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# Scaling Up Low-Carbon Infrastructure Investments in Developing Countries

## The Critical Mass Initiative Working Report as of January 2011


World Economic Forum

Prepared in collaboration with PwC, Project Adviser to the World Economic Forum on the Critical Mass Initiative

in partnership with

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in association with

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# Contents

# Foreword

Arguably, a new era of economics is upon us: how to grow the world economy when capital is relatively abundant, but the supply curve of other previously unconstrained environmental goods, including a clean atmosphere, now arcs downward.

Transforming the world economy into a "green growth" economy of low-carbon emissions is an urgent endeavour that will require significant amounts of investment. In particular, the growth potential of developing and emerging economies over the coming decades, in combination with their accelerating demand for improved infrastructure especially in energy and transport systems, presents a very real opportunity for the scale up of low-carbon investment. However, as the recent UN High Level Advisory Group on Climate Change Finance has indicated, these financing needs will be well beyond both the domestic public purse and the available budget of overseas development assistance. This means that public finance and policy innovations will be required, innovations that can attract the attention of domestic private finance and the international capital markets. How can this wave of innovation begin?

For the next few years, a window of opportunity exists for public and private financing and industry actors to come together and act as market makers. New public-private collaborations are required to help pioneer a new wave of bankable and scalable transactions in low-carbon infrastructure, in developing and emerging economies. As more such transactions emerge, they will act as a portfolio of investment proof points, building confidence within the market. In time, and informed by these pioneer transactions, larger volumes of capital will increasingly flow into low-carbon infrastructure in developing economies and a shift to a self sustaining investment flow will emerge. The new infrastructure market will have been primed.

To catalyse the very start of these collaborations, the Critical Mass Initiative was created in early 2010. It is a unique platform convened by the World Economic Forum, International Finance Corporation and United Nations Foundation, in association with the Institutional Investors Group on Climate Change and the Investor Network on Climate Risk. PwC was the Project Adviser to the World Economic Forum for this initiative. The initiative convened a community of institutional investors, asset managers, development banks, donor agencies, government officials, infrastructure project developers and climate finance experts, and enabled them to co-design a first wave of public-private financing solutions. The Initiative's work was possible in part thanks to the generous support of Zennström Philanthropies.

The Critical Mass Initiative adopted a distinctive co-design and "learn-by-doing" approach to help participants innovate in their approach toward designing investment transactions in low-carbon infrastructure in developing countries. It did this by hosting three different public-private investment "laboratories" at the project, program and sector level. These included India Solar (on a projects level), the South African Renewables Initiative (on a programmatic level) and Energy Efficiency (on a sector level).

This report outlines some of the key findings from the Critical Mass Initiative.

- It begins with an overview of the lessons gained from the Critical Mass Initiative. A scale up of this kind of approach seems an increasingly pertinent agenda for 2011 and the overview also provides some suggestions on how such a Critical Mass style platform for collaboration and innovation can be scaled up, or mainstreamed.

- The main text is divided into two parts:

  - Part 1 offers context. It presents a unique set of perspectives on the low-carbon finance agenda, drawn from experts and practitioners active in global capital markets and from both a debt and equity perspective. They provide their latest insights, they consider the role of the carbon markets in delivering the financing required, and they describe from their perspective, what they see as the barriers to and enablers of greater investment.

  - Part 2 details the specific work undertaken by the Critical Mass "laboratories". Within each specific context, the report defines the financing problem and describes the progress made in overcoming these problems, among others, through the design of breakthrough funding models. The specific learning points gained from each laboratory are highlighted and the role that the Critical Mass initiative played to facilitate and accelerate the design of the funding solutions is explained

The World Economic Forum is delighted to have helped host the Critical Mass Initiative alongside its partners, the International Finance Corporation and the United Nations Foundation. On behalf of the World Economic Forum and our partners we are extremely grateful to the many individuals who responded to our combined invitation to participate in the various workshops, interviews and Cabinet discussions that the initiative convened and who gave so generously of their time, energy and insights. Particular thanks are also due to those partners and collaborators who helped facilitate the Critical Mass process, including Ole Beier Sørensen, Chief of Research, ATP; Chris Fox, Director of Investor Programmes, Ceres; Jonathan Maxwell, Chief Executive Officer, Sustainable Development Capital; Shilpa Patel, Head, Climate Business Strategy and Metrics, International Finance Corporation; Stephanie Pfeifer, IIGCC; Taiya Smith, Senior Adviser, United Nations Foundation; Jon Williams, Partner, Sustainability and Climate Change, PwC; and Simon Zadek, Senior Fellow, John F. Kennedy School of Government, Harvard University. Finally, many thanks are due to Brindusa Fidanza and Sandilya Vadapalli of the World Economic Forum's Environment Initiatives Team, who facilitated the initiative with support from Michael Chen who was kindly seconded to the Forum for the project from PwC.

The work shows that, at this stage of the market building process for low carbon infrastructure investments in developing and emerging economies, there can be significant value in creating hubs and platforms to host collaborations among public and private sectors, bilateral and multilateral development banks. From these public-private platforms, the first wave of iconic projects and pioneering policy innovations can emerge. All the key actors who must be involved in the agenda can build experience, capacity and relationships from engaging in these kinds of activities.

We trust that these findings will provide useful guidance to various stakeholders in the public and private sector to help shape broader and deeper investment innovation programmes in the coming months. It may be that the creation of these sorts of public-private platforms can hold real potential to accelerate learnings in the low-carbon investment agenda during 2011 on how to actually use public finance in practice to leverage larger flows of private capital. In this way, real and tangible examples of public-private financial innovation from the (sub) national policy, program or project level can be generated which in turn can help inform those who are building the new climate finance architecture post Cancún, on how best to use the Green Climate Fund to leverage much larger flows of private capital into developing countries.

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# Overview

**Lessons Learned from the Critical Mass Initiative and the Agenda for 2011**

## The Emergence of Green Growth

The agreement reached at COP 16 in Cancún was a step towards renewed confidence in the UN climate change negotiations process. The parties accepted the need to hold the increase in global temperatures to within 2°C and delivered a balanced package of measures, covering finance, forestry, adaptation and measurement, reporting and verification (MRV). The key components of the Copenhagen Accord, including both fast-start and long-term funds, have also been incorporated into the official text. Importantly, a Green Climate Fund (GCF) is also to be established to help mobilize US$100 billion of finance per annum for developing countries, as promised in Copenhagen.

The costs of transforming the global economy to a low-carbon one are considerable: the World Bank estimates put the incremental financing needs of climate mitigation at US$ 140-175 billion per annum over the next 20 years, and a further US$ 30-100 billion per annum for adaptation over the same period. For non-OECD countries, the IEA estimates that the required investment amounts to US$ 197 billion in 2020.

The sheer scale of finance required in low-carbon infrastructure in developing countries has opened up a more engaged appreciation of the role that public and private finance can play in low-carbon investments. In fact, climate policy is increasingly understood as being an integral part of, and having the potential to be advanced by, new industrial and economic "green growth" strategies. This is an important evolution in the climate finance debate. Low-carbon investments need not be perceived as a niche policy choice (or a slow growth path) for developing countries. Instead, a green growth strategy can be an astute economic development plan that can gain the confidence of the capital markets, especially for faster growing developing economies. Yet, financing green growth remains a challenge.

## The Urgent Need for Private Finance

Although the recent report by the UN High-Level Advisory Group on Climate Change Financing (AGF) showed that a mix of carbon markets, existing and new public instruments together with multilateral development finance, direct budget contributions and other public and private flows could meet capital needs, these pledges combined only make up a very small proportion of the required investment. With developed country government debt-to-GDP ratios projected to rise to 110% by 2015[1], there is increasing recognition that public revenue transfers and climate policy-related taxes and charges in developed countries, while important, can realistically provide only a limited amount of the overall finance that developing countries need to address climate change, at least in the foreseeable future. Relying overly on carbon markets is also difficult given their lack of global scale, a currently low carbon price and the uncertainty surrounding international negotiations and market mechanisms. Private investors and lenders are also cautious given the policy uncertainties, developing country, technology and commercial risks, and high transaction costs, particularly in a post-crisis capital constrained world.

As the immediate need is to provide financing of low-carbon growth in emerging markets at a scale significantly in excess of fast-start funds, the role of private sector capital, how it is supported by public policy and how it interacts with public funding, is key.

## The Critical Mass Initiative

**How can private investment in low-carbon infrastructure in developing countries be accelerated as quickly as possible?**

This question has been at the core of the Critical Mass Initiative, a partnership of the World Economic Forum, International Finance Corporation and United Nations Foundation, in association with the Institutional Investors Group on Climate Change and the Investor Network on Climate Risk, and advised by PwC. The initiative convenes a community of institutional investors, asset managers, development banks, donor agencies, government officials, infrastructure project developers and climate finance experts, and enables them to co-design financing solutions. Through "learning by doing", the initiative can help accelerate investment in low-carbon infrastructure transactions in developing countries, which can then support national green growth strategies.

There is already a wealth of information on public finance mechanisms and the risks and barriers to the private sector. The organizations involved in the Critical Mass initiative believe that a process of practical experimentation and collaboration between the public and private sectors is now critical. By working on live transactions and with national low-carbon

1 IMF (2010) Navigating the Fiscal Challenges Ahead.

programmes, the public and private sectors will be more likely to create win-win arrangements that mobilize the participation of private finance at scale.

Three "laboratories" were created to address these issues in three specific contexts. Each involves a broad range of private investors, project developers, bilateral and multilateral development agencies, and government officials. With all parties working together to develop financing frameworks for specific large-scale opportunities, each has been able to explain and design the role they can play, the risks they are willing (or not) to take on and the rules or clarity they need to turn the opportunity into a transaction.

The three laboratories are introduced below. Full details can be found in the Part 2 of this report:

- *India Solar (a project-based approach):* Within the context of both the India National Solar Mission and solar schemes in various Indian states, the Critical Mass Initiative created and led this laboratory, which demonstrated the potential for significant scale up of solar energy projects through the design of breakthrough public-private financing models that improve the risk-return equation of larger than average solar projects. For grid-connected power, this laboratory explored how to bring together two key financing mechanisms which if combined could potentially form a comprehensive investment proposition for large India Solar projects: firstly, international public-private partnerships and the Climate Public Private Partnership (CP3) Fund – a proposed investment vehicle spearheaded by the UK Department for International Development (DFID) in collaboration with the Asian Development Bank (ADB) and the International Finance Corporation (IFC), through which institutional investors can access opportunities to invest in low-carbon and resource-efficient infrastructure assets and services in Asia, alongside MDBs; and secondly, a Credit Enhancement Facility currently being developed by the Asian Development Bank, specifically for India Solar, to provide cover against various risks associated with power purchasing agreements (PPA) (legal, political, commercial, technical, etc.). For off-grid solar power, a financing model is also being developed by the laboratory which may include technical assistance, concessional or grant financing, and early stage equity risk capital.

- *South Africa Renewables Initiative (SARi) (a programmatic approach)*: SARi aims to scale up renewable energy in South Africa (20GW by 2020) by proposing an innovative financing arrangement that minimizes the use of niche "climate finance" by focusing investors instead on the industrial and economic benefits of the program. The incremental cost of this ambitious program, using the current level of South Africa's feed-in tariffs, would be as much as US $21 billion, which is in excess of what would be domestically affordable. However, this cost can be reduced by bringing down the cost of capital through domestic institutional de-risking and the provision of a blend of concessionary debt and risk guarantee instruments from international sources. This could be combined with modest amounts of domestic private and public funds channelled through the feed-in tariff at a level offset by domestic economic benefits and fiscal revenues. International public grants, channelled through the feed-in tariff for maximum effectiveness, would complete the financing of estimated incremental costs. This laboratory helped SARi to test its financing concept with international equity investors, lenders, project developers and bilateral and multilateral development finance institutions. The private workshops highlighted, inter alia, that i) the strategic use of concessionary debt and associated risk-mitigation instruments would be attractive to international private investors, ii) such financing should be built into a wider investment policy framework for advancing renewables in South Africa rather than being negotiated on a project-by-project basis and iii) commercial debt and equity would find SARi appealing if the right tariff pricing combined with concessionary finance and new institutional arrangements were put in place.

- *Energy Efficiency (a sector-based approach):* Energy efficiency has a vital role to play in reducing greenhouse gas emissions as well as creating greater energy security resulting from the reduced reliance on imported fuels. The IEA estimates that, on average, a US$ 1 investment in demand side energy efficiency can save more than US$ 2 on the supply side. Energy efficiency is widely seen as one of the most cost-effective carbon abatement options, with a negative lifecycle cost per tonne, but requires significant upfront capital expenditure. The Energy Efficiency laboratory is exploring potential breakthrough funding mechanisms in the buildings sector. Work is in progress to identify projects that can be financed and to facilitate transactions by bringing together the key stakeholders.

### Lessons from the Critical Mass Initiative

Each of the three laboratories has resulted in different outcomes, lessons learned and plans for next steps.

- Within the Indian Solar project laboratory there is now specific work underway to investigate the application of the ADB Credit Enhancement Facility and test it on a real project under development, a learn-by-doing process which is valuable both for the target projects, for their delivery consortia and for the Asian Development Bank's credit committee in designing the guarantee. The impact of capital efficiencies that may result could help to significantly reduce cost of capital and development/construction, establishing a model that could be scalable and replicable, and more commercially sustainable for all parties – for instance by reducing interest on debt, improving equity returns and, ultimately, over the longer run accelerating reductions in required feed-in tariffs. It is hoped that a significant transaction can emerge from this process in early 2011.

- Within the SARi program laboratory, exposure to international investors helped the programme refine its policy proposition to be more conducive to attracting international finance. The fundamental challenge SARi faces is relatively simple. On straightforward commercial terms, building 20 GWs of renewables in South Africa, based on a mix of on-shore wind and solar, particularly concentrated solar power (CSP) would cost in the order of US$ 50 billion. Put another way, generating electricity from this installed capacity of renewables would cost roughly US$ 9 billion (net present value) more over the period to 2025 than it would at full financial cost to generate the same power from coal-fired stations. Overcoming this financing challenge at a programmatic level therefore became the key to unlocking SARi and to stimulating a future critical mass of investment in renewables in South Africa. Exposure to different public and private investor viewpoints in the safe space of the SARi laboratory helped program designers to test and refine SARi's financing proposition. Interestingly, as well as the right policy framework, the laboratory discussion also explored what other financial support mechanisms could be used to stimulate the significant capital required to meet the 20 GW capacity by 2020 or 2025. With respect to on-shore wind, investors and analysts concurred that costs could come down to grid parity (assuming this was at the full financial cost of coal-generated electricity) after an initial wedge of say 2 GW of wind had been implemented over a five year period or so, if the effectiveness of the new enabling environment and specific institutional arrangements were demonstrated as expected. In this way, concessionary debt could be used for this initial wedge; then, once confidence in the new program was built, commercial debt could service future wind developments, allowing the remaining available concessionary finance (debt and public finance) to focus on subsequent solar investments.

- The Energy Efficiency laboratory is focused on developing a deal flow which can be self-sustaining without, after the first few transactions, public finance. Currently, members of the public and private group are working to develop consolidated market intelligence with developers, equipment suppliers, service providers, etc. to map out where the most effective investments in the building sector are occurring and where there is scope for such activity but it is not occurring due to policy and financial barriers.

  The working group's schedule for 2011 will begin with a discussion with industry experts to narrow in on several critical geographies; lay out a variety of financing mechanisms; and extract lessons from deals that have already been done and the degree to which they can be applied in the opportunities being considered. Some potential projects will be shortlisted as a result. Coming out of this workshop, two to three geographies will be selected for further work and the laboratory team will bring together the appropriate local actors and economic models, and begin preparing delivery models on which finance can be structured, including coordinating the design of the financing model and facilitating transactions by bringing together key stakeholders. Follow-on work will focus predominantly on creating several deals which can be financed with an eye towards the policy steps that will be needed to create a longer term flow of such deals. The aim of the laboratory would be to enable participating institutions to move forward with one or several deals by summer 2011.

More details on each of the laboratories and their lessons can be found in Part 2 of this report.

Notwithstanding specific individual lessons and approaches, there were a number of common themes which have emerged from across the three laboratories.

- A focus on breakthrough projects is not enough. Public policies need to be "investment grade" to attract private capital. Transparent, stable, consistent and fit for purpose policy is essential to carry the confidence of the relevant bilateral or multilateral development banks, given the AAA credit ratings these carry and the pivotal role they can play in designing mechanisms and funds to draw in domestic and international private finance to projects in a particular national plan. Investible policy is also the key factor for private sector financial institutions which see long-term, credible and transparent public policy as an important risk mitigant.

- Bilateral development agencies and Multilateral Development Banks (MDBs) have a critical role to play in the public-private low carbon finance architecture. This echoes the findings of the UN AGF and many other studies which consistently identify the importance of development finance institutions and their use of targeted public finance innovation in any scaled solution which seeks to catalyse more private investment into low-carbon infrastructure in developing countries. They bring important capacity building skills and knowledge of developing markets, and a relationship with host country governments that many private sector financiers do not have. There is also an implicit credit enhancement effect on account of their participation.

  Furthermore, developing countries governments can also partner with a bilateral development agency or MDB as an expert collaborator to:

  – help develop its national plan or sector strategy within the context of the country's wider economic growth strategy

  – act as an external communicator to domestic and international capital markets as to the integrity of the plan

  – act as an architect to develop public finance-related funds and mechanisms in partnership with the government and investors to help overcome scale challenges related to large initiatives andcertain risks within the national plan (including among others commercial, technical, legal, currency risks) and to draw in additional private investment

- *Robust commercial frameworks are important:* investors identified in particular the need to test the integrity of power purchase agreements (PPA) or equivalent within the national strategy or sector plan; these are the most significant issue in assessing counterparty risk.

- *National governments, bilateral development agencies and MDBs should design and use public finance mechanisms to leverage private investment:* attracting private sector investors, through lowering the cost of project finance and guaranteeing against particular risks, can reduce the need for domestic market subsidies such as feed in tariffs for private investors. This point is also reflected in the findings of the UN AGF.

