Renewable Energy and Multilateral Development Banks: India Case-Study

By

Shubh Soni

Junior Fellow, Observer Research Foundation, India

1. Introduction - India's Energy Challenge

25% of India's population, or 300 million people[1], do not have access to electricity. India's per capita electricity consumption, computed as a ratio of the estimate of total electricity consumption during the year to the estimated mid-year population of that year, stood at a mere 957 kilowatt-hours (kWh) in 2013-14[2] – in 2011, average per capita electricity consumption in the United States was at 13,240 kWh.[3] While India is the fourth largest consumer of electricity, and the third largest carbon emitter, the sheer scale of its energy poverty continues to be a serious challenge to its developmental objectives. Moreover, poverty, and energy poverty, are mutually reinforcing - The World Energy Outlook Report 2002, for example, concludes that lack of access to electricity and dependence on fuels such as biomass are positively correlated to poverty and hinder poverty reduction programmes.

In its Intended Nationally Determined Contributions (INDCs), India recognizes that its electricity demand is set to increase from 776 TWh in 2012, to 2499 TWh in 2030.[4] This increase in demand is borne out of the country's efforts to industrialize, eradicate poverty and provide its population with better living standards. This industrialization will require bolstering the manufacturing sector, building reliable infrastructure, and ensuring rapid urbanization. The challenge facing India therefore is to "Grow Coal", i.e. much of its development needs will be predicated upon coal and fossil fuels, while at the same time "Go Green", i.e. it will need to rapidly scale up its renewable energy sector to ensure its development is sustainable and to do its part in the action against climate change.

To achieve both these objectives, a significant increase in international financial and technological flows would be required. Up until 2010, all of India's coal-fired power plants used subcritical technology for power generation. As a result, the average efficiency of these plants was 28%, as compared to 36% in China and 33% in the United States. In turn, the emissions from India's coal plants are around 1100 grams of CO2 per kWh, well above the most efficient plants in the world at 750 grams. Moreover, Indian plants continue use poor quality, high ash, Indian coal, which not only compromises efficiency, but also reduces plant availability as significant time is devoted towards maintenance.[5] Given India's structural dependence on coal, and given that much of its development imperatives will be met through a coal-based economy, international financial flows, which target improved technology in the sector, would go a long way in increasing efficiency, and thereby reducing emissions.

While much of India's development will rely on coal-based plants, the government has recognized the "20th century model of development" is no longer an option. Given this reality, the government is eager to show its leadership in renewable energy consumption. India is today the world's largest biomass, third-largest solar, and fourth-largest wind energy producer. Further, the average Indian spends about one and a half times what the average Chinese spent, between 2.2 and 4.3 times what

[1] https://www.washingtonpost.com/graphics/world/world-without-power/
[2] http://www.livemint.com/Industry/jqvJpYRpSNyldcuUlZrqQM/Indias-per-capita-electricity-consumption-touches-1010-kWh.html
[3] http://data.worldbank.org/indicator/EG.USE.ELEC.KH.PC
[4] http://www4.unfccc.int/submissions/INDC/Published%20Documents/India/1/INDIA%20INDC%20TO%20UNFCCC.pdf
[5] http://www.industry.gov.au/Office-of-the-Chief-Economist/Publications/Documents/Coal-in-India.pdf

the average Japanese spent, and around 2 times what the average American spent as a percentage of their income on renewable energy.[6] The document put forth before the UNFCC highlights that between 2002 and 2015, the share of renewable grid capacity has increased over 6 times, from 2% (3.9 GW) to around 13% (36 GW). The government now is looking to leverage this momentum to significantly scale up the renewable energy sector to achieve the target of 175 GW renewable energy capacity in the next few years.[7]

In addition to financing energy generation from both coal and renewable sources, India needs significant investment in energy transmission and distribution. Losses in transmission and distribution (T&D) of energy can be defined as that proportion of electricity which is generated, but does not reach the end consumer. India currently has one of the highest levels of transmission and distribution losses in the world – 20% of energy generated counts as T&D loss, twice as much as the world average, and nearly three times as large as those in the United States.[8] Reasons for such loss are two-fold – (i) Technical Loss; and (ii) Theft. Some of the reasons for both are highlighted below.[9]

- Technical Loss - Inadequate investment on transmission and distribution, particularly in sub-transmission and distribution; Haphazard growths of sub-transmission and distribution system with the short-term objective of extension of power supply to new areas; Large scale rural electrification through long 11kV and LT lines; Improper load management; Inadequate reactive compensation; and Poor quality of equipment used in agricultural pumping in rural areas, cooler air-conditioners and industrial loads in urban areas.
- Theft - Making unauthorized extensions of loads, especially those having "H.P." tariff; Tampering the meter readings by mechanical jerks, placement of powerful magnets or disturbing the disc rotation with foreign matters.; Stopping the meters by remote control; Willful burning of meters; Changing the sequence of terminal wiring; and Bypassing the meter.

With technologies available to counter technical loss, and international best practices available for managing theft, reducing T&D losses is serves as a low hanging fruit to solve a significant proportion of energy challenges.

