National Green Banks in Developing Countries:

Scaling Up Private Finance to Achieve Paris Climate Goals

Developing Dedicated Local Clean Energy Finance Institutions — Green Banks — As Focal Points to Catalyze Public & Private Investment to Meet National Climate Goals

coalition for green capital

By the Coalition for Green Capital

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About the Coalition for Green Capital

The Coalition for Green Capital (CGC), a 501(c)(3) non-profit, is the leading advocate, expert and consultant on the topic of Green Banks – public or quasi-public clean energy financing authorities. CGC works directly with governments and other key partners to identify ways for public capital to stimulate private investment in mature clean energy technologies and accelerate the growth of clean energy markets. CGC often works with government to help create the institution, assessing various legal options to institutional creation and financial options for Green Bank capitalization. CGC also works with governments to implement innovative clean energy finance and market development mechanisms through existing public institutions. CGC sometimes offers this support pro bono, as governments are often eager to understand and implement these financing concepts, but do not have the know-how, institutional capacity, or funding to do the necessary work themselves.

About this Project

The Coalition for Green Capital (CGC), with support from the Hewlett Foundation, conducted this scoping effort to identify how the Green Bank model could be implemented in emerging markets to complement existing efforts to meet Nationally Determined Contributions (NDCs) and achieve national climate goals. The core hypothesis explored was that Green Banks (either purpose-built entities or adaptations of existing institutions) can be highly effective in channeling investment from carbon to clean in emerging economies by spurring private investment into low-carbon projects, and in driving global clean energy investment to the scale required to achieve international climate goals.

The lead authors off this report are Andrea Colnes, Rob Youngs and Jeff Schub, with support from Reed Hundt, Jillian Bunting and Nick Kline. To inform our work, CGC conducted a series of interviews and a stakeholder work-session with more than 100 representatives of development financial institutions, national development banks, developing country representatives, existing Green Banks, capital providers, climate funds, thought leaders, government officials and others from the climate finance community. We also worked closely with a core group of expert organizational partners to help inform and shape our recommendations on application of the Green Bank model. The content of this report only represents CGC's views. A number of organizations provided input and helped inform our thinking on portions of the paper including the Rocky Mountain Institute, Climate Policy Initiative, Organization of Economic Cooperation and Development, and Natural Resources Defense Council.

CONTENTS

FIGURES

EXECUTIVE SUMMARY

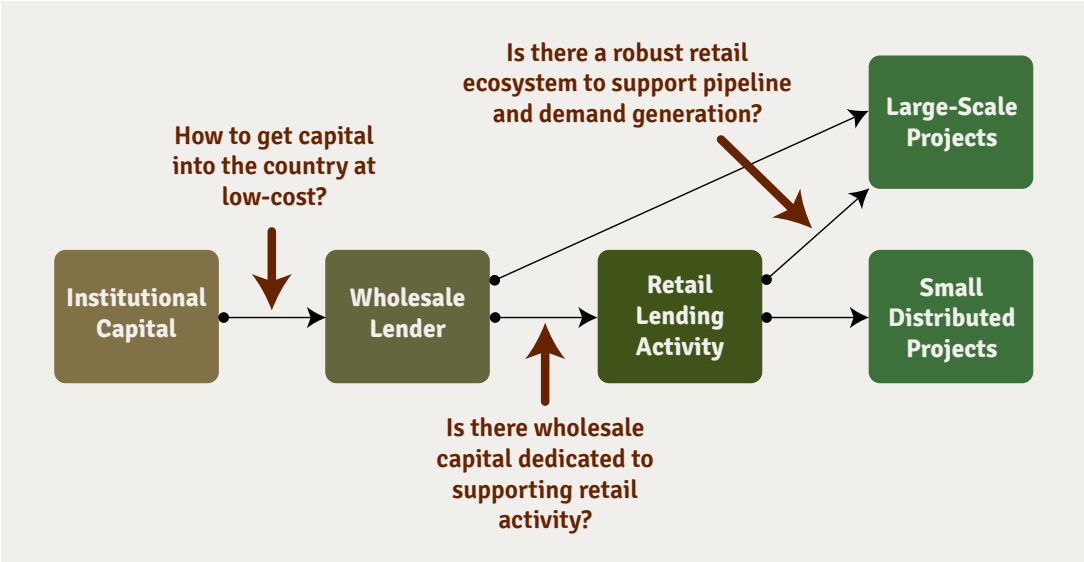
With the Paris agreement in place, the burden of climate action has shifted from international discussion to nation-specific implementation. And with that shift it becomes clear that far more investment, primarily from the private sector, will be needed to meet local climate goals and Nationally Determined Contributions (NDCs). Existing climate policies and investment pledges are projected to yield far less global climate investment than what is needed to keep temperature rise below two degrees Celsius. There is a $27 trillion investment shortfall that must be filled.[1] New approaches are needed to drive private investment at unprecedented scale, and quickly. Many existing institutions in the landscape were not designed with the focus and structure needed to connect global capital to local low-carbon projects, with local decision making driving action. An additional hurdle is that investments must offer attractive returns while also delivering affordable clean energy solutions to customers. This challenge is particularly acute in developing economies where issues of energy access and affordability are central to the clean energy transition.

National Green Banks can build markets and deploy capital for local needs

National Green Banks – structured as either new purpose-built institutions or adaptations of existing institutions – can be formed around the world to address critical market gaps and drive public and private climate investment. Green Banks are public-purpose finance institutions dedicated to green investment, embodying the pure focus and local market-oriented approach needed to fill the investment shortfall. In multiple countries, Green Banks have successfully driven investment into clean energy infrastructure in their local markets. Green Banks are designed to maximize total investment, using limited public funds to leverage far greater private investment. By developing innovative finance and market development solutions, Green Banks address barriers that currently restrict clean energy market growth.

Within any given clean energy market, there are often gaps between institutional capital, clean energy retailers and consumer demand, which limit the flow of investment and clean energy adoption. These gaps can occur at the wholesale level – for example, private institutional capital may not flow into a country because of currency exchange risk. Gaps at the retail level also exist – for example, capital may not flow from a National Development Bank to an individual energy efficiency project because there is no retail lending and/or project development intermediary capacity. In addition, scaling investment quickly in new markets or new technologies will require risk mitigation, focused technical assistance, enhanced project pipeline development, and project origination capacity. Addressing these challenges holistically requires focus and flexibility to fill gaps along the project origination, development and finance spectrum.

Green Banks are built to serve their local markets, offer deep knowledge of local conditions, and are part of the investment landscape. Where strong National Development Banks exist, Green



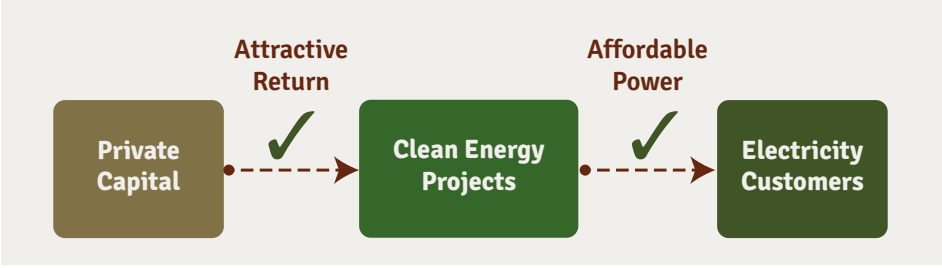
Banks can complement or enhance their capacity by providing a dedicated green focus, enhanced technical assistance capacity, project pipeline development, and innovative capital deployment. Effective local green finance institutions that seek to meaningfully penetrate the addressable clean energy market will need to understand project economics, relevant policies and regulations, the relative competitive economics of carbon-based power, and the barriers to demand for new clean energy technologies.

Whether operating on a wholesale or retail level, Green Banks seek to build the bridges that can overcome market gaps. This set of activities results in increased private investment in clean energy infrastructure, delivering affordable energy to end users, while supporting attractive risk-adjusted returns for investors.

Clean energy must be affordable in all countries while still attractive to capital providers

Market gaps will only be filled if all actors are able to realize economic gains from the transaction. Investors must see good risk-adjusted returns from investing in clean rather than fossil fuel energy. And end users must see economic benefits, chiefly in the form of lower energy costs or the increased resiliency of climate-smart infrastructure. This challenge must be addressed in each market based on local economics and conditions.

Green Banks in Australia, Malaysia, Japan, the United Kingdom and various states in the U.S. have demonstrated the capacity to address market barriers and deliver financing techniques that combine public and private capital at scale. The specific approaches of Green Banks vary by country, but all share the mandate to spur increased investment in low-carbon by offering risk mitigation and transaction enabling support to the private sector. To date, the founding members of the Green

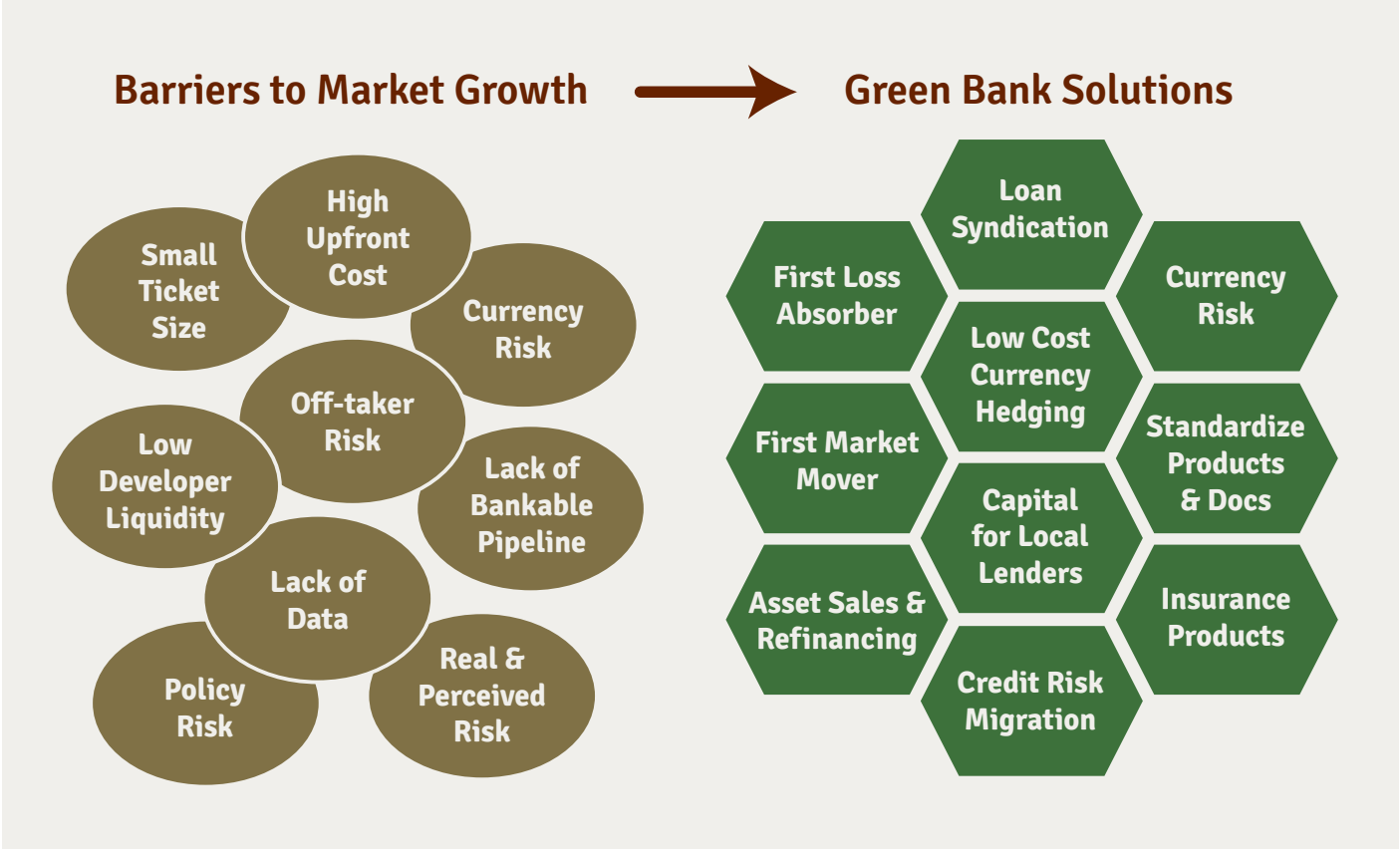


Bank Network[2] have financed nearly $26 billion in clean energy projects in less than 5 years average operation. The world must shift to a 21st century energy platform that creates abundant, affordable, reliable, renewable power to drive a rising standard of living for humanity, and Green Banks can help redefine the global climate finance architecture to realize this future.