- *Private-to-private risk transfers can reduce the ask of the public sector:* by involving a wide variety of private sector financial institutions, certain risks can be transferred between private sector players, for example certain country or performance risks which are often insurable. This will enable the public finance to target those areas where private finance is most difficult to raise, such as in least developed countries.

## From Experimenting to Mainstreaming

The Critical Mass Initiative is proving that there is significant value in the existence of platforms or hubs which host collaborations among the public and private sectors, bilateral and multilateral development banks, enabling financial innovation and experimentation and cross-learnings to occur from different geographic and sector-specific financing packages for projects and national programmes.

Notwithstanding the value of these experiments, if scaling up, or reaching "critical mass" in leveraging private finance is to be achieved in the short term, then lessons from this early collaboration need to be mainstreamed.

What is then needed going forward is a broader and deeper programme which embodies some of the messages outlined below. These points draw upon the lessons learned from the Critical Mass Initiative and were echoed by the participants in the aforementioned World Economic Forum private finance session in Cancún.

- *Led by private investors, banks, bilateral and multi-lateral development agencies:* As the challenge at hand relates to stimulating private finance, the private sector financial institutions need to be involved as early as possible in the design stage to get their buy in and ensure maximum credibility. Also important are the bilateral and multilateral development agencies as they are able to design risk mitigation instruments (concurrently with private investors) that enable greater leverage of private capital. As discussed earlier, these development banks and agencies also assist in developing national or sector strategies and contribute developing country experience.

- *Close collaboration with national governments:* As the Critical Mass Initiative has shown the private sector must work side-by-side with the national government on the basis of national climate change plans. "Investment-grade" policies and credible commercial frameworks are key enabling factors for leveraging private capital. Close collaboration is also important to ensure that vehicles and mechanisms are in place to receive public and private financing (e.g. through Nationally Appropriate Mitigation Actions – NAMAs). NAMAs can and will increasingly be formulated as "NAMA+" plans, to not only drive domestic coherent development and attract international public transfers but also to secure the engagement of domestic and international private capital.

- *Complement the UN climate finance negotiations:* the decision at COP 16 to create a Green Climate Fund (GCF) to help mobilize US$ 100 billion annually is an important milestone in the climate finance debate. Given the overall scale of funds needed, private sector solutions will be necessary to complement the GCF. Private financial institutions will need to be involved at the design stage to ensure that the GCF is capable of catalysing private pools of capital and that both public and private capital are co-deployed at the programme and project level.

- *Work on a multitude of large, replicable, live projects or programmes:* The platform must enable the various players outlined above to come together at the programme or project level and work on real, live transactions with short-term commercial outcomes. The transactions must be scalable, in terms of the size of projects, and replicable, and have the potential to be disruptive in breaking business as usual.

- *Learning dissemination is key:* To ensure maximum scale, the lessons from this programme must be made publicly available so that it can be shared among the private finance community, bilateral and multilateral development agencies, and national governments. Further, it was often stated by the participants of the Critical Mass Initiative that a substantial amount of knowledge sharing was required within their own organizations.

The questions that need to be asked in 2011 to ensure demonstrable impact by COP 17 should therefore be:

*How can the progress made in COP 16 and the lessons learned from the Critical Mass Initiative be advanced such that*

1. *Governments are supported in designing the emerging Green Climate Fund architecture to best blend public-private finance?*
2. *Interested emerging economies are supported in developing investment-grade policies to leverage private capital?*
3. *The private sector is incentivized to work on tangible and scalable transactions?*

# Part 1

**Beyond Climate Finance: Perspectives on Private Finance for Low-carbon Infrastructure in Developing Countries**

Historically, there has been much discussion on the role of the public sector in helping to provide the financing that is required for climate change mitigation and adaptation. Developed countries committed in Copenhagen to provide US$ 30 billion "fast-start finance" for the period 2010-2012 for adaptation and mitigation in developing countries and mobilize US$ 100 billion a year by 2020. In Cancún this public finance commitment was strengthened.

An analysis carried out by the World Resources Institute estimates that by November 2010, pledges publicly announced by developed countries come close to the goal, as they total US$ 29.27 billion[2]. Despite these pledges however, the total amount of additional public finance that has actually been raised and committed within the fast start process is less clear, especially given that the funds can be channelled in various ways, such as through existing aid budgets, new bilateral programmes and international institutions. As such, the Cancún Agreement have called for greater transparency and have requested developed countries to submit their commitments annually to the United Nations Framework Convention on Climate Change (UNFCCC).

The Cancún Agreement also made progress on long-term finance through establishing a "Green Climate Fund", to mobilize the US$ 100 billion per year by 2020. A transitional committee has been established to work on the formation of the fund, and observers hope that work can begin on the fund structure ahead of the next COP conference in Durban.

Notwithstanding the positive progress made in establishing the Green Climate Fund, the Cancún agreement remained silent on how the US$ 100 billion per year was actually going to be raised, except to say that it will be from a "wide variety of sources, public and private, bilateral and multilateral, including alternative sources." The report from the High Level Advisory Group on Climate Change[3] identified a variety of these potential sources of finance, including the auctioning of emission allowances, domestic carbon taxes, carbon pricing international transportation, redeployment of fossil fuel subsidies, some form of financial transaction tax and direct budget contributions.

Given the ambigious context of public finance commitments and the sheer scale of finance needed over a short-time frame, a more engaged appreciation of the roles that both public and private finance can play in low-carbon energy has emerged. This section offers perspectives on this issue – where can private financial markets find additional flows of finance for low carbon investments? Expert opinions have been sought on the latest state of carbon markets and their ability to deliver adequate capital flow into developing countries, as well as on trends and prospects for more mainstream capital markets to increase flows of capital toward low-carbon infrastructure in developing countries. Finally, the section offers an institutional investor viewpoint on how to stimulate a step change in private capital flows.

## 1. Can carbon markets deliver adequate capital flow into developing countries?

*This section was written with contributions from Abyd Karmali, Managing Director and Global Head of Carbon Markets, Bank of America Merrill Lynch and President, Carbon Markets & Investors Association; Steven Gray, Vice-President, Carbon Finance, Climate Change Capital; and David Lunsford, Policy Leader, Emissions Trading, IETA.*

A glance at the state of the carbon markets in autumn of 2010 shows that the last 12 months have been some of the most challenging times. The financial crisis has impacted both demand and supply of certified emission reductions (CERs). Continued uncertainty on what the international response to climate change will be post-2012 has dampened optimism. The realisation that the US is now unlikely to adopt a federal cap and trade scheme any time soon has removed one of the biggest catalysts for future carbon market expansion. Developed countries outside the EU (e.g. Japan, New Zealand and Australia) have also been delaying the implementation of national schemes.

2 WRI's preliminary analysis on countries' immediate "fast-start" climate finance pledges announced thus far http://www.wri.org/document/summary-of-developed-country-fast-start-climate-finance-pledges

3 Includes representatives of Norway and Ethiopia as Co-Chairs, US, China, Guyana, Brazil, Mexico, United Kingdom, France, South Africa, Australia, Japan, Singapore, India, representatives of the World Bank, the African Development Bank, UNCTAD, private sector representatives Caio Koch-Weser, Vice-Chairman Deutsche Bank, and George Soros, and Nicholas Stern of LSE

In only a few years the Clean Development Mechanism (CDM) has mobilized billions of dollars towards clean energy finance across the world and, possibly more importantly, has allowed entities with emission reduction targets in mostly Europe and Japan to meet domestic targets at least cost. The Cancún Agreement endorsed an ongoing role for CDM, implemented a series of reforms that will help to reduce transaction costs for project developers and indicated for the first time that carbon capture and storage projects could be eligible for carbon credits provided they meet certain risk parameters.

The CDM is, however, still likely to experience barriers primarily caused by the uncertainty about global demand for carbon credits. Systemic CDM issues have also prevented progress from the supply side of the market. A constrained CDM governance structure, changing regulation, case by case decision-making, and regulatory and capacity bottlenecks now mean the average CDM project takes up to three years to make its way through the CDM regulatory system and issue its first certified emission reduction credits. Stakeholders have an increasingly difficult task trying to manage and operate in a complex CDM regulatory cycle.

Consequently new investments in the primary market for CDM carbon credits have dropped 30-40% in each of the past two years. In 2009, the project-based transactions delivered only US$ 3.4 billion of investment, which compared with US$ 7.3 billion in 2008, represents a 54% drop in one year[4].This represents a downward trend given that in 2008 investment was 12% below 2007 levels[5].

A recent study[6] painted a gloomy picture for the US$ 125 billion international carbon market. The annual market sentiment survey conducted for the International Emissions Trading Association (IETA) by PwC has found that regulatory uncertainty is undermining confidence in this market and in low-carbon investment more generally. Reflecting a lack of investor confidence in the carbon market after 2012, nearly three quarters of respondents say regulatory uncertainty is suppressing low-carbon investment. More than two-thirds believe that the carbon price will need to be more than 40 euros to stimulate the scale of investment required to limit warming to 2°C, but confidence in prices has fallen compared to last year. The weighted average price prediction for EU Allowances in Phase III of the EU ETS (around 2015) was 25.97 euros in 2010, down from 30.11 euros in the prior year.

With carbon price expectations dented by the recession and by slow progress in the international negotiations, it is difficult to see the carbon market driving the scale of investment required, without tougher targets at the national level. Companies struggling to finance low-carbon projects would welcome a price floor, but government needs to be careful not to undermine the market. Left to its own devices, the market will find the right price for carbon and, in this way, help reduce emissions at the lowest possible cost. But it is expectations of future prices that drive investment, not the price today.

What does seem clear is that there will be more complexity not less when it comes to carbon policy. In its years of operation, the carbon market has allowed for significant flows of capital and experience in implementing mitigation activities in developing countries. Carbon markets will continue to play a key role in addressing the challenge of climate change, though perhaps not as material a role as envisioned pre-Copenhagen. A difficult few years are likely ahead for those involved in carbon finance.

*"The fundamental challenge for low carbon finance is the need for capital reallocation from highly carbon-intensive assets to low/no carbon-intensive assets at scale and speed. The assumption is that the private sector must deliver the majority of finance to be deployed. With carbon pricing absent in many parts of the world it is difficult to see how this can occur at the scale and speed required. This suggests that now more than ever policy-makers need to focus on a full suite of measures that lower the risk of low-carbon investments and/or lower the cost-of-capital of finance for both debt and equity providers."*

*Abyd Karmali, Managing Director and Global Head of Carbon Markets, Bank of America Merrill Lynch and President, Carbon Markets & Investors Association*

4 World Bank (2010) State and trends of the carbon market 2010.
5 World Bank (2009) State and trends of the carbon market 2009.
6 http://www.pwc.com/gx/en/press-room/2010/carbon-mkt-price-limit-warming.jhtml

## 2. A pulse check on capital markets and investment in low-carbon infrastructure in developing countries

*This section was developed using contributions from Michael Liebreich, Chief Executive, Bloomberg New Energy Finance and Rupesh Madlani, Equity Analyst, Barclays Capital.*

The AGF report sees private investment flows as being essential. Multilateral development banks, in close collaboration with the United Nations system, are seen as playing a "significant multiplier role and leverage additional green investment in a way that integrates climate action into overall development programmes". The AGF estimates that for every US$ 10 billion in additional resources, multilateral development banks could deliver US$ 30-40 billion in gross capital flows and significantly more by fostering private flows[7]. It is worth noting that the AGF calculations are based on the assumption that the carbon price will be US$ 20-25 per ton of CO2 equivalent in 2020.

Hence, to incentivise private capital at scale, it is important to understand the current state of capital markets, particularly in relation to low-carbon infrastructure in developing countries. It is also useful to explore private sector perceptions on the conditions which stimulate greater private capital flows.

According to the International Financial Services London, assets of the largest 1,000 banks in the world grew by 6.8% in the 2008/2009 financial year to a record US$ 96.4 trillion while profits declined by 85% to US$ 115 billion. Growth in assets in adverse market conditions was largely a result of recapitalisation. Banks have written off more than US$ 1.3 trillion in bad loans according to the IMF with additional write-downs of US$ 1.5 trillion possible[8]. Despite a strong third quarter in autumn 2010, capital markets maintained concerns about the eurozone sovereign debt crisis and worries of a double-dip recession.

The equities market for renewables has performed poorly. The Barclays Capital Renewables Benchmark Index, which tracks the stock performance of these companies, fell 23% in 2010, compared to a gain of 13% for the S&P 500, and was one of the worst performing sectors of the year. This stock performance has limited companies' ability to raise additional equity capital and debt finance to expand. Market perception of weakness in policy resolve, and companies' ability to return to profitability, has compounded these issues.

Despite the volatility in the equity and debt markets, investment in clean energy surged ahead in 2010, according to data from Bloomberg New Energy Finance. New third-party funds into the sector totalled US$ 243 billion last year marking not just a 30% rise over the prior year but an all-time high.

The global trend masks considerable regional differences, however. The Asia and Oceania region has not felt the effects of the financial crisis nearly as much as Europe and North America. This – together with ambitious clean energy policies in countries like China – meant that Asia and Oceania finished a close second in attracting regional investment with US$ 82.3 billion in 2010 compared with US$ 94.4 billion in the Europe Middle East and Africa region. The Americas finished a distant third.

*"We have been saying for some time that the world needs to reach a figure of US$ 500 billion per annum investment in clean energy if we are to see carbon emissions peak by 2020. With US$ 243 billion in new funds invested in 2010, we are half-way there, and it is very good news. But the figures do contain an important caveat. More than in most years, growth has been in fairly direct response to government intervention, whether in the form of cheap debt in China, sweet off-take deals for European offshore wind, feed-in tariffs for solar or a regulatory push for smart grids. The industry needs to continue to drive down its costs and reduce its reliance on this sort of support."*

*Michael Liebreich, Chief Executive, Bloomberg New Energy Finance*

7 United Nations Report of the Secretary-General's High-Level Advisory Group on Climate Change Financing
8 International Financial Services London (8 February 2010), Banking 2010

China has seen the most activity of all countries accounting for the large majority of investment in Asia and Oceania. This is not surprising given its ambitious mandatory targets for wind and solar power together with its strong manufacturing capabilities and export markets as well as domestic demand. Much of the financing activity has centred on adding new wind power generation. In 2009, China set an all time record with 14,000 MW new wind capacity added. In 2010, it surpassed that with approximately 17,000MW added. No other country came close in terms of new wind installs. The US, second only to China, put approximately 5,000 MW net wind capacity into the ground.

India is also blossoming as a site of clean energy investment: record capacity is forecast to be added in 2010–2011 thanks to a range of policy options to promote growth and a resilient domestic stock market. Wind has attracted the most interest due to generous feed-in tariffs and there is significant potential from other renewable energy sources including solar, small hydro and biomass. In both India and China, rapidly growing economies and an energy generation infrastructure that is struggling to keep pace are all driving new investment.

The Asia and Oceania region could well remain the leader in attracting new clean energy investment in 2011, given the significant level of government support. Bloomberg New Energy Finance projects that by 2020, China will continue to be the global leader in investment but India will be third on the list, assuming both countries stick to their existing policy regimes.

In South America, lower priced gasoline created challenges for locally-produced ethanol to compete, but interest in renewable energy power generation continued to grow. Brazil is poised for significant growth in wind energy investment and has one of the world's highest biomass and small hydro power capacities, with more expected to be built over the next 10 years. However, dollar investment levels are lower in Brazil than might be expected because these technologies are lower cost and have higher capacity factors compared with others like solar.

Another important theme in 2010 was the extraordinary growth in small-scale, distributed generation projects, surging by 91% to US$ 59.6 billion, and now accounting for approximately one in four dollars invested in clean energy. Germany alone saw 8.5 GW of new photovoltaic capacity added in 2010, an all-time record, mostly in the form of small-scale residential or commercial rooftop systems. Other countries with feed-in tariff systems, including the Czech Republic, Italy and now the UK also saw rapid growth, as did certain US states.

### 3. Views from institutional investors on how to further stimulate private capital

*These findings have been made possible thanks to the active support of the Investors Network on Climate Risk at Ceres, the Institutional Investors Group on Climate Change, the United Nations Foundation and PwC. Interviews were conducted with a number of organizations: ATP; Bloomberg New Energy Finance; BT Pension Scheme; CalSTRS; Climate Change Capital; Deutsche Bank; Standard Chartered; State of Connecticut Retirement Plans and Trust Funds; State of Maryland Treasurer's Office; SUN Group; Tana Energy Capital LLC; and Zurich Financial Services.*

*"Investors are concerned with the risks presented by climate change to regional and global economies and to individual assets. At the same time, investors are interested in the large potential economic opportunities that the transition to a low-carbon economy presents. Investors have a fiduciary responsibility that requires them to seek optimal risk-adjusted returns on their investments. At present, in the absence of strong and stable policy frameworks, many low-carbon investment opportunities do not currently pass this test."*

*INCR, IIGCC, IGCC "Global Investors Statement on Climate Change: Reducing Risks, Seizing opportunities & Closing the Climate Investment Gap", November 2010*

The Critical Mass Initiative conducted a number of investor interviews in May-September 2010 to gauge perceptions on the barriers and enablers that will draw in greater investment. The results showed that overall the investors surveyed did express interest in a wide range of low-carbon investment opportunities in developing countries. However, they also identified an equally wide range of potential obstacles, mostly related to excessive or unquantifiable investment risks and inadequate or insufficiently predictable returns in such markets.

In general, these investors, including both owners and managers of funds, take the view that the starting point for the intergovernmental community on this question should not be to determine which projects public institutions should finance in full, but rather which projects the private sector finance could finance at least in large part, and therefore what cost-effective public sector interventions have the potential to bring this about if the market proves incapable of doing so on it its own.

