The Big Picture: Making Grid Scale Renewables Work

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The power situation in India is precarious with over half of the Indian population lacking access to modern forms of energy. A significant fraction of power generated is lost before getting utilized; there are with almost 30% aggregate technical and commercial, or AT&C, losses, of which half might be theft, on average. India faces both a significant peak deficit and total energy deficit, and a large number of villages/hamlets still do not have access to the grid. Additionally, India's foreign oil import bill of around US$150 billion (varying with oil prices) that contributes to a significant worsening of India's current account position needs to be brought under control. The negative impacts of climate change are also becoming more apparent and India's high vulnerability due to its large population will slow its economic growth, impact health and development, make poverty reduction more difficult and erode food security. India therefore cannot ignore climate change and must start putting plans in place to reduce carbon emissions.

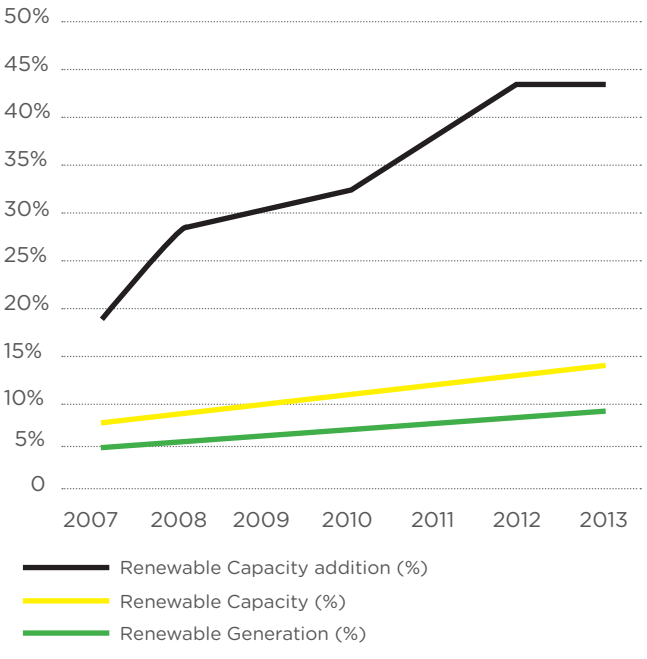
All these factors, therefore, present a huge opportunity for accelerating renewable energy growth in India. According to the India Renewable Energy Status Report 2014, the total renewable energy potential from various sources in India is close to 250 GW, of which only 30 GW is currently being exploited and shows significant growth potential.[1]

Today, renewables are not only an important source of energy, but also a tool to address many other pressing needs, including: improving energy security; reducing the health and environmental impacts associated with fossil and nuclear energy; mitigating greenhouse gas emissions and creating jobs.

GLOBAL OVERVIEW AND INDIA

Globally, the share of renewable energy continues to increase within the electricity market. Renewables (excluding, large hydro projects) account for 43.6% of the new generating capacity installed worldwide in 2013, raising its share of world electricity generation from 7.8% in 2012, to 8.5% in 2013.

FIGURE 1: Renewable Power Generation and Capacity as % of Global Power



SOURCE: IEA, EIA, Bloomberg New Energy Finance

[1] *A number of other publications show significantly higher potential. In theory, solar power could provide all the electricity India needs, but the issues become cost, land, and storage.*

From an investment perspective, the total investment in renewable power and fuels (excluding large hydro-electric projects) however, fell for the second year running in 2013, reaching $214 billion worldwide, some 14% lower than in 2012 and 23% below the 2011 record. Concerns about policy support, and reductions in technology costs, were the two main reasons for the fall in global financial commitments to renewable energy in 2013.

2013 also witnessed, for the first time, China investing more in renewable energy than Europe. China's total RE investment was down by 6 per cent at US$56 billion, while Europe dropped 44 per cent to US$48 billion. The United States saw a fall of 10 per cent to US$36 billion. India moved 15 per cent down to US$6 billion and Brazil 54 per cent down to US$3 billion, the lowest since 2005[2].