Applying the Green Bank model to the developing country context

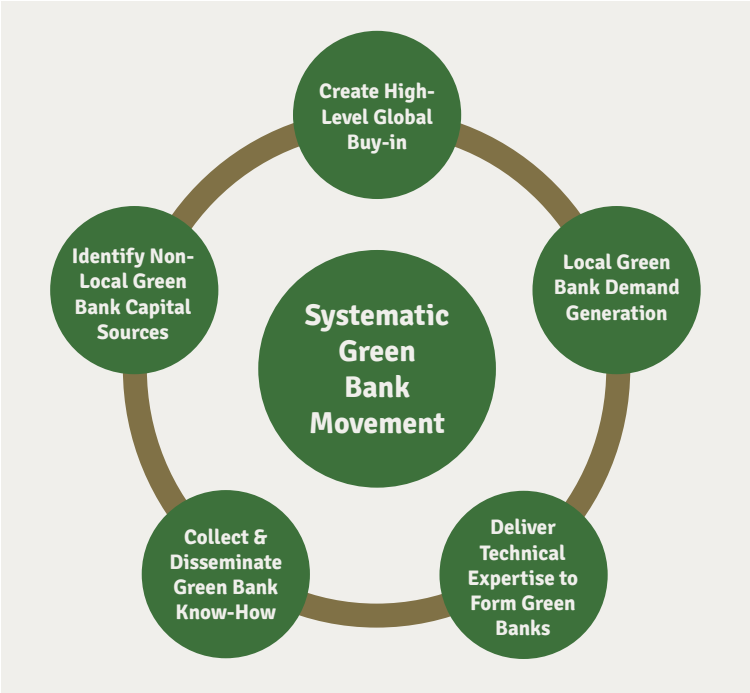
High and low income countries vary in important ways, but many similarities exist related to financing new technologies where lack of track record and weak enabling environments inhibit investment. In any geography, close attention must be paid to designing solutions that achieve product market fit, and address barriers on both the finance and demand side of transactions.

In many high and low income countries alike, investment barriers include small ticket size of energy efficiency and distributed energy projects, high transaction costs, real and perceived technology risk, and regulatory uncertainty. In developing economies, other barriers may include currency risk, high policy risk and weak enabling environments. Countries may also face an insufficient pipeline of bankable projects due to a shortage of project developer expertise, track record, and equity capital. To achieve product-market-fit -- and drive increased private investment -- all these issues must be addressed by local institutions with the resources, mandates and flexibility to fill these gaps.



The Green Bank development process

Although financial and political conditions are unique to each country, there are certain core elements to any national Green Bank development process that can define and structure a systematic approach. These elements include: development of national interest and a local champion, a market analysis across technologies and sectors, engagement of key stakeholders, consideration of and adaptation to the local enabling environment and policy framework, and recruitment of public and private sources of capital. Green Banks can be developed as new institutions or out of/within existing ones. Different strategies will suit the differing institutional landscapes of individual nations.



Complementary areas of work needed for systematic Green Bank initiative

Developing a replicable Green Bank model to scale climate investment through a re-tooled climate finance architecture requires the efforts of multiple expert organizations. A core group of non-profit organizations is in the process of developing a collaborative framework to advance the goal of establishing and supporting the first generation of national (and sub-national) Green Banks in emerging markets. This work is seeking to facilitate the design and capitalization of 4-6 institutions that can be operational by approximately 2020 and serve as models for replication by others.

An immediate opportunity for action

Interest in the Green Bank model has grown in recent years, and as ownership of climate finance shifts to the local level post-Paris, the time is opportune for Green Bank formation in an initial cohort of pilot countries. While local institutions like Green Banks have high potential in many countries around the world, several promising countries have emerged as a potential first cohort, based on criteria such as strong local champions, existing local capacity, and enabling environments that – while they still need strengthening – have already seen improvements in recent years. Significant interest in local Green Banks to increase climate finance capacity has been expressed by several countries:

- The Development Bank of Southern Africa (DBSA) seeks to set up a Climate Finance Unit to serve the southern African region;

- There is ongoing work underway in India to develop a Green Bank in coordination with the Indian Renewable Energy Development Agency (IREDA);
- The Malaysian government has committed RM 5 billion (USD 1.17 billion) to continue the Green Technology Financing Scheme (GTFS) with the possibility of forming a more specialized innovative green financial institution;
- There is emerging leadership and interest in the Philippines for developing a new Green Bank to serve national climate goals;
- There is a high level of interest in Chile in a Green Bank (or similar unit) to serve climate investment goals;
- Initial interest in the Green Bank model is emerging in several countries in Latin America, as explored at a Green Bank and NDB summit held in Mexico City in June of 2017;
- There is emerging interest a regional Green Bank to serve northern Africa via leadership from Morocco; and possible early-stage interest in Indonesia and Kazakhstan.

Green Banks offer a powerful model to reimagine the climate finance landscape as countries take ownership of their NDCs. The scale and immediacy of the climate finance challenge is enormous. Redirecting international finance flows away from fossil fuels while keeping energy affordable and accessible will require the combined expertise and capacity of a consortium of organizations, capital providers, development finance institutions, foundations and international climate funds.

> **"To achieve zero net greenhouse emissions globally by the end of this century, governments need to make full use of their capacity to leverage and unlock much larger flows of private investment in low-carbon infrastructure. Public green investment banks can help accelerate the shift to low-carbon investment at the national and sub-national levels."**
>
> **– Angel Gurría, OECD Secretary-General**

SITUATION—

THE GAP IN LOCAL CLEAN ENERGY INVESTMENT

1 Ambitious global climate commitments require a surge in location-specific investment

Paris agreement drives each nation to increase climate related technology adoption

In December 2015 in Paris, 195 nations of the world made a historic agreement, each committing to reduce their carbon emissions. Each nation made its own pledge, committing to reduce the absolute level of, the acceleration of, or intensity of carbon emissions over a period of time. Each country's pledge is different, and the mechanisms to achieve commitment vary in specificity. Some, though not all, Nationally Determined Contributions (NDC) identify the specific emission sectors to be addressed, the policy mechanisms that may be used, and the kinds of technology solutions needed to achieve national targets. Among developing nations, it is common for the NDCs to also include contingencies requiring financial support from developed nations to achieve certain targets *(see A below)*. The Paris Agreement does not include any formal global framework for wealth transfer to finance this dramatic change *(see B below)* and it is largely left to individual nations, private actors and development institutions to determine how to support the capacity of developing nations to meet climate goals.

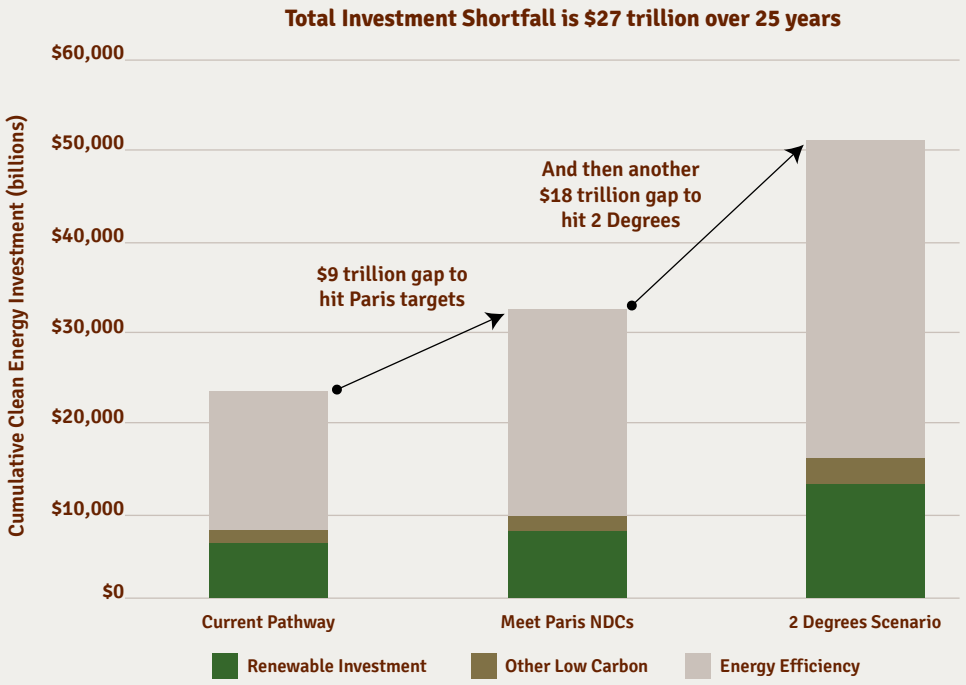
Estimates show $50.4 trillion needed to meet the two-degree target, far from current trajectory

Globally, the current set of activities, even incorporating new post-Paris policies and investment pledges, is not enough to meet the Paris commitments, and falls far short of what is needed to meet the two-degree target. In 2015 the IEA found there was $517 billion of total investment globally in renewables, energy efficiency and other low carbon technology ("clean energy") alone. This includes both public and private capital from all measured sources. Under the current set of global policies, IEA estimates that over the next 25 years average annual investment will be $912 billion. But in order to achieve the goals laid out in Paris, annual investment must be $1,276 billion. And to keep global warming below 2 degrees, annual investment must be $2,019 billion. Cumulatively over those 25 years (2016-2040), the gap between the current pathway of investment ($22.8 trillion in total) and the investment level needed to meet the Paris commitments ($31.9 trillion in total) is $9.1 trillion. And the gap between the current pathway and the investment level needed to prevent 2 degrees of warming ($50.4 trillion in total) is $27.6 trillion.[3]

A *For example, Malaysia's NDC says, "Malaysia intends to reduce its greenhouse gas (GHG) emissions intensity of GDP by 45% by 2030 relative to the emissions intensity of GDP in 2005. This consists of 35% on an unconditional basis and a further 10% is conditional upon receipt of climate finance, technology transfer and capacity building from developed countries." See Intended Nationally Determined Contribution of the Government of Malaysia.*

B *The Green Climate Fund, slated to be $10 billion in scale for both mitigation and adaptation financing is a small source of capital relative to the size of the investment need, and is designed to be catalytic to increase private finance, not fill the investment gap on its own.*

Figure 1: Global Cumulative Clean Energy Investment Gap 2016-2040 Under IEA Scenarios

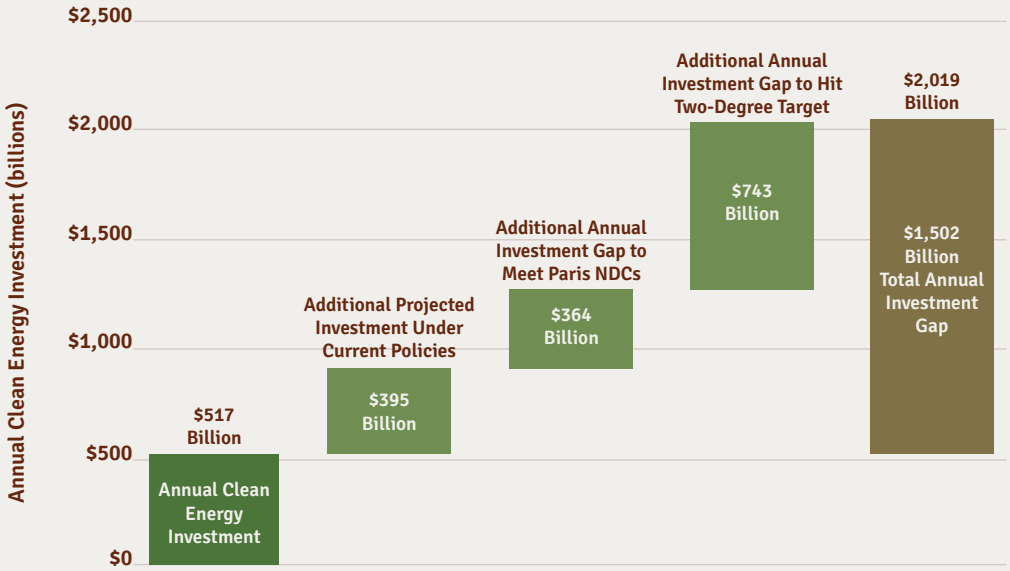


To put this in context, IEA calculated that globally there was $517 billion of global clean energy investment in 2015. To reach the Paris commitments, this number must rise to $1,276 billion of annual investment, and it must sustain this level for the next 25 years. But the current set of policies is only estimated to increase this figure to $912 billion per year, leaving a $364 billion gap above and beyond the current projected investment levels.