This perspective is important. It reflects a conviction among the private sector investment community that there is a substantial role for public policy and public finance to play in enabling private financing of clean energy projects in developing countries, but that private finance should form the majority of funding needs. Private sector funders, regardless of institution class, unanimously point to consistent, well-articulated and long-term public policy as the most important criterion when considering investment in this arena.

Bilateral and multilateral development institutions also have a critical role to play in reducing risk. Public finance can be usefully deployed to help de-risk projects for the private sector. Some of the most critical risks that need to be addressed include: 1) risk of changes to government policy that inadvertently reduce the competitiveness of low-carbon technology, 2) limited capacity and risk appetite among commercial lenders, 3) shortage of risk capital for funding the scale-up of early stage clean technologies, and 4) aggregation challenges for large numbers of small-scale, low-carbon investments, given high transaction costs.

This more targeted use of public funds can help attract private capital to areas and situations that may not initially appear attractive to investors from a risk-return standpoint or in terms of uncertainty or novelty (e.g. frontier markets, new technologies or investments with large upfront risk, such as geothermal exploration).

While appetite exists within the private sector investor community for low-carbon infrastructure in developing countries, a more direct and immediate effort is needed to address uncertainties related to risks and returns if their investment is to expand quickly and at scale. Within this context, a smarter deployment of limited public funds to help mitigate key risks in the investment value chain is seen as critical.

For fuller description of the outcomes from the private sector interviews, please see Appendix A

**The role of credible national policies and public sector finance mechanisms in stimulating sector investment**

*By Ole Beier Sørensen*

The single most significant driver of private sector investment in climate change solutions is strong, stable, transparent and credible policy. It is the sine qua non of climate finance – in developed as well as developing countries. A basic lesson to be learned from past experience in renewable energy is that almost without exception private sector investment in climate solutions has been driven by consistent and sustained policies.

But, when looking at emerging economies, consistent and sustained policies may not be enough. In most emerging economies, investors will be facing additional risks and those risks will of course expose investors to additional challenges and affect the risk-return assessment of concrete deals. Examples of such risks may be more limited transparency, strong third party dependency, higher transaction costs, weaker possibilities to reuse competences created and higher financial as well as political uncertainties and risks.

This means that private sector investment in climate solutions in these countries can only be accelerated if risk levels are brought down through a combination of capacity and policy development.

There is a clear role in this respect for public sector finance mechanisms to help leverage private finance. Rather than creating new instruments, the key requirement is to look into the possibilities for an expanded application of existing mechanisms such as export credit guarantees and guarantee schemes for local credit institutions. Policies and programmes must support a mainstreaming of climate finance. If this requirement is not met, the danger is that climate finance remains a niche activity for a small number of investors.

Most importantly, however, the deal flow for low-carbon projects in developing countries will be improved with the implementation of strong and credible national policies. With the right policy frameworks in place at national and international levels, money will be available for climate finance.

*Ole Beier Sørensen is the Chief of Strategy and Research at ATP and Chairman of the Institutional Investors Group on Climate Change (IIGCC). IIGCC is a network of more than 65 members, including some of the largest pension funds and asset managers in Europe, representing around 6 trillion euros (www.iigcc.com)*

**Private investors call for policy frameworks and tools to catalyse low-carbon investment**

*By Mindy S. Lubber*

Leading institutional investors such as pension funds and asset managers are now focused on the risks presented by climate change to the global economy and to assets in their portfolios. Many investors are also exploring the opportunities created by the need to respond to climate change and to shift to a clean energy economy, seeing significant potential in scaling up renewable energy, energy efficiency and other low-carbon technologies worldwide.

To meet their fiduciary duties, however, investors require an economic environment in which low-carbon investments offer risk-adjusted returns that are truly competitive with other investment opportunities. At present, in the absence of strong and stable policy frameworks, many low-carbon investment opportunities do not currently pass this test.

While investors worldwide are currently taking actions on their own to address climate risks and opportunities – considering and addressing climate risks in their existing investments; investing in assets such as renewable energy, energy infrastructure and clean tech; pressing companies to reduce their greenhouse gas emissions, persuading regulators to require corporate disclosure of the business impacts of climate change, among other initiatives – these efforts must be scaled up dramatically to reach the levels needed to achieve a global low-carbon economy.

Private investment will only flow at the scale and pace necessary if catalysed by clear, credible and long-term policy frameworks and finance tools that shift the risk-reward balance in favour of less carbon-intensive investment. Carbon markets can be a part of the solution but are not in themselves the answer; investors need a range of domestic and international measures that provide relative long-term certainty about the direction of clean energy, climate policies and financing. Investors also need multilateral development banks and other development finance institutions to apply risk-reducing finance tools that can enable market development and help scale up private investment in developing countries.

That is why, in November 2010, investors issued the Global Investor Statement on Climate Change: Reducing Risks, Seizing Opportunities & Closing the Climate Investment Gap, calling on domestic governments and international institutions to take action to provide the finance vehicles and the climate and energy policy frameworks needed to catalyse private investment in the low-carbon economy.

The global investor statement was organized by the Investor Network on Climate Risk (INCR), the Institutional Investors Group on Climate Change (IIGCC), the Investor Group on Climate Change Australia/New Zealand (IGCC) and the United Nations Environment Programme Finance Initiative (UNEP FI), with support from the Principles for Responsible Investment (PRI) Advisory Council.

Investors stand ready to work with governments and international institutions to deliver tools and frameworks that meet investors' needs, catalyse private investment and move the world to a low-carbon future.

*Mindy S. Lubber is President of Ceres and Director of the Investor Network on Climate Risk (INCR), a network of more than 95 investors with over US$ 9 trillion in assets (www.incr.com).*

# Part 2

**Learning-by-Doing: Critical Mass Initiative Laboratories**

In summary, the viewpoints from investors seem to indicate that while appetite exists for allocating assets toward low-carbon infrastructure in developing countries, a more direct and immediate effort is needed to address uncertainties related to risks and returns if this investment is to expand quickly and at scale.

It is interesting to note that investors across all asset classes suggest that there is appetite among a significant minority of the investment community to take a leadership position and explore investment opportunities in low-carbon infrastructure in developing countries. This appetite may have grown slightly following the enhanced sense of confidence in international climate policy making following Cancún, but it still remains weak overall given current conditions in the financial markets. However, there is a caveat: to get engaged, this private investor leader group requires a specific, substantive and sustained dialogue with the public sector, in particular on the role that Development Finance Institutions (DFIs) can play to mitigate risks and incentivize returns.

Could the creation of a series of hubs, platforms or laboratories of public-private stakeholders working together to ascertain how to jointly finance real low carbon projects programs or policies in developing countries, provide the answer the investors are looking for?

To find out, creating a "safe space" for the demonstration of ideas of public-private financing was the aim of the Critical Mass Initiative.

What are the specific ways in which DFIs can be encouraged to shift their operational focus quickly and to scale, focusing more on risk mitigation and return enhancement as well as on wholesale fund structures?

The organizations involved in the Critical Mass Initiative supported a bottom-up process of practical experimentation supported by research and dialogue among investors, banks, asset managers, project developers, donor governments, DFIs and other relevant parties. By building fit-for-purpose financing solutions and understanding how they can be scaled quickly, the public and private sectors will be more likely to create win-win arrangements that mobilize the participation of institutional investors at scale in low-carbon investments in developing countries.

This is the essence of the Critical Mass Initiative. Critical Mass "laboratories" are uniquely safe spaces for detailed, specific project finance and design discussions to take place between a full range of private investors and DFI officials, and between domestic government officials and project implementers. With all parties working alongside each other to develop financing frameworks for specific large-scale opportunities, each is able to explain and design the role they can play, the risks they are willing (or not) to take on and the rules or clarity they will need to turn the opportunity into a potential transaction.

As part of the process, concrete progress can then be made to test, reverse-design or develop concepts for investment funds, fiscal instruments or incentive mechanisms. This bespoke design process will enable specific log jams to be overcome and will attract specific types of private investment into the particular investment opportunity at sufficient scale within the required time frame. With these real project examples, real data on costs, risks, returns, the impact of different interventions, the public-private leverage impact for additional finance, and the emissions reductions avoided can all be modelled and calculated with a degree of confidence.

Taken together, the common learnings from the Critical Mass experiments provide a rich source of material for policy-makers as to where and how DFI activity can be adjusted and how the private investment community can be engaged in the low-carbon infrastructure project, programme or fund design and financing. In turn, this material will help to shape broader discussions as to the public-private fund, instrument and incentive designs that will work for the private sector in a range of given conditions.

The following sections outline the three laboratories that were convened as part of the Critical Mass Initiative. Appendix B outlines a number of innovative public-private financing models, some of which helped in the design of the various financing mechanisms utilized in the Critical Mass laboratories.

## Laboratory 1: India Solar

*This section was written with contributions from Jonathan Maxwell, Chief Executive Officer of Sustainable Development Capital; Harish Hande, Chief Executive Officer, SELCO Solar Light (P) Ltd; Radhika Bharat, Senior Private Sector Development Adviser, Climate Change, DFID; and Don Purkha, Senior Investment Officer, Asian Development Bank*

Within the context of the India National Solar Mission (NSM) and schemes in various Indian states, the Critical Mass Initiative created and led this laboratory which demonstrated the potential for significant scale-up of solar energy projects through the design of breakthrough public-private financing models that improve the risk-return equation of larger than average solar projects.

### Context

India's power sector has a total installed capacity of approximately 165 GW of which around 54% is coal-based, 25% hydro, 8% renewables and the balance is gas and nuclear-based[9]. India is the world's fourth largest economy and the fifth largest emitter of greenhouse gasses, accounting for about 5% of global emissions. India's carbon emissions are estimated to increase from 1.1 Gt in 2005 to 3.3 Gt in 2030[10].

India's National Action Plan on Climate Change (NAPCC) was released in mid-2008. The NAPCC outlines India's existing and future policies and programmes to address climate mitigation and adaptation. The principle of the NAPCC is to maintain high economic growth to "promote development objectives while also yielding co-benefits for addressing climate change effectively[11]." Central to the NAPCC are eight "National Missions", of which the NSM[12] has been identified as high priority.

The NSM is an ambitious plan to drive the large-scale deployment of 20 GW of grid connected solar capacity by 2022. It is important for the country's energy security, for its commitment to tackle climate change as well as to kick-start its clean growth agenda. As of March 2010, India has 14 MW of installed solar capacity.

The key objectives of the Mission are:

- To develop solar capacity of 20 GW by 2022 in three phases: 1st Phase: 1-1.2 GW by 2013; 2nd Phase: 4-5 GW by 2017 and 3rd Phase: 20 GW by 2022
- To develop domestic solar manufacturing and accelerate R&D to drive solar costs down

To meet its objectives, the Government of India has put in place the following incentives:

- Tariffs set were intended to provide return on equity of 16% (post-tax and in rupee terms)
- Power purchase agreement (PPA) for 25 years through a single buyer model
- Blending solar power with thermal power to reduce the cost burden on distribution companies and consumers
- Ten-year tax holiday
- Photovoltaic (PV) feed-in tariff ceiling at 38 cents (18 Rs/kWh) – current fiscal year
- Concentrated Solar Power (CSP) feed-in tariff ceiling at 32 cents (Rs 14.6/KWh) fixed for two years
- Solar-specific renewable portfolio obligation (RPO) (to be implemented by state regulators) with 0.25% in Phase I increasing to 3% by 2022

Various states in India have outlined their own solar initiatives, in conjunction with the NSM. Gujarat has a proactive policy to encourage the development of solar power. Gujarat has selected 24 Solar PV projects totalling 360 MW and 10 Concentrated Solar projects totalling 350 MW[13]. Rajasthan currently has 11 projects with MoUs totalling 66 MW which are being transferred to Phase 1 of the NSM. It has two projects of 5 MW each under construction and is currently seeking 50 MW of Solar PV and 50 MW of CSP capacity through competitive tariff bidding[14].

In addition, under the NSM, the targets for off-grid and decentralized solar applications are 200 MW of installed capacity by 2013; 1,000 MW by 2017; and 2,000 MW by 2022. The mission recognizes the importance of off-grid and decentralized solutions not just in terms of carbon savings but also in terms of energy provision for the population who are energy poor and live in rural areas.

9 Prime Minister's Council on Climate Change, 2008. "National Action Plan on Climate Change". Government of India
10 Data from IEA, 2007. "CO2 Emissions from Fossil Fuel Combustion 1971-2005"; IEA, 2007. "World Energy Outlook 2007: China and India Insights" and USEPA, 2006. "Global Anthropogenic Non-CO2 Greenhouse Gas Emissions: 1990-2020"
11 Prime Minister's Council on Climate Change, 2008. "National Action Plan on Climate Change". Government of India
12 http://mnre.gov.in/pdf/mission-document-JNNSM.pdf
13 http://mnre.gov.in/solar%20energy%20conclave%202010/solar-energy-conclave-2010-13.pdf
14 http://mnre.gov.in/solar%20energy%20conclave%202010/solar-energy-conclave-2010-14.pdf

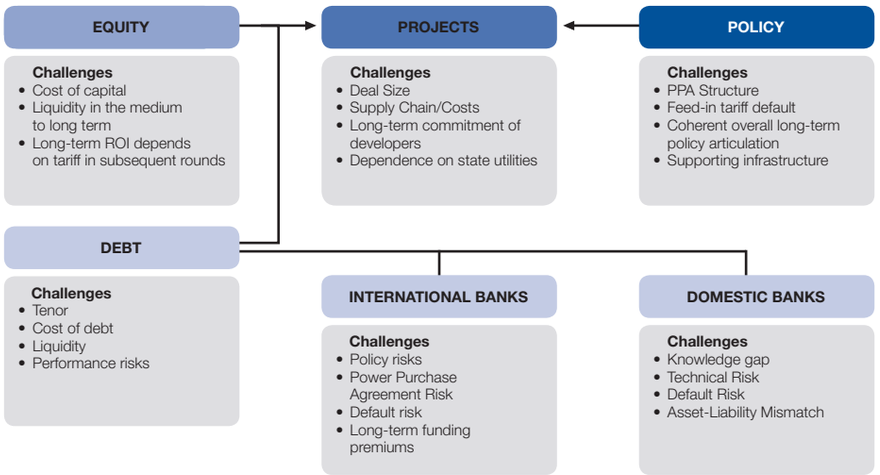
The following sections will outline the problem definition and the breakthrough funding model for both grid-connected and off-grid solar power in India. A combined description of lessons learned will be provided at the end of this section.

## A. GRID-CONNECTED

### Problem Definition

At this stage, despite the promising potential of solar and the Government of India's commitment to the NSM, there are still a number of challenges. These need to be addressed to make India Solar an attractive investment proposition with bankable projects at scale.

The key challenges include (as outlined in the figure below):




**Power Purchase Agreement (PPA) structure:**

The PPAs associated with the national and state schemes are evolving as the allocations progress. These are the first generation of Solar PPAs in India. Given the lack of track record, the risk perception is high.

- Until costs decrease, solar projects are not viable in a market dispatch environment without a long-term off-take contract
- Given the 25-year duration of the PPAs, the long-term viability of the feed-in-tariff and risk of default and the supporting infrastructure for off-take is uncertain
- Lack of consistent regulatory environment and a state by state approach to renewable purchase obligations (RPOs) leads to further uncertainty and risks perceived by the lenders
- The current nature of PPAs (some versions are not assignable to lenders, although this is being addressed) makes it difficult to access non-recourse financing and discourages many developers and those without strong Indian balance sheets.

**Cost of finance:**

- The main debt players in the initial round will mainly be domestic banks. There is a knowledge gap and a need for technical assistance for some domestic banks to participate as they are unfamiliar with technical risk associated with solar projects.
- Few Indian banks are offering non-recourse debt financing and none have reached financial close with non-recourse financing as of autumn 2010.
- The first wave of solar projects in India is generally too small to attract direct debt funding by multilateral development banks (a majority have been sized at 5-10 MW).
- For international banks, the policy risk is perceived as high and guarantees are needed.
- The debt to equity ratio is sized based on power generation capacity and tariff – in most cases the maximum leverage is 70% and real and perceived risks make the banks reluctant to lend long term.

- The debt tenor from local banks is typically 10-12 years (versus 15 years plus required by the project developers for viability) with the consequence that long-term assets are funded with shorter term financing and therefore providing exposure to material refinancing risk.
- The first phase of the NSM alone requires an investment of US$ 3-4 billion and the total investment needed until 2022 would range anywhere between US$ 20 billion and US$ 30 billion depending on how the cost reduction curve develops. Liquidity will be an issue as more projects are allotted.
- Where onshore borrowing costs are high (11-13%), projects lack feasibility.
- Credit enhancements need to be explored to mitigate risks and reduce financing costs. Lower costs debt would have benefits for project viability as well as the long-term cost of capital for government. ADB has estimated that a 2% reduction in interest rates would equate to an 8% reduction in the levelized cost of electricity production, indicating that solar power projects are highly sensitive to the cost of debt.

**Lack of appropriate financial instruments:**

Fit-for-purpose financial instruments targeted at India solar (such as partial credit or risk guarantees) are still being developed. Given the opportunity that the NSM provides in terms of the scale and the possible transformation of a sector, public-private finance mechanisms that address key issues in the initial stages of the solar industry in India could have significant impact.

- Coordinated effort is required to come up with bespoke products to address the specific risks perceived by the various players – by the local, international investors and banks and multilateral agencies are at a nascent stage.
- For these to be fully developed, the projects need to be large enough and bankable and the first round of the NSM does not have projects of the required size; however, some of the state schemes do currently provide more options.
- Governments are being asked to credit enhance solar off-takers for default risk, and external guarantees are being sought from multilateral development banks, both for comprehensive coverage and specific risk guarantees.

**Policy Coherence:**

The national and state level solar initiatives depend on robust, stable and long-term policy support. An enabling policy environment, which brings together regulation, planning and subsidies could rapidly scale up solar energy.