In terms of capacity addition, India needs to align its energy policies and institutions with global practices, especially China. China today has 1,300 GW of installed power capacity and is adding 70 GW every year of which 30 GW – roughly 45% – is wind and solar capacity. India has a total installed capacity of 240 GW and we are scarcely adding 3 GW of wind and solar power each year. So, there are lessons from the China model that would be worth considering while framing India's renewable energy policy. India must consider China's model of penalizing old coal-based plants, having an economically viable long-term policy and giving huge monetary incentives for both generation and manufacturing. The finance minister's recent move to double the clean energy cess from rupees 50 to rupees 100 per tonne (levied on coal, peat and lignite) is very prudent in light of the push to expand the scope of its use to areas such as financing and promoting clean environment initiatives and funding research in the area of clean energy.

So, what is it that India needs to do to further encourage the growth of renewable energy?

India's Unique Proposition – Resource: Not A Restraint

It is estimated that with the current level of technology, the 'on-shore' potential for utilization of wind energy for electricity generation is of the order of 100 GW. The unexploited resource availability has the potential to sustain the growth of wind energy sector in India in the years to come.

Similarly, India is endowed with vast solar energy potential. About 5,000 trillion kWh per year energy is available over India's land area with most parts receiving 4-7 kWh per sq. m per day. There are 250-300 sunny days in most parts of the country. *This is many times more than the total power consumption of the country.* With a positive regulatory environment and R&D efforts picking up, solar energy is expected to reach grid parity level in the next 3 to 4 years.

POLICY ENABLERS: ERRATIC IMPLEMENTATION

In India, there has been policy support over the last decade for renewables, but a few specifics have not been stable (e.g., Accelerated Depreciation for windpower, which was withdrawn in between, or Feed-in-Tariffs that have varied a lot). Further, this support needs to be more comprehensive rather than piecemeal.

Jawaharlal Nehru National Solar Mission (JNNSM)

The Jawaharlal Nehru National Solar Mission (JNNSM) was launched as part of National Action Plan on Climate Change to increase penetration of solar energy in India. It is a transformational initiative for solar energy development in India and its primary focus is to establish an enabling environment for solar power, both at a centralized and decentralized level, with 22,000 MW of grid-connected solar power capacity by 2022 (recently upgraded to 100,000 MW of solar).

[2] *While investments fell, capacity additions increased in some cases, due to a fall in prices.*

The JNNSM program has been designed as a three-stage process with targets set under each phase. Phase 1 (up to 2013) focused on capturing available options in solar thermal; promoting off-grid systems to serve populations without access to commercial energy, and making a modest increase in capacity to grid-based systems. Under Phase 2 (2013-2017), 10,000 MW grid-connected solar plants will be implemented, including rooftop and other small-scale applications. For off-grid solar applications, the cumulative target for Phase 2 is 1,000 MW. Besides the national program, solar programs at the state level also exist.

Policy support needs to be comprehensive rather than piecemeal

Even after successfully implementing Phase 1 of the JNNSM, nothing significant happened on Phase 2 till the beginning of 2014. The delay of more than a year brought about stagnancy in the solar industry.

Carbon Credits And Clean Development Mechanisms (CDMs)

The Clean Development Mechanism (CDM) is an arrangement under the Kyoto Protocol. The mechanism allows developed countries with a greenhouse gas (GHG) reduction commitment to invest in projects that reduce emissions in developing countries as an alternative to more expensive emission reductions in their own countries. The developed country gets carbon credits, while the developing country gets capital and clean technology.

India is the second largest seller of carbon credits. However, companies, which had invested in CDM projects, are now facing a real loss due to a major slump in prices that have fallen below one euro per credit. Demand Creation is critical to growing the renewables sector in India. Distribution of power is mostly in the hands of state owned companies. It is from these companies which are regulated by the SERCs that ultimately demand has to be generated.