Total amount of global energy investment need not change dramatically to meet the Paris NDCs. Under the current pathway, $64.5 trillion will be invested in energy supply and efficiency over the next 25 years, and this figure must only increase by 3% to $66.8 trillion to meet Paris pledges.[4] The key to this equation lies in redirecting capital from investment in fossil fuels into renewable energy and energy efficiency.

> **"Investment in low-carbon, climate-resilient infrastructure falls far short of what's needed to tackle climate change. We urgently need to redirect capital from high-carbon to safer, cleaner and more productive investments. Both the public and private sectors are critical. Investors will provide the majority of capital needed provided that the public sector creates effective enabling environments and takes on risks the private sector is unwilling or unable to bear."**
>
> **– Barbara Buchner, Executive Director, Climate Finance, Climate Policy Initiative**

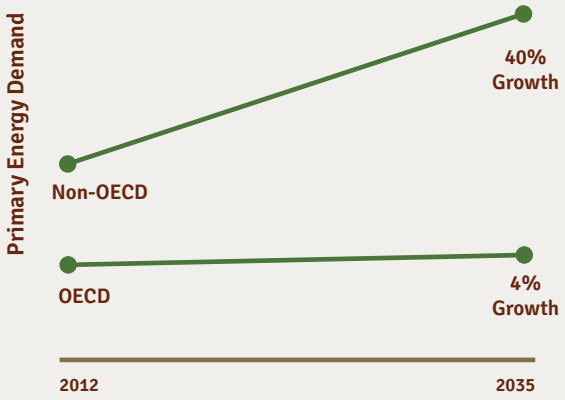
Figure 2: Global Annual Clean Energy Investment Gap Under IEA Scenarios



In developing nations, the investment gap is most acute

This collective shortfall of anticipated climate investment will have an unequal impact on individual countries and their capacities to achieve the NDCs and SDGs. Poorer nations with developing economies, immature energy systems, less stable central governments, high levels of poverty, low levels of energy access, high fossil-fuel dependence, subsidized energy costs and competing development needs are likely to suffer the brunt of the shortfall in NDC and SDG investment.[5] Energy demand in non-OECD countries is already close to double that of OECD nations. And from 2012 to 2035 the IEA projects that 95% of all new energy demand will come from non-OECD nations.[6] These nations have been clear that their ability to meet climate goals will rely to some degree on international cross-border assistance designed to mitigate economic impacts of lowering carbon emissions. Strained fiscal situations in some countries mean that domestic public capital available for climate-related investment is limited. Undeveloped domestic debt and banking markets mean local private capital cannot be a singular solution.

Figure 3: Growth in Primary Energy Demand 2012-2035[6]



Real and perceived risk of investment from foreign capital inhibit the flow of direct foreign investment. Nascent clean energy industries mean that the wholesale and distribution mechanisms to connect capital supply with clean energy demand in some countries are only now being formed. The existing architecture of development finance is already committed to meeting a wide set of development needs related to infrastructure, transportation, agriculture, education, health, and energy.[7]

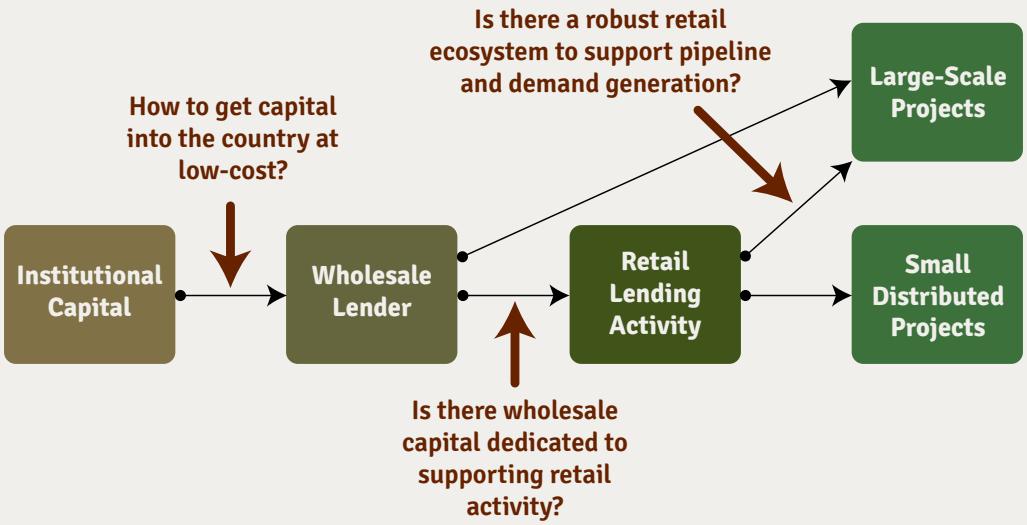
COMPLICATION—

THE CURRENT FINANCE SYSTEM IS NOT SUFFICIENT

2 Investment at scale requires attractive returns for investors, but energy must be affordable

Within a given energy market, there are often a series of gaps between institutional capital, clean energy projects and consumer demand that inhibit the flow of investment. These gaps can occur at the wholesale level - e.g. the flow of institutional capital into a country or from a wholesale lender such as a National Development Bank to retail lending institutions and projects. Gaps at the retail level – e.g. the flow of capital from lending institutions to projects or customers – also exist. Capital will only flow to markets where there is sufficient return for risk, and where investment opportunities are readily apparent.

Figure 4: Wholesale & Retail Capital Flow Gaps



Gaps in capital supply chain connecting capital to demand prevent capital flow

A simplified overview of the flow of capital into clean energy projects in developing countries is illustrated in the following schematic.

Institutional capital flows – often from outside the country – to wholesale capital lenders. Sometimes that wholesale lender will directly finance a project, typically a large renewable energy project. Otherwise it will on-lend that capital to retail actors and lenders. Those retail lenders will then directly finance the end-project which may be a large or a small distributed project, such as energy efficiency. Capital only flows through this chain if:

1) Capital providers believe they can earn an adequate risk-adjusted return for their money;
2) There is an adequate pipeline of projects that produce economical, low-cost energy; and
3) Institutions and intermediaries exist to perform the market functions necessary to connect investment capital to projects.

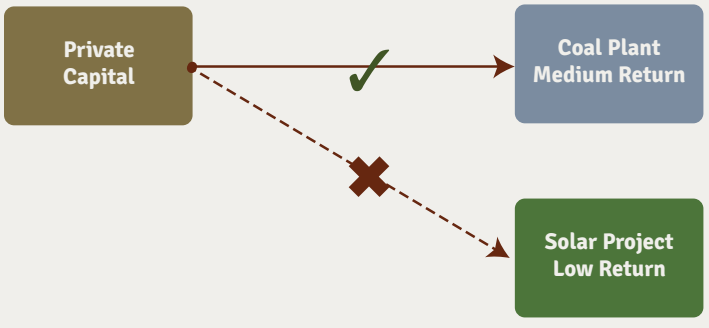
As shown in the schematic above, gaps can and do exist in this system in many countries. Capital can be difficult to bring into a country where sovereign risk, currency risk, currency hedging costs, political risk, low-carbon policy/regulatory risk, limited guarantee capacity from the local government, small ticket size or other issues may inhibit foreign investment. Once capital does enter a country, there are gaps between wholesale and retail actors. For example, developers and downstream actors may have a viable clean energy finance origination business, but are unable to access capital. Or local retail lenders might see an opportunity to expand lending relationships to existing clients, but cannot source capital that is tailored to their investment needs (e.g. small distributed projects).

Finally, a pressing problem in nearly all markets, is a lack of retailing capacity. Effective and scalable retailing requires a host of capabilities designed to identify customers, develop projects and make them suitable for investment. Retail capital must be packaged into attractive product structures, on economically attractive terms, combined with technical assistance, and delivered to customers in a turn-key fashion to support rapid adoption. Although each nation has unique energy market conditions and policy objectives, the schematic below illustrates structural gaps common across energy markets.

There is no demand if low-carbon options are not affordable – and demand is essential to scale markets rapidly

Market gaps will only be filled if all actors see economic gains from transactions. Investors must see better returns from investing in clean rather than fossil fuel energy. And end users must see economic benefits, chiefly in the form of lower energy costs or the increased resiliency of climate-smart infrastructure. Private investors will not simply redirect their capital from coal to solar if it offers lower risk-adjusted returns. Beyond removing tax breaks and subsidies for fossil-based generation, specific financing interventions to create good risk-adjusted returns can also help spur investment in low-carbon technology.

Figure 5: Capital Won't Change Direction if Returns are Lower (1 of 3)



The most direct way of adjusting this calculus is to produce higher returns by increasing the offtake price that customers pay for the clean power. But this would clearly compromise demand for the project's power if it costs more than the existing power.

The challenge that must be addressed in each market (based on local economics and conditions) is how to structure projects so that private capital is attracted to invest in clean and there is strong demand for clean energy from end-users because clean energy is affordable.

Figure 6: Simply Increasing the Project Return Eliminates Demand (2 of 3)

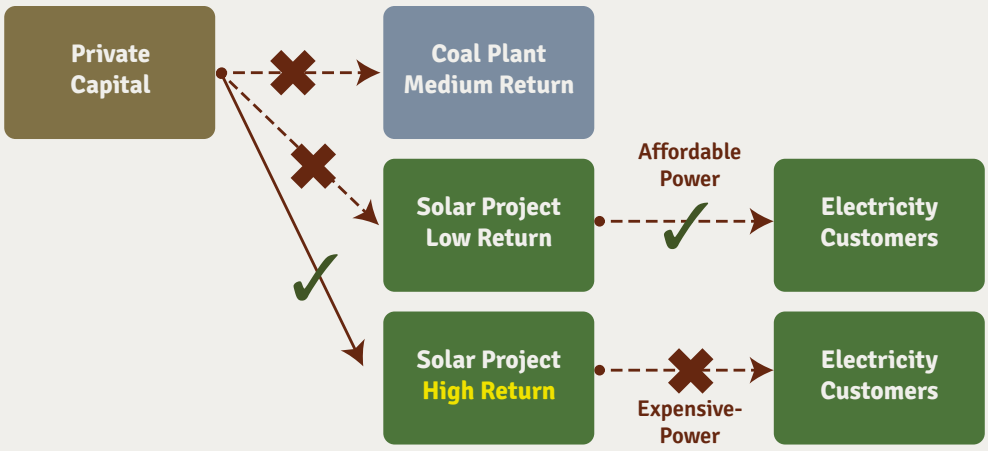


Figure 7: Must Build Structures that Give Attractive Returns and Lower-Cost Clean Energy (3 of 3)

3 Local institutions are needed to improve low-carbon project economics

Market gaps require local solutions and Green Banks to date have been effective when they are locally focused and part of the investment landscape. Where strong National Development Banks exist, Green Banks can complement their capacity by providing a dedicated green focus, enhanced technical assistance capacity, project pipeline development, risk mitigation, and capital where it is most needed to help spur private investment. Effective local green finance institutions must understand the projects suitable for a particular geographic market, relevant local regulatory situation, competition with carbon-based power, and the market demand. They need to be staffed primarily by skilled individuals knowledgeable about local conditions, but also clearly will benefit from links to global sources of capital, knowledge sharing and experience.

Public capital and focused institutions can bridge the gaps, leverage private investment

Private capital will be critical to meeting the investment opportunities presented by the NDCs. However, private capital providers often will not take the first risk associated with new markets, technologies and policy regimes. Dedicated public finance institutions like Green Banks, empowered to use public capital in innovative ways, can fill these market gaps and produce favorable economics for both sets of market participants. As discussed above, institutions can have the focus and permanence, yet flexibility to operate in markets in multiple ways.

If a local clean energy finance institution is capitalized with flexible, low-cost public capital, it can use those funds to mitigate risks, lower investment costs and absorb market-making operating expenses that private actors are unwilling to bear. It can provide a low-cost currency hedging tool or provide wholesale capital to retail lenders. It can issue RFPs to identify downstream partners willing to originate projects at the lowest capital cost, and bundle those projects to attract commercial investors. It can provide subordinated financing to support senior private capital or incur direct operating costs, such as providing technical assistance and training contractors (a common sales channel) to build up retailing capacity. Because the institution is equipped with public-purpose funds, and a "patient capital" mandate, it is better positioned to provide these services and improve market economics than a private institution.

