Scaling up solar in India through public-private action

Status Update from the Capital Markets Climate Initiative

EXECUTIVE SUMMARY

Climate change, global price volatility and long term energy security concerns have prompted the accelerated development of non-fossil fuel based energy sources around the world. The rapidly growing Indian economy needs to balance its ever growing and predominantly fossil fuel based energy consumption against these global concerns. In order to create a conducive environment for the rapid growth of renewable energy, the Government of India (GoI) has put a comprehensive range of policy and regulatory incentives in place, including the Jawaharlal Nehru National Solar Mission (JNNSM) with an ambitious target of achieving 22,000 MW of solar installations by 2022.

In order to achieve the scale envisioned by the Mission, private sector participation is crucial, especially as the government starts to wind down its explicit support and expects the natural competitive forces to take over and drive the Mission. The GoI has undertaken a number of positive steps to create a strong enabling environment, such as renewable purchase obligations and renewable energy credits mechanism. However, to scale up private sector investment, there still remain a number of challenges to be met.

Recognising that developed and developing countries face similar challenges in blending public and private finance for green growth, Gregory Barker, UK Minister for Climate Change has launched the Capital Markets Climate Initiative (CMCI) to analyse where and why public private partnerships in this field have led to the most successful scaling-up of private finance and to share this knowledge. This theory is also being supported by a working group (led by the World Economic Forum) undertaking a limited number of practical case studies in countries with strong potential. India is one of two countries where this is currently taking place, with a focus on the JNNSM. This report is presented as a status update to the GoI and contains a preliminary analysis of challenges and recommendations that are based on extensive consultations with a wide range of stakeholders such as foremost international financial institutions, donors and international policy makers. intention is to build on these preliminary findings to launch a full case study to highlight the huge potential of the NSM as a progressive initiative of the GoI.

Some of the key challenges identified by this report include **financial hurdles** such as limited non-recourse financing, **policy barriers** such as the need to police RPO fulfilment and ensuring REC viability, and **market based challenges** like the lack of experienced EPC providers and reliable evacuation infrastructure. The report also develops **six recommendations to begin meeting these challenges**:

EARLY POTENTIAL SOLUTIONS TO SCALING-UP PRIVATE INVESTMENT IN SOLAR IN INDIA

Financial	
Potential Solution	**Benefits**
1. Designing a PPA breach of contract insurance instrument for international investors and lenders	Secures a reliable revenue stream to invest and borrow against
2. Creating a foreign exchange hedging instrument for solar projects	Mitigates FX exposure risk
3. Detailed design and launch of a Solar Park Financing Vehicle (SPFV)	Provides a channel to accelerate deployment of solar and access new debt markets through bond issuance
4 Expanding the Asian Development Bank's partial Credit Guarantee Facility	Partly absorbs and mitigates project risks for lenders
5. Supporting the emergence of an Indian market for Renewable Energy Certificates (REC)	Creates confidence in a stable RE price, incentivising investment in solar
6. Catalyse the emergence of a Credit Default Swap market to serve the solar market	Supports the evolution of the bond market and increases capital for solar projects
7. Develop a solar guarantee fund (benefits:	Underpins revenues from Discoms and/or de-risks projects for lenders)

Policy/ Regulatory	
Potential Solution	**Benefits**
<u>Changes to Financial Regulations</u>	
1. Establish separate exposure limits for lending to renewable energy or solar power	Allows differentiation between renewable and non-renewable energy investments
2. Support efforts to access foreign pools of capita	Enabling all parties to understand what best financing vehicles are for Indian context
<u>Policy Recommendations</u>	
1. Introduce pre-qualification for bidders	Ensuring that only viable bidders with long-term interest in solar involved in bidding process
2. Strengthen the bid bond to penalise non-compliance	Ensuring higher quality developers
3. Extending time for projects to achieve financial closure	Enabling higher quality project due diligence
4. Re-affirm government's commitment to dynamic NSM review process	Improving market intelligence, to reduce investor risk perception
5. Allocating money from the coal cess	Direct money to solar sector

Next Steps

The CMCI will be further consulting members on the efficacy and feasibility of the financial solutions outlined in this report, including drawing on some of the detailed analytical capability of its members. With regard to the policy suggestions, the UK government hopes to be able to support the GoI in analysing feasibility of approach where appropriate. The World Economic Forum would like to use the 17th Conference of the Parties in Durban (COP17), and its annual meeting in Davos in January 2012 to highlight the potential of Indian solar.