To do this the Renewable Purchase Obligation targets have to be enforced. Under RPO rules, distribution companies, open access consumers and captive consumers are obligated to buy a certain percentage of their power from renewable sources of energy. Just like China, India must strictly enforce the obligation on distribution companies to purchase power produced from renewable sources and penalize those who fail to meet their targets. The current contribution of renewable energy is 12.5 percent of India's total generation installed capacity. The Ministry of New and Renewable Energy (MNRE) estimates that this contribution will increase to 16 percent or 17 percent by the end of the 12th Five Year Plan in 2017. RPO is one of the tools for implementing this ambitious goal. We believe that going forward; the enforcement of RPO will create the volumes needed for the Renewable Energy Certificate (REC) market.

INFRASTRUCTURAL GROWTH

Land Acquisition

At present most of the acquisition of private land for wind and solar projects occurs through mediations directly with the land owners. This has been identified as a major barrier for renewable projects across India (in reality, all power projects). Additionally, the lead time to acquire land can range from 6 to 12 months to more than a year.[3] There should thus be a single window clearance for all approvals. Land acquisition should become easier through faster forest approvals and ease of use classifications. For solar, revenue land from state governments should be allotted for generation.

Grid Management

To further support the growth of the renewable energy sector, the expansion of transmission infrastructure, for both intra and inter-state, is required. Grid enhance-

[3] *World Bank ESMAP Report on Barriers for Solar Power Development in India, 2010.*

ment and management is the key for integration of wind power. Wind power, both variable and intermittent, stresses the grid. Large-scale wind integration may introduce new patters in the flow of power which could cause congestion in the transmission and distribution networks. To address these issues, planning for the grid and planning for wind power must go hand in hand.

We should develop a robust interstate transmission network to evacuate power, which is currently not optimized in India. In this regard, MNRE and Power Grid Corporation of India Limited (PGCIL) have planned six dedicated green energy corridors to evacuate renewable energy from regions rich in such energy and feed it into other regions. These green energy corridors have also been envisaged to address intermittency and variability aspects as well as grid integration issues of large scale RE generation.

Government should encourage domestic manufacturing with an export oriented mindset

The corridor needs to be rolled out on a priority basis. Mega Park sites also need to be aligned with and in proximity of the green corridor for easy evacuation of RE. The integration of wind power also requires better scheduling and forecasting of wind power generation. It requires that we set up state-of-the-art centralized forecasting centers, which will have to be integrated with supervisory control and data acquisition systems. As wind power installation increases in the country, grid management will become even more important.

Decentralized / Small-Scale Renewables

While the development of large-scale renewable energy has now become a desperate need to sustain and fulfil the energy requirements of the nation, the government should also incentivize setting-up of small renewable energy plants. Because of the remoteness of much of India's un-electrified population, decentralized renewable energy offers the most viable solution for providing basic energy access to all. Off grid or small scale renewables have the potential to support small communities of people and be more appropriate for the immediate surrounding environment.

Research and Development

Research and Development (R&D) in wind and solar sector is poor in India. As most technology is imported into India, there is little encouragement for in-house research, especially in the solar space outside niche academia or research. Government and industry need to develop substantial R&D capabilities within the country to suit the needs of the country's wind and solar power sectors. This can also help keep costs under control.

Encourage Manufacturing

Government should encourage domestic manufacturing with an export oriented mindset by attracting Foreign Direct Investment (FDI), providing capital subsidies or other incentives to manufacturers.

Financing

Achieving and Sustaining Investment Volume (Investment Environment) in India

A variety of investors finance renewable energy projects in India, including institutions, banks, and registered companies. Institutional investors are either state-owned or bilateral or multilateral institutions. Among banks, both private sector and public sector banks are involved. In addition to registered companies, venture capital and private equity investors contribute equity investment. Return expectations of the investors vary according to the sources of their funds and the risk attached to specific projects.

Debt Financing

There is a significant difference between India and the developed world financial markets in terms of cost of

debt. It is a known fact that the cost of domestic debt in India (~13%-13.5%) is significantly higher than that in developed countries (~3.5%-4%).[4] At the same time, it does not make sense for an Indian RE project to opt for foreign lending due to high landed cost of such debt (13%-13.5%), which is primarily attributable to significant hedging cost (8%-10%).