> **"National green investment banks (GIBs) offer a replicable model for moving the locus of problem-solving and agency to the national level, empowering developing countries to benefit from international financial resources while also better attracting private capital. This model can serve as the centerpiece of a radically more efficient and effective climate finance architecture that enables the fulfillment of ambitious Nationally Determined Contributions (NDCs)."**
>
> **–Paul Bodnar, Managing Director, Rocky Mountain Institute**

Market needs are local

Each of these methods, and others, can be implemented in ways suited to the local market conditions that are found in an individual developing country. The suite of tools and techniques are common, but the specific applications will be unique. They must be applied by people knowledgeable in local conditions, based on and working with local government and regulators, using technologies and physical products that are suitable for that specific market. The feasibility and potential demand for low-carbon solutions will depend on the state of local energy markets, the relevance of fossil fuel alternatives, the purchasing power of consumers and local partnerships.

Institutions from afar can support local market development and supply capital. But it can be difficult for distant institutions to operate in the local market as market conditions and the nature of the market gaps themselves are constantly changing. For the same reason multinational corporations typically create local subsidiaries and distributors to sell services or products to fit local needs: the financial and market development architecture of climate investment requires local knowledge and flexibility to address local needs. In the development space, for example, the African Guarantee Fund (AGF), created in 2011 and focused on SME lending, was seen as a valuable local addition to the existing development landscape *(see C below)*.

C *AGF was developed in coordination with the African Development Bank, and bilateral shareholders & partners including the Ministry of Foreign Affairs of Denmark, Spain's AECID, NDF, AFD, SIDA and USAID.*

4 Current institutions are committed, but face an enormous investment gap

The existing system of development finance institutions (DFIs) is potentially a natural home for this kind of investment and gap-filling functionality. Multilateral development banks (MDBs) and bilaterals, working with local national development banks (NDBs) have long worked to play this role in climate and clean energy markets. However, for a host of reasons related to structure, scale and location, this set of institutions, in their current form, may not be sufficient to fill the large local investment gaps alone. DFIs house tremendous clean energy investment expertise, knowledge and a capacity for innovation. However, the gaps are so large that analysis of DFI past investment levels and new commitments shows that DFIs are on track to fill only 6% of the clean energy investment gap, using conservatively high estimates for private sector leverage *(see additional information below)*.

New commitments will not fill the gap

DFIs are expected to play a significant role driving climate investment. In 2014, DFIs financed $131 billion of climate projects, including both mitigation and adaptation.[8] As stated earlier, the gap between the real annual investment level in 2015 and the level needed to achieve the Paris commitments is $759 billion.

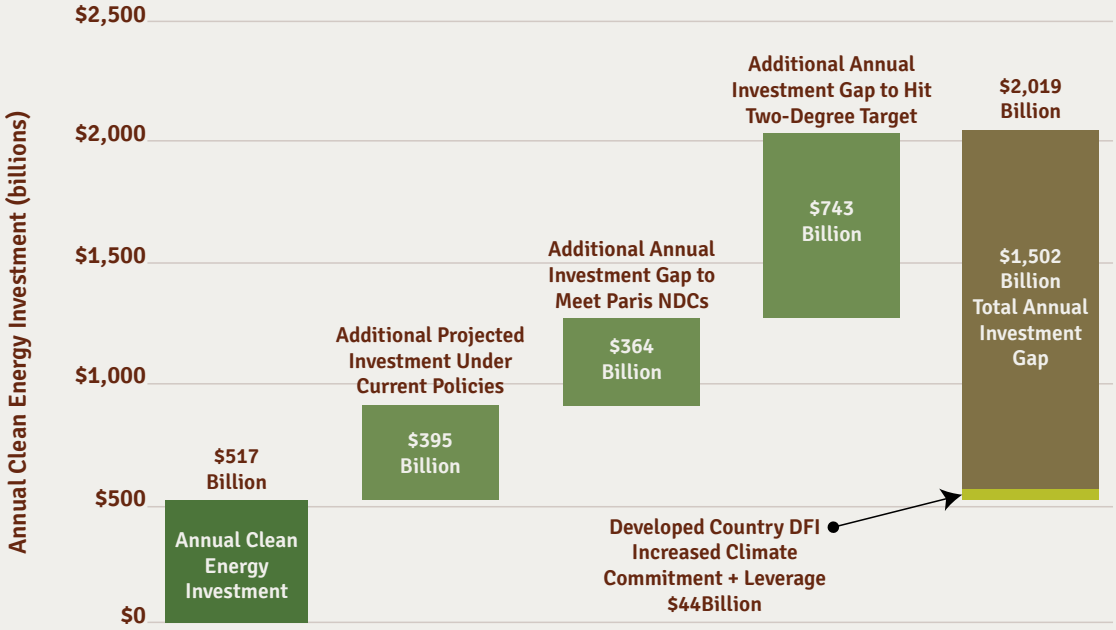
In 2009, developed countries committed to mobilize $100 billion per year by 2020 for climate action in developing countries. Based on forward-looking pledges made (by September 2016) by individual countries and MDBs to scale up the climate finance they provide, the OECD projected that developed countries' public climate finance could reach about $67 billion by 2020.[9] This represents a close to $22 billion increase compared to the estimate of public climate finance for 2014.[10] As mobilized private finance cannot be projected with the same degree of confidence as public finance, the OECD projection for 2020 presents a range based on the average amount of private finance mobilized per dollar of public climate finance. For instance, if the $22 billion increase in public finance is matched one-to-one with private capital (at the high end of the OECD projection), this means that developed countries will have increased their annual provision and mobilization of climate finance by a projected $44 billion compared to 2014.

This fills only 5.8% of the total $759 billion annual gap that exists between current investment levels and the "Meet NDC" scenario, and only 2.9% of the annual gap between current and two-degree target investment. New capital sources, institutional frameworks and mechanisms of leverage will be needed to fill the majority of the investment gap beyond existing and newly committed DFI activity.[11]

Separate projections from Bloomberg New Energy Finance (BNEF) estimate that dramatically dropping prices of low-carbon technologies like wind and solar will lead to increased investment levels. But BNEF analysis shows that even if cost projections are correct, given current policies around the globe, the world's carbon dioxide emissions from the power sector will be only

about 4% lower in 2040.[12] As Ethan Zindler of BNEF noted in the Financial Times, "to hit the trajectories that might be needed to stand a good chance of keeping global warming to the internationally-agreed objective of "well below" 2 degrees, more radical action would be needed."[13]

Figure 8: Global Annual Clean Energy Investment Gap Under IEA Scenarios with DFI Commitments



The existing DFI system will not be able to fill this investment shortfall alone. Not only does more public capital have to flow into climate investment, but that public capital has to achieve far greater leverage from the private sector. Further, the development needs of nations around the world are immense and diverse. While it is wise for DFIs to increase the number of investments in low-carbon infrastructure and make all other investments through a "climate lens" to ensure that agriculture, healthcare and civil society development efforts are carried out in a climate-friendly way, these activities can be quite different from achieving the levels of direct investment needed in decarbonization, or even adaptation, projects.

In addition, given that the basic institutional and financial designs of most DFIs are appropriately designed to minimize risk-taking, maintain high credit rating and diversified portfolios and introduce change slowly, changes of this magnitude and speed may be hard to achieve. By design, international DFIs work through partnerships with governments, National Development Banks (NDBs) and other local actors all of which must address the significant in-country market gaps described above. Local programs and institutions dedicated to increasing private and DFI investment in green will be critical to scale up investment to the necessary levels and act as effective local intermediaries. Green Banks, or similar programs of local public finance institutions, have the potential to complement existing actors and increase opportunities for DFI investments, by increasing specialized intermediation and risk mitigation, and offering tailored solutions to fill existing gaps.

RESOLUTION–

DEDICATED NATIONAL GREEN BANK INSTITUTIONS

5 National Green Banks can build markets and deploy capital for local needs

To fill the investment and institutional gap, National Green Banks can be formed to build the necessary bridges from capital to projects, fill market gaps, and accelerate clean energy technology deployment. Green Banks and related entities are currently operating in multiple countries around the world providing a diversity of examples regarding institutional form and interventions tailored to specific market conditions. Existing Green Banks use similar core attributes and a consistent set of operating principles.

Green Banks are locally-oriented, dedicated clean energy finance institutions that use public and private capital to maximize low carbon investment and drive clean energy market penetration.

Green Banks are public, quasi-public, or nonprofit institutions that finance the deployment of commercially viable renewable energy, energy efficiency, and other clean energy and green infrastructure projects in partnership with private lenders. Green Banks provide loans, leases, credit enhancements and other financing services to close gaps in the private capital markets for clean energy projects. Green Banks also operate as transaction enablers, supporting market development and filling gaps related to low demand and small ticket size. In the geographies in which they operate, they serve as an institutional platform for increasing private investment in low-carbon technologies. The goal of a Green Bank is to accelerate the deployment of clean energy. They use capital in innovative ways and help build the mechanisms, market structures, and activities that must exist to connect large pools of capital with clean energy demand. Green Banks reduce the upfront cost of clean energy adoption, leverage greater private investment, and increase the efficiency of public expenditures in the low-carbon space.

> **"Green banks in US states like New York are critical and successful examples of how climate action is being driven at a local level. Under the right conditions they offer a model for driving climate action in developing countries."**
>
> **–Jay Koh, Managing Director, The Lightsmith Group**

Green Banks are locally-oriented institutions, designed and operated to serve the needs of the local market. Green Banks can operate as wholesale or retail finance entities, or both. They can directly finance projects, or can provide capital to retail entities which then deploy capital. Green Banks pair financing activity with a range of market development activities. Green Banks absorb the operating costs associated with building new markets which private actors are not willing to bear.

Green Banks operate according to a number of core principles

Green Banks around the world operate under a number of different names (UK Green Investment Bank, Australian Clean Energy Finance Corporation, Connecticut Green Bank, etc.). They can serve different markets, offer different kinds of products, and are inherently flexible institutional structures. But they all operate with a core set of principles.[14]

"Green Banks: What's in a name?"

While the term "Green Bank" or "Green Investment Bank" is useful shorthand term for dedicated green finance entities as described in the OECD's 2016 report on Green Investment Banks,[15] in fact, most Green Banks are not actually "banks." They do not accept deposits and are not subject to the same regulations as banks. Depending on the structure and investment approach, Green Banks can be more accurately described as "green finance corporations," "green investment funds," or "low-carbon investment authorities."

- **Focused Institution** – Green Banks are built with a core institutional focus on addressing the climate investment gap. A Green Bank has a mission, goal, metrics and culture that is defined by the need to maximize clean energy investment from the private sector and deployment of technology to combat climate change. They employ and train staff with skill sets that combine knowledge of project finance, energy markets, policy and marketing.
- **Leverage Private Capital** – Green Banks seek to maximize the total private investment that can be achieved per Green Bank dollar. Green Banks seek to pair their own balance sheet capital with that of other investors and lenders, absorbing investment risk as needed. This not only makes Green Bank capital go farther, but also allows private investors to become familiar with clean energy investing.
- **Market-Oriented & Flexible** – Green Banks are market-based institutions, operating within the markets they serve. Green Banks serve to be risk absorbers and market provers for commercially viable, yet underinvested sectors: they do not aim to provide concessional finance, but rather seek to address market failures. As market-oriented entities, Green Banks do not seek to finance projects that are not economically viable.
- **Self-Sustaining** – Green Banks seek to earn revenue on their investments sufficient to cover their operating expenses. They may rely on multiple sources of revenue and capital infusions to maintain self-sufficiency, but do not need to be replenished annually from public budgets. By self-sustaining, they demonstrate to private actors that clean energy investment is a viable business, while reducing dependence on government budgets.
- **Independence** – Green Banks are governed through mechanisms that allow for independent, market-based investment and operating decisions. Individual investments do not have to be approved by politicians or oversight mechanisms that sit outside the Green Bank. If individual investments are being approved by politicians, it creates the perception that the Green Bank is merely supporting pet projects, rather than focusing on market needs. And much of the value of a Green Bank comes from consistency and reliability. Private market participants are less likely to partner with an entity that is perceived to be inconsistent or unpredictable in how it will behave.
- **Complementary** – Green Banks seek to complement and enhance existing policies and programs offered by governments and DFIs. Green Banks do not aim to be competitive with market actors. Green Banks can co-invest alongside existing investors, both public and private. It can pair its capital with local rebate programs. It can coordinate its activities with existing private actors to ensure end-users are presented a single turn-key solution. Complementarity and coordination with other actors is an essential part of building demand, as market complexity and the need to work with multiple actors can reduce willingness to adopt new technologies.