2. Barriers to Renewable Energy Development in India

In its INDCs, India has put forth ambitious targets on the renewable energy front – the government has committed "*To achieve about 40 percent cumulative electric power installed capacity from non-fossil fuel based energy resources by 2030 with the help of transfer of technology and low cost*

[6] http://www.brookings.edu/blogs/planetpolicy/posts/2015/05/05-indian-leadership-climate-change-saran-sharan

[7] http://www4.unfccc.int/submissions/INDC/Published%20Documents/India/1/INDIA%20INDC%20TO%20UNFCCC.pdf

[8] http://www.eia.gov/todayinenergy/detail.cfm?id=23452

[9] http://www.teriin.org/upfiles/pub/papers/ft33.pdf

international finance including from Green Climate Fund".[10] On specific renewable sources, the following commitments have been made:-

- **Wind Energy –** 60 GW of installed capacity by 2022, which has the potential to be scaled up to 100 GW.
- **Solar Energy –** 100 GW of installed capacity by 2022.[11] The Ministry of New and Renewable Energy expects to achieve 20,000 MW of installed capacity by March 2017.[12]
- **Biomass Energy –** 20 GW of installed capacity by 2022, by from 4.4 GW in September 2015.[13]
- **Hydropower –** While there is no specific commitment on Hydropower, the government recognizes there is enough potential to scale up installed capacity to 100 GW, from the current levels (Sept. 2015) of 46.1 GW.[14]

These ambitious commitments have been well received by the international community and re-affirms India's position as a global leader on climate action. In fact, as noted by eighteen civil society groups in a study titled "Fair Shares: A Civil Society Equity Review of INDCs", the national declarations of the developed world have failed to impress, while the commitments of certain developing countries such as India have exceed their 'fair share' of emission cuts.[15]

While India's commitments are certainly aggressive, there exist significant hurdles, both in the international framework, and in domestic capabilities.

2.1 International Barriers

2.1.1 International Trade

The major success of the Conference of Parties 21 (COP 21) at Paris was that the international community at the highest levels recognized the immediate dangers posed by climate change and the urgency with which all actors needed to respond to this challenge. This green transition which individual countries have agreed to brings with it certain costs - the market determined cheapest source of energy, i.e. coal and fossil fuels, is no longer an option.

The need to move away from fossil fuel based economies has meant increased investment in renewable energy. Since the renewable energy sector is still nascent, particularly in the developing world, significant government support has been provided to domestic manufacturers – be it in the

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[10] http://www4.unfccc.int/submissions/INDC/Published%20Documents/India/1/INDIA%20INDC%20TO%20UNFCCC.pdf

[11] ibid

[12] http://economictimes.indiatimes.com/industry/energy/power/solar-power-target-achievable-capacity-to-hit-20000-megawatt-by-fiscal-year-2017/articleshow/51038837.cms

[13] http://www4.unfccc.int/submissions/INDC/Published%20Documents/India/1/INDIA%20INDC%20TO%20UNFCCC.pdf

[14] http://www4.unfccc.int/submissions/INDC/Published%20Documents/India/1/INDIA%20INDC%20TO%20UNFCCC.pdf

[15] https://www.sei-international.org/mediamanager/documents/Publications/Climate/SEI-DB-2014-INDCs-equity-analysis.pdf

form of subsidies, tax benefits, feed-in-tariffs, etc - to ensure the long-term viability of the industry. In addition, political leaders have been compelled to justify to their constituencies, not just from an environmental but also an economic perspective why this transition is necessary. And one such mechanism is to guarantee a robust domestic renewable industry which will not only reduce emissions, but also provide jobs and profits.

This need to create a domestic economic ecosystem around renewable energy is in direct conflict with the international trading regime as enshrined under the WTO. The "national treatment" principle of the WTO calls for equal treatment of products, irrespective of where they are sourced from i.e. imported goods must be treated on par with ones produced locally. Additional principles, which look to promote fair competition and non-discrimination, including subsidies and dumping regulations, are aimed at creating a level playing field.[16] As a result, "government interference" has been found to be in violation of World Trade Organization norms and multiple disputes have been taken to the Organisation's Dispute Settle Body (WTO DSB). Moreover, individual countries have taken unilateral action against their global counterparts in the form of anti-dumping duties and countervailable subsidies.

2.1.2 International Financial Norms

The Basel III Accords, the latest set of international banking standards from the Basel Committee on Banking and Supervision, are designed to create a more resilient and robust international banking system with a suite of capital adequacy, leverage, and liquidity requirements.[17] However, as result of these requirements, financing renewable projects in particular has become increasingly difficult. One such example is that of the Liquidity Coverage Ratio, which came into effect from January 2015 and is to be increased annually by 10%.

