?

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Abstract. As we are transitioning towards low carbon economy, renewables have become a compelling investment for foraying ahead in shaping global energy sector landscapes. Upfront higher costs are an impending challenge for the global renewable market. Ways and means to channelize and inflow of capital into renewables is of utmost priority. Innovation, co-creation and bonds are some approaches towards creating an equally accessible and allocable renewable energy portfolio with reduced credits risks. Credit risks and policy risks are the two major constraints that are undermining the mobilization of finance in renewable energy projects. Hedging solutions per se and reducing barriers better facilitate and manage shall need varied tools, instruments, mechanisms and rating models. This paper aims to put forth the valid policies, practices, frameworks and tools –on improving the access and allocation of green energy projects and credit risk management with better solutions for ease of implementation for future trajectories. Varied policies and tools that reduce barriers and mitigate risks include a) Enabling policies and tools which are divided into Financial policies and regulations, Project Preparation Facilities, Project facilitation tools, on-lending facilities, and Hybrid structures b) Financial Risk Mitigation Instruments which include Guarantees, currency hedging instruments, liquidity facilities, Resource risk mitigation tools and c) Structured Finance Mechanisms and Tools which includes Standardization, Aggregation, Securitization, Green bonds and Yieldcos, The policy push for systems integration of renewables and enabling technologies (such as energy storage) should focused primarily on increasing power system flexibility and control, as well as grid resilience. Flexibility, in particular, is an important requirement for systems integration of renewables as the share of VRE (Variable Renewable Energy) generation rises. The key deliverables from the paper include: policies which should advance the integration of both centralized and distributed VRE and increase the flexibility of the power system pertaining to, for example: market design, demand side management, transmission and distribution system enhancements, and grid interconnections. Since, countries have renewable energy support policies, they should now promote renewable portfolio standards (RPS), other quota obligations, incentives, feed-in policies (tariffs and premiums), renewable power tenders and auctions, incentives and community choice aggregation programmes.

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1. Introduction

Developing countries are aggressively investing in renewable energy capacity, which reflects the priorities of government policies, as distributed renewable energy projects are crucial for expanding access to electricity in poor regions (OECD, 2020) there is a increase in market competition. In lieu of it is essential to price deals for risk correctly, and this calls for granular and robust assessment of the two main risk factors: first the likelihood that a project will default on its obligations – probability of default (PD). And secondly, what losses will the lender incur if the project does default – loss given default (LGD). Tools and methodologies already exist for lenders to conduct a rigorous internal assessment of a project finance deal. A robust project finance credit risk tool rests on the following pillars:

• Default and recovery data – either internal or provided by external ratings agencies – that can be used to calibrate PD and LGD models empirically

• Comprehensive experience of the industry leaders, for example from relevant professional associations and internal teams in assessing project finance projects to developing and using the appropriate credit risk frameworks

• Predictive analytical models that are tested for predictability against project finance data and/or external ratings of the various asset classes.

2.Objective:

The objective of the paper is to know how evolved renewables are towards low carbon resilience and are they shaping the landscapes of Energy Markets frontiers ?

3.Methodology

Each type of renewable energy technology and each project needs to be evaluated on its own merits, but there is a common set of credit risk drivers that apply across all the renewable energy sub-sectors. These include operational risk, the regulatory environment, the competitiveness of the market in which the project operates, geographical conditions and how these impact production capacity, and the experience and management structure of the project team. Technological considerations are particularly important in assessing risk in the renewables industry because of constant innovation and refinement of existing technologies and the resulting questions surrounding their efficacy and reliability. What is necessary in the current set up is increasing investment in renewable energy which requires identification, evaluation, and monitoring of credit risk in project finance investments. Renewable energy companies and investment projects typically have high volatility in terms of returns on investment, hence the need for standardized credit risk metrics, particularly probability of default (PD) and loss given default (LGD). Also included are notching factors which refers to factors that can notch the PD up or down, including strength of structuring, refinancing risk, construction risk, termination payment, and capital expenditure management. (OECD).

3.1. Renewable Energy Tools

I. Enabling Policies and Tools:

- *Financial policies and regulations*
- *Project Preparation Facilities*
- *Project facilitation tools*
- *On-lending facilities*
- *Hybrid structures*

II. Financial Risk Mitigation Instruments

- *Guarantees*
- *Currency hedging instruments*
- *Liquidity facilities*
- *Resource risk mitigation tools*

III. Structured Finance Mechanisms and Tools

- *Standardization*
- *Aggregation*
- *Securitization*
- *Green bonds*
- *Yieldcos*

3.2. How to manage currency risk :

• Currency risk is one of the major barriers to the financing of clean energy projects in developing countries. The high degree of political and country risk associated with developing countries increases the risk premium, thereby increasing the cost of clean energy. It also has an indirect impact on the financing of clean energy projects, in which it acts as a factor in credit assessment, thereby resulting in low ratings for projects. Foreign investors generally use long-term currency swaps to cover the currency risk.

3.3. How would structured finance mechanism help in enabling capital market financing for clean energy ?

Use of structured finance mechanisms could help in enabling capital market financing for clean energy. Clean energy assets are typically small scale and illiquid in nature, which makes the refinancing of such projects difficult. Measures like warehousing and securitization can help in transforming illiquid assets into liquid and tradable instruments and can assist in the refinancing of the projects. Warehousing is a process in which it is possible to aggregate smaller projects to reach a scale and securitize them into a special-purpose tradable asset. Rating agencies assess these securitized assets for default and then trace them in the secondary market as fixed-income instruments. The bundling of securities could diversify the risk for such instruments and can help in securing high credit ratings.