Figure 9: Green Bank Core Principles

- Are **focused institutions**, created to **deploy clean & resilient energy technology**
- Use public money to de-risk & **leverage private** capital through innovative structures
- Use debt, warehousing, credit-enhancing and related instruments to **produce cost-effective energy** for end-users and deliver returns for private investors
- Seek to be **self-sustaining**, and preserve public capital
- **Complement** existing actors and programs, bridging gaps in capital supply chain
- Are **market-oriented and flexible** adjusting offerings, products and partnership structures to suit the customer-need
- Are **steadfast** in the face of changing political landscape & budget changes
- Work closely with government to foster a **stronger enabling environment**

Green Banks adopt a typical set of market-engagement strategies and forms

Green Banks may seek to engage with and seek to change energy markets in a number of ways. The strategy is independent of the specific legal form of the Green Bank. However, it is likely to depend on the specific market segments and technologies most suitable for local conditions. The sources of capital used to fund the Green Bank may create their own constraints.

Green Bank Strategy

Green Banks must find good product-market fit to be effective in bringing markets to scale and targeting the most relevant sources of emissions. Thinking through which part(s) of the market a Green Bank wishes to address is a key part of defining the mandate and products of a new or adapted Green Bank. CGC has observed several general approaches to discovering product-market fit, for example, in the electricity sector. These are: directly finance (or mitigate risk) for distributed projects, directly finance (or mitigate risk) for large-scale grid-tied generation and distribution projects, and provide wholesale financing of intermediary financial institutions.

The first strategy, requires project development of localized generation, efficiency, storage, and distribution. This approach is well-matched to off-grid contexts, but can be pursued for grid-tied applications as well, particularly when the right enabling policy environments are in place. The second strategy works to deploy more utility-scale projects that provide renewable power through the grid, reliably, at affordable prices. Project development in this case is particularly capital intensive. Green Banks may also operate as a more agnostic wholesale capital provider, where intermediary firms provide retail financing to projects.

Examples of Dedicated Institutions Created to Advance Bold Goals

When governments and societies have identified a pressing social or economic need they often form dedicated institutions. Like rebuilding the global economy after the Second World War and putting a man on the moon, rapid redirection of capital to avert climate disaster clearly warrants the focus of dedicated institutions. Historic examples include:

- The World Bank by Allied governments – after the Second World War;
- The Mexican Nacional Financiera – responding to the Great Depression, and the Second World War; [16]
- The War Finance Corporation – after the First World War;
- The Brazilian Economic Development Bank – to focus on economic development; [17]
- The Inter-American Development Bank – to address development challenges; [18]
- The African Development Bank – to fight poverty and improve living conditions on the continent; [19]
- The China Development Bank – to drive construction of domestic infrastructure; [20]
- The Overseas Private Investment Corporation – to support developing economies and U.S. business opportunities.

There are lessons to draw from the successes and weaknesses of each of these examples. Green Banks already heed one of the key lessons, tapping international capital but keeping investment decisions local.

Institution Form

Independent of strategy, a Green Bank institution can be formed through three pathways.

- **New Institution** – Green Banks can be developed as new purpose-built institutions. This may be done by legislation, regulation or administrative action and in some cases, Green Banks can be incorporated as private institutions (typically non-profit.)
- **Re-Formed Institution** – Green Banks can be created by reforming an existing entity. For example, an existing institution might be given a new mission, new board and/or new by-laws to begin operating as a Green Bank.
- **Division of Existing Institution** – Green Banks can be formed as a dedicated and independently operated division of an existing institution. For example, an existing infrastructure bank might develop a new Green Bank division. To provide the necessary independence and focus, Green Banks created within an existing entity will likely require a distinct operating unit.

Legally, Green Banks can be public, quasi-public or non-profit. They can be directly part of government, wholly owned corporations of government, or operated like DFIs, with a government as the equity owner. Green Banks have financial statements similar to other financial institutions, with a balance sheet, statement of operations and cash flow statement. The nature of those statements evolves as the institution develops.

Capital Sources

To date, Green Banks have been capitalized with public funding from the local governments that created them. However, Green Banks can receive their initial and/or on-going funding from a number of sources.

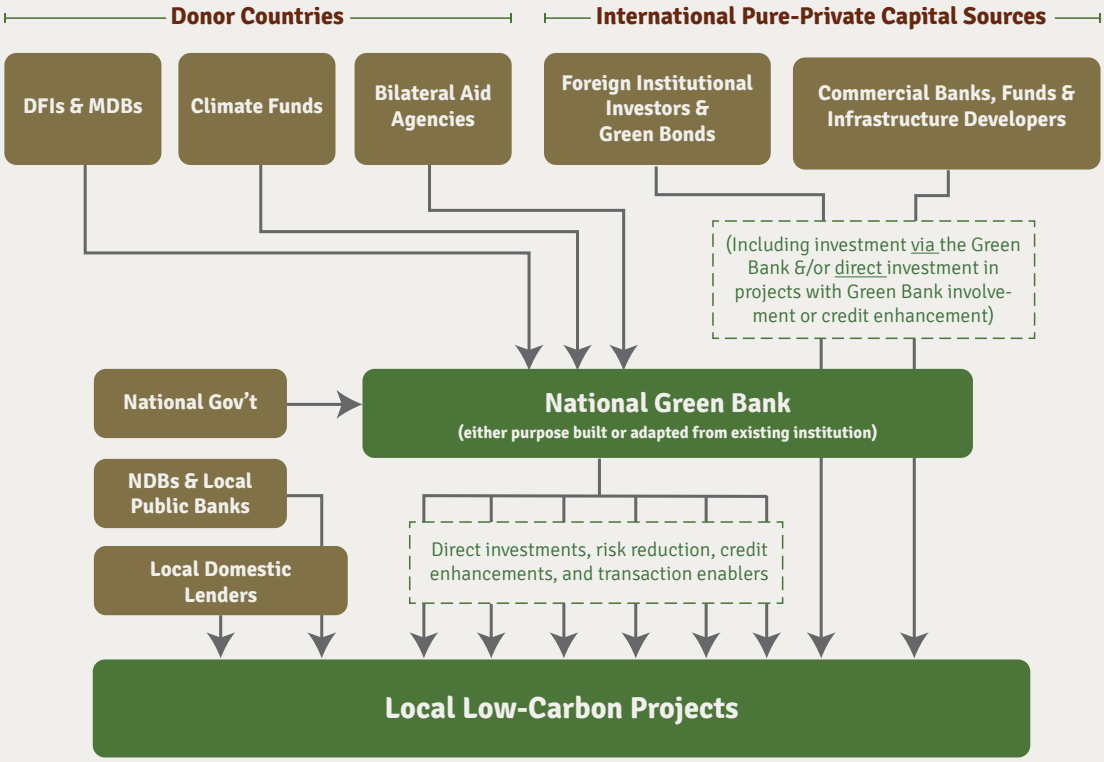
- **Domestic Public Sources** – Local governments can directly capitalize a Green Bank with public funds from budget appropriations, utility surcharges, carbon tax revenues or other sources.
- **International Public Sources** – DFIs and other related donor funds can capitalize a Green Bank.
- **International Climate Funds** – Green Banks can seek capital from dedicated climate funds, like the Green Climate Fund.
- **Philanthropic & Impact Investment** – Green Banks can draw on foundation grants and program-related investment. They can also seek out mission-driven capital from private investors.
- **Institutional Private Capital** – Green Banks can also directly take in capital on its balance sheet from private investors. The cost of this capital may vary and may be below "private market rates." For example, a foundation may provide a program-related investment at a very low interest rate (below 3%). And a private bank may also only require a low return if the investment satisfies specific legal or internal mandates. *(see D below)*

More details on capital sources can be found in an earlier paper, written by Coalition for Green Capital, NRDC and Climate Finance Advisors, "Green & Resilience Banks." *(See E below)*

D *For example, private banks in the U.S. have loaned money to Green Banks and similar entities at interest rates below 3% because the activities of the Green Banks satisfy legal requirements on the private banks to invest in under-served markets.*

E *Natural Resources Defense Council, Coalition for Green Capital, and Climate Finance Advisors, "Green & Resilience Banks: How the Green Investment Bank Model Can Play A Role in Scaling Up Climate Finance in Emerging Markets," November 2016.*

Figure 10: The Role of Local Green Banks in the International Climate Finance Landscape



In addition, Green Banks can and do issue bonds. This allows them to sell assets through securitizations in order to recycle capital and return liquidity to the Green Bank's balance sheet. Green Banks can also accumulate diversified assets on their balance sheets and have sufficient reserves to issue general obligation bonds. This follows the leveraged finance model typically used by DFIs, where the institution is primarily lending borrowed funds. These bonds would inherently be Green Bonds, as the proceeds would be used to recapitalize the Green Bank and be used to further the Green Bank mission. *(see F below)*.

Green Bank institutional forms and capital sources will likely evolve over time, following the trajectory of "start-up" financial institutions, initially capitalized with an upfront "equity" investment from government or other grant sources. If this is the sole source of capital, the Green Bank will effectively operate as a large revolving loan fund, with revenue streams re-lent back into the market. Over time, as revenue becomes sufficient to cover operating costs, and when the Green Bank has a diverse balance sheet, it can then take on debt to increase its lending capacity. As the Green Bank takes on debt, either through bonds or direct loans, the Green Bank will need to balance its assets and liabilities to ensure cash flows and returns match repayment needs.

F *Though there is still scant evidence of a pricing benefit for green bonds, there is ample demand from institutional investors to purchase green bonds. For example, see, "The Investment Case for Green Bonds," Seeking Alpha, at https://seekingalpha.com/article/4058210-investment-case-green-bonds*

Green Bank Capitalization and Debt Considerations

The idea of initially capitalizing a Green Bank with debt should be carefully considered for any Green Bank institution. It is possible for a Green Bank to take on debt from a variety of sources including the GCF, DFIs, and pure-private lenders, all with unique considerations, such as return requirements, capital adequacy, and sovereign guarantees. Several examples are offered here and hybrid options are also available.

- **Grant funding without debt** – Funded entirely with sources such as local government budget appropriation, cap and trade revenue, philanthropic grants, bilateral donor and climate fund grants. This capital could come in the form of a dedicated, defined base of capital at start up, or be an annual capital influx. Such a structure would likely not follow strict banking requirements around capital adequacy and would operate similar to a revolving loan facility. A Green Bank's strategy on financial sustainability is a key design consideration, and is directly related to its product offerings and its investment philosophy around concessions and risk taking.
- **Debt with limited restrictions** – Capitalized with some of the above grant sources, plus capital from sources such as concessional debt or equity from GCF, Philanthropy Program Related Investments (PRI) or concessional DFI and bilateral donor capital. This structure may mean that the Green Bank follows some general best practices around capital adequacy and fiduciary standards of the Green Climate Fund. Such capitalization may seek sovereign guarantees. Any Green Bank capitalization approach with limited restrictions would need to carefully consider what products it offers as well as approaches to portfolio management, capital adequacy, and credit rating implications.
- **Traditional debt with full requirements** – A sufficiently large allocation of paid-in equity (e.g. from government sources, philanthropy) that would be used to raise debt capital from international debt markets, DFIs, and others. This approach would likely come with sovereign guarantees, and potentially more strict fiduciary requirements such as Basel III standards including net stable funding ratio (NSFR) and the liquidity coverage ratio (LCR).[21] This capitalization structure would be similar in some ways to NDBs, but replicated without the strong existing balance sheet assets. Raising sovereign-backed debt can be a political challenge in some countries, depending on current level of national debt. This structure would affect the products and management of the institution and the kinds of risk taking and risk mitigation it is able to provide.

Markets & Technologies

Green Banks can be designed to finance a range of clean energy-related technologies. This includes distributed renewable generation, grid-tied renewable generation, building efficiency, industrial efficiency, thermal fuel-switching, smart-grid technology, transmission, distribution, smart meters and clean transportation (both vehicles and infrastructure). As Green Banks are designed by local actors to suit market needs, the range of eligible technologies will vary and

cover the deployment of technologies across multiple sectors. These can include residential, commercial, industrial, multi-family, utility, municipal, and schools/hospitals.