- *Deal Size:* The small size of PV deals in the first round in the NSM (5 MW) leads to high transaction costs which may dissuade larger developers from the first round of allocation. It is also not attractive for investors and multilateral agencies. Banks would rather lend against a corporate balance sheet rather than structure as a limited recourse financing based on the project's cash flows, given the high transactions costs relative to deal size.
- *Cost Reduction is critical for scale-up:* The technology cost for solar, especially the capital cost, is high as compared to other sources of energy. Projects need to be sized at sufficient scale to achieve cost reductions from major equipment suppliers. Grid parity is expected to be achieved over time as economies of scale and R&D benefits kick in. The long-term success of the NSM depends heavily on the costs of technology coming down with scale and with local manufacturing being generated by project demand.
- *Local Obligations:* Mandating local components in projects, given the nascent supply chain in the country, may increase the technical risk in the initial rounds and make projects more challenging.
- *Start-up challenges:* Many other resources that are needed for solar energy projects, such as land or water can be scarce or hard to secure. The mission will need systematic support by the state governments for land acquisition. It can be difficult to get the required permissions and sourcing the necessary technology and resource inputs (due to limited scale of current local supply chain).
- *Confidence in PPA:* While solar generation costs remain significantly higher than grid clearing prices, the PPA structure is critical; there is a general lack of confidence in the bankability of the PPA. There have been calls for an Indian government guarantee and/or the passing of a renewable energy law. The Indian government is considering a credit enhancement of NVVN Limited, the single off-taker of the NSM scheme.

**Technology Risk:**

PV is preferred by most lenders, having less complex design where for instance the failure of an individual panel is not critical. CSP has benefits in terms of scale on the one hand but also has scaling up risks technically.

**Construction and counterparty risks:**

A credible sponsor is key; it can be difficult to secure EPC capacity and expertise, and smaller firms with weaker credit act as installers/integrators and O&M providers.

Indicative terms for typical solar PV projects in India is characterized by:

## Designing a Breakthrough Funding Model

The central and state programmes will initially generate a large number of small solar PV projects in the range of 3-25 MW, involving individual projects costs of US$ 9-75 million. CSP projects are being sized at approximately 50 MW.

The Critical Mass Initiative tracked a number of live solar projects, typically around 25 MW solar PV projects in Gujarat and a smaller number of CSP projects involving higher capital costs. Projects of 25 MW PV were deemed most appropriate given that they offer significant potential for scale and reliability, yet remain bankable. It is also a size that would be appropriate to receive credit enhancement facilities that are currently being developed by the Asian Development Bank (ADB). More details on these facilities are discussed below.

**Financial Structure**

- Maximum 70/30 debt-equity ratio
- Minimum Debt Service Coverage Ratios (DSCR) of 1.2-1.3x before an event of default
- Minimum Debt Service Coverage Ratios (DSCR) of 1.5x before cash trap/dividend block
- Typical lending margins of 300-400 bps
- Sponsors must retain at least 100% of shareholding during construction and 51% for two years thereafter
- Sponsors guarantee cost overrun and completion until construction completion
- 50-100% equity contribution by sponsor before first disbursement of loans
- Pre-funded six-month equivalent debt service reserve account (DSRA)
- Interest and currency risk should be fully hedged (subject to market availability)

**Sources of funding:**

Local banks

Local banks can typically provide 10-12 year funding using their base rates of 7.5-8.5% (which are subject to annual resets if cost of funds increases). This implies 10.5-13% all-in lending rates for solar. Local banks would prefer guarantees from creditworthy corporate entities to reduce the cost of debt.

International banks

International banks can provide long-term funding but have to charge significant funding premiums over LIBOR before adding on project risk premiums. Most international banks prefer 7-10 year loans

The discussions of the Critical Mass Initiative examined two key financing solutions that could combine to form a comprehensive investment proposition for India Solar projects.

- International Public-Private Partnerships, for example as being organized at scale through the "The Climate Public-Private Partnership" (CP3) Fund for Equity investments
- The Credit Enhancement Facility being custom-developed for India Solar by the Asian Development Bank

### The CP3 Fund

The "Climate Public-Private Partnership" (CP3) Fund is a proposed investment vehicle spearheaded by the UK Department for International Development (DFID) in collaboration with the Asian Development Bank (ADB) and the International Finance Corporation (IFC), through which institutional investors can access opportunities to invest in low-carbon and resource-efficient infrastructure assets and services in Asia, alongside MDBs. The Fund will target financial returns and climate change mitigation and is expected to have a large development impact. The Fund will be structured as a public-private partnership to maximize opportunity and minimize risk. It will benefit from the experience of public sector investors in emerging markets and create a link with public sector concessionary finance and risk mitigation tools to create the conditions under which private investors will be attracted to invest capital at scale in emerging Asian markets.

The CP3 Fund is looking at ways in which it can help to accelerate the pace of sustainable development in Asia. The Critical Mass Initiative is helping to illustrate and clarify some of the key barriers to the scaling-up of financing for low-carbon infrastructure in developing countries by drawing together public sector financial institutions and risk mitigation tools, and private sector developers and equity investors.

For example, with regard to the role of technical assistance and risk mitigation, the Critical Mass Initiative has illustrated the importance and potential impact of applying instruments that mitigation some of the key risks associated with projects (see table below). The transfer of such risks, which private sector investors are not able to mitigate, through risk mitigation instruments or insurance products offered by the public sector could have a transformative effect in terms of the appetite of private sector financial institutions, both local and international, to lend and invest in projects at a lower cost of capital.

The application of risk sharing mechanisms will vary and be required in different measure for different sectors in different geographies. However, the Critical Mass Initiative is helping to identify the discrete obstacles in certain key markets such as Indian solar and how public and private sector collaboration through innovative instruments can catalyse change.

| Identified risk | Mitigated by |
|---|---|
| A funding gap associated with an information and knowledge gap | An institutional vehicle that can provide both capital and know-how |
| Lack of scale: projects tend to be small in scale and have high transaction costs | Investment through private equity funds and development of scalable and replicable projects |
| Low-carbon regulatory/policy risk and lack of adequate market incentives | Policy dialogue and access to sources of concessionary finance |
| Regulatory, legal, country, political, technology and execution risks associated with low-carbon infrastructure in developing countries | Technical assistance and risk mitigation, including access to MIGA/ADB/OPIC/ECA guarantee and insurance products |
| Governance risks | Due diligence and MDB networks |

Further details on the CP3 Fund can be found in Appendix 2.

### Credit Enhancement/Loan Guarantee

Following a Critical Mass meeting in London on 1 September 2010 to explore solutions enabling practical financing and policy architectures that would support the scaling-up of investments in solar in India, it became clear that both public sector and private sector banks and financial institutions could see benefits in collaboration, improved communication and shared learning in this key emerging sector. Subsequently, interest was identified from project developers in forming a relationship with the Critical Mass Initiative and the associated network of public and private sector institutions working together on a transaction-oriented basis to create projects at scale.

Opportunities and challenges associated with solar in India emerged through dialogue with the banks and other stakeholders. Some limitations on the scope of the multilateral development banks (for instance that they are typically limited to lending 25% of project cost for private sector borrowers) and the need for and benefit of partnership with the private sector became clear. Firms with an interest in creating projects at scale to achieve "breakthrough" economies illustrated the need to coordinate between government planning and multiple financial partners. Developers stood to benefit through access to international finance and expertise.

At a subsequent meeting in New Delhi in late October 2010 held during the Delhi International Renewable Energy Conference (DIREC), further discussions were held on the significant role that multilaterals have to play in developing and applying risk mitigation tools for private sector projects: for instance, the Asian Development Bank (ADB) is hoping to roll out a US$ 150 million partial credit guarantee to provide cover against all risks (legal, political, commercial, technical, etc.) in Q1 2011, subject to board approval, to mitigate credit (and other) risks associated with PPAs for India Solar as discussed above. The guarantee would provide commercial lenders with 50% cover for any non-payment by the borrower, effectively replacing half of a project's risk (estimated at B-BB equivalent) with ADB credit risk (AAA); enable extension of loan tenors to 15 years plus; and allow ADB to leverage financial support for projects that are too small for typical project financing. In addition, ADB is in discussions with donors to help buy down the cost of this guarantee product (to further reduce the cost of financing for the projects) and ADB is also planning to provide technical assistance directly to the commercial banks to build capacity in the areas of solar technology, performance and risk assessments.

There was significant value in opening the dialogue between private sector banks, MDBs and private equity infrastructure investors at the meeting. For example, private sector banks were able to stipulate which elements of the guarantee (i.e. credit) were most critical, allowing for potential improvements to the design and efficiency of the risk mitigation tool.

There is now specific work underway to investigate the application of the guarantee and test it on a real project under development, which is valuable both for target projects and their delivery consortia and for the Asian Development Bank's credit committee in designing the guarantee. The impact of capital efficiencies that may result could help to significantly reduce cost of capital and development/construction, establishing a model that could be scalable and replicable, and more commercially sustainable for all parties – for instance by reducing interest on debt, improving equity returns and, ultimately, over the longer run accelerating reductions in required feed-in tariffs.

## OFF-GRID

### Problem Definition

Rural off-grid electrification using Solar PV has been tried for many years in India and other parts of the world. Off-grid solar electrification is a social imperative. Around 70% of India' population is involved in agriculture and lives in rural areas. The International Energy Agency estimates that over 400 million people[15] have no access to grid electricity in India. A large number of deaths occur annually due to indoor air pollution due to the lack of access to clean cooking. Decentralised energy needs to be tackled from a developmental perspective while building market mechanisms to enable it to be self-sustaining in the long run. Entrepreneurs and firms will need to deliver solutions targeted at satisfying the requirements at sustainable prices.

15 International Energy Agency, World Energy Outlook 2010.

**The key challenges facing the sector include:**

- *Business Models and Eco-system:* Many of the user needs are not yet mapped. The commercial eco-system that enables investments in most sectors including on-grid solar does not exist.
- *Scale and Economics:* The economics of off-grid make them unattractive for pure commercial players. The disaggregated nature of projects makes transaction costs too high for large investors.
- *Lack of fit-for-purpose financial products:* Many of the existing financial products and services are not suitable for solar products (as they do not match the cash flows). Specific, off grid focussed solutions need to be deployed. To get off-grid applications to scale a mix of public and private capital deployed in an innovative way is required.
- *End-user financing issues*: Given that the target customers for off-grid solar are very different, there is also a need to provide guarantees, while in parallel creating different financial products for end-user purchase of off-grid solutions.
- *Knowledge Gap:* Many of the local financial institutions are averse to investing in off grid solar as there is a knowledge gap in terms of the ability to evaluate such projects; they perceive it as high risk and are not clear about the financial viability in this sector. There is also a lack of social-business practitioners in the due diligence teams of many of the funds attempting to invest. Many of the new funds in this space attempt to adapt standard models from other sectors into this sector instead of re-defining the parameters given the social impact.
- *Capability Gap:* Lack of adequately skilled human resources across the value chain and at all levels in the off grid solar sector. There are very few local training institutes that offer training courses in conceptualizing, selling, designing and servicing solar systems in the rural areas. This leads to lack of support for local bankers attempting to finance systems for poorer clients. It also slows the growth of networks for suppliers in the rural areas. Standard business models, that often rely on external subsidies, which are not sustainable (for the rural areas) in the long run are routinely pursued in this sector: it is a different market. The business models are not innovative or holistic in execution.
- *Inadequate public support:* The government has acknowledged that the key to unlocking the scaling-up of decentralized and off-grid energy in India is financing. To promote off-grid applications, the government is offering financial support through a combination of subsidy and low-interest loans for companies in the business. The implementation of similar policy measures in the past has had little long-term impact.
- *Carbon Value:* There is no comprehensive system in place to capture the value of carbon, avoided deforestation and benefits of reducing emissions as compared to the use of fossil-based and biomass fuels from large-scale, off-grid deployment.
- *Tax relief and other fiscal incentives:* Given the social benefits and developmental priorities associated with off-grid solar, the development of the rural energy ecosystem by providing tax breaks and innovations in technical products, financial products and process and market linkages through public support is not at the level it should be and needs to be accelerated.

## Designing a Breakthrough Funding Model

While this model is still being developed, it is becoming clear that the role for technical assistance, concessional or grant financing, and early stage equity risk capital is key to off-grid solar solutions.

| EQUITY | DEBT | GRANTS |
|---|---|---|
| • Concessionary finance provides lower cost of capital for small and medium sized enterprises, new entrepreneurs or for existing enterprises who want to create a new solar portfolio | • For capital projects as well as working capital needs<br>• Concessionary loans for end-users and enterprises<br>• For guarantees against suppliers | • Creating a fund to guarantee end-user finance<br>• Use for developing the ecosystem<br>- Capacity building, including training, in local financial institutions<br>- Innovation in technical and financial products<br>- Growth of human resource and the number of suppliers in rural areas<br>- Systems and process development, including new business models |

## Lessons Learned and Potential for Scale-up

Critical Mass is seeking to achieve material benefits in terms of capital efficiency for Indian solar projects by bringing together public and private sector banks and financial institutions, and seeking to apply risk mitigation techniques to lower project risk and cost of capital. The desired outcome is a public-private partnership approach to financing of specific Indian solar projects. The approach of this laboratory was one of providing project level proof points.

### Process:

The initiative followed a staged process to develop financing solutions for unlocking private capital flows to solar projects in India. This approach followed a set of steps of brainstorming and analysis combined with “learning-by-doing”. The practical steps used in this approach are replicable and based on “live” examples and input from investors and key multilateral agencies.

1. *Background:* Understanding the challenges facing the sector. A broad analysis of the sector based on research followed by active multistakeholder input from key players active in the solar sector in India.

2. *Barriers:* Identifying the key risks perceived by the international private sector. Deep dive into the risks perceived by banks and international investors interested in the solar sector in India that they would like the public and multilateral and development finance agencies to address.

3. *Developing Options:* Explore key public-private financing levers. Leveraging the latest thinking in the low-carbon finance arena globally and testing their specific application to the solar sector in India by preparing a hypothesis for a customized solution.

4. *Learning-by-doing:* Identify transactions to test the solutions using a practical live transaction and refine the solutions to enable quick application and rapid scale-up.

5. *Support in structuring the financing package and share learnings:* Help design the investment proposition using public-private finance mechanisms developed by the players to catalyse the participation of private capital in India Solar at scale.

The Critical Mass India Solar working group followed the process above to help structure public-private financing solutions fit-for-purpose for investments in the solar sector in India. It built on the initial investor convening and independent background work done by the key participants. The working groups and sub-groups had meetings in London in September 2010 and in India in October 2010 and November 2010.

**Solution focused multistakeholder dialogue:**

The process of convening multiple stakeholders is closing information and relationship gaps between the public and private sector, and even between different elements of the public sector, revealing opportunities for capital efficiency. For example, a dialogue between public and private sector banks has revealed opportunities for collaboration on specific financing opportunities. Meanwhile, a dialogue between the ADB and a donor government has revealed opportunities, under appropriate conditions, to apply donor funding to reduce the cost of the guarantees to the point at which private sector banks are prepared to mobilize capital for solar project finance.

By working with multiple stakeholders, including banks, project equity investors, developers, EPCs and governments, Critical Mass is seeking to achieve benefits in terms of a breakthrough in cost and availability of capital or equipment, with the potential to create systemic change, for example by:

- Designing projects that allocate risks to those best placed to take them, for instance by investigating and testing the application of loan guarantees being designed by the ADB
- Facilitating the market for international bank financing, for instance by identifying key risks and preferences, and addressing them with public sector financial partners
- Deepening local market capacity, for instance through the introduction of liquidity and sector expertise from the international capital markets, helping to reduce lending margins and increase tenors
- Exploring the role for international export credit agencies in lending or providing lower cost trade finance
- Creating the conditions under which equity investors and developers can achieve more sustainable returns in the longer term, by aiming at reduction in the cost of capital
- Generating interest and investment in local manufacturing (creating jobs) through demand from projects for supply of solar panels and other technology
- Creating the conditions under which capital efficiencies can be introduced, with the long-term objective of creating scale deployment, capital and equipment cost reductions and ultimately reducing the cost of required market incentives required from government

**Key Process/Platform Lessons:**

While the laboratory is ongoing, some important insights can already provide important learning for similar efforts looking to replicate the India solar example:

- *The discussions were led by private investors, banks and multilateral development agencies:* The solutions needed the different financial players to work together to catalyse the solutions. The private sector financial institutions, bilateral and multilateral development agencies, and project sponsors led the Critical Mass discussions.
- *Policy feedback and government interaction:* As the Indian solar mission was already aligned with the national climate change plans the Critical Mass Initiative discussions were focused on providing input to make the policy "investment-grade" and help refine the commercial frameworks. Discussions with key officials at the 2010 India Economic Summit and participation at DIREC 2010 were part of this effort. The policy architecture needs improvement and there is a need for feedback and refinement. Collaboration between the public and private sector is helping to clarify opportunities for risk sharing and appropriate allocation of risk. The deconstruction of risk and return along the value chain and analysis of new public sector risk instruments that are being developed is pointing to some key priorities and opportunities, such as:
  - Importance for India to provide confidence in a clear and consistent regulatory framework, including integrity of feed-in tariffs and PPAs – perhaps through a renewable energy law
  - Potential for the development of insurance and risk mitigation products and markets.

- *Providing "live" examples:* The India solar working group had the different players come together at the project level and work on live transactions with commercial deliverables. The transactions are looking at the meaningful size of projects that have the potential to be catalysing examples.
- *Solutions need to be shared effectively:* The required financial mechanisms are being developed by various players but need to be supported with early success stories and proper knowledge sharing to build confidence in the market. The objective of the initiative to improve the capital efficiency of low-carbon infrastructure projects is being demonstrated and can be shared. By addressing risks for lenders, cost of capital could be reduced, improving sustainability of returns for developers and investors in India Solar and over time, allowing for "critical mass", economies lof scale and, ultimately, a reduction of required subsidies and an overall reduction in cost of capital for the Indian government. To ensure scale-up, the lessons from this demonstration platform will be shared among the private finance community and multilateral development agencies and governments.