CONTEXT

Since the early 1990s, India has been on a trajectory of rapid economic development. A key component and prerequisite for achieving this growth has been the development of the power sector in the country. In other words, the power sector has been both a driver, as well as a primary beneficiary of the rapid economic growth in the country.

Drivers for promoting alternative energy

An overwhelming majority (over 85%) of India's electricity is sourced from fossil fuels. According to the Planning Commission India's primary energy supply will need to increase 4 to 5 times (5.8% per annum) and its electricity generation capacity by 6 to 7 times by 2030, verses 2004 levels. In order to meet even its current energy requirements, India has to import as much as 25% of its total energy needs[1]. With the international price of fossil fuels rising and India's increasing reliance on imported coal means that the current energy economy imposes a considerable financial burden on the country's economy and energy security. Coupled with the rising threat from climate change, the GoI has made clear its intention to deliver a robust response to these challenges, while simultaneously emphasising the overriding national priority of maintaining growth and raising living standards[2].

In this context the government have announced its intention to de-couple emissions from growth and reduce the emissions intensity of its GDP 20-25% by the year 2020[3]. Expanding the national renewable base presents an obvious means to reduce emissions intensity. With an already relatively mature wind sector, focus has widened to include solar as having a vital role to play. According to recent estimates the expansion of solar power could offset as much as 7% of emissions from India's electricity sector and ~2.6% of its total emissions by 2020[4]. Estimates state that the solar value chain in India presents a potential USD$110bn market in the next decade[5], and could create up to 1 million jobs during the period 2017-22[6], alongside the health benefits from renewables.

Indian policy, regulatory and institutional framework

The creation of a dedicated Ministry for New and Renewable Energy (MNRE) in 2006 has provided resources and centralised responsibility for defining and rolling out the government's strategy for deploying solar. In addition, the government has also put in place several central and state-level policy and regulatory mechanisms to promote solar energy. The introduction of Renewable Purchase Obligations (RPO) has created a requirement for states to generate a proportion of their energy from renewables and specifically from solar. The introduction of a national bundling mechanism for the purchase of solar power and of State solar policies has also provided an accompanying incentive. Since March 2011, the GoI has introduced a tradable market in solar power generation credits (REC's) to provide a cross-state market mechanism to allow renewable energy generation obligations to be met.

National Initiatives - The National Solar Mission

The Jawaharlal Nehru National Solar Mission (JNNSM) - launched in November 2009 - aims to incentivise the installation of 22,000 MW of on- and off-grid solar power using both PV and CSP technologies by 2022 as well as a large number of other solar applications such as lighting, heating, and water pumps. It will be rolled out over three phases, each designed to feed on the lessons of the

[1] Oil imports constitute 75% of consumption in 2011, Coal imports are expected to rise 30% of consumption by 2017, KPMG, 2011 The Rising Sun
[2] This commitment to 'inclusive low carbon growth' is expected to be re-affirmed and become a central pillar of India's 12th Five Year Plan due in April 2012.
[3] Against 2005 levels, National Planning Commission, May 2011
[4] KPMG, 2011 The Rising Sun
[5] Cumulative investment opportunity across the solar value chain but excluding manufacturing, on and off-grid, KPMG, 2011 The Rising Sun
[6] Based on Nrel, 2008 figures of jobs per Kwh and analysis of market size delivered by KPMG, 2011, Rising Sun

previous one: phase one focuses capturing low hanging options in solar thermal, promoting off-grid systems and modest capacity addition in grid-based systems. Phases 2 and 3 intend to build on this to aggressively scale grid interactive utility scale power.