Green Banks can be formed to finance other forms of green infrastructure and projects that are related to climate change. For instance, policymakers might find it suitable for a Green Bank to finance agriculture, forestry land use and water-related projects as well as adaptation projects. In some cases, it might be most practical to create a Green Bank with distinct divisions, as the risk-return profiles, and nature of project underwriting can vary across projects.

Financial Tools

Though many individual investment structures are used (such as senior debt, subordinated debt, second loss reserves, etc.), most Green Bank financing methods fall into three categories.

- **Credit Support** – Green Banks use various credit support or enhancement mechanisms to mitigate risks for private investors and incentivize investment on better terms. This technique is most useful for encouraging lenders who may be considering making capital available, but only at terms that prevent meaningful market penetration. Green Bank interventions can be in the form of a first or second loss reserve, a partial loan guarantee or subordinated debt. Earning an adequate return for the risk being taken by the Green Bank may be an issue.
- **Co-Investment** – A Green Bank could directly lend into a project alongside a private sector partner. For instance, a Green Bank could provide 50% of the project debt, and a private lender could provide the other 50%. This technique is most useful when there is a specific gap in capital needed to complete a project (and it might also provide better financial returns for the Green Banks).
- **Aggregation, Warehousing & Securitization** – Aggregation is a critical Green Bank method of lending and bundling small clean energy projects that are traditionally difficult to finance. Many clean energy projects, like distributed generation and building efficiency, are small, scattered and have varying credits which makes them unappealing to underwrite for private lenders. Green Banks can directly originate, or aggregate these kinds of loans to achieve scale and diversity of risk. This can lead to securitization, which allows the Green Banks to recapitalize its warehouse.

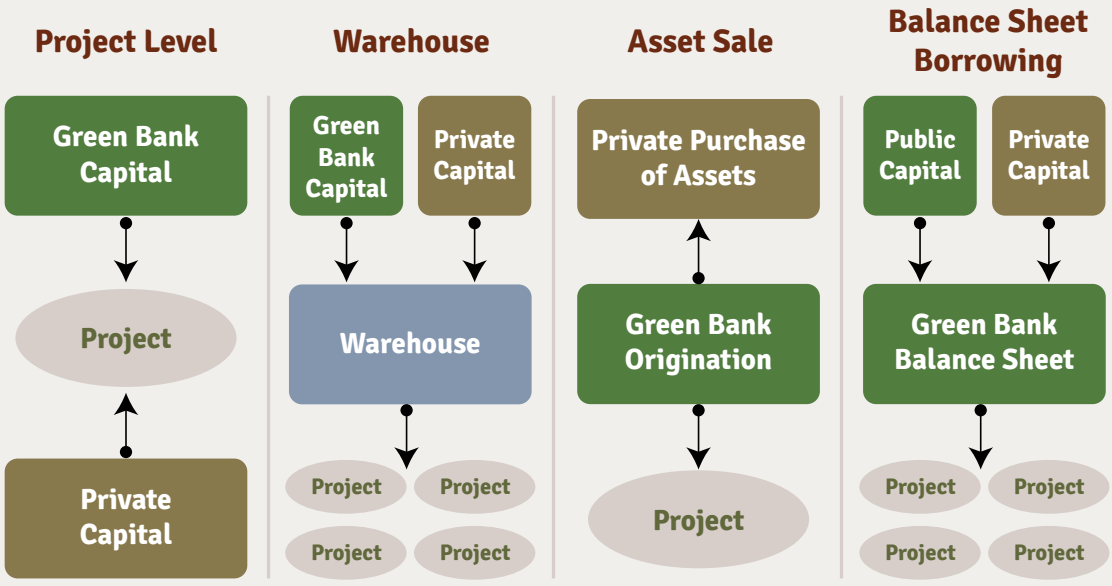
A Green Bank product is the use of a finance tool to deploy a low-carbon technology in a given sector. Green Banks can deliver these financial mechanisms through a number of product-based structures, creating defined products for specific market segments in a programmatic manner, or making capital available to investments in response to requests from market participants. Green Banks can implement both of these approaches, offering defined products for some segments, while being responsive through an RFP, for instance, to others. Market-responsive approaches are most suitable for wholesale level financing where the Green Bank's customers are other financial institutions or developers. A market-responsive approach is unlikely to be effective at the retail level where energy end users are the actual customers.

Private Sector Leverage

Each of these tools can be used to leverage private capital. Green Banks employ four forms of leverage.

- **Up-front Project Level** – Green Bank capital is co-invested alongside private capital to finance a specific project "up-front," or at the time of construction.
- **Warehouse Level** – Green Bank capital is co-invested with private capital in a warehouse aggregation facility, through which the Green Bank and private capital is used to finance many individual projects at a fixed proportion.
- **Asset Sale/Securitization** – Green Bank capital is used to finance individual projects (either on project basis or via warehouse) and then the Green Bank capital is replaced with private capital on the "back-end" through an asset sale. This could be a public securitization or a similar private transaction.
- **Balance Sheet Borrowing** – The Green Bank as an organization can borrow capital against its total balance sheet, effectively blending the Green Bank's original public capital with private capital for future investments. This includes general obligation bonds and direct loans to the Green Bank.

Figure 11: Forms of Green Bank Leverage



The optimal form of leverage will vary by market sector and technology. A Green Bank may see an opportunity to achieve high levels of volume very quickly in a specific market by directly financing projects itself. It can then leverage capital on the back end through an asset sale, reducing the complexity of each individual transaction. Or the Green Bank may see that only a small portion of Green Bank capital is needed to complete a large transaction. In this case, a small credit enhancement upfront may be best.

6 Applying the Green Bank model to developing country contexts

Applying the Green Bank model to developing country contexts will require addressing common barriers familiar to existing Green Banks in high-income countries, as well as distinct challenges unique to the developing world. Below is a list of challenges and barriers common to both developed and developing world contexts, followed by a discussion of challenges that tend to be most concentrated in lower and middle-income countries. This overview is followed by a discussion of potential Green Bank interventions to address these challenges in developing world contexts.

Some market gaps are common to high and low/middle income countries

Key barriers to low-carbon investment in low and middle countries can be quite different than those in high income countries, but many market gaps are similar. Both higher and lower income countries deal with issues such as: small ticket size of energy efficiency and distributed energy projects, tendency for local banks to focus exclusively on a borrower's credit rating during the underwriting process, rather than a project's estimated energy savings, lack of expertise and equity of project developers, lack of project pipeline, high transaction costs, real and perceived risk in new sectors and regulatory and policy uncertainty.[22]

Small project size

Small ticket size of projects is a common investment barrier across developed and developing economies, limiting the investment appetite of private investors.[23] Small ticket size means that transaction costs and underwriting costs can be high, making it harder for smaller project to access debt and equity finance. This often requires aggregation of smaller projects into a larger portfolio, making underwriting more complex without good standardization at the project level.

Low familiarity and lack of data

Low levels of investment in clean technologies is often related to investors' lack of familiarity with new technologies. Local commercial banks have an important role to play in low-carbon lending, however commercial banks often lack staff capacity in these sectors.[24] For example, loan officers may be unfamiliar with new energy efficient building equipment of water-smart agriculture technology, and there are limited resources to increase their capacity. This means that local lenders tend to have a narrow underwriting process that cannot take into account things like energy savings, or residual value of project equipment.[25] In this case, status quo lending activities prevail, and without some level of demonstration or front-end assistance, private financiers can be limited in the amount of resources they dedicate to new sectors. In newer low-carbon sectors, this translates to less data available on what has been successful and therefore fewer opportunities to learn from past experiences.[26]

Low total cost of ownership, but high up-front costs

Many low-carbon technologies have a low total cost of ownership (TCO) over the lifetime of their use, related to lower fuel and operational costs, lower water usage, or lower susceptibility to climate stress (e.g. drought tolerant agricultural practices). However, sustainable infrastructure projects often have high upfront capital costs and long paybacks. Low carbon projects can suffer from high risks (both real and perceived) which drive up the cost of capital, impacting project economics. For projects with high upfront costs, a small change in cost of capital can have a large effect on the Levelized Cost of Energy (LCOE), and this is particularly relevant for developing countries, where capital costs tend to be higher.[27]

High levels of risk, both real and perceived

Policy uncertainty is a common risk factor in developed and developing nations alike, and are often identified as one of the most important risks for renewable energy investment.[28] Political swings can lead to fickle incentives and changing of rules, cooling investment in clean energy technologies.

Offtake risk and consumer credit risk lead to high costs of capital and high underwriting costs for distributed energy and energy efficiency projects. This can be a challenge, to varying degrees, in both developed and developing world contexts. In the U.S. for example, low-income communities struggle to access finance for distributed energy and energy efficiency products. Companies like Posigen (which works with the CT Green Bank) and others, are tackling this problem by using alternative underwriting criteria. Consumer credit risk in the developing world can be much higher, and credit histories (in both residential and commercial sectors) can be lacking. In the developing world, the proliferation of distributed energy solutions or "infrastructure as a service models" means financing this infrastructure can be tied to smaller and sometimes less creditworthy entities such as SMEs and households.[29]

Construction risk and lack of developer liquidity

Construction risk, particularly with new technologies or in markets with developers with limited track record, can be quite high. With many investors unable to take on construction risk, this risk is often left to banks and developer equity.[30] With limited capital available to take on these risks, this can lead to higher capital costs and debt costs for many low-carbon projects.[31] Similarly, without clear exit vehicles, developer capital can be tied up in early stage projects for longer periods of time, limiting liquidity and the ability to develop new projects. Examples from the very large (UK Green Investment Bank's £1 billion Offshore Wind Fund[32]) to the very small (Bboxx's $500,000 off-grid Kenya solar securitization with Dutch investment firm Oikocredit) demonstrate the drive to connect deep capital markets with de-risked operational projects that offer competitive risk-adjusted returns.[33]

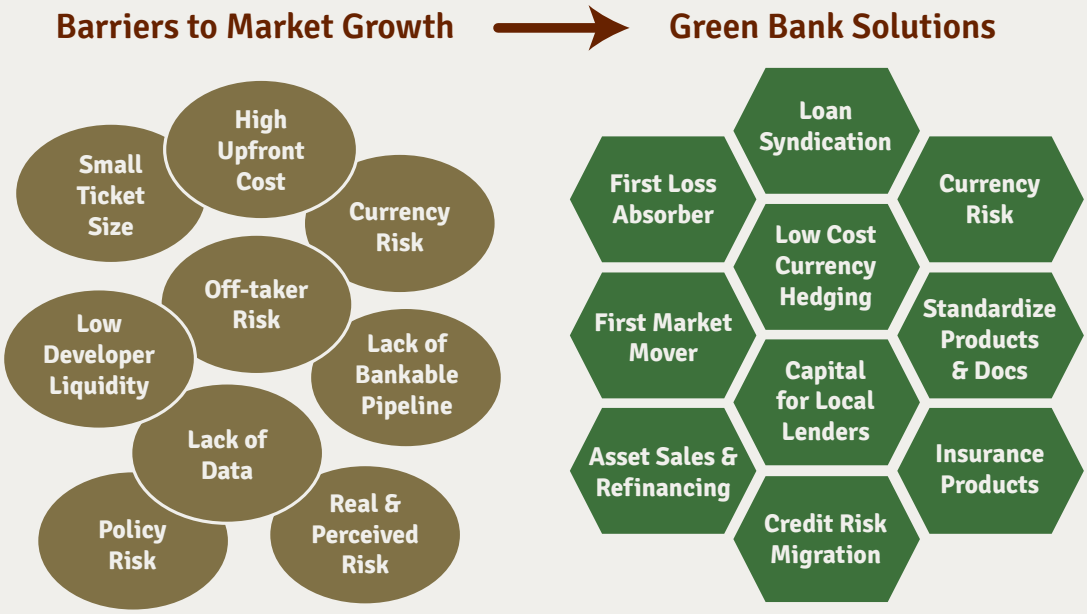


Figure 12: Common Market Barriers & Green Bank Solutions

Some market challenges are unique to developing countries

While similar market gaps and challenges exist in countries across the income spectrum, low and middle-income countries face some unique and significant challenges. Green Banks will need to develop and adapt existing interventions to address these key barriers in emerging markets that are often related to overall weaker investment environments and lack of project preparation capacity.[34]

Risks and challenging enabling environments

Currency Risk

Macroeconomic instability and currency fluctuations in developing countries can lead to sub-optimal levels of private foreign investment. This problem applies in particular to capital intensive projects with cash flows in local currency—without a currency hedge, foreign investors risk losing investment due to depreciation of the local currency.[35] Therefore, any Green Bank solutions that rely on foreign investment will need to address the problem of currency risk.