The objective behind this ratio is to promote short-term resilience to liquidity disruptions. It ensures that the stock of unencumbered high quality assets that can be converted into cash is sufficient to cover the bank's liquidity needs for 30 calendar days under a predefined short-term stress scenario.

$$\frac{\text{Stock of high quality liquid assets}}{\text{Net cash outflows over a 30 day period}} \quad >=60\%$$

Given this situation, for banks it will become increasingly difficult to fund capital intensive renewable energy projects as holding such assets will not help improve its stock of high quality liquid assets as these projects, financed through project finance or special vehicles, do not qualify under this category. Moreover, renewable energy projects financed through project finance and special purpose vehicles, worsen the bank's liquidity ratio as liquidity facilities are made available (for instance during the construction phase) because it strengthens the denominator while leaving the numerator untouched.[18]

2.1.3 Technology Flows

[16] http://www.mitpressjournals.org/doi/pdf/10.1162/GLEP_a_00255
[17] https://financere.nrel.gov/finance/content/whos-afraid-basel-iii
[18] The likely impact of Basel III on a bank's appetite for renewable energy financing by Patrick A. Narbel

Michele Boldrin and David K. Levine, two economists from Washington University, St. Louis, have highlighted how the current patent/copyright system discourages inventions from actually entering the market. They go on to state that the IPR system only helps large corporations and multinational corporations (MNCs) rake up profits, noting that the majority of patents are registered by corporations rather than individual innovators. Boldrin has termed intellectual property as "intellectual monopoly," arguing that it hinders innovation and wealth creation.[19]

The international intellectual property rights (IPR) regime has often been sighted as a barrier to technology transfer in the renewable energy sector. During the deliberation of the Bali Action Plan in 2008, post the Conference of Parties in Bali in 2007, a number of developing nations stressed the need to address the IPR challenge – India argued that the full potential of technological advancement would require a framework across the technology cycle, from R&D to deployment. On IPR specifically, India argued that technology transfer should be aided through a suitable IPR regime. Many studies have shown the negative impact of IPR on technology transfer – Watal in 1998 who highlighted through two cases the effect of IPR on technology transfer in India in the context of the Montreal Protocol to protect the Earth's ozone layer; Ockwell et.al. in 2007 studied Light Emitting Diode (LED) lighting technology and the transfer barrier India faced to access these. On IPR they concluded "Another barrier relates to the IPR issue associated with LED manufacturing. It is a highly protected technology. As there are various processes involved in manufacturing LED chips, each process is patented and requires huge investment. At present, the cost of investing in both chip manufacturing and resolving IPR issues is substantially high compared to importing the chips".[20]

2.2 Domestic Barriers

2.2.1 Institutional Capability

Institutional capability includes the capacity of institutions to carry-out projects, human knowledge and the requisite skill-set of personnel, and availability of data to guide policy making. There exist significant gap on all three fronts in India's renewable energy sector.

- **Institutional Capability –** In India, doing business is not easy - The World Bank's Ease of Doing Business study ranked India 155 out of 189 countries in 2016, a marginal improvement from its 2015 ranking of 164.[21] One major impediment to doing business in India is the number of clearances required to carry out projects, and the lack of a single authority that can approve these. For renewable energy projects, State Nodal Agencies play a critical role in the approval process of clearances – these agencies are supposed to act as a single window agencies which facilitate approval from different line ministries, from pollution control to fisheries. In practice however, the onus of getting the clearance is on the project developer and not the State Nodal Agency. Land acquisition in particular has been cumbersome – for instance as per the Land Acquisition and Rehabilitation & Resettlement Act, 2013, 'agricultural land' cannot be acquired - this has to be converted into 'non-agricultural land' before acquisition can take place. The entire process of identifying suitable

[19] https://source.wustl.edu/2009/03/economists-say-copyright-and-patent-laws-are-killing-innovation-hurting-economy/
[20] http://www.twn.my/title2/IPR/pdf/ipr14.pdf
[21] http://www.doingbusiness.org/data/exploreeconomies/india/

land, then converting from 'agricultural' to 'non-agricultural' and then finally acquisition can take months, if not years.[22]

- **Knowledge and Skill Set –** The skills required to ensure smooth function of renewable energy are different from those required for conventional sources. Grid integration of intermittent sources of energy is particularly challenging in India. For instance, the state of Tamil Nadu, which has 40% of India's wind resource, has been unable to scale down electricity generation as it has often faced grid congestion. State load dispatch centres, which are responsible for integrated operation of the power system need to be equipped with the latest forecasting systems and tools for effective and efficient management of the grid. Moreover, skills of the personnel responsible for grid management also need to be updated at a regular basis.[23]
- **Data Availability –** Reliable, consistent, and easily accessible data are pre-requisites for sound policymaking. In renewable energy, data on resource pricing patterns is crucial for regulators to set tariffs. While the Union Ministry of New and Renewable Energy has taken significant steps to address this issue, much more needs to be done. For instance, MNRE in collaboration with the Indian Institute of Science, set up the Biomass Resource Atlas to identify the resource potential of biomass, particularly for power generation.[24] The website is blank and has no data.[25] Moreover, state nodal agencies too haven't kept pace – they still do not maintain a comprehensive data bank or knowledge repository on renewbales.

2.2.2 Non-Compliance with Regulation

As per government regulation, State Electricity Regulatory Commissions (SERCs) are required to implement Renewable Purchase Obligations (RPOs). RPO is a mechanism under which electricity distributors can either generate a minimum percentage of renewable energy or purchase Renewable Energy Certificates (RECs) to make up for shortfalls.[26] It has however been witnessed that RPO regulations are seldom complied with. As per a study by the Indian Energy Exchange, as many as 16 states have reported compliance of less than 70% - 9 states reported compliance of less than 50%. RECs as substitute mechanism too hasn't worked - 62 lakh RECs remaining unsold in Indian Energy Exchange(IEX) in the 2014-15.[27] There is a need therefore to either ensure strict penalties are imposed and States are forced to comply with these regulations, or then to have a re-look at whether the regulation itself is feasible in the long-run.