The Mission leverages market based competitive forces to rapidly scale up technical, financial and operational skill sets to achieve its targets. The innovative competitive bidding mechanism of the Mission is expected to spur private sector competition and induce rapid growth to tap economies of scale. Under the first phase of the NSM 1,000 MW of solar projects have been allocated in two batches with a 50:50 split between solar photovoltaic and solar thermal power projects. A recent status update from MNRE showed that the entire allocation of solar thermal projects was successfully bid for, against 150 MW secured for PV projects. As a result 350MW of PV will be bid for in 'Batch II".

The Capital Markets Climate Initiative's Spotlight on Indian Solar

Private sector participation is a key ingredient to ensure that the market forces are able to take over and power the sector's growth. The first phase of the NSM alone requires an estimated investment of US$ 3-4 billion and the projected total investment needed by 2022 ranges between US$ 20-30 billion[7]. The limited history of non-recourse debt financing in the Indian financial market and novel nature of solar technologies has contributed to a risk premium that could, if conditions remain static, limit private investor participation. In light of these structural limitations the GoI should consider orientating the policy landscape to balance the desires of the private sector to transact, with the broader policy considerations that face a government looking to nurture a growing national industry.

Building on the work of previous multi-stakeholder initiatives[8] the CMCI has – during 2011 – brought together international and domestic Indian financiers along with policy makers, donors, developers/operators and solar sector experts to combine transactional expertise from the international capital markets with domestic industry experts and policy makers to support efforts to unlock climate compatible investment for the JNNSM. The intention is to provide a case study which outlines some suggested ways forward, and this report a status update of that work.

Some Public-private 'Quick wins' have already been delivered.

Similar platforms have already delivered results concluding that one solution that would draw in private investment would be to launch a Partial Credit Guarantee (PCG), to provide cover against legal, political, commercial, and technical risks encountered by solar project developers. The ADB has since successfully launched a US$150 m Partial Credit Guarantee Facility, which covers 50% of the payment default risk on bank loans made to solar project developers, replacing half of a project's risk (estimated at B-BB equivalent) with ADBs credit risk (AAA). This enables extension of loan tenors to over 15 years and is available to local and foreign commercial banks that are looking to finance private sector solar power plants in India. Due diligence is currently being carried out by ADB on a number of banks and projects. The extension of the PCG represents an important first step and demonstrates how public and private partnerships could be effectively formed.

[7] World Economic Forum, Critical Mass, 2011
[8] World Economic Forum, Critical Mass Initiative 2011

In parallel some other structures have been developed to support investment in solar projects

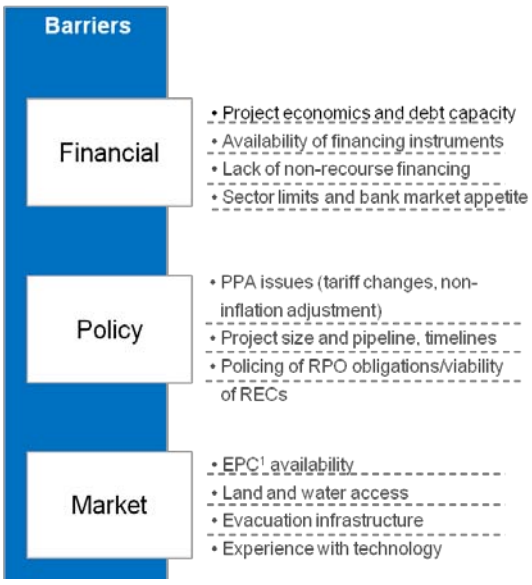
To support investment from foreign (specifically US) companies in the Indian solar sector the US Overseas Private Investment Corporation (OPIC) has offered a political insurance facility to mitigate the perceived risks of operating in the Indian market. This insurance covers up to a total project value of $250m and has already been used in the Indian market to support solar projects. Risks covered by OPIC's political risk insurance include: loss to tangible assets, investment value, and earnings that result from political perils, such as expropriation, breach of contract, regulatory changes, political violence, or inconvertibility.

A good start but more can be done to scale-up investment

Despite a strong policy impetus and the government's forthcoming support to the Indian solar sector, it is increasingly being recognised that achieving the NSM targets will require enormous amount of debt and equity raising, which can be most efficiently achieved through private capital market participation. CMCI consultations aim to develop a framework for this type of participation by highlighting financial, market and regulatory challenges. The rest of this report serves to highlight the most significant challenges we heard and offer some potential solutions.