4. Results and Discussions

4.1. Policy Support for enabling Renewable Energy:

Policy support for renewable energy can be categorised as direct policy and indirect policy. Direct policies such as mandates or financial incentives, explicitly target the increased deployment of renewables and enabling technologies. Indirect policies support effective operating conditions and the integration of renewables and enabling technologies into energy systems and markets. Policies to advance renewable energy production and use can be targeted at any and all end-use sectors, including heating and cooling (in buildings and industry), transport and electricity. Renewable energy policy can exist across all levels of governance, including international and regional; national, state and provincial; and municipal governments. In jurisdictions with regulated power systems, national and sub-national public utility commissions (also called energy commissions or energy regulators) develop policies that apply to regulated utilities (REN, 21).

Trade policy also has an impact on the production, exchange and development of renewable energy products, as well as renewable energy demand levels within specific countries. Renewable Energy and Climate Change Policy include :

• Net zero Emission Targets
• Both NetZero Emission targets and Carbon Pricing Policy
• Carbon Pricing Policy
• Sub-National Carbon Pricing Policy

Carbon pricing policies include emissions trading systems and carbon taxes. Net zero emissions targets mentioned are binding and include those that are in law or policy documents, as well as those that have already been achieved.

• Also in place are Nationally Determined Contributions (NDCs) for emission reduction under Paris agreement.

• Policy mechanisms that promote large-scale, centralised renewable power include renewable portfolio standards (RPS) and other quota obligations, feed-in policies (tariffs and premiums), renewable power tenders and auctions, financial incentives (for example, grants, rebates and tax credits) and more recently we have the community choice aggregation programmes. In 2019, the shift continued away from feed-in policies and towards mechanisms such as auctions and tenders. Feed-in policies have been used to promote both large-scale, centralised renewable energy and decentralised renewables. Many small-scale residential and commercial installations benefited from net metering policies, which compensate system owners for surplus electricity fed into the grid. Virtual net metering (VNM) has emerged as a mechanism to facilitate participation in shared renewable energy projects, in which multiple customers can receive net metering credits tied to their portion of a single distributed system.

4.2. Policies to support mobility infrastructure

Electric vehicle (EV) policies are not renewable energy policies by themselves. While EVs may not always increase the renewable energy share in the transport sector, they do offer the potential for greater penetration of renewable electricity, increased efficiency and lower emissions. Policies to support the increased uptake of EVs include binding targets, financial incentives, public procurement and public support for charging infrastructure. Incentives such as congestion charging, free parking and preferred access also can contribute to greater EV uptake. Targets and financial incentives are two of the most common forms of policy for EVs. The creation of low-emission vehicle zones could increase the uptake of both EVs and biofuels. Through community energy arrangements: residents, businesses and others within a relatively small geographic area initiate, develop, operate, own, investing and/or directly benefit from a renewable energy project. Communities vary in size and shape (for example, schools, neighbourhoods, city governments, etc.), and projects vary in technology, size, structure, governance, funding and motivation. Policy plays a crucial role in permitting or fostering the deployment of community renewable energy projects. FIT schemes, net metering and VNM, and policies dedicated to supporting community energy arrangements all have the potential to incentivise community renewable energy initiatives. At a municipal level, community choice aggregation (CCA) programmes (also called municipal aggregation) allow municipalities and other local governments to procure renewable energy on behalf of their residents and businesses while still receiving transmission and distribution services from existing utilities. By aggregating the demand of multiple residents, communities gain leverage to negotiate better rates and opt for renewable energy sources.

Technology		Risk
Wind	Onshore	Low
	Offshore	High
Solar	Crystalline Silicon PV	High, Medium and Low
	Thin Film PV	High, Medium
	Concentrator PV	High
	Concentrated	High
	Solar Power	
Biofuels	First Generation	Low
	Second	High
	Generation	
Biomass and Waste	Incineration	Low
	Other biomass	Medium
Geothermal		Medium
Ocean/Marine		High
Small Hydro		Low

Fig. 1 - Technology Risk Classification for Various Renewable Energy Technologies,

5. Conclusions

Flexibility, is an important requirement for systems integration of renewables as the share of VRE generation rises. Policies that can advance the integration of both centralised and distributed VRE and increase the flexibility of the power system pertain to, for example: market design, demand side management, transmission and distribution system enhancements, and grid interconnections. Policies also may support the deployment of enabling technologies, such as energy storage, which in addition to supporting power systems in general may help to integrate renewable electricity into the transport and heating and cooling sectors. The key reason for the low penetration of renewables in the final end-uses of thermal and transport energy is the lack of supporting policies in these sectors. As renewable energy policies typically are enacted at a single level of governance and tend to focus on a single end-use sector.

Strategies to align renewable energy policy across multiple levels of governance and across multiple economic sectors are rare. Although most renewable energy policies are not integrated or co-ordinated across sectors or levels of governance, examples of integration and co-ordination are emerging.

Co-ordinated policy efforts often are organised under national or state-/provincial-level energy or climate change strategies. Key workable should include :

- Reduce prices
- Increase subsidies on renewables
- Cap the production
- Cap the consumption
- Do not cap price as it widens gap
- Deploy BAT (Best Available Technologies) invest in renewables and not divest the portfolio as its a short term gain and other future proofing tooler.

Targets are a primary means of expressing commitment to renewable energy and sending a positive signal to market players. Although targets on their own are generally insufficient to stimulate investment in renewables, they may be converted into action through the adoption and implementation of complementary policies. Globally, most renewable energy targets are aimed exclusively at the power (electricity) sector. However, some jurisdictions have enacted independent targets in the heating and cooling and transport sectors, and some (although fewer) have committed to cross-sectoral, economy-wide renewable energy targets.

The way we treat the grid shapes the renewable market, low carbon resilience answer lies in man management ie the approach towards access, allocation distribution and end use technologies are additionality.

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7.References

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