2.2.3 Financial Constraints

The biggest financial constraint facing the renewable energy industry is that of debt - for a variety of reasons, debt is either too expense or simply unavailable. Some of the factors leading such a situation are detailed below:

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[22] http://indiacode.nic.in/acts-in-pdf/302013.pdf
[23] http://www.teriin.org/projects/nfa/pdf/working-paper-14-Governance-of-renewable-energy-in-India-Issues-challenges.pdf
[24] http://www.cseindia.org/agenda2010/pdf/Biomass%20Resourse%20Atlas.pdf
[25] http://lab.cgpl.iisc.ernet.in/Atlas/
[26] http://www.pv-tech.org/news/india_ramps_up_renewable_purchase_obligations_target
[27] http://indianexpress.com/article/business/business-others/green-power-quota-16-states-post-below-70-compliance/

- **High Interest Rate –** India currently faces a significant infrastructure deficit – according to former Finance Minister, India has a one trillion dollar infrastructure deficit just for the next five years (2013-18).[28] This increased investment in infrastructure needs to be managed with inflationary pressures facing the economy and as a result, benchmark interest rates in India are higher than those in developed economies. In fact, post the economic crisis developed countries significantly lowered their benchmark interest rates to revive their economies. In India on the other hand, interest rates continue to remain high in light of increased borrowings for infrastructure and other government needs.[29]
- **Lack of Long-Term Debt Instruments –** There are two key reasons for the unavailability of long-term debt – first, banks are the predominate source of financing infrastructure projects as the corporate bond market is significantly under-developed. Bank in turn are unable to fund long term projects such as those required in the infrastructure as the majority of deposits in Indian banks are for a short duration – as of March 2015, 90% of deposits of scheduled commercial banks were for a duration of less than five years, whereas infrastructure projects are upwards of ten years.[30] Second, India has a very weak bond market – as of 2013, Government and Corporate bonds stood at 54.5% of India's GDP, with corporate bonds accounting for only 5.4%. In comparison, bond market in Hong Kong stood at 69.2% of GDP (corporate bonds accounted for 31.4%), in South Korea at 126.2% of GDP (corporate bonds accounted for 77.5% of GDP), and in Malaysia at 105.5% (corporate bonds accounted for 43.1% of GDP).[31] A string of government regulation, from taxation, to the lack of a bankruptcy code (though this has now been enacted), have meant the bond market in India continues to struggle.[32]
- **Limited Fixed Interest Rates –** Due to the asset-liability asymmetry and a weak bond market, loans are commonly sanctioned on variable, rather than fixed, interest rates. As a result, cash flows to equity holders (project cash flows less interest payment to debt holders) is less certain as it is subject to change depending upon the interest rate.[33]
- **Availability of Debt –** There are a number of reasons for the unavailability of debt in India, particularly for the renewable energy sector. For instance, banks have sector limits to specific markets and as the renewable sector picks up pace, many banks are close to reaching their sector limits. Moreover, renewable energy falls under the power/energy sector and this is requires heavy borrowing. The renewable energy sector is also deemed 'novel' with immature technology and uncertain regulation leading to limited to no lending at all.[34]

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[28] http://timesofindia.indiatimes.com/business/international-business/India-has-1-trillion-infrastructure-deficit-Chidambaram-tells-World-Bank/articleshow/19660814.cms

[29] http://climatepolicyinitiative.org/wp-content/uploads/2012/12/Meeting-Indias-Renewable-Targets-The-Financing-Challenge.pdf

[30] https://rbidocs.rbi.org.in/rdocs/Publications/PDFs/T_12465454829E09F4D9BA5790C9811EE5F75.PDF

[31] http://www.iimb.ernet.in/research/sites/default/files/WP%20No.%20450.pdf

[32] http://www.iimb.ernet.in/research/sites/default/files/WP%20No.%20450.pdf

[33] http://climatepolicyinitiative.org/wp-content/uploads/2012/12/Meeting-Indias-Renewable-Targets-The-Financing-Challenge.pdf

[34] http://climatepolicyinitiative.org/wp-content/uploads/2012/12/Meeting-Indias-Renewable-Targets-The-Financing-Challenge.pdf

There are a number of other factors that limit the flow of debt to the renewable energy sector. India has limits on foreign lending, in the form on interest rate ceilings and capital controls; there are technological risks associated with the sector; and the fact that State Electricity Boards (SEBs), which act as counterparties to Power Purchasing Agreements as they are responsible for purchasing power that is generated and selling to final consumers, are severely cash strapped and often bankrupt.[35]

3. MDBs and Energy Finance in India

3.1 World Bank

The World Bank has been an important source of finance for India's development needs. As per a report published by the Bank earlier this year, India has been the largest recipient of its loans (USD 102.1 billion) ever since the Bank's inception in 1945 (till July 2015).[36] The Bank's loans have primarily focussed on rural and urban development projects pertaining to transport, water and irrigation, health, power, and agriculture. The following illustrates a sector-wise breakup of the Bank's projects in India from 2011-2015 (complete table in Annexure):-

Sector	Number of Projects
Sub-national government administration	18
Other social services	17
Rural and Inter-Urban Roads and Highways	14
General agriculture, fishing and forestry sector	13
Central government administration	10
Agricultural extension and research	9
Agro-industry, marketing, and trade	9
General water, sanitation and flood protection sector	9
Health	9
Irrigation and drainage	9
Public administration- Transportation	9
Water supply	8
Public administration- Water, sanitation and flood protection	7
Animal production	6
Flood protection	6
Public administration- Agriculture, fishing and forestry	6
Sanitation	6

While these projects cut across sectors, the primary focus has been on improving government administration, both at the national and sub-national level. In the infrastructure sector, Roads & Highways, and Water & Sanitation have been given prominence.