CHALLENGES FACED IN FINANCING SOLAR PROJECTS UNDER THE NATIONAL SOLAR MISSION

The National Solar Mission is one of the most ambitious programs ever launched by the GoI. In addition to fostering a nascent technology with the aim of scaling it up from nearly Zero to 20,000MW in under 15 years, the Mission also aims to involve the private sector in what is perceived to be one of the most risky power-sector related investments at present. In order to accelerate the market on such a steep growth path, apart from mobilizing the estimated US$ 20-30 billion required to finance the Mission, the government also needs to provide a robust, investor friendly atmosphere to enable private investments to support the Mission. The following are the major challenges that face the Mission and the investor community at present.



Financial challenges

1. **The cost of financing:** Solar power projects are highly sensitive to the cost of debt. India's interest rates, at nearly 13%, make the domestic cost of borrowing high and can put significant pressure on deal economics. As a side effect of the successful tariff bidding that is being implemented in the NSM Phase, the margin between financing costs (which are sensitive to interest rates) and tariffs is far smaller than in other solar power producing geographies like Germany and Spain, thus significantly reducing project return to levels which may not be sustainable

2. **The availability of appropriate financing instruments:** The solar industry in India is young and the perception of political and regulatory risk means that bespoke financial products (insurance, guarantees etc) are required by most international (and a significant number of domestic) investors to mitigate risk and provide sufficient comfort to provide both equity and debt funding.

3. **Limited experience with limited or non-recourse debt financing (project financing).** Unlike European and US markets where project financing models are established the Indian financial sector's capacity to structure non-recourse deals is limited and solar project developers have historically financed projects on-balance sheet. This is to some extent due to the negligible past experience in solar energy in India, and consequently, the financial institutions lack the technical experience to evaluate projects that approach them for financing. At the same time, this lack of experience also hampers the ability of Indian project developers to present a comprehensive risk allocation and funding proposal to the financial institutions.

4. **Sector limits** on financial institutions' investment in the power sector can create challenges. A number of lending institutions face a 5% cap on investments in the power sector and renewables are part of this allocation and so investment in renewables comes at the expense of finite investments in conventional power which may offer more attractive risk-adjusted return profiles under current market conditions. In addition, lenders' exposure is calculated over a four-year term (i.e., if a renewable project is on the books in year one, it stays there till year four, even if it is divested in year two).

There have been recent positive developments. Fit-for-purpose financial instruments targeted at India solar (such as partial credit or risk guarantees) are now under development and a number of institutions have expressed their intention to revisit sector limits on renewable power. Capacity building for domestic banks is also underway through initiatives being run by the Asian Development Bank and the expansion of expertise in project financing is, although not widespread at present, likely to expand as leading institutions demonstrate case studies of project viability. However despite this progress financiers continue to see a series of significant policy and regulatory challenges which may be outside their direct control.

Policy challenges

While the regulatory environment for solar is recognised by the private sector to be maturing a number of challenges are routinely raised as areas where more could be done to enhance the effectiveness of the regulatory frameworks.

1. **The open bidding window** under the National Solar Mission has been interpreted by some as leading to low or 'suicide bids' from developers with limited experience in the solar sector and that are willing to fund projects on balance sheet and absorb uneconomical projects. While the competitive bidding mechanism was intended to leverage market forces to drive down the cost of technology, some developers are perceived to have viewed this mechanism as an opportunity to 'get a foot in the door' to the Indian solar industry and have consequently created a negative perception of solar technology's viability and in turn having resulted in greater lender concern about risk.