### Laboratory 2: South Africa Renewables Initiative

*This section was written with contributions from Simon Zadek, Team Leader, South Africa Renewables Initiative and Edwin Ritchken, Special Project Advisor, Department of Public Enterprise, Government of South Africa.*

SARi aims to unlock renewable energy (20 GW by 2020) by proposing an innovative financing arrangement to minimize the use of "climate finance" enabled by a focus on the industrial and economic benefits. The Critical Mass Initiative supported SARi in helping it test its concept with equity investors, lenders, project developers and bilateral and multilateral development finance institutions.

#### Context

South Africa has one of the world's highest levels of carbon intensity of income (GDP) with an economy energized through domestically mined, low-quality coal used in ageing coal-fired power stations. The economy, while growing rapidly in recent years on the back of increased commodity exports and prices, is very energy inefficient and perceived as being dependent on cheap energy. Its exports are dominated by energy and carbon-intensive commodities, with exporting industries using about 40% of all electricity generated. Inefficient use of energy is encouraged by electricity tariffs that are significantly less than the full financial cost of coal-fired power generation. Tariff increases, while embraced in government policies and practices, are unsurprisingly deeply unpopular in domestic and business circles, making rapid change difficult.

Energy security is a major concern for South Africa, with only the current economic recession having delayed the economic and social disruptions linked to inadequate electricity being available. As a result, the South African government has considered diverse options for addressing the energy security imperative, including coal, nuclear and renewables. The controversy surrounding the recent World Bank loan for building one of the world's largest coal-fired power stations in South Africa exemplifies the policy challenges in balancing energy security, energy prices and subsidies, and international carbon mitigation commitments.

The scaling-up of renewables offers an avenue for addressing some of these issues. South Africa has world-class potential for renewables generation, especially on-shore wind and solar. While estimates differ, a broad consensus exists that there is a technical potential for at least 15% of the 2020 grid capacity would be feasible, or about 20 GWs. Achieving this level of renewables generation would contribute up to one-third of South Africa's statement of commitment under the Copenhagen Accord[16].

South Africa has established some of the institutional arrangements required to advance renewables. A feed-in tariff (REFIT) for wholesale renewables has been put in place offering generous tariffs to independent power providers. Furthermore, a national target has been set for renewables, albeit relatively low. Many renewables projects are under discussion

16 SARi estimates: SARi Briefing, 2010.

at the current time, involving diverse technologies and potential investors and operators. Some are at a relatively advanced stage of technical design, but remain unimplemented because of uncertainty on all sides as to what is the longer term future of renewables in South Africa and the underlying financing and related institutional arrangements.

Analogous to India's strategy on India Solar, the South African government views the development of renewables through an industrial policy, or clean growth, lens. In particular, the Industrial Policy Action Plan (IPAC) had identified that developing renewables can contribute towards:

*Value Chain Localization:* jobs could be provided if South Africa availed itself of opportunities in the renewables global value chain for manufacturing, build and servicing, and potentially research and development, taking advantage of South Africa's comparatively strong technical, scientific and manufacturing base, and its potential location as a regional hub for renewables. Initial estimates based on renewables at 15% of the grid suggested that up to 50,000 jobs[17] could be created, not including regional export potential or positive macroeconomic impacts.

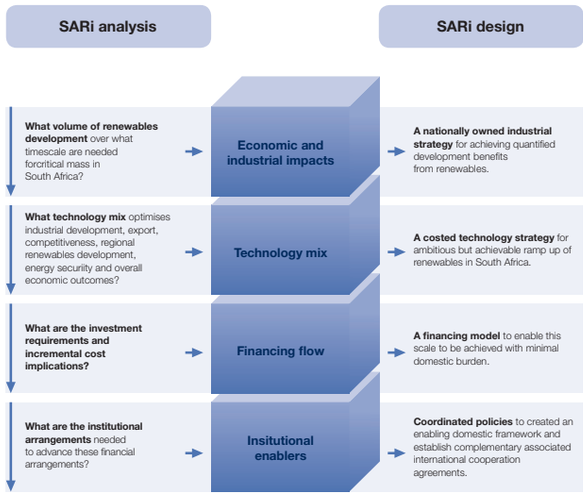
*Export Protection:* renewables could protect the nation's exports in the face of growing carbon sensitivity of international markets and the possible emergence of both statutory carbon border adjustments and/or private standards that would otherwise disadvantage South Africa's energy and carbon intensive exports. While prospects in this policy area remain highly uncertain, estimates based on the current debate and South Africa's export profile suggest that up to US $11 billion[18] of its current exports would be vulnerable as international markets become more carbon sensitive in the future.

*Energy Security:* renewables would support medium-term energy security needs that could not conceivably be addressed through other energy sources for a decade or more. Economic disruption costs arising through discontinuities in energy supply do not exist but were highlighted in various roundtables held in South Africa as being dangerously high, and will have been a key rationale for the World Bank's support for the development of the Medupi coal-fired power station.

## Problem Definition

Practically, however, little has been progressed to implementation; current renewables generation capacity feeding the grid is insignificant. Investors and technology providers, while enthusiastic in theory, have expressed concerns at numerous practical levels. Private players remain unsure and so unwilling to advance investments as the policy environment remains unclear, and the institutional arrangements not sufficiently mature to provide confidence that implementation would be smooth or that remedies to arising problems could be readily enacted.

Underlying the lack of progress are the incremental costs of renewables. Like elsewhere, these are significantly above the full financial cost of coal-fired generation, especially for solar, and considerably so over the next decade before technology costs are expected to reduce. These incremental costs are well-understood by the government and recent tariff increases have incorporated the element required to cover these costs up to the current modest target. Beyond this, however, such incremental costs would be prohibitively high to finance domestically, which has informed the government's unwillingness to increase renewables targets closer to technical potential.



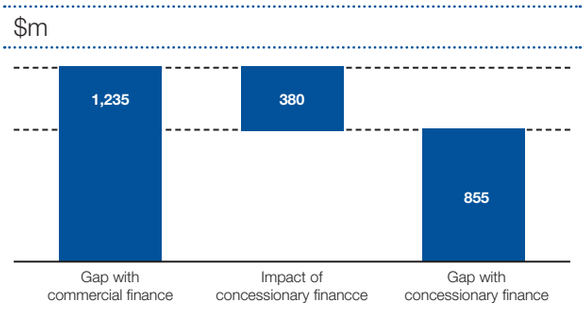

17 SARi estimates: SARi Briefing, 2010.
18 SARi estimates: SARi Briefing, 2010.

South Africa faces significant economic challenges by virtue of its location, low labour productivity by international standards and perceived political risk and institutional weaknesses. The imperative is to address high and persistent levels of unemployment and inequality through diversification and improved international competitiveness. Climate change in this context, while engaged with by the South African government as a global challenge, takes second place at best to the domestic economic imperative.

The availability and quantum of financing required is also a key challenge. On straightforward commercial terms, building 20 GWs of renewables in South Africa, based on a mix of on-shore wind and solar, particularly concentrated solar power (CSP), would cost in the order of US$ 50 billion. Put differently, generating electricity from this installed capacity of renewables would cost roughly US$ 9 billion (net present value) more over the period to 2025 than it would at full financial cost to generate the same power from coal-fired stations.

Overcoming the financing challenge therefore became the key to unlocking the critical mass in renewables. Pursuing its economic logic, the South African Renewables Initiative (SARi) is a South African government initiative championed by the Ministers of Trade and Industry and Public Enterprises and integrated as part of the work programme of the Renewables Working Group of the Inter-Ministerial Committee on Energy and the Industrial Policy Action Plan Task Team. The initiative was started in early 2010 to determine whether and how South Africa's renewables ambitions could be substantially increased as part of its broader industrial and economic strategy. Its aim is to define an industrial strategy for securing the economic gains from an ambitious programme of renewables development and to design and secure the financing and associated institutional arrangements.

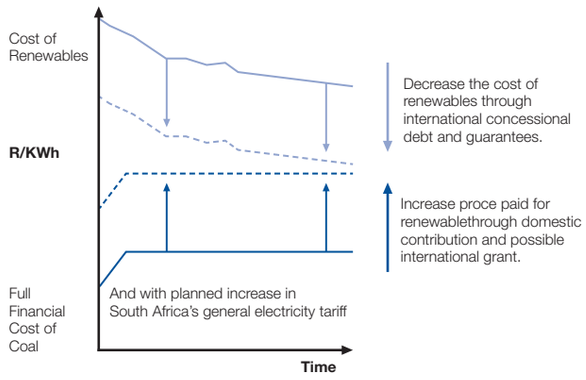
**Average annual gap in REFIT funding**




## Designing a Breakthrough Funding Model

### Stimulate private investment through a feed-in tariff

The South African Renewables Initiative has designed a possible financing solution that uses as its building blocks well-understood sources and types of finance, but blended, structured and leveraged in ways that can overcome the limits or weakness of each alone. At its core, the proposed solution would reduce the incremental feed-in tariff requirements on the supply side investment costs by making concessionary finance available to private investors linked to currency hedges and political risk insurance.




The remaining incremental feed-in tariff costs would be covered by combining international grant support with domestic financing drawn from an existing carbon levy and an additional levy on energy-intensive exporters, enabling them to secure green certificates, so offsetting energy and carbon-related risks and price discounting in international markets.

The financing scenario implied by this design based on the 15% potential, and the technology mix adopted and associated cost structures, highlights that:

**Sources for closing remainder of gap**

**South African domestic funding sources**

- An equivalent of a 3.8% immediate increase in the electricity tariff is needed to cover the gap
- However, SA can cover 63% of gap through incremental tax revenue and avoided BCAs

**International grant funding**

- Providing grants to cover the full gap would cost the equivalent of $5.5/tCO2e ebated
- Covering the gap beyond domestic funding would require grants with a PV of $2.4bn

Concessionary debt and related risk-reducing instruments reduce the payable annual incremental costs by over 30% from US$ 1.2 billion to US$ 855 million, which, while not costless in effect, leverages the highly rated borrowing status of the lender and shifts risks towards them, which in a success scenario imposes little burden on the fiscus. Financing the remaining incremental costs, effectively the REFIT premium still required after concessionary debt and related risk-reducing instruments are in place, will need to be covered through domestic or international finance or some combination. South Africa has already set funds aside through the electricity tariff for financing its feed-in tariff, although at a low level. One way of looking at the split between international support and domestic financing would be to impose a condition that the latter did not place net additional pressure on domestic public finances. In applying the principle of minimizing the economic burden of renewables financing on South Africa, a scenario considered for illustrative purposes would be:

- Domestic tax revenues at a level which could be effectively offset over the period by increased tax revenues associated with renewables investment, yielding in effect a fiscal-neutral outcome.
- A carbon tax in the form of a green export levy that would equate to its estimated value to exporters facing increasingly carbon-sensitive markets, thereby again effectively seeking to make the levy margin-neutral to impacted businesses.

Using this illustrative approach, over half of the remaining REFIT premium could be covered through domestic funding streams in ways that yield a commercially beneficial and fiscally-neutral outcome. On this basis, the remaining incremental costs needing to be financed would have a net present value of US$ 2.4 billion over the period 2012 to 2025, or an average annual cost of US$ 274 million over the period.

### Testing the SARi concept with the private sector and development finance institutions

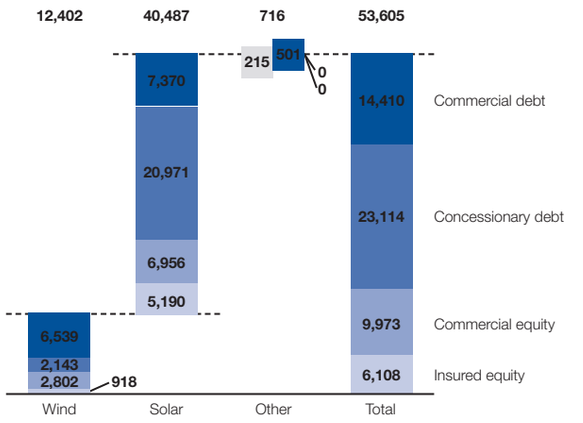
The World Economic Forum convened a workshop in October with equity investors, lenders, project developers and bilateral and multilateral development finance institutions to test the SARi concept. Moreover, the group was tasked with the question of whether a public-private financing model could be designed to mobilize the funding required for SARi.

Participants confirmed that a stable, well-designed policy framework is critical for private capital to flow into renewables in South Africa. Once the right policy framework is in place, there also needs to be other financial support mechanisms to stimulate the significant capital required to meet the SARi objective of 20 GW capacity by 2020 or 2025. In fact, with respect to on-shore wind, there were strong views voiced by investors and analysts that costs could come down to grid parity (assuming this was at the full financial cost of coal-generated electricity) after an initial wedge of say 2 GW had been implemented, and demonstrating the enabling environment and specific institutional arrangements to be effective and as expected. That is, concessionary debt could be used for this initial wedge, after which commercial debt could service wind developments, allowing available concessionary finance (debt and public finance) to focus on solar investments.

More broadly, the strategic use of concessionary debt and associated risk mitigation instruments, as proposed by SARi, was met with approval, since it reduces financing costs, increases debt capacity and stimulates further commercial debt. In addition, institutions providing concessionary debt, especially multilateral, regional and bilateral development banks, could bring considerable expertise of operating in South Africa and comparable environments to the table, which would further raise the attractiveness of the underlying investment opportunities to private investors, thereby also reducing risk and associated costs.

**Total financing requirements by 2020**

$m



Other forms of concessionary finance considered include the possibility of instruments like zero-interest mezzanine finance. Mezzanine finance reduces the risk for the private sector, as its right to claim repayment in the event of default is "junior" to private sector senior debt. As mezzanine finance lowers the amount of senior debt required in the project, this will increase debt service cover ratios (all else constant) or "headroom", which gives lenders greater comfort. The fact that it is zero-interest also means that the cost of finance for the project is reduced.

Despite the benefits of concessionary debt in introducing cheaper financing to projects, experience shows that accessing such finance can be time-consuming and cumbersome. Participants of the workshop therefore expressed considerable support that such financing should be built into the core of South Africa's framework for advancing renewables rather than being negotiated on a project-by-project basis.

There was considerable discussion as to whether with the right tariff pricing, concessionary finance and institutional arrangements, adequate commercial debt and equity would be forthcoming, an issue and potential constraint that has become increasingly debated elsewhere (see for example discussion of India solar above). SARi proposals currently indicate that over 60% of the planned debt financing would come from the private sector or about US$ 23 billion over the period. Diverse views were offered on this, with the weight towards there being a ready supply of both if the conditions were right – an issue that will warrant further exploration going forward.

By the end of the workshop, participants suggested that the public-private financing mechanism for SARi could be designed as a form of clearing house or advisory body, which provides two important elements: 1) access to pools of concessionary funding and 2) technical assistance and risk mitigation facilities. Rather than being a subsidy entity itself, it could be designed as an easy-to-access conduit to the public sector for concessionary instruments and risk mitigation.

### Lessons Learned and Potential for Scale-up

Compared to the India Solar laboratory which was aimed at the project level, the SARi laboratory was aimed at the programmatic level. The initiative itself is still in development and for policy consideration. Well advanced is its underlying economic logic and associated financing approach, many of the technical and financing parameters, and its engagement with potential public and private partners, with support from the Critical Mass platform. The approach of this laboratory was to look at creating enabling national policies and fit-for-purpose international support that would create the renewables ecosystem.

**Process:**

The initiative followed a multidimensional process to develop solutions for creating a conducive environment for renewables scale-up in South Africa.

1. *Economic logic, technical parameters and financing approach:* The economic logic, financing options and the technical parameters were developed as a coherent proposition as part of the South African Renewables Initiative.
2. *Alignment with National Policy:* As the initiative is championed by the South African government, it is closely aligned with national policy.
3. *Exploring international financing options:* Independent of the Critical Mass process, the initiative tested the avenues for securing international bilateral and multilateral funding.
4. *Involving the international private sector finance players:* The SARi programme had extensive discussions with the local private sector, as well as a few international finance players, and used the Critical Mass platform to test the concepts and the proposition with a wider audience of international and multilateral agencies.
5. *Feeding back to the design of the initiative:* The discussions hosted by Critical Mass helped the SARi team in getting a wider private sector perspective and design the package better as it is being developed.

**Dialogue:**

A number of key questions remain outstanding that need to be addressed in advancing the underlying design and securing the political leadership of the South African government, partnerships with other governments as sources of concessionary finance and grant, and engagement by key actors, notably the private sector.

- *Multilateral and bilateral/regional engagement:* South Africa is committed to progressing a multilateral agreement under the UNFCCC. However, as it has seen elsewhere, there are opportunities within this framework to forge partnerships with bilateral and regional development finance institutions.
- *Industrial partnership or untied aid:* Should and can the provision of publicly supported concessionary finance be linked directly to the source countries' business and economic interests, pursuing in effect an industrial partnership approach, or should these be separated, complying rather with "no tie" rules associated with traditional views of international "aid"?
- *Carbon markets:* SARi proposals currently exclude the use of carbon markets, partly because of the lack of clarity as to the future value of carbon markets going forward, but more importantly as South Africa would wish carbon mitigated to count against their commitment. That said, there are some financing options through the use of carbon markets and these might have to be returned to if full financing is not secured in other ways.
- *Industrial concentration versus competition:* What are the optimal balance and associated costs of achieving technology consolidation and scaled localization in manufacture, and the advantages of ensuring ongoing competition between technology providers?
- *Institutional arrangements:* What are the critical institutional arrangements required to minimize the risk premium associated with private investment, secure international concessionary finance and grants and satisfy domestic policy conditions?

Resolving these and other questions requires progress on three broad fronts:

- *Institutional design:* Success in many ways depends on establishing domestic institutional arrangements that will be effective, meet domestic needs and satisfy the interests of international public partners and private investors. Such arrangements span diverse issues, from the basis on which domestic financing commitments are made through to the terms of on which grid access is assured and the entire initiative is formulated and governed.
- *International public finance:* Designing to reduce grant funding and ensure its effective application is a necessary but not sufficient condition for securing such finance. Clearly the next step is to move more concretely to agreeing on the initial flows to support the first deals.
- *Domestic engagement:* Domestic business will be affected over time, as will those seeking employment and their respective representatives. Engagements to date have been very positive, but the need to secure a deeper understanding and basis for collaboration is crucial, especially for the energy-intensive exporters that might be asked to pay an additional electricity levy as part of an export market facing green certification programme.