Over the past 5 years, only 9 projects in the energy sector have been commissioned by the Bank. Of these 9, the "Development Policy Loan (DPL) to Support Inclusive Green Growth and Sustainable Development in Himachal Pradesh" project looks to support the State government in the improved

[35] http://climatepolicyinitiative.org/wp-content/uploads/2012/12/Meeting-Indias-Renewable-Targets-The-Financing-Challenge.pdf

[36] http://www.business-standard.com/article/specials/india-largest-recipient-of-world-bank-loans-over-70-years-116011300637_1.html

management of its natural resources across growth engines, with a focus on energy, watershed management, and industry & tourism. For the first phase of this project, the bank commissioned USD 100 million from IBRD and used these resources to leverage another USD 100 million from the Clean Technology Fund (CTF) for DPL 2.

"The Partial Risk Sharing Facility in Energy Efficiency" project, which has been commissioned twice, once for USD 18 million and once for USD 25 million, looks to assist India in achieving energy savings by mobilizing commercial finance and through participation of energy service companies. The project is managed by the Small Industries Development Bank of India (SIDBI), and funded through the Green Environment Facility and backstopped by the CTF.

The Bank also commissioned the "Scaling Up Deployment of Renewable Energy Technology for Promoting Innovative Business Models" project for USD 1.10 million to support preparation of sustainable and replicable business models that are both entrepreneur driven and delivery based, for providing energy solutions to rural areas using renewable energy technologies.

3.2 Asian Development Bank

The Asian Development Bank Country Partnership Strategy (CPS) for India for the period 2013-2017 is guided by five principles - (i) respond to client demands, (ii) expand and incorporate lessons from past work that was done well, (iii) take advantage of ADB's strengths and align with Strategy 2020 priorities, (iv) avoid duplicating work done well by others, and (v) ensure innovation and value addition. These principles are based on India's Twelfth Five Year Plan, the key features of which include Faster Growth, Inclusive Growth, and Sustainable Growth. To help achieve these objectives, the CPS has identified five core areas:-

- **Infrastructure development**
- **Job creation and access to jobs**
- **Regional connectivity**
- **Environmental sustainability**
- **Synergies (with government initiatives)**

Given the core thrusts of the ADB, the table below maps the projects funded in India from 2011-2015. Unlike the World Bank, the ADB has restricted its scope to specific sectors, particularly infrastructure. Within infrastructure, energy has been given prominence with 53 of the 184 projects financed having an energy component.

Sector	**Number of Projects**
Energy	53
Transport	44
Water and other urban infrastructure services	36
Finance	14
Education	12
Agriculture, natural resources and rural development	8
Public Sector Management	7
Industry and Trade	4
Health	4

Multisector	1
Information and Technology	1
Total	184
Source: http://www.adb.org/projects/search/country/ind	

The ADB has targeted two critical areas of the energy sector - (i) energy generation primarily through renewable sources, particularly solar energy; and (b) improving India's energy transmission and distribution. The two most common modalities of assistance have been in the form of loans and technical assistance to Government programmes, both at the national and sub-national level. For projects pertaining to energy generation, the ADB has provided financial assistance in the form of loans, as well as equity investment. Some of these projects are highlighted below.

For the "Madhya Pradesh Power Transmission and Distribution System Improvement Project", ADB commissioned a loan of US$ 350.00 million. Through this project, the ADB will fund about 1,800 circuit kilometers of transmission lines and more than 3,100 circuit kilometers of distribution lines, and construct or upgrade substations.

The ADB has also leveraged its resources to tap into international funds – for instance, for the "Rajasthan Renewable Energy Transmission Investment Program", which looks to improve the electricity transmission systems in Rajasthan in help develop renewable energy in the country, the ADB commissioned USD 300 million from its ordinary capital resources and raised another USD 200 million from the Clean Technology Fund. This project had components of both technical assistance, and financial support in the form of a loan.

The ADB also made an equity investment of USD 50 million in ReNew Power Ventures Pvt Ltd. The "ReNew Power Investment Project", involves the construction and operation of at least 1,000 MW of renewable power generation, across various states in India. ADB''s investments will be used to partially fund the ReNew Power Ventures Private Limited (ReNew or the Company) equity injection in the pipeline portfolio of at least 560 megawatts (MW) of additional wind power capacity energy projects.