The points below highlight the need to support RE sector in India by facilitating schemes to bring lower cost, long-term debt into the Indian RE market.

Declare Renewable Energy (RE) as Priority Sector

While the country is reeling under power shortage and wind energy is amongst the cleanest energy produced, the hurdles in financial closure for projects are resulting in a delay of projects. This calls for a much greater need to include lending for RE energy projects under the priority lending category for faster implementation. And also to consider a lower interest rate and longer tenure of lending for wind energy sector.

Scheme for Offsetting Hedging Cost for RE Projects

The high cost of debt i.e. high interest rates is amongst the most pressing problems being currently faced by the RE sector in India. Besides, declining availability of debt for RE projects is becoming another impediment; discussions with lenders indicate that many lenders may be reaching the limit for the amount of money they will lend to the RE sector.

Need to facilitate schemes to bring lower cost, long-term debt into the Indian RE market

In this regard, support could be provided by offsetting/subsidizing the high hedging cost through a scheme so that RE project developers can get access to cheaper debts. Needless to say, this would be a big support to the investors and at the same time it would put a lower burden on the government, since hedging would be part of a bigger portfolio of government level forex transactions. RBI or IREDA may provide low-cost foreign exchange hedges at 3-4%.

Custom Duty Exemption

A total exemption for wind project components under the renewable energy sector is recommended. This will help reduce the cost of wind machines and thereby reduce the cost of wind energy. Also, the proposed Anti-Dumping Duty (ADD) on the import of solar cells should not be considered.[5] These recommendations can lead to a complete collapse of the solar sector and impact India's ambitious solar programme of installing of over 22,000 MW (in the process of being upgraded to 100,000 MW) of solar energy by March 2022.

Renewable Energy Certificate (REC) Market

The REC market has been witnessing continuous and drastic downfall since inception. The situation has now reached an alarmingly low level wherein the REC market itself is under the threat of being rendered defunct/extinct in the absence of any support. The Government of India should earmark a fund that would act as market assurance for buyout of unsold inventory of RECs at the floor price at the end of each financial year. Subsequently, these RECs could be resold (to Discoms or obligated entities) as and when the natural demand for RECs improves due to RPO enforcement.

Equity Financing

Equity typically comprises 30% of the total project cost. Strategic investors, venture capital, private equity, tax equity investors are the key providers of equity to RE projects. In India, the hurdle rates for direct equity investments range between 16 and 20 percent and are dependent on several factors, such as the size of the project, background of sponsor, technology risk, stage

[4] *Exact rates vary by country and even within country on a case-to-case basis.*

[5] *In light of the limited manufacturing capabilities within the country, and to encourage the overall sector, the government recently announced they will not implement Anti-Dumpting Duty on solar cells. "No anti-dumping duty on solar cells to lower power cost", Business Standard, New Delhi, December 10, 2014.*

of maturity, and geographic and policy risks. Private equity funds have dominated equity investment in the renewable energy sector in India. Most investments are made in Rupees and typically the funds stay invested for a period of 5 to 7 years.

There is a strong case for the creation of a proper Return on Investment (ROI) environment for more equity investment. New forms of equity capital such as fund raising from international sources and attracting more FDI through long term visibility will go a long way in providing a boost to the RE sector.

If India wants to achieve a total of 100,000 MW by the year 2022, or an increase of 80,000 MW in next 8 years, or 10,000 MW per year, using estimates based on today's numbers, it requires almost 3 billion dollars of equity financing every year and 8 billion dollars of debt financing.

CONCLUSION

If India chooses to place renewable energy sources as a key component of its future power system, major institutional, governance and technical changes would have to be made to make that choice successful. These include a fundamental reassessment, rethink and restatement of the power sector strategy through an explicit recognition of and accounting for the direct and indirect costs and benefits of renewable versus conventional resources. Government should support a robust transformation of power sector planning and continued reduction of the cost of renewable electricity to the buyer over time.