**Key Process/Platform Lessons:**

SARi is an on-going programme. From its involvement in the Critical Mass process, a few insights can provide important learning for similar efforts:

- *Policy feedback and government interaction:* As it is a South African government initiative championed by the Ministers of Trade and Industry and Public Enterprises and integrated as part of the work programme of the Renewables Working Group of the Inter-Ministerial Committee on Energy and the Industrial Policy Action Plan Task Team, it is well plugged in to the government agenda. SARi showed the importance of why the only way low-carbon and renewables policies can take off is by being closely integrated with the national plans. The Critical Mass platform and independent efforts by the SARi initiative showed that a multistakeholder input to the process helps refine the policy.

- *Private Sector and multilateral development agencies need to provide input to the design:* The private sector financial institutions bilateral and multilateral development agencies highlighted what they would expect in a national plan and provided useful input to those developing the policies to consider as part of the Critical Mass platform discussions on SARi.
- *Lessons need to be shared effectively:* The complications and issues that need to be resolved before the successful deployment of SARi are explained above and provide useful input to other countries developing such policies and similar initiatives. It also helps the private sector understand better how the government policy is being prioritized.

### Laboratory 3: Energy Efficiency

*This section was written with contributions from Shilpa Patel, Head, Climate Business Strategy and Metrics, IFC; Taiya Smith, Senior Advisor, United Nations Foundation; and McKinsey & Company.*

The Critical Mass Energy Efficiency working group is exploring potential breakthrough funding mechanisms in the buildings sector. Work is in progress to identify projects that can be financed and facilitate transactions by bringing together the key stakeholders.

### Context

Energy efficiency has a vital role to play in reducing greenhouse gas emissions as well as creating greater energy security resulting from the reduced reliance on imported fuels. According to the International Energy Agency (IEA): "Increasing energy efficiency, much of which can be achieved through low-cost options, offers the greatest potential for reducing CO2 emissions over the period to 2050[19]."

The IEA has modelled a scenario, called the "BLUE Map" scenario, where emissions are halved by 2050 compared to current levels using the lowest cost in achieving this. This scenario is based on the IPCC scenario aimed at keeping temperature increases below 2.4°C. Energy efficiency measures have the largest role to play (and are most cost-effective) in reducing emissions, particularly over the next 20 years.

The advantages are not only related to emissions. The IEA estimates that, on average, a US$ 1 investment in demand side energy efficiency can save more than US$ 2 on the supply side. Energy efficiency is widely seen as one of the most cost-effective carbon abatement options, with a negative lifecycle cost per tonne, but requires significant upfront capital expenditure.

Recent work by McKinsey has analysed the largest energy saving potential by sector and geography. The numbers on the table illustrate the potential energy savings in TWh in 2020.

**Substantial energy savings can be achieved**

| Sectors | Nations: China | India | Middle East | Rest of developing Asia | Brazil | Mexico | Rest of Latin America | South Africa | Rest of Africa | Rest of Eastern Europe | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Power | - | - | - | - | - | - | - | - | - | - | - |
| Transport | 398 | 85 | 69 | 75 | 89 | 24 | 45 | 17 | 12 | 17 | **831** |
| Buildings | 660 | 123 | 193 | 118 | 49 | 31 | 56 | 34 | 107 | 189 | **1562** |
| Iron and Steel | 766 | 80 | 9 | 33 | 31 | 8 | 6 | 6 | 10 | 24 | **974** |
| Chemicals | 377 | 62 | 159 | 22 | 23 | 12 | 34 | 6 | 6 | 9 | **710** |
| Waste | - | - | - | - | - | - | - | - | - | - | - |
| Petroleum and Gas | 86 | 43 | 148 | 77 | 10 | 21 | 30 | 4 | 25 | 14 | **457** |
| Cement | 8 | 2 | 1 | 2 | 0 | 0 | 0 | 0 | 1 | 0 | **15** |
| Other Industry | 804 | 115 | 34 | 62 | 11 | 14 | 27 | 25 | 5 | 17 | **1115** |
| Forestry | - | - | - | - | - | - | - | - | - | - | - |
| Agriculture | - | - | - | - | - | - | - | - | - | - | - |
| **Grand total** | **3099** | **510** | **614** | **389** | **214** | **111** | **198** | **92** | **165** | **271** | **5663** |

Negative/null values | 0 - 10 | 11 - 50 | >50

*Source: McKinsey & Company*

19 International Energy Agency, Energy Technology Perspectives, 2010

Despite this potential, energy efficiency measures are still not being implemented at scale. A large part of this is due to misaligned incentive structures. For example, power industry incentives are structured in such a way to encourage more production, not less. This is exacerbated by low (and often subsidized) fossil fuel-derived energy and the lack of a global price on carbon, which further discourages investment in energy efficiency.

A survey by UNEP[20] showed that private sector financial institutions are very interested in energy efficiency ("perhaps the next goldmine"). There is a substantial investment opportunity: it is estimated that US$ 170 billion per year invested in "energy productivity" globally could feasibly cut projected energy demand growth by half by 2020, generating an internal rate of return of 17% from future energy savings[21].

Despite the opportunities and interest in EE, the UNEP survey showed there are also a number of barriers to unlocking capital flow, such as:

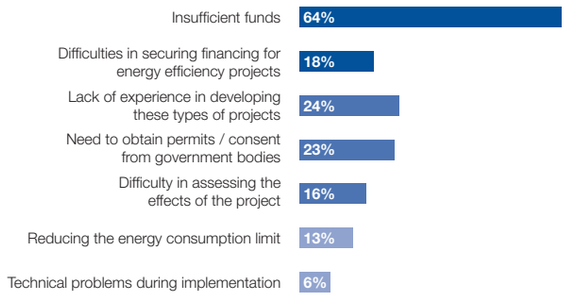
- *Challenge of aggregation*[22]*:* The energy efficiency savings from one building or asset does not always merit investment (this is strongly linked to the challenge of artificially low energy prices). Large corporate banks are unlikely to invest their time and energy on conducting due diligence for investments lower than US$ 100 million as the returns compared to competing investments would be minimal.
- *Split incentives:* The entity paying and the entity benefiting from an energy efficiency investment are often not the same, meaning that there is often not sufficient incentive to support the initial investment despite it being cost-effective in the long term. Buildings often suffer from this barrier given the number of actors involved, ranging from the construction of the building (it is more expensive to construct an energy-efficient building) to the property owner (when renting in particular, the property owner will not benefit from any investment, as the savings will be realized in energy bills) to the renting party (who is often not willing to make the investment because the payback period may outlive their tenure)[23].
- *Lack of guarantees:* There are currently insufficient guarantee mechanisms for energy efficiency lending to smaller scale energy service companies (ESCOs)[24].

In addition, according to a recent OECD/IEA report, the main risks faced by energy efficiency projects are well known. They fall into five categories:

- Operational risk describes the risk of a technology failure while in use
- Technical/project risk is a failure in the project implementation: any consumer change or technical breakthrough during the implementation phase of the project
- Monitoring risk reflects uncertainty surrounding a local user's ability to monitor the implementation of a technology
- Regulatory and institutional risk refers to uncertainty on the reliability of policies in place or unpredictable, sudden changes in regulation
- Financial risk includes risks of losses due to price fluctuation of energy (i.e. electricity), interest rate movements, oil price volatility, as well as counter-party risk (the risk that the borrower will not be able to repay the banker)

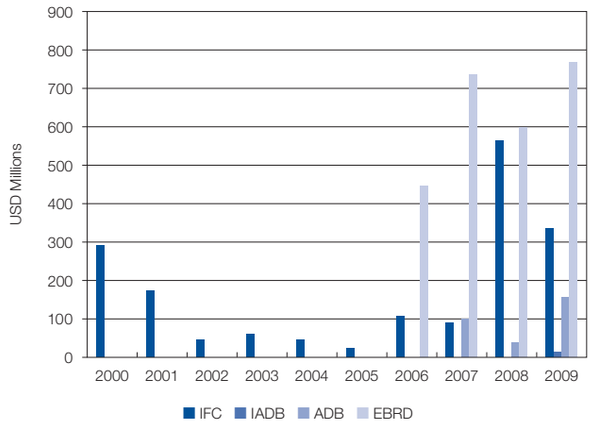
20 Kirsty Hamilton, 'Energy and the Finance Sector', UNEP Finance Initiative (2009)
21 Ibid., p.17
22 World Economic Forum, Energy Efficiency: Accelerating the Agenda, 2010
23 World Economic Forum, Energy Efficiency: Accelerating the Agenda, 2010
24 Kirsty Hamilton, 'Energy and the Finance Sector', UNEP Finance Initiative (2009)

These challenges are even more acute in developing countries. The chart below shows the results of a survey undertaken by IFC in Russia to research attitudes towards energy efficiency investments and barriers preventing their adoption and implementation.
In addition to the lack of financing, there is often a lack of technical capacity to assess energy efficiency opportunities in addition to a general lack of understanding of the financing opportunity on the part of local financial institutions.




To overcome these challenges, multilateral development banks have been active in providing credit lines and technical assistance to local partner banks to reduce the actual and perceived risks to energy efficiency as well as to provide the necessary incentives to stimulate private sector capital flows. These incentives can be in the form of risk-sharing facilities and long-term credit lines to the local banks or policy support to facilitate the creation of an enabling framework for energy efficiency financing.

Energy efficiency commitments by multilateral finance institutions have increased significantly in recent years[25], as illustrated in the figure below.

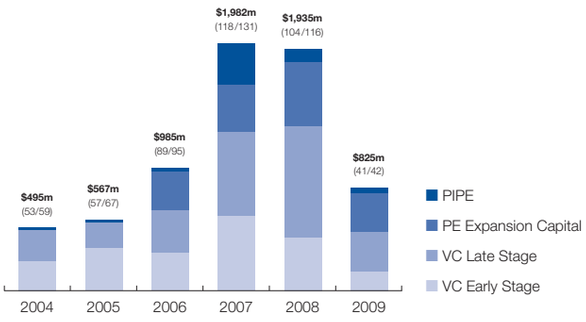



For example, the EBRD has been active and successful in providing Sustainable Energy Financing Facilities (SEFFs) to local banks in a number of eastern European states. These local banks are committed to lend these funds to borrowers undertaking eligible energy efficiency or renewable energy projects. The ADB finance project directly, through the Clean Energy Financing Partnership Facility (CEFPF) which was designed to fund small energy efficiency investments that require quick transactions. It also funds some technology transfer costs of clean technologies and provides grant assistance for such activities such as developing the knowledge base of clean energy technologies.

IFC has similar programmes in many parts of the developing world, including China and Russia. IFC not only takes portfolio risk and provides capital, but it also provides credit guarantees. It structures deals differently depending on what makes “most sense to fill the financing gap”, and provides capital and risk-sharing facilities which provide the “largest bang for the buck” in unlocking energy efficiency financing by private sector financial institutions. IFC has been able to achieve high levels of leverage – with one dollar of IFC investment mobilizing at least another dollar from the local bank in the case of credit lines and two in the case of guarantee facilities, in addition to the beneficiary’s own contribution to the project.

25 OECD / IEA, Money Matters, August 2010

Investment by private financial institutions is very difficult to track, although McKinsey estimates US$ 170 billion of available cost-effective investments yearly[26]. Data collected by Bloomberg New Energy Finance related to new private equity (PE) and venture capital (VC) transactions in energy efficiency and power storage in 2009 shows an overall figure of US$ 825 million.This only accounts for 0.5% of the estimated cost effective potential of US$ 170 billion.




*Source: New Energy Finance, 2009; * 3 First quarters; $ = USD*

Models for investing in energy efficiency have multiplied within the private sector. An Energy Efficiency report published by the World Economic Forum in December 2010[27] on accelerating the agenda for energy efficiency gathered a set of examples from interviewing actors from various sectors:

**Buildings**

*Energy Performance Contracting:* ESCO takes the risk and guarantees a certain percentage of savings to be made; savings are then split between property owner and ESCO. Examples: Johnson Controls, Arup and Honeywell

*Green Leases:* Incorporation of energy efficiency into building leases; broker commissions are tied to energy performance. Examples include: UK Better Buildings Partnership

*Enhanced Property Value:* Investments made in property are guaranteed by a government credit and thus support incremental return on savings. Example: Climate Change Capital

**Power**

*Opportunity Bundling:* Aggregation of buildings/assets across a company to enable view of energy efficiency as a source of generation and enable savings to be used as a resource, for example integrated into resource planning. Examples: Energy Resources Management, Transcend

**Cross-Industry**

*Monetizing Asset Value:* Purchasing of energy efficiency as an asset (versus technology, company or services) within projects with fast payback periods, and savings made throughout project lifecycle. Examples: Sustainable Development Capital (SDC)

*Off Balance Sheet Contracting:* Using unsecured funding to support investment in energy efficiency implementation, the degree to which debt or equity to finance this investment is used will vary based on the measure and the predictability of return. Example: Carbon War Room

## Critical Mass Laboratory Approach to Energy Efficiency

The Energy Efficiency Working Group held its first workshop in London on 5 November 2010 to discuss the ways in which investments in energy efficiency in developing countries can be catalysed. The overall aim of the working group is to facilitate the scale-up of investment in energy efficiency through the demonstration of transacting one or more energy efficiency opportunities, for which a financing model either does not currently exist or is very difficult to design at scale. To meet this overall objective, the group needed to first identify a small number of sector/geography combinations to focus on. In subsequent gatherings, attention can turn to gathering the relevant market data and identifying specific projects within these sector/geography combinations, for which funding models can then be developed based on the specific barriers that appear to currently prevent investment in the identified opportunity.

26 McKinsey (2008) "How the world should invest in energy efficiency" The McKinsey Quarterly,n Economic studies in OECD / IEA Money Matters
27 World Economic Forum, 2010. Energy Efficiency: Accelerating the Agenda

To meet the objective of identifying scalable opportunities, the sectors and regions where the largest opportunities lie needed to be considered. To assist in this market mapping exercise, the group used the McKinsey & Company "hotspot analysis", which shows the largest energy saving potential by sector and geography (see summary matrix above). Participants in the workshop narrowed down the various combinations based on the greatest sector-level potential and geographies where financial instruments do not exist at scale.

**Potential opportunities: Buildings and Iron and Steel**

### Buildings

There was significant interest in buildings among the working group. It was acknowledged that designing a financing solution that is not only at scale, but replicable, would be a challenge, as affirmed by EBRD's experience in this sector. Nevertheless, participants agreed that it would be worthwhile devoting effort to attempting a transaction, given that it is the sector with the largest potential energy savings according to the hotspot analysis.

It was decided that the working group should work with established players, such as property developers, cities initiatives or international design and engineering companies for a variety of reasons. First, they would have influence across a range of properties globally, which lends itself to potential aggregation and upscale. Second, they are more likely to have experience in, and know-how of, various delivery models, around which potential funding mechanisms could be designed.

In terms of geographies, the rest of developing Asia would be of interest to the participants, such as the Philippines, Vietnam and Indonesia. However, it was noted that geographies are of secondary importance, and that finding the right counterpart is of greater importance. As the group is looking to work with established industry players, they are likely to be international, which should mean that the lessons from the potential transactions can be applied across national boundaries.

### Iron and Steel in China

The industry/geography combination with the greatest potential energy savings is iron and steel in China. There is considerable experience across the working group in this sector, some with experience in China. An information session can be organized to learn from some of these experiences and further explore a potential focus for this area. However, for the time being, the group decided to focus efforts on one sector and felt that buildings provided the best opportunities.

**Next Steps**

The Energy Efficiency Working Group is focused on a finance-driven agenda. As such, the group is focused on developing a deal flow which is self-sustaining without, after the first few transactions, public finance. Currently, members of the group are working to develop consolidated market intelligence with developers, equipment suppliers, service providers, etc. to map out where the most effective investments in the building sector are occurring and where there is scope for such activity but it is not occurring due to policy and financial barriers.

The working group's schedule for 2011 will begin with a presentation of this work to its members and a discussion with industry experts to narrow in on several critical geographies, lay out a variety of financing mechanisms and extract lessons from deals that have already been done and the degree to which they can be applied in the opportunities being considered, shortlisting some potential projects. Coming out of this workshop, two to three geographies will be selected for further work and the Critical Mass team will bring together the appropriate local actors and economic models, and begin preparing delivery models on which finance can be structured, coordinating the design of the financing model and facilitating transactions by bringing together key stakeholders. Follow-on work will focus predominantly on creating several deals which can be financed with an eye towards the policy steps that will be needed to create a longer term flow of such deals. The aim of the laboratory would be to enable participating institutions to move forward with one or several deals in summer 2011.

# Appendix A

## Private Investor Perceptions

*These findings have been made possible thanks to the active support of the Investors Network on Climate Risk at Ceres, the Institutional Investors Group on Climate Change, the United Nations Foundation and PwC.*

To date, most discussion about catalysing increased private climate finance for developing countries has focused on project-based public-private partnerships (in the broadest sense) that leverage relatively small amounts of private sector funding. The larger question of how much and in what form developed countries and other donors will provide support to developing countries has yet to be answered. The role that private sector finance can play in this context needs to proceed from an understanding of:

### a. Nature of the investments and how they are viewed by the private sector

The private sector will invest in new technology within the broad clean energy spectrum (alternative energy technology/renewables, advanced energy technology, smart networks, storage, energy efficiency, etc.) with a view to achieving reasonable returns from the successful technologies where these returns will have global application. Venture capitalists will seek high returns, but are also willing to assume the risks associated with very early stage technologies. Other investors, such as pension funds, will be content with somewhat lower returns where there is more of an annuity type of return profile but will not be take on the same level of risk. The location of such investments is today primarily in the United States and parts of Europe, but increasingly in developing markets, such as China and India. In addition, many private sector funders are actively involved in investments in infrastructure and projects relating to alternative energy in emerging markets. Investment in production facilities (e.g. a wind turbine factory) in emerging markets falls between these two classes.