4. Financing Mechanisms and Models used by MDBs – Encourage Pvt. Finance? Scale of complimentary Pvt. Finance?

The ADB has looked to address two of India's energy requirements, namely, investment in renewable energy, and in improving electricity transmission and generation, with the latter being assigned more projects. Financing has primarily been done through loans or technical assistance, and often a combination of the two. The ADB has also combined its resources with those of the Clean Technology Fund, and other development banks (such as the KfW Bankengruppe), to support projects in India.

Of the 53 projects analysed, 50 had a loan component. While sub-national governments have been the primary recipients, loans have also been extended to the national government, state-owned corporations, and private sector organizations. The loans commissioned under the ADB LIBOR-based loans come with a lower interest rate when compared to other international lenders – ADB's offers 6

month LIBOR + 0.60% less permanent credit of 0.20%;[37] in comparison, many international agencies find the Indian government's interest rate cap at 6 month LIBOR + 3% for three to five year loans and six-month LIBOR + 5% for loans longer than five years, unfavourable as it is deemed too low.[38]

The ADB has also taken significant steps to mobilize private finance for renewable energy. For instance, in 2014, the Bank extended a loan of USD 200 million to YES Bank, India's fourth largest private sector bank, to finance working capital and investment loans targeted towards small farm households and rural women self-help groups. These funds helped YES Bank issue India's first ever Green Infrastructure Bonds, raising an amount of INR 1000 crore (approx USD 150 million). The amount raised will be used to finance Green Infrastructure Projects in Renewable Energy including Solar Power, Wind Power, Biomass, and Small Hydel Projects. [39][40]

The biggest step to mobilize private finance however has been the ADB's support to the Credit Enhancement Scheme of the India Infrastructure Finance Company Ltd. (IIFCL), a govt. of India enterprise. Under this scheme, IIFCL provides credit guarantee to the extent of 20% of the total project cost, and up to 40% with a backstop guarantor.[41][42] In Sept. 2015, the first bond issues under this scheme were launched - ReNew Wind Energy issued Rs. 451 crore worth of bonds with Infrastructure Development Finance Company, and Hindustan Power issued bonds worth Rs 380 crore with YES Bank. For both these bond issues, the IIFCL would provide the first partial loss credit guarantee to the bondholders along with an irrevocable backstop guarantee from the ADB.[43]

5. Incorporating sustainability into project life cycle – focus on capacity building

Over the course of the five years, the ADB implemented 21 projects with a technical assistance (TA) component. The following table details the various forms a TA project can take:-

TA Type	TA Subtype	Definition
Single TA	PPTA	Project preparatory technical assistance (PPTA) is TA for project preparation. PPTA may be processed for a standalone project or program, or a sector development program; a subprogram under the program cluster approach; single sector lending for a series of subprojects; or a multitranche financing

[37] http://www.adb.org/sites/default/files/institutional-document/33775/libor-based-loans-overview.pdf
[38] http://climatepolicyinitiative.org/wp-content/uploads/2012/12/Meeting-Indias-Renewable-Targets-The-Financing-Challenge.pdf
[39] https://www.yesbank.in/media-centre/press-releases/fy-2014-15/yes-bank-successfully-issues-india-s-first-green-infrastructure-bond.html
[40] https://www.yesbank.in/media-centre/press-releases/fy-2014-15/yes-bank-raises-usd-200-mn-unsecured-loan-from-asian-development-bank.html
[41] http://www.iifcl.co.in/Content/ceps.aspx
[42] the extent of guarantee / credit enhancement extended by IIFCL to any infrastructure project for its project bonds shall be limited to the extent which enhances the credit rating of the project bonds to its desired credit rating (minimum AA rating) subject to a maximum of 50% of the total amount of Project Bonds issued
[43] http://www.business-standard.com/article/companies/iifcl-s-credit-enhancement-debuts-with-renewable-energy-issuance-115092301088_1.html

		facility comprising a series of tranches.
	PATA	Policy and advisory technical assistance (PATA) covers TA to finance sector, policy, and issues oriented studies. It may be on a stand-alone basis or accompanying a project. In some cases it may be project-specific. PATA assists in (i) preparing national and sector development plans and programs, particularly in small DMCs; and (ii) carrying out sector-, policy-, and issues-oriented studies
	CDTA	Capacity development technical assistance (CDTA) undertakes institutional and organizational capacity development and supports implementation, operation and management of ADB-financed projects. CDTA assists in (i) establishing or strengthening organizations and institutions in DMCs; (ii) implementing, operating, and managing ADB-financed projects; and/or (iii) enhancing knowledge management.
	RDTA	"Research and Development TA (RDTA) involves TA activities conceived to address global or regional development issues which require further analysis or understanding. RDTA is usually processed by the Economics and Research Department, Office of Regional Economic Integration, or Regional and Sustainable Development Department, collaborating closely with other departments. However, in some cases a regional or some other department may lead an RDTA activity, if the regional or other department has specific expertise or is in charge of a focal area.
Cluster TA	• C-PATA • C-CDTA • C-RDTA	Cluster Technical Assistance (C-TA) is group of TAs which includes PATA, CDTA and RDTA and are processed as C-PATA, C-CDTA and C-RDTA which are explained above. Approval of C-TA means approval to all TAs included in it.
Regional TA (RETA)	• R-PPTA • R-PATA • R-CDTA	If a PPTA, PATA, or CDTA covers more than one Developing Member Country (DMC) it is processed as regional TA (R-PPTA, R-PATA or R-CDTA).
Small Scale TA (SSTA)	• S-PPTA • S-PATA • S-CDTA • S-RDTA	PPTA, PATA, CDTA, and RDTA can be in the form of small-scale TA (S-PPTA; S-PATA; S-CDTA or SRDTA). TA is considered small-scale if ADB financing does not exceed $225,000 and the TA does not require substantial logistical support from the recipient. Small-scale TA is a useful and convenient means of rapidly providing expertise. Small-scale TA is most appropriate for (i) updating feasibility studies; (ii) initiating or completing project preparation work; (iii) addressing narrowly defined development issues; and (iv) financing assessments in an emergency situation as a rapid response tool.
Source: http://finmin.nic.in/the_ministry/dept_eco_affairs/MI/Types_ADB_TAs.pdf		