Policy Risk

While high income countries can suffer from policy uncertainly (e.g. the stop-and-start support for U.S. wind sector), this kind of political uncertainty can be even greater in low and middle-income countries. Regulatory frameworks with changing rules, highly-politicized decision-making and fraught land acquisition issues can add to the risk of low-carbon infrastructure investment.[36] Beyond uncertainty in the regulatory and policy space, high levels of political instability can also lead to risky investment environments. Existing Green Banks in the developed world (often government-adjacent entities that are part of a larger policy effort)

work hard to ameliorate policy uncertainty, and this role will be even more important in the developing world context.

Offtake Risk

Credit worthiness of utilities in low and middle-income countries is also a serious challenge that drives up cost of financing and inhibits investment. In many developing countries, improved governance, management and regulation would enhance the creditworthiness of utilities.[37] Insurance products or guarantees to backstop power purchase agreements (PPA) with state-owned utilities can help decrease the risk associated with utility lending in emerging markets.[38] New approaches to underwriting residential and SME borrowers with low-credit (or simply lack of credit history) are also emerging. Creative solutions to low credit worthiness of utilities will be an important feature of Green Bank design in the developing world.

Lack of bankable project pipelines

Many developing countries suffer from a chronic shortage of necessary project developer expertise, track record, and equity capital.[39] Lack of sufficient project developer expertise leads to lack of project pipeline, resulting in under-investment. Part of this shortage is due to problems in the enabling environment, policy risk or poor project economics, leading to low proliferation of project development companies. Another factor that prevents project developers from getting to scale is liquidity: lack of available debt capital, or exit vehicles for operational assets means that that development capital gets tied up longer in projects.

When developing country governments lack credible long-term infrastructure development plans, this can contribute to lack of project pipelines. Developers find it difficult to plan or justify further diligence around large infrastructure investments without clear signals from government planners.[40] Project preparation facilities can play a key role in increasing project pipelines. However, governments of developing countries often do not invest in project preparation unless there is a clear line of sight on attracting financing. At the same time, it is difficult to line up commitments for private financing when there is low commitment to project preparation, leading to a negative feedback loop that limits robust project pipelines.[41]

Examples of Local Investment Barriers

Presented at the June 26-27, 2017 National Development Banks and Green Banks Conference in Mexico City

Naeeda Crishna-Morgado, OECD

Blended finance has significant potential, but

- Blended finance and risk mitigation cannot replace strong enabling environments for green investment
- Standards are needed to ensure concessional climate finance crowds in, without crowding out
- More work is needed to mobilize private investment for adaptation, and across a range of countries
- Better monitoring, evaluation and reporting is needed to assess effectiveness of blended climate finance

Rafael Gambia, FIRA, Mexico

The barriers for a massive implementation of new climate finance solutions have to be considered for a 2nd tier National Development Bank

- Different understanding of what is a Green project, which among other things, diminishes the appetite of financiers
- Excessive requirements from donors and international institutions because of multiple objectives (climate change, SMEs, indigenous rights, biodiversity, among others). It would make sense to start with a single goal and proceed incrementally
- Even though monitoring is a must for Green projects, the more complex it is, transaction costs increase making these projects less desirable, particularly for SMEs
- To involve local financial intermediaries (1st Tier), it is crucial to make project identification and measurement part of their credit process

Green Banks need expanded tool kits to address developing country market gaps

Green Banks are flexible institutions, designed to be market responsive and tackle investment barriers specific to their local markets. Fine-tuned financial instruments and supporting programs can make investing in low-carbon infrastructure more attractive by mitigating risks to provide more certain cash flows, by reducing due-diligence requirements and transaction costs, and offering investment vehicles that lower the cost of capital and provide additional liquidity to local project sponsors.[42] Green Banks can play these roles in emerging markets to help increase private sector financing of low-carbon infrastructure. The below list is not exhaustive, but provides a sample of the kind of roles that Green Banks can play to mitigate risk and increase investment in their local markets.

Green Banks can act as first loss absorber and demonstrative first mover

Transaction costs for clean energy projects can be higher because there is often a shorter track record and fewer opportunities to learn from past experiences.[43] Therefore, Green Banks typically play an important role as a first mover and market-prover with new sectors, technologies, or regulatory structures. Public finance that is dedicated to green investment,

such as Green Banks, can deploy patient capital to prove out the business case for sustainable-infrastructure investment, and demonstrate to the private sector that there are money-making opportunities.[44]

One way for Green Banks to do this is through direct co-investment, potentially with risk mitigation tools such as a subordinated position in the capital stack. Greater use of catalytic first-loss capital will be important in developing countries, to help de-risk opportunities for investors.[45] The Green Climate Fund, with its Private Sector Facility and mandate to help developing countries drive more investment into sustainable infrastructure, can play a significant role in helping pilot innovative instruments such as first loss capital, with high levels of private sector leverage.[46] Depending on the gaps and needs of the local market, Green Banks can use concessional or long-tenor debt to bring in more non-concessional equity, where it is most needed, helping develop the local SME and entrepreneurial sectors.[47]

Green Banks can structure green securitizations, loan syndication and refinancing to lower cost of capital and facilitate capital recycling

For some low-carbon projects, such as SME energy efficiency, small ticket size and correspondingly high transaction costs call for Green Bank interventions that can aggregate projects to help get more private sector investors involved. Combining different pools of capital, and arranging for take-out financing can drive down the weighted average cost of capital by cycling more expensive capital from the high-risk construction stage, to less expensive capital at the operational stage, when cash flows are steady, and risk greatly reduced.[48] Increasing the ability of low-carbon projects to access debt finance has the benefits of not only lowering the cost of capital for projects but also increasing liquidity of project developers, allowing them to put capital back into developing new projects.

Green loan syndication not only has the potential to facilitate the recycling of early stage development capital, but can also increase the familiarity of institutional investors with low-carbon securities, and reduce transaction costs. Green Banks can add value by doing the difficult work of structuring deals and acting as the facilitator between project developers and investors, and often public financiers can de-risk projects simply by virtue of being at the table.[49] As a recent McKinsey & Company report on sustainable infrastructure summarized it: "That is why a muscular set of nudges and risk-sharing instruments are required: they can shift perceptions and get capital to flow."[50]

Green Banks can offer products designed for currency and political risk

Given the depth of local capital markets, low-carbon projects will continue to rely to varying degrees on foreign investment, and tailored currency and political risk instruments will therefore be required. Increasing the number of country risk products designed to support low-carbon projects has been proposed, for example by UNEP-FI.[51] Green Banks or local government partners, could offer this kind of dedicated product locally. The UNEP-FI analysis notes that, because local project specifics can influence the terms of risk insurance, it may be easier to

structure these insurance and hedging products in-country, with local entities in charge of undertaking appropriate due diligence at the project level.[52] Green Banks, as local entities with close proximity to local projects, policymakers and market conditions, are well positioned to play this role.

> **"Soft costs of financing impair the economic viability of smaller, non-utility scale clean energy projects, particularly in emerging markets. Through aggregation facilities and through use of standardized documentation, Green Banks can bring scale to emerging markets projects by bringing more financing at lower costs."**
>
> **–Richard Kauffman, Chairman of Energy & Finance for New York State, former partner of Goldman Sachs**

Currency risk remains a formidable challenge to increasing foreign investment in low-carbon projects, and costs of hedging products can be high. Dollar- or euro-denominated investments are one option, but come with their own risks relative to borrowers' ability to service their debt. Targeted hedging facilities, such as the Indian Currency Hedging Facility proposed by the Climate Policy Initiative (CPI), can potentially offer lower-cost and longer-term hedging solutions specifically targeting low-carbon infrastructure.[53] Building on the success of the Currency Exchange Fund (TCX) supported by the Dutch Ministry for Development Cooperation, Green Banks or their partners can seek to create local hedging facilities, using public resources for cost-effective currency hedging products to enable more foreign investment in low-carbon.

Green Banks can work to increase investment from local financiers and asset managers

While it is possible to lower the price of a currency hedging product, it always adds additional cost. Green Banks can also explore options for increasing access to local capital markets, where currency hedging is not required. While most private investor assets under management are held in Europe and North America, this paradigm is shifting as capital market are growing in developing countries, which will enable middle income countries to increase private domestic investment.[54] Increasing local investor participation in low-carbon projects in emerging economies will require approaches tailored to these kinds of investors. As Green Banks like Australia's Clean Energy Finance Corporation (CEFC) note, successful refinancing sends a clear message to developers and local investors that it is possible to complete a development-finance-exit cycle in new sectors.[55]

Domestic investors, in addition to being insulated from currency risk, can be more knowledgeable about local policy uncertainty. Green Banks have the potential to be a bridge between borrowers and local capital markets, as they have done in developed world contexts.

(For example, UKGIB's Offshore Wind Fund and CT Green Bank's first-of-its-kind securitization of energy efficiency projects.) Asset managers in emerging markets can be very conservative, but this kind of loan syndication can offer lower-cost, lower-risk ways to increase their exposure, allowing more private investors to get involved, building their confidence and overall willingness to invest.[56]

Green Banks can help increase the pipeline of bankable projects

Globally, many institutional investors have infrastructure investment targets that are much higher than their current holdings.[57] As a result, identifying sources of debt and equity capital is now a far less significant concern compared with the scarcity of good, bankable projects.[58] There are also many family offices and impact investors looking to invest in green projects, but they lack a credible local intermediary to help arrange deals.[59] Project preparation facilities are an important part of any strategy to increase pipeline, particularly in emerging markets with chronic shortages of developer equity and expertise.[60] In the early preparation and construction phases of project development, concessional climate finance can be effective to de-risk and reduce the cost of capital, and leverage increased private investment.[61] Project preparation support is an area where the right complementary financing facilities can make a large impact.[62] Green Banks – with patient capital, and financial professionals on staff that are keenly aware of what factors can limit a project's bankability – are well positioned to help fill this role.

Project preparation can include feasibility studies and research on new sectors or project types. Governments tend to underinvest in these kinds of studies (often for fear that projects will not find financing at the end of the process).[63] Governments may be more likely to invest in project preparation if Green Banks – by working as a bridge between commercial investors and project developers – can demonstrate a clearer line of sight to investment. Existing Green Banks, such as the CEFC of Australia, release market reports to help spur increased investments in new sectors, while others offer direct support through trainings and other market development activities. Dedicated programs, such as the US-India Clean Energy Finance (USICEF) program can also act in a coordinating role, channeling available concessional and grant funding for project preparation activities to deserving projects.[64]

Green Banks can help drive standardization in the market

Standardization is another important component of improving project preparation and enabling environments. Government agencies, or quasi-government entities like Green Banks can reduce costs and make doing business easier by establishing common legal and design standards.[65] Green Banks can also help drive project standardization in their local markets by offering standard loan products or terms when select criteria are met.[66]

Standardization is an important tool to drive increased private finance participation in the long run. However, some degree of flexibility is required in the short term, particularly in new sectors, so that terms can be shaped to fit the needs of both borrowers and lenders. Green Banks,

with a mandate to drive more private increase investment in new green sectors and patient capital, are well-positioned to spend the necessary time structuring projects and terms for new project types in the short run, with a vision toward driving greater standardization into the market. In some cases, it may make sense for Green Banks to operate an adjacent "fund" of concessional capital that local public and private financial institutions can access if they meet certain criteria. This would allow some top-down standardization of projects and would allow the local actors such as NDBs and banks to layer in concessional funding and do projects on the riskier edge without affecting their credit ratings.[67]

Green Banks can use insurance products that enable new transactions

Targeted insurance products are an important tool to crowd in private investment and demonstrate the attractiveness of investments to lenders in new sectors. Insurance can offer high leverage ratios of private investment, and have spillover effects to increase familiarity and comfort with new investments. One example of insurance products for low-carbon infrastructure is the Energy Savings Insurance (ESI) product, originated out of Climate Policy Initiative's Climate Lab.[68] The ESI instrument, proposed by the Inter-American Development Bank, works with local NDBs to offer insurance products to boost SME energy efficiency lending in Latin America. Insurance products can often require additional market development support, and the ESI program also includes targeted trainings to banks, borrowers and contractors in their local markets. Green Banks, similar to NDBs with their local presence, are well positioned to work with other local market actors such as engineering and verification firms and insurance companies, to offer innovative local solutions.