### b. Different classes and general characteristics of the private sector funders

While each class of investors has its own specific characteristics, all private funders have one thing in common – they are rational actors. That is, they operate with a view to generating appropriate returns for their shareholders or depositors and, therefore, adopt a methodology for analysing deals and determining whether they have the appetite for taking on that risk. This is in contrast to many public sources of capital which are subject to political and institutional variability. Further, while institutions are careful about sharing proprietary information, most are very willing to share the process by which they analyse potential investments and which sources of information they use in making those decisions. As a result, once the map of investor classes, the associated appetite for risk and expected rate of return is understood, many developing countries might find that private sector investors prove to be more significant partners than their government counterparts.

The key private sector funders in relation to alternative energy infrastructure investment in emerging markets will be primarily pension funds and international banks together with large domestic banks. Other private sector actors in this arena will be venture capital, private equity, insurance companies and rating agencies, plus businesses such as utilities that are beginning to finance clean energy technologies as investments, with a view to deployment in projects they are sponsoring or supplying.

Public sector support would be in the form of direct investment by MDBs, guarantees or insurance provided by MDBs, and bilateral or multilateral budget support from developed countries. There is also a key role to be played by sovereign wealth funds which already have significant roles in redeploying capital reserves.

### c. Range of opinion, attitude and approach shown by individual investors within each class

The private sector funders, regardless of institution class, unanimously point to consistent, well-articulated and long-term public policy as the most important criterion when considering investment in this arena. When there is a believable, trustworthy political system in place with a well-defined regulatory structure and rule of law, private funders are willing to accept the other perceived risks of operating in that country or locality. Specifically, this means policies like stable favourable tariff regimes and reliable long-term power purchase agreements. From a purely insolation standpoint, Germany was an unlikely place to find a booming solar market. However, the implementation of strong investment incentives quickly turned Germany into the leading global market for solar.

There is also general consensus as to the direction of the sector. Private funders see a long-term potential for making money in low-carbon infrastructure investments in emerging markets. They also see a need for certain risks to be mitigated before they can invest in certain projects or countries, but they prefer to draw on the instruments previously developed for conventional energy or infrastructure projects rather than rely on new ones developed specifically for alternative energy. The exception to this is the introduction of carbon markets finance, which private funders have become comfortable with as a mechanism for reducing exposure.

On the other hand, there is a wide range of opinion on funders' willingness to accept currency risks relating to emerging market investments. One pension fund would not accept any currency exposure beyond its home currency, while another was actively seeking exposure to certain BRIC or BRIC-type economy currencies (albeit partly prompted by a gloomy view of their home currency). A major bank with considerable existing exposure to emerging markets was in a position to fund through local currencies, while other international banks would not be in that position. This diversity of opinion should actually be seen as helpful when formulating public support instruments and enable them to be applied more judiciously when needed. It also highlights the potential ability of currency risks to be managed substantially within the private sector through existing foreign exchange markets or bilateral risk transfers.

There are also a range of approaches to the means by which private funders would make investments in this arena. Of the investors surveyed, one would see itself making investments directly, necessitating the establishment of its own office in the country or region. Another would want to make use of a managed fund with other investors where they had control over the investment decision. Others would be willing to invest in funds managed by the MDBs.

**d. Type of risks they consider, returns they expect and the implications for the form of public sector support and funding**

All funders are willing to accept the risks associated with investing in the private market (as opposed to low-risk government bonds) such as credit conditions, illiquidity, economic growth changes and inflation for varying rates of return. Many are willing to work in emerging markets, though the risks (perceived and actual) are much higher and complicated, including currency risk, political risks and often risks associated with a lack of necessary infrastructure. A significant number of institutional investors have an appetite for the set of risks associated with alternative energy in emerging markets. For each investor, risk is measured by its perception of what the worst case scenario could be. When the "downside" scenario would likely result in a loss of capital, the investor usually decides to move on to another deal.

**For the purposes of this report, risks can be divided into three categories:**

I. Risks that most investors will accept.

II. Risks that only some investors can accept, and therefore can be managed either within the private sector or with public sector intervention

III. Risks that no investor can accept and, therefore, require public sector intervention to gain private sector interest.

The key risk in Category III identified by all investors was that of the host government's policy framework regarding alternative energy. The risks associated with the host government's stability and consistency of investment policy have in the past been ameliorated by interventions from the public sector, especially the multilateral development banks (MDBs). Good, stable and trustworthy policy is seen by investors as a fundamental and necessary precondition to their willingness to invest in any country's alternative energy infrastructure.

This suggests that public support should be directed at helping design those policies in the first place, and then underpinning their continuity thereafter. Investors are clear that this should not be taken as a call for the global adoption of feed-in tariffs (FiTs). Indeed, they express doubts as to the applicability, sustainability and transparency of FiTs in all cases and need to be used sparingly as part of a wider policy response to ensure their implied subsidy does not simply transfer capital through excessive returns to investors.

Another Category III risk for investors relates to the risk, not so much of the investments themselves, but of being able to originate, structure and complete the investments in the first place. They recognize that this involves certain skills and experience in dealing with emerging market governments, institutions and environments, which they would not acquire easily. They see the role of MDBs here as exemplary, in the

sense that they would be keen in principle to follow MDBs acting as lead investors and accept the same risks, rather than necessarily require the MDBs to mitigate the private investors' risks. Another role for MDBs that funders support is when the MDB takes on more of the initial risk and then turning projects with reduced risks over to a lower cost of capital investor that requires a lower but annuity type of stable return. They also see a role for certain public sector institutions to assist developing countries in establishing appropriate low-carbon economic plans such as NAMAs, as a framework for project development and deal flow.

Currency risk is clearly a Category II risk to the extent that it arises. This suggests a range of potential instruments that may not be required in all cases. Emerging market infrastructure projects in the recent past were frequently structured so as to transfer currency risk to the power purchaser. This proved unsustainable in many instances so efforts have been made to develop conduit or guarantee vehicles (e.g. Guarantco) to combine local currency funding of such projects by domestic institutions with project risk acceptance by international institutions. Such local currency funding would not only be more sustainable for the host country, but it would also be attractive for those pension funds seeking such currency exposure.

Also in Category II are carbon market risks. It seems that a number of investors or carbon funds are keen to accept post-2012 risk on certified emission reductions (CERs) or carbon credits, when the returns on a project are attractive in and of themselves, without the carbon component. This is probably on the basis that their value is almost disregarded when making an investment decision, while they offer the prospect of a considerable upside "kicker". There is clearly scope for discussion among project stakeholders as to who should be awarded the benefit of CERs and how they should be earned.

Based on this preliminary surveying of institutional investors, some suggestions for addressing some of the main concerns of private funders can be derived:

- *Finding ways to create a baseline for evaluating national and local investment and clean energy policy predictability* can be done by encouraging all countries looking for financial support to have a credit rating agency evaluate their alternative energy policy framework and associated investment climate. For example, the World Bank funded the rating of the sovereign credit for countries in the West African region. The rating process would create a baseline for improvement and help both the host country and donors to target capacity building efforts to encourage investment. Such ratings would also help to facilitate the availability of private political risk insurance.

- *Focusing technical assistance on capacity building* can help countries understand the implications that national policies, or the alignment of policies, will have on private investors' risk evaluations. For example, a feed in tariff policy might be very attractive, but if the import duties and corporate tax regimes are not aligned, the expected deals will not emerge.

- *Encouraging a diversity of policy frameworks:* Alternative energy policy frameworks should be developed by countries to be consistent with their policy approaches to energy and infrastructure in general. Feed-in tariffs should not be promoted as panaceas and should be adopted only when their sustainability can be assured or when there is long-term predictability for their being scaled back. For example, the catalysing effect of Spain's policy built the market there, but when it was abruptly pulled back rather than being scaled back over time, the market collapsed.

- *Encouraging MDBs to expand their role as lead investors and to develop funds and other mechanisms for co-investment with private sector funders;* this could include ways for them to take on more of the initial risk and then turning projects with reduced risks over to a lower cost of capital private investor that requires a lower but annuity type of stable return. Institutional investors value their AAA ratings, due diligence capabilities and close relations with governments which are often the explicit or implicit sponsor of large infrastructure and industrial projects in emerging markets.

# Appendix B

**Promising public-private financing models**

*This section has been written with contributions from Radhika Bharat, Senior Private Sector Development Adviser, Climate Change, DFID; Mark Fulton, Managing Director and Global Head of Climate Change Investment Research & Strategy, Deutsche Bank Climate Change Advisors; Kassia Yanosek Founding Principal, Tana Energy Capital LLC; and, Mark Tomlinson, Advisor, World Bank.*

The laboratories from the Critical Mass Initiative sample a small number of innovative public-private financing models to catalyse private investment at scale, one of which was the CP3 model, which is outlined in further detail below.

There are also a number of other practical funding models for low-carbon infrastructure in developing countries that can be helpful in attracting and channelling public finance to catalyse private investment in low-carbon infrastructure in developing countries. These are also outlined below.

**a. Climate Public-Private Partnership (CP3)**

Climate Public-Private Partnership (CP3) Fund is an initiative to launch a public-private fund to catalyse low-carbon investments in developing countries. The original idea for CP3 derived from the World Economic Forum's Task Force on Low-Carbon Prosperity in 2009 and through discussions between the Prince of Wales and the P8 Group, which represents some of the largest pension funds and sovereign wealth funds and is an initiative hosted by the Cambridge Programme for Industry. The British government, through its Department for International Development has spearheaded the initiative, in collaboration with the Asian Development Bank (ADB) and the International Finance Corporation (IFC). The World Economic Forum, through its Critical Mass programme helped give a more concrete form to the concept, by bringing together public and private sector stakeholders to foster a dialogue on key issues.

The proposed Climate Public-Private Partnership (CP3) aims to address several of the barriers to private sector investment in low-carbon infrastructure in developing countries. It tackles the lack of viable projects by providing early stage project equity, management support and technical assistance. It would address the high-risk perception by providing risk mitigation instruments and by creating a demonstration effect. It may consider providing a link with targeted subsidies for high-potential technologies which currently have low-risk adjusted returns. It would tackle the lack of access to capital by providing early stage equity finance, which would also help bring in debt providers.

The CP3 Fund will use limited financing from the public sector to leverage significant equity and debt financing from institutional investors such as pension funds which have a history of investing in infrastructure and who have expressed an interest in diversifying into emerging markets and into low-carbon alternatives. The financing raised would be used to invest in regionally or sector-focused climate change funds which would then invest in low-carbon infrastructure and companies. It may also liaise with facilities to provide risk mitigation instruments, technical assistance and support to project pipeline development. The current phase of the CP3 Fund would focus on Asia, where current growth rates and infrastructure investment needs (including the need to provide access to energy for the poorest) combine to create the greatest risk of carbon lock-in. However, the model could be replicated in other regions, including Africa.

Current estimates suggest that every GBP 1 of donor financing could leverage up to GPB 9 of private finance through this structure. The British government and multilateral development banks will act as anchor investors and may contribute equity alongside the private investors. They may also provide

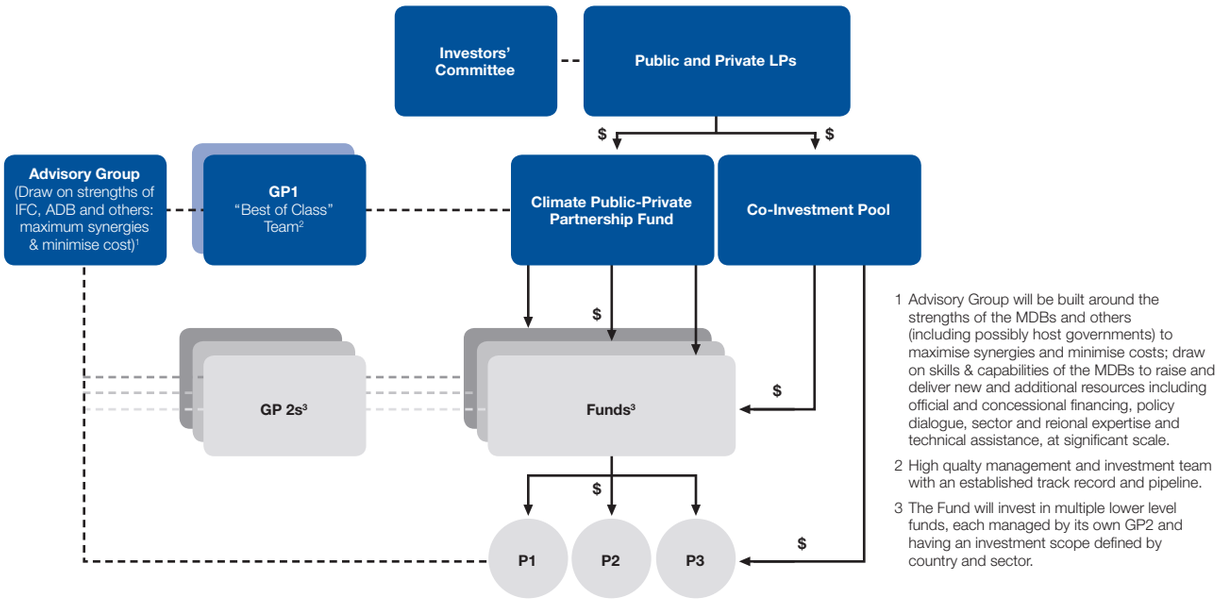
*"There are three key reasons for the current lack of private sector investment in low-carbon infrastructure in the developing countries. First, there is a lack of viable low-carbon projects. Second, the risks associated with such projects, including political and regulatory risks, are perceived to be too high and for some technologies the risk adjusted returns are too low to attract private investment. Third, there is a lack of access to the right type of capital. As a result, investments continue to flow into high-carbon infrastructure such as coal-powered stations."*

*DFID presentation of the CP3 Fund*

grants to finance technical assistance and capacity building work.

The CP3's objective to address multiple market failures through a public-private initiative makes it unique and provides the core rationale for collaboration between development finance institutions/MDBs and public agencies.

The Fund's investment strategy is designed to provide investors with a cost-efficient access route to scalable and replicable investment opportunities in low-carbon and resource-efficient infrastructure assets and services in some of the fastest-growing markets in the world. It will invest through specialist private equity infrastructure funds, leveraging and stimulating capacity and expertise in the market, and also make direct investments by way of co-investments with investee funds in underlying projects and companies. It will seek to achieve economies of scale both at the Fund and the underlying investment level, minimizing transaction costs and processing time.




1 Advisory Group will be built around the strengths of the MDBs and others (including possibly host governments) to maximise synergies and minimise costs; draw on skills & capabilities of the MDBs to raise and deliver new and additional resources including official and concessional financing, policy dialogue, sector and reional expertise and technical assistance, at significant scale.

2 High qualty management and investment team with an established track record and pipeline.

3 The Fund will invest in multiple lower level funds, each managed by its own GP2 and having an investment scope defined by country and sector.

The Fund would put in place an innovative approach to public-private financing for climate change which delivers value for money and a high leverage of private finance. It will lead to increased investment into low-carbon infrastructure in developing countries such as energy generation, sustainable transportation, waste and water management, forestry and green buildings, and thus lead to reduced carbon emissions. It will improve access to energy for the poorest and strengthen private sector in-country.

Depending on the size of the Fund, the initiative could, over 25 years, create up to 5 gigawatts of new renewable energy, generating massive opportunities, including 60,000 jobs, and removing 150 millions tonnes of CO2.

**b. Global Energy Transfer Feed-in Tariffs Framework (GET FiT)**

The Global Energy Transfer Feed-in Tariffs (GET FiT) Program is a concept to specifically support both renewable energy scale-up and energy access in the developing world through the creation of new international public-private partnerships, with the public partner implementing a strong and transparent regulatory environment and funding for the renewable premium while the private sector deploys capital to fund the projects.

It aims to support developing countries' scale-up of renewable energy by providing the following financial support, risk mitigation and technical assistance.

This combined approach would catalyse the supply of, and the demand for, private sector financing of renewable energy projects in both middle- and low-income countries, while also insuring maximum incentive capture at least cost to the funding partners. Importantly, it would provide what is crucial for private investors: transparency, longevity and certainty – TLC.

### Financial support

Feed-in-tariffs, and similar performance-based incentives, have proven to be effective and efficient mechanisms for creating investor security and driving rapid renewable energy growth. By 2008, feed-in tariffs had driven 75% of PV capacity and 45% of wind capacity worldwide.