Normally, ADB finances TA projects on a grant basis – unless detailed engineering services are required as part of a PPTA. TA's given to private organizations on a grant basis are subject to arrangements for recovery of the full cost of the PPTA to the extent that the TA results in further financial assistance from ADB.[44]

Capacity building has been a significant component of the larger projects funded by ADB in India. The Himachal Pradesh Clean Energy Transmission Investment Program, for which the ADB provided a USD 350 million loan, brought with an additional USD 600,000, for a capacity building component which sought to benefit Himachal Pradesh Power Transmission Company Ltd. (HPPTCL), the state's transmission utility. The objective was to reform the power sector, including the formation of an independent transmission utility.

In addition to the existing projects in the state, the ADB financed the Madhya Pradesh Power Transmission and Distribution System Improvement Project, a USD 750,000 TA; the project recognized that the quality of power and reliability of service in MP are significantly below-par when compared to modern networks, and required improvement - particularly investments on upgrades and reconfiguration of the medium and low voltage distribution networks. The objective then was to provide adequate transmission and distribution capacity to supply growing power demand and reduce the system losses to ensure financial sustainability of the MP power distribution companies.

6. Conclusion

As can be seen from the above sections, renewable energy will form a core thrust of India's INDCs, and also of the India specific country strategies of the World Bank and the Asian Development Bank. Speaking with the Department of Economic Affairs, Ministry of Finance, India, the author was informed of significant scale-up in the activities of both these MDBs on the renewable energy front. The World Bank's US$ 625 million support on May 13, 2016, to the Govt. of India's roof-top solar panel project was highlighted as a case in point.[45]

There are also two new entrants, the New Development Bank and the Asia Infrastructure Investment Bank that will be funding renewable projects in India. In fact, the first tranche of loans of the New Development were announced in April this year and India received USD 250 million towards renewable energy with the aim of generating 500 MW of renewal energy and savings of about 800,000 tonnes of carbon emissions. [46]

The ADB and the World Bank have therefore ticked off two of three boxes of India's energy requirements, namely, investment in renewable energy, and in improving electricity transmission and generation. However both these agencies are reluctant to fund coal projects. The World Bank has issued a statement stating it does not see coal as a source to cure global poverty.[47] The ADB too

[44] http://www.adb.org/sites/default/files/institutional-document/31483/omd12.pdf
[45] http://www.worldbank.org/en/news/press-release/2016/05/13/world-bank-approves-625-million-to-support-grid-connected-rooftop-solar-program-in-india
[46] http://www.business-standard.com/article/economy-policy/india-to-get-250-mn-for-renewables-from-brics-new-development-bank-116041500441_1.html
[47] http://www.theguardian.com/environment/2015/jul/29/world-bank-coal-cure-poverty-rejects

has made it clear it will only fund selected coal based projects.[48] This is particularly of concern to India as the country is still structurally dependent on coal – in fact, at the Paris COP 21, the Indian delegation made it clear its ambitions to double energy production from coal will not be thwarted.[49] Given that that India's coal sector currently doesn't deploy international best practices and technologies (as highlighted in the previous section), a change in World Bank policy is needed to fully meet India's energy challenge.

It is also worth mentioning that the scope of the MDBs is limited and certain challenges, both at the international and domestic level, need to be addressed if the global ambitions around climate change and clean energy are to be met. At the international level, the conversations around trade and banking norms need to incorporate infrastructure development needs of developing nations. At the national level, institutional capabilities need to be enhanced to provide for a robust eco-system which allows renewable energy development.

7. Policy Recommendations

While significant investment has been made by existing MDBs in renewable energy generation, in improving transmission and distribution, and in building capacities of both personnel and institutions, the following three policy areas have been identified to further catalyze the renewable energy sector in India :-