2. **The structure of existing power purchase agreements (PPAs) between energy buyers and providers:** PPAs are key to securing financial closure on projects by providing a reliable revenue stream for operators, the basis on which financiers are prepared to lend. In this context PPA 'bankability' is considered key. Countries like USA and Spain have successfully demonstrated the ability of PPAs to obtain suitable project finance. In their current form Indian PPAs are viewed as sub-optimal by financiers for a number of reasons:
   - The final responsibility for guaranteeing PPAs rests on state level distribution companies (DISCOMS), the financial viability of these institutions is perceived to be uncertain[9] creating a higher risk perception for lenders
   - Some PPAs are not assignable to lenders, reducing collateral and increasing project risk and costs
   - Grid access is not assured by state transmission utilities and considered to be the responsibility of the project developer creating additional risks for financiers

3. **Renewable Purchase Obligations (RPO's)** are an important regulatory obligation but a number of stakeholders suggested that confidence in their enforcement and policing by regulators is required, to give greater investor confidence in the market scales and to support the emergent Renewable Energy Certificate market.

4. **Project size and transparency:** The first wave of solar projects allocated in India under the NSM (5-10MW) was sometimes interpreted as of insufficient size to attract investors who could view individual transaction costs as prohibitive. This has already been recognised as an issue by the MNRE and NVVN who have expanded the total capacity allowed per developer under Batch II of the National Solar Mission to 50 MW.

Market challenges

1. **The maturity of the domestic Engineering Procurement and Construction** (EPC) market can be interpreted as a challenge for investors**.** There are currently few 'pure play' EPC providers in the Indian market. The existence of established EPC providers can provide significant comfort for lenders who are able to mitigate project and construction risk by structuring contracts with reputable EPC providers who can take on some of those risks.

2. The **availability of land and water**, as well as the ability to secure timely access and building permissions, is perceived as a barrier to building a dependable pipeline of solar projects – a key issue for developers seeking equity finance. While far from a universal barrier, the regulatory process for securing access to land is routinely cited as extending the timeline from project delivery – despite short project build timelines (sub-six months)

On both these challenges attempts are being made to resolve some of these market barriers through the introduction of pre-permitted access to land, water and evacuation infrastructure through solar parks and effective and professional EPC providers are expected to increase as the market expands beyond its incipient phase.

[9] "Review of financial situations of state utilities" Power Finance Corporation report

To help overcome these challenges it has been recognised that collaboration between the public and private sector communities are required to create new innovative financing frameworks

The challenges discussed above are well known to investors. The issue has now become how effective frameworks and financing vehicles can be created to move forward. In this context greater effort is needed to translate the specific concerns of policy makers and financiers and provide a platform for productive engagement.

POTENTIAL SOLUTIONS

Through its work with Indian stakeholders the CMCI has identified potential solutions in both the domestic and international finance sectors, as well as a number of regulations changes that could be pursued as a means to unlock greater private sector investment in the solar sector. T**he CMCI presents these early suggestions to the Government of India and to the international financial and climate finance donor communities**. It is hoped that we can build a working relationship with key parties and discuss whether, and how, these could be taken forward through drawing on the intellectual and technical thought leadership of the CMCI's members and inviting a combination of donor and private sector investment.

Potential Financial Solutions

Outlined below are 6 potential actions that the financial and international donor community could work to deliver. They are, at this stage, suggestions only as the feasibility and efficacy of each needs to be explored thoroughly.

Potential Solutions		Primary Benefits	Probable Implementer
1	Design a PPA breach of contract insurance instrument for international investors and lenders	Secures a reliable revenue stream to invest and borrow against	MIGA and/or an ad hoc agency jointly owned and managed by a multilateral funding agency and the GoI
2	Creating a foreign exchange hedging instrument for solar	Mitigates FX exposure risk	The Green Climate Fund and/or specialised bilateral institutions, in cooperation with GoI
3	Design and launch of a solar park financing vehicle (SPFV)	Provides a channel to accelerate solar deployment and access new debt markets through bond issuance	A Solar Park legal entity, with credit enhancement provided by a combination of GoI, donor governments and multilaterals, with assistance from CMCI and the Clinton Climate Initiative
4	Expanding Asian Development Bank's partial credit guarantee facility	Reduces implicit political and project risk	ADB can consider expanding the existing facility for other government/private lenders to join and expand the facility
5	Supporting the emergence of an Indian market for Renewable Energy Certificates (REC)	Creates confidence in a stable RE price, incentivizing investments in solar energy	Government led initiatives to ensure penalty mechanism for RPO-non compliance are implemented
6	Catalyze the	Supports the evolution	CMCI led private financiers consortium to

	emergence of a credit default swap market to serve the solar industry	of the bond market and increases capital for solar projects	leverage international experience to guide the development of such a market in India, supported by appropriate policy and regulatory interventions by the GoI
7	Develop a solar guarantee fund	Underpins revenues from Discoms and/or de-risks projects for lenders	

Potential recommendations for policy makers

In addition to the financial solutions the challenges highlighted above lead the CMCI to suggest a number of potential regulatory changes.