The GET FiT Program envisages public sector entities partnering with developing countries to financially support policy structures that appropriately adapt best practices to national context, as part of broader, low-carbon development strategies. Such policies would include:

a) Primarily, the deployment of advanced feed-in tariff designs that target on-grid, commercialized, renewable resources at the right price and the focuses on the most appropriate technologies for local conditions

b) Power purchase agreements (PPAs) as a pre-FiT regulatory mechanism in countries that face grid integration constraints or for technologies that have a limited in-country track record, with the ultimate goal of the implementation of broader FiT

c) Adaptation of FiT design principles to create performance-based incentives for decentralized multi-user energy generation, especially mini-grids, in rural areas not included in current grid expansion plans

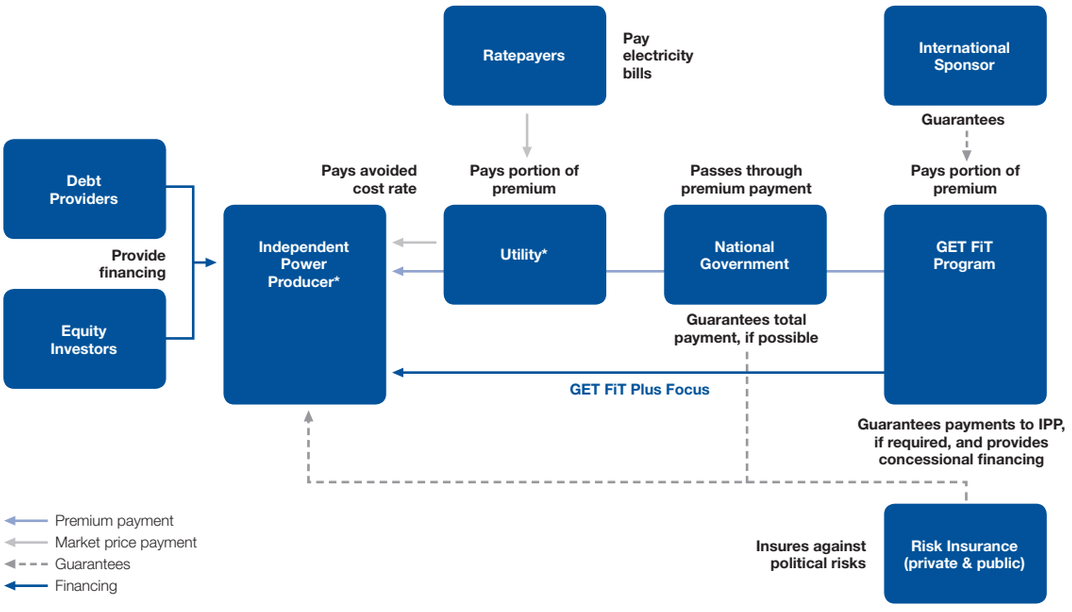
In each of the three cases outlined above, the GET FiT Program proposes public sector funds to share above-market costs of renewable electricity with partner countries, whereas utilities would commit to purchasing electricity from generators at market price.

### Risk mitigation – a hybrid approach to funding

The GET FiT Program would work with national and international partners to address a variety of risks and barriers faced by project developers, investors and financiers to activate development activity, reduce risk profile and so consequently reduce return expectations. As seen by the graphic below, such tools may include:

- Renewable energy premium to the independent power producer guaranteed by the national government or by the GET FiT Program
- Concessional financing to be provided by national governments or the Get Fit Program
- Political risk and counterparty risk guarantees to mitigate sovereign risk and address concerns about the current or future creditworthiness of the utility
- Currency risk mitigation through payments of GET FiT portion to be made in hard currency

**The GET FiT Program is structured to address a broad range of risks and barriers faced by investors and financiers.**

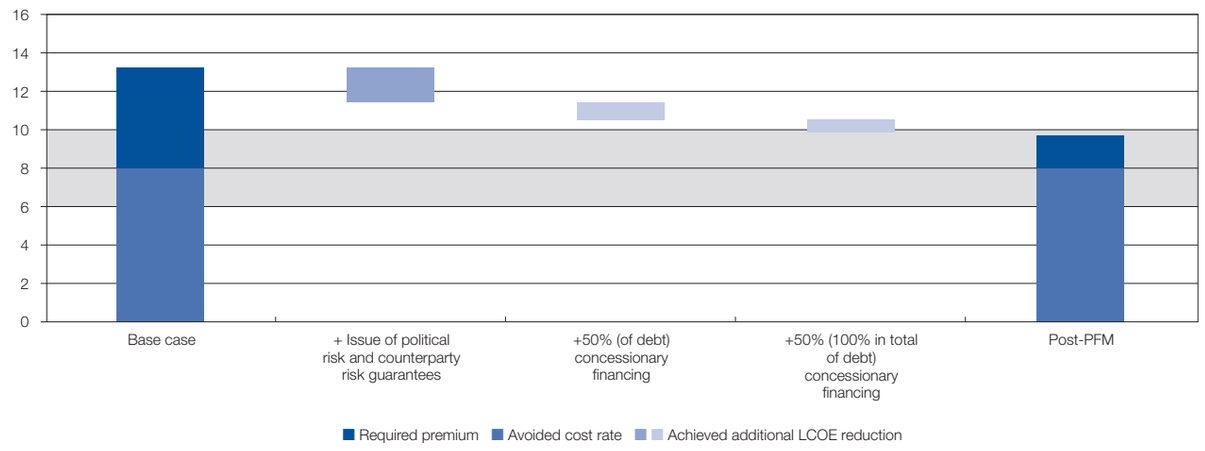



*As discussed in the first GET FiT report (pp. 32-33), potential support for mini-grids can be conceived in a similar manner as the support for FiTs and lighthouse PPAs depicted in this figure. A key difference is that under certain circumstances, the IPP would also effectively play the role of the mini-grid "utility" and collect payments directly from the ratepayer.

*Source: DBCCA analysis, 2010*

These aspects could then be used to both reduce the levelised cost of energy and also to directly fund the premium depending on the appropriate structure for the domestic market as well as the international donor working through Get FiT Program.

## LCOE development wind – illustrative case




*Source: DBCCA analysis, 2010*

## Technical Assistance

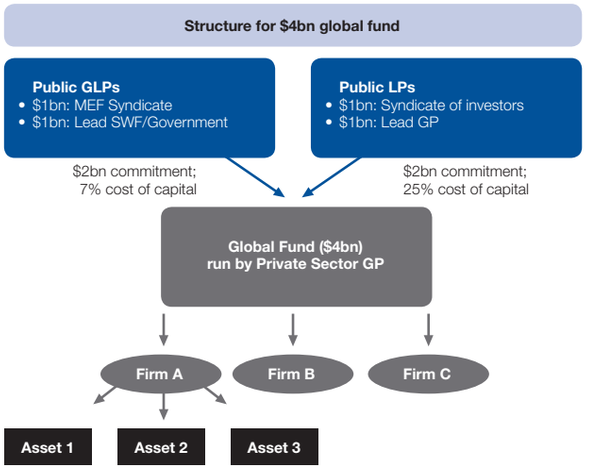
Direct financial support and risk mitigation strategies can create the financial conditions necessary to attract domestic and international capital. In the developing world, however, renewable energy projects can also face an array of non-finance challenges. GET FiT would seek to address the challenges by coordinating existing resources in the energy sector and directly involving domestic players in the development of renewable energy expertise and capacity. More specifically, a GET FiT Program would help source technical assistance and capacity building focusing on areas such as:

- Advanced feed-in tariff policy design, including initial rate setting and ongoing review
- Grid capacity and expansion cost analysis, resource assessments, project feasibility studies and integrated energy planning processes for governments and government agencies
- Grid management and renewable energy integration strategies for utilities
- Financial due diligence and risk mitigation strategies for local financiers
- Renewable energy project development, system construction and operation and maintenance services for local private sector players

## d. Global Public/Private Clean Technology Commercialization Fund (PPCT Fund)

The daunting financing challenge is particularly acute for the commercialization of new technologies, defined as the stage at which a technology is ready for scale-up from pilot to full-scale development. Investment in the scale-up of such technologies is essential for renewables to achieve cost parity with conventional energy and increase their market share. However, these technologies often fall into the "CommercialiSation Gap": they are too capital-intensive for venture capital, yet too risky for private equity, project or corporate debt financing.

To date, an inadequate risk/return profile for the scale-up of technologies associated with power generation, coupled with a shallow financing market for this investment stage has inhibited private capital commitments. A Public/Private Clean Technology CommercialiSation Fund ("PPCT Fund" or "Fund") is a solution which could bridge the commercialization gap. Such a fund would attract significant private money and sector know-how in exchange for capped public-sector returns. An example structure of the Fund, managed by a private sector investment partner, could combine US$ 2 billion of public and US$ 2 billion of private capital with attractive upside to private sector investors after a 5-7% capped return to public sector investors. The Fund would aim to invest in 15-20 portfolio companies over a 10-year investment horizon.




- 100% equity investments at the corporate level
- Project-level investments require capital calls; individual investments can be further levered
- Public funds (loans, loan guarantees) receive priority 7% return over life of fund
- Private sectors receives uncapped return

| | DESCRIPTION |
|---|---|
| **Public Sector Role** | • Potential participants:<br>- CEDA (U.S. loan guarantees);<br>- SWFs & Dev banks<br>- MEF syndicate<br>• Portfolio = diversified collateral pool<br>• Share risks in return for operational rigor of private funds |
| **Private Sector Role** | • Potential participants:<br>- Lead GP (PE/investment firm)<br>- Syndicate of investment banks<br>• Lead private fund and other funds provide investment expertise; skin in the game with capital at risk<br>• Each fund is managed by private GP |
| **Investment Targets** | (Example technologies)<br>- Enhanced geothermal<br>- CCS<br>- Energy efficiency finance<br>- Solar technology commercialisation |

The Fund concept, which has been proposed by Tana Energy Capital LLC in collaboration with major corporate and finance partners in the US, has the following potential characteristics:

- *Technology/Sector focus will be limited to scaling clean technology.* Applicable technologies and projects may include but are not limited to: enhanced geothermal, solar thermal, solar technology scale-ups, CCS, second generation biomass/biofuels and scaled energy efficiency finance.

- *The Fund is structured to diversify risk to investors across the portfolio.* The PPCT Fund pools risk across all investments at the portfolio level. This structure provides government limited partners (GLPs) the advantage of a portfolio effect[28] in contrast to committing risk capital on a project-by-project basis. This structure provides the Fund flexibility to invest Fund capital across a portfolio of technologies and regions in an efficient, streamlined manner without the complicated structures and processes needed to employ government-backed capital at the company level.

- *Experienced private investors serve as the fund manager and are responsible for deal sourcing, investing and portfolio management activities.* In contrast to the CTF Fund administered by the World Bank and other multilateral institutions as part of the climate investment funds[29], the PPCT Fund will be led by and administered by a lead private sector investor (the General Partner, GP) with significant sector-specific experience as a control investor. The GP will be selected through a competitive process based on a track record of leading, executing and successfully exiting investments in the sector and regions the Fund will be active in[30]. This structure prioritizes efficient and financially driven capital deployment decisions.

- *The GP has significant experience in the game, driving efficient, market-based investment decisions.* The GP will be expected to supply a substantial capital commitment to the Fund, ensuring the fund manager is highly motivated to maximize value as an investor and portfolio manager. The hands-on approach of a motivated GP provides governments the benefit of fully leveraging private sector capabilities and value added.

- *The GLP participants underwrite private capital returns in return for the operational rigour of a private sector fund.* GLPs will receive a capped return on an investment-by-investment basis. Public-private funds to date, such as the US OPIC Fund program, have structured returns to the government in the range of 5-7%. Once the capped return is met, the remaining distributions flow to the GP and private sector LPs.

- *The geographic focus of the Fund will likely reflect the geographic make-up of the GLP syndicate.* The geographic distribution of government participants in the fund will serve as a guide for geographic targets for the fund. Discussions with potential funders will explore the viability of a fund with an expansive global remit versus a fund inclusive of a number of smaller "regional funds", e.g. an Americas Fund, Asia Fund, Europe/Africa Fund. Deviations from the geographic targets would need approval by a vote of GLPs and LPs.

28 For example, GLPs which provide loan guarantees to the PPCT Fund will base their credit subsidy cost (loan loss provision) on a diversified pool of investments, not on an individual project or company level.
29 There may be latitude within the terms of the Climate Investment Fund to provide capital to or co-invest with the PPCT Fund.
30 The US Government OPIC funds program, which funds venture investments in developing countries, provides a good model for the selection of private sector fund managers and fund governance terms and procedures.

### e. Green Africa Power (GAP)

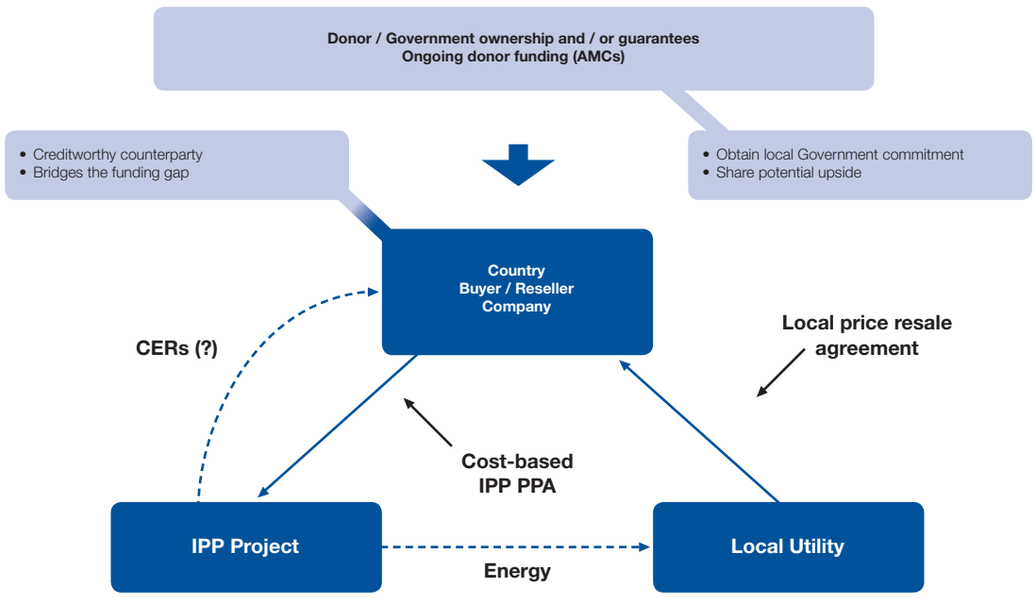
The goal of Green Africa Power (GAP) is to support progressive, reform-oriented governments in sub-Saharan Africa to strengthen low-carbon, climate-resilient growth and human development. GAP aims to achieve this through assisting selected countries to stimulate private sector investment in large-scale renewable energy generation. An initial target is to achieve installation of 500 MW of renewable capacity annually by 2015 – a significant step compared with current rates of private investment in the sector. The possibility to achieve this acceleration lies in GAP's innovative use of development funding to anchor new types of private-public funding partnerships.

As a new Private Infrastructure Development Group (PIDG) facility, GAP will aim to address the market failures through a "cash on delivery" approach to privately financed renewable energy projects. It will be established as a power trading company and buy power from renewable energy producers through long-term power purchase agreements (PPAs) on terms which provide generators with cost-reflective tariffs and security of payment. GAP will then sell the power to utility companies or other wholesale customers through corresponding power sale agreements.

GAP will use concessional development finance to bridge gaps between a utility's ability to meet full payment under a PPA and the rate needed for the developer to achieve a normal investment return. Support will be provided alongside government programmes to strengthen sector creditworthiness; thus support will diminish over time as tariffs achieve a commercially sustainable level. The PPAs will require that any carbon credits (e.g. certified emissions reductions) earned by a project be transferred to GAP to contribute to the financial bridging provided by development finance. Capital investment in the renewable projects supported will be provided by the private developer and private lenders: the full-cost PPA and credit security provided by GAP will significantly ease challenges to mobile private resources, both local and foreign. A key principle of GAP will be substantial African involvement, for example the allocation of equity stakes to national governments or the concerned regional economic communities.

The diagram below outlines what is expected to be the typical arrangement in a pilot country or region. GAP will provide a creditworthy off-take and payment guarantees, to the extent these are beyond the present means of the concerned utility. These facilities will be provided alongside government programmes to strengthen sector creditworthiness and assurances by government concerning the stability of aspects of sector policy and regulation.

Illustration of the mechanism for Green African Power for a single country (or region)



The ambition of GAP is to facilitate construction of 500 MW of renewable generation per annum by 2015. Although far short of the 7 GW required[31], such capacity additions can demonstrate at scale the feasibility of market-based and privately financed development of renewable generation while delivering immediate benefits in countries with severe energy shortages. Countries will be selected according to the suitability of their policy and regulatory regime, in particular as regards a favourable climate for private investment in power. An immediate objective is to finance two projects over the next two years.

All these examples show there is considerable thinking on pragmatic ways to combine targeted public financing interventions with private capital, to help shape bankable markets for low-carbon infrastructure in developing countries rapidly and on a significant scale. However, as these ideas get traction, much work remains to be done as to their implementation. The financing community as well as the public, intergovernmental community lacks demonstration at scale and implementation of these ideas is likely to remain a rhetoric exercise without a coordinated push to create successful examples.

31 The Infrastructure Consortium for Africa (2010) "Africa's Infrastructure: A Time for Transformation". Available at: http://www.infrastructureafrica.org/aicd/library/doc/552/africa's-infrastructure-time-transformation

# Critical Mass Events

The Critical Mass Initiative was conceived at the World Economic Forum Annual Meeting 2010 in Davos-Klosters and was advanced through a number of meetings:

- Critical Mass workshop in London, to launch the process, hosted by the European Bank for Reconstruction and Development
  *31 March*

- Critical Mass workshop in New York, to get feedback from US constituencies and brainstorm three laboratories, hosted by the UN Foundation
  *26 - 27 April*

- Low-carbon finance private session at World Economic Forum on Africa Dar es Salaam, Tanzania
  *5 May*

- Low-carbon infrastructure (renewables and energy efficiency)private meetings co-hosted with the US Department of Energy on the margins of the Clean Energy Ministerial Meeting
  *20 July*

- Critical Mass India laboratory: private meeting in London, hosted by PwC
  *1 September*

- Low-carbon finance private session at World Economic Forum Annual Meeting of the New Champions 2010, Tianjin, People's Republic of China
  *13 September*

- Critical Mass SARi laboratory: private meeting in London, hosted by PwC
  *22 October*

- Critical Mass India laboratory: private dinner and meetings, New Delhi, India on the margins of the DIREC 2010 conference
  *27 - 29 October*

- Critical Mass Energy Efficiency laboratory: private meeting in London, hosted by PwC
  *5 November*

- Low-carbon finance private session at World Economic Forum's 2010 India Economic Summit New Delhi, India
  *13 November*

- Critical Mass private session co-hosted with the government of Mexico at Green Solutions at COP 16, Cancún, Mexico
  *6 December*

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# Acknowledgments


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International Finance Corporation
United Nations Foundation

**Organizations associated with the Critical Mass process**

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**Over 200 participants from the following organisations took part in the Critical Mass Initiative**

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