1. **New and Additional Private Capital for Renewable Energy Projects –** As noted earlier, the World Bank has committed US$ 650 million towards India's roof-top solar panel project. More recently, the World Bank also committed to provide $1 billion support to Indian solar energy projects under the International Solar Association, which is led by India.[50] While such significant investment is welcome, the concern is that such large investment can potentially crowd-out private players looking to make similar investment. A more efficient utilization of World Bank resources would entail catalyzing international private finance, be it in the form of commercial finance or channelling long-term finance such as Sovereign Wealth Funds and Pension Funds, through co-financing mechanisms, rather than financing entire projects on its own. Multilateral Banks could achieve this objective by making co-financing a part of their corporate score-sheets (thus incentivizing their employees to tap private resources), and by simply having an internal guideline which states for every dollar invested by the Multilateral Bank in a specific project, it must raise two dollars from the private sector. By implementing these policies internally, Multilateral Banks can significantly raise quantum of finance towards renewable energy, increase the number of sources of finance, and increase the number of projects they fund (as it frees up the Bank's own resources).
2. **De-Risking –** The World Bank and the Asian Development Bank's support to the Credit Enhancement Scheme of the India Infrastructure Finance Company Ltd. (detailed earlier) is a step in the right direction. There currently exist numerous infrastructure projects, including

[48] http://www.livemint.com/Industry/lrdKk3sYCDsl7sQWtLzfBI/For-India-Chinabacked-lender-may-be-answer-to-coal-investm.html
[49] http://www.theguardian.com/environment/2015/dec/14/india-says-paris-climate-deal-wont-affect-plans-to-double-coal-output
[50] http://www.business-standard.com/article/economy-policy/indian-solar-energy-to-get-1-bn-from-world-bank-116063000413_1.html

renewable energy projects, which do not receive adequate funding since the credit rating of such projects is too low. MDBs, by providing the minimum level of back-stopping support which would increase the credit rating of these projects, MDB finance can play a critical role in scaling up renewable energy efforts. To give de-risking a further push, all MDBs should pool in resources to set up a credit enhancement mechanism which would target specific projects to improve their credit worthiness.

3. **Research & Development** – India's R&D sector lags behind other developed and other economies – as of 2013, India produced only 366 R&D personnel per million population, spent 0.85 percent of GDP on research activities (global average stood at 1.8 percent), and researchers were paid 22-percent less than they would have been if they worked in other sectors.[51] Given the need for technological innovation in renewable energy, and the fact that technology transfer from the developed countries remains a challenge, investment in R&D in the form of collaborative efforts with Indian universities and institutions, presents an opportunity for the MDBs to promote innovation in India which would not only produce localised solutions, but also contribute to the larger technological advancement in renewable energy.
4. **Micro, Small and Medium Enterprises –** India is heavily reliant on Micro, Small and Medium Enterprises - as of 2012, the MSME sector employed over 69 million people and accounted for 45% of industrial output and 40% of exports. Further, the contribution of the sector to GDP had been growing at 11.5%, faster than the rate of overall GDP growth.[52] The rapid growth of the sector has been accompanied by its increasing share in the country's emissions- reports suggest the SMEs are responsible for 30% of India's pollution.[53] The major stumbling block when it comes to financing green projects of SMEs is the lack of knowledge and expertise on both the demand and supply side. On the demand side, most SMEs are unaware of avenues of finance that can be leveraged for improved environmental performance. As for the supply side, financial institutions lack the expertise to quantify and administer risk profiles of SME financing needs regarding green projects. There does not exist systems, processes and policies to roll out new products within financing and lending portfolios. Specifically, understanding how products such as green loans are placed within the traditional lending portfolio represents the biggest challenge faced by personnel of financial institutions at local branch offices. MDBs can therefore specifically target capacity building programmes for both SME firms and India's financial sector to increase green lending to firms that have so far not had access to such finance.

[51] http://www.business-standard.com/article/specials/india-lags-emerging-world-in-research-imperils-innovation-115043000474_1.html

[52] http://www.ifc.org/wps/wcm/connect/4760ee004ec65f44a165bd45b400a808/MSME+Report-03-01-2013.pdf?MOD=AJPERES

[53] http://www.aston.ac.uk/news/releases/2015/march-2015/indian-project-to-tackle-sme-pollution/

Annexure

Sector	Number of Projects
Sub-national government administration	18
Other social services	17
Rural and Inter-Urban Roads and Highways	14
General agriculture, fishing and forestry sector	13
Central government administration	10
Agricultural extension and research	9
Agro-industry, marketing, and trade	9
General water, sanitation and flood protection sector	9
Health	9
Irrigation and drainage	9
Public administration- Transportation	9
Water supply	8
Public administration- Water, sanitation and flood protection	7
Animal production	6
Flood protection	6
Public administration- Agriculture, fishing and forestry	6
Sanitation	6
Crops	5
Forestry	5
General transportation sector	5
General energy sector	4
Public administration- Health	4
Energy efficiency in Heat and Power	3
Housing construction	3
Information technology	3
Pre-primary education	3
Railways	3
General education sector	2
General information and communications sector	2
General public administration sector	2
Hydropower	2
Other industry	2
Other Renewable Energy	2
SME Finance	2
Solid waste management	2
Wastewater Collection and Transportation	2
Wastewater Treatment and Disposal	2
Adult literacy/non-formal education	1
Banking	1
Capital markets	1

Housing finance	1
Microfinance	1
Primary education	1
Public administration- Education	1
Public administration- Industry and trade	1
Public administration- Other social services	1
Secondary education	1
Tertiary education	1
Urban Transport	1
Vocational training	1
Source: http://www.worldbank.org/en/country/india/projects/all?strdate=01%2F01%2F2011&enddate=12%2F31%2F2015&x=42&y=26&qterm=&lang_exact=English	