Potential Changes to Financial regulations

1. **Establish separate exposure limits for renewable energy or solar power.** Discussions suggest that these guidelines could limit solar investment and could be revisited with a specific focus on how a separate 'renewable energy' allocation allowance could be appropriately structured.

2. **Support efforts to access foreign pools of capital.** As efforts to scale solar continue, the amount of domestic finance available for investment is reduced by regulations that limit banks' ability to guarantee infrastructure bonds and that set sector limits for renewable energy. Discussions suggest that policy makers should consider the range of prospective financing vehicles that could unlock international and institutional capital and could include solar bonds and the novel Credit Default Swap markets. A greater degree of dialogue between financiers and regulators would help to identify how these mechanisms could play a role in the sector and identify the specific regulatory changes that would enable their effective deployment in the market (tax allowances for bonds etc).

Potential modifications to the National Solar Mission and state solar programs

1. **Introduce pre-qualification for bidders.** A more evolved pre-qualification process could be applied to ensure that bidders are viable developers with a long-term interest in the solar sector. This could be done by including adding specific criteria for lining up engineering procurement and construction (EPC) contracts in advance of bidding and/or qualification only on the basis of submitting an initial due diligence report on project performance. This pre-qualification would not exclude first time solar developers, but the criteria would provide some weight towards past experience in the energy sector, and ensure that applicants had the requisite capabilities and a minimum level of commitment to the sector

2. **Strengthen the bid bond to penalise non-compliance.** Closely related to the issue of pre-qualification is the issue of bid-bonds. Under the current solar bidding rules, developers face penalties for failing to complete projects within the allotted time periods. This mechanism should act as a form of pre-qualification by creating a disincentive for low bids. However evidence from project financiers suggests that this is not creating a sufficient disincentive and should be revisited to ensure it is effective in holding developers to account.

3. **Extend the time allowed for projects to achieve financial closure.** The time allocated under the NSM for achieving financial closure has been cited by some sector participants as

creating a challenge for the level of due diligence possible and impacting the ability of developers and lenders to appropriately structure a financing agreement. Recognising this MNRE recently announced an extended time period for financial closure (from 180-210 days), which has been broadly welcomed by the financial community. However some stakeholders suggest that the benefits for further extending the completion window (with suggestions ranging from 6-9 months).

4. **Re-affirm the government's commitment to a dynamic NSM review process.** MNRE should be recognized for its proactive, ongoing revisions to the implementing guidelines for the NSM, as well as its consultation with industry. To address continued data and perception issues, continued engagement with the financial sector should be encouraged and it has been suggested that **quarterly reports on progress could be made available providing** solar plant performance and ground isolation data. This would, it is suggested, enable superior market intelligence, thereby reducing investor and lender risk perceptions.

5. **Consider allocating money from the coal cess.** Funds accumulated within the coal cess (a tax on domestic and imported coal at the rate of INR50 a ton) provide a potential source of funds to credit enhance the purchase scheme under NSM or state programs. Policy makers could re-evaluate the disbursement of these funds (currently earmarked for the National Clean Energy Fund) to destinations that would support the scale up of solar (e.g., through tariffs or solar parks)

Next Steps

The CMCI will be further consulting members on the efficacy and feasibility of the financial solutions outlined in this report, including drawing on some of the detailed analytical capability of its members. With regard to the policy suggestions, the UK government hopes to be able to support the GoI in analysing feasibility of approach where appropriate. The World Economic Forum would like to use the 17th Conference of the Parties in Durban (COP17), and its annual meeting in Davos in January 2012 to highlight the potential of Indian solar.