Green Banks can offer guarantees and loan loss reserves to drive private investment with high leverage ratios

Guarantees can achieve high levels of leverage and help crowd-in additional private investment, and there have been calls to increase the use of guarantees in public finance generally.[69] Guarantees help new (and more risk-averse) investors to participate in projects, and have a learning-by-doing effect, allowing private investors to gain experience in a sector where they may have low familiarity.[70] As more low-carbon projects demonstrate success in emerging markets, this generates new data, shapes perceptions of risk, and helps build capacity at private lending institutions.[71]

Guarantees are attractive in part because they are flexible instruments that can target specific classes of risk.[72] Perceptions of policy and regulatory risks can be quite high, particularly in low-carbon sectors, resulting in higher costs of financing. Guarantees are therefore an especially good fit for low-carbon infrastructure, as they can be directed specifically to address these risks.[73] Guarantees are powerful tools for increasing private investment, but must be designed carefully to maximize private investors skin in the game (to avoid the moral hazard of overly risky investing), and to maximize positive spillovers such as learning and capacity building at participating lending institutions.

Loan Loss Reserves (LLRs) are similar structures to guarantees and can have similarly high private investment leverage ratios. LLR can be structured in a variety of ways, such as with second or first loss provisions, to increase private sector risk sharing. For example, the CT Green Bank offers a LLR product to local banks for residential energy efficiency projects. The LLR product covers a portion of potential defaults, depending on the borrowers' credit rating, and is in a second loss position in relation to the lender, maximizing the incentive of lenders to appropriately assess risk.[74] Depending on the technology, other project preparation or market support around LLRs may be necessary to help build capacity at participating lending institutions. In the case of CT Green Bank, this looks like contractor training (contractors are often the primary "salespeople" of efficiency technology and associated loan products) to facilitate higher consumer uptake of the loan products.

Targeted insurance products, guarantees and loan loss reserves, can be powerful tools for Green Banks to increase private sector investment in low-carbon technologies, with high leverage ratios and spillover effects. Increased use of these techniques would require a dedicated strategy and special attention to capital adequacy requirements. These kinds of products are also most effective when combined with broader market development activities to increase their reach.

Green Banks can serve as "in market" actors to reduce regulatory risk

Shifts in regulatory structures and incentives are often one of the largest risk categories for private investors in low-carbon infrastructure. A 2016 McKinsey & Company report quotes David Jones, head of renewable energy at Allianz Capital Partners: "Regulatory risk is the most important aspect of a renewable energy investment…Therefore we seek to invest only in countries with solid political support."[75]

Green Bank mandates vary, but they are typically publicly capitalized, commercially operated institutions. Green Banks are positioned to be a trusted bridge of information between the private and public sectors. This privileged position – along with the finance and investment expertise on staff – allows Green Banks to make clear, financially-fluent arguments to regulators and policymakers in government, and to credibly explain the necessity of policy reforms to spur further investment. In this way, Green Banks function as a tight feedback loop to local governments, and help drive regulatory reforms that further de-risk low carbon sectors and create better enabling environments for low-carbon investment.

Having leaders in government that understand investor needs is critical to avoid changing regulations and investment uncertainty, and having local actors within the treasury departments is particularly important.[76] Green Banks – often set up as part of package reforms to improve the enabling environment – demonstrate local leadership dedicated to tackling regulatory barriers, and de-risking the investment space. NY Green Bank, a key component of New York State's broader Reforming the Energy Vision (REV) initiative, is a good example of this integrated approach.[77]

7 Green Banks have proven successful at driving clean energy investment

There are an increasing number of Green Banks and similar entities in development around the world. Collectively these institutions have financed billions of dollars of clean energy projects with innovative financing structures, leveraging multiple private dollars per public dollar of financing. The operating Green Banks demonstrate that this model is viable, can achieve scale and can transform markets.

Operating Green Banks have driven nearly $26 billion of investment

Through 2016, the six Green Banks that are members of the Green Bank Network have financed $25.9 billion in clean energy projects, using $7.9 billion of public Green Bank capital. This investment has flowed into a range of clean energy technologies including solar, offshore wind, and building efficiency. These investments have avoided 12 million tons of CO2 emissions, and they have used a range of financing techniques. These include debt, subordinated debt, equity, and credit enhancements, delivered through a number of innovative structures, like property tax-based financing, equipment leases, aggregation, fund investment and others. Together, they have demonstrated a wide range of products and market development solutions that can be deployed in partnership with the private sector.[78]

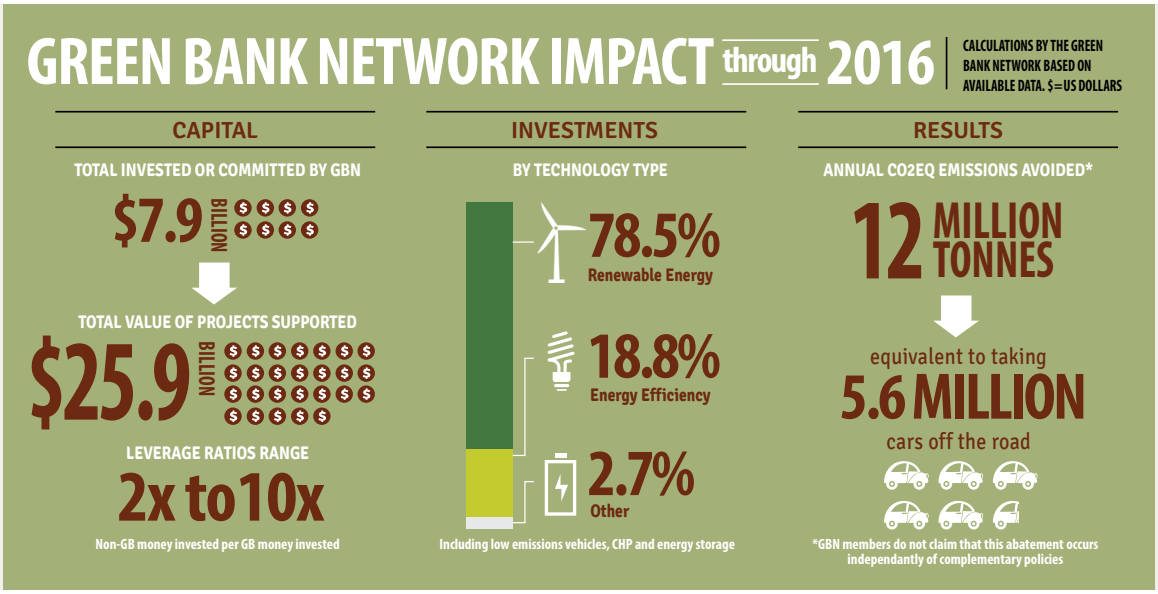


Figure 13: Impact of Member Organizations of Green Bank Network

Operating Green Banks include the:

- Australian Clean Energy Finance Corporation (CEFC)
- UK Green Investment Bank (UK GIB)
- Connecticut Green Bank (CGB)
- New York Green Bank (NY Green Bank)
- Malaysia Green Technology Corporation

- Japan Green Finance Organization
- Rhode Island (USA) Infrastructure Bank
- California (USA) CLEEN Center
- Hawaii (USA) Green Infrastructure Authority
- Montgomery County, Maryland (USA) Green Bank

Each of these Green Banks was created with a different structure, capital sources and goals meant to serve local market conditions.[79]

> **"Based on our experience in Connecticut mobilizing over $1 billion of investment into the state's green energy economy, Green Banks are dynamic in the market institutions that are flexible, responsive, and able to drive positive change over time. The Connecticut Green Bank, with our public and private partners, has been able to be market-responsive by applying risk mitigation where it is most needed to scale-up markets while being able to move on and be a catalyst in new market challenges as they emerge."**
>
> **–Bryan Garcia, President and CEO, Connecticut Green Bank**

A number of additional Green Banks are under development, specifically:

- The Ontario Green Bank, or the Ontario Climate Change Solutions Deployment Corporation, where founding regulations have been adopted;[80]
- The Indian Renewable Energy Development Agency (IREDA) Green Bank unit (discussed in detail later in this paper);
- Green Development Funds in China recently launched to reduce financing costs through approaches such as credit mechanisms and green insurance;[81]
- The Nevada (USA) Clean Energy Fund, where founding legislation was passed in June 2017; [82]
- The District of Columbia (USA) Green Finance Authority, where legislation has been introduced and is pending approval.[83]
- The concept of a Nordic Green Investment Bank, was proposed in a study released by the Nordic Council of Ministers in April 2017.[84]

In addition, active Green Bank creation efforts are under way in a number of states in the United States.[85]

Insights on Green Bank Operations and Strategy

The existing institutions and financing practices can inform approaches to Green Banks structure and product design.

Political Independence

It is crucial for a Green Bank to be created in a manner that prevents political interference in the investment decision making of the organization. As stated above, if market actors perceive the Green Bank is biased or unpredictable, it undercuts the Green Bank's ability to secure partnerships. This can generally be achieved through the creation of a Board of Directors or investment review committee that is not appointed by or beholden to political interests. But a more complex challenge is designing a Green Bank that is connected to and empowered by government, but where its core mission or funding is not a subject to on-going political debate. For example, the Australia CEFC investment return targets have been altered by politicians undermining the CEFC's ability to operate. The CEFC's Board chair Jillian Broadbent said the return requirement is, "an unrealistically high target for this market," and that achieving the target would force the CEFC to seek "out-of-market returns."[86] Insulating the institutions from this kind of interference involves careful organization design and consideration of funding mechanisms.

Leverage versus Self-Sufficiency

Green Banks are designed to leverage private sector capital and there are many ways this can be done, each with different operational consequences. If a Green Bank seeks to maximize upfront leverage, then it may limit the total amount of or rate at which its own capital will be deployed. However this might reduce the amount of revenue earned by the Green Bank, thus inhibiting its ability to be self-sufficient. Leverage cannot be compromised, as the goal is to drive investment to scale beyond the Green Bank's own balance sheet. But new Green Bank operators should consider the need to operate sustainably when determining the timing and form of private sector leverage.

Private Sector Leadership versus Green Bank Volume & Speed

Green Banks need to balance the desire to show private sector actors how to operate in clean energy markets versus the intrinsic need to drive volume as quickly as possible. For example, a Green Bank might see a market gap that it can fill at scale very quickly, where no private actor is currently operating. This process might be slowed, though, if the Green Bank only desires to demonstrate market viability in order to draw in a private sector actor to take over in that market space. Green Banks should consider how to balance its own ability to achieve volume with the goal of drawing in private sector actors.

Programmatic versus Responsive

Some Green Banks have proactively designed programs and products to deploy into the market, while others have created structures to be responsive to funding applications and inquiries. Both have their benefits and drawbacks. The benefit of a programmatic approach is that the Green Bank can directly address known market gaps with a structure it creates in partnership with private actors. However, this kind of programmatic work often requires far higher operating and staff costs. A market responsive approach, like the RFP structure used by the NY Green Bank, is a simple and efficient way to draw in funding applications and serve the market's needs. A downside of this approach, though, is that known market gaps may not be filled if respondents don't necessarily seek funding to fill that specific gap. A hybrid of these two approaches may be a balanced way to efficiently and effectively fill market gaps, and design consideration like this must be explored in local market contexts relative to local climate goals.

Performance Metrics and Objective Function

Green Banks should set clear market objectives and operating strategies, and then track and report data that is aligned with those objectives. A broad set of performance metrics related to investment volume, private sector leverage, clean energy deployment and carbon emissions reductions are a common baseline. But a single "objective function" metric can be decided upon as a central focus of the organization. The objective function is a distillation of an objective into a simple mathematical formula that an organization can seek to maximize on. For instance, a Green Bank can set an objective function to maximize private clean energy investment per public dollar deployed, or to maximize GHG emissions reduction per public dollar, or to maximize total investment per dollar of operating expense. There are significant operational consequences to choosing one of these example functions over the other. Establishing a clear objective function enables organization alignment.

STRATEGY–

CREATING NATIONAL GREEN BANKS IN DEVELOPING COUNTRIES

8 Candidate nations for pilot "proof of concept" Green Bank development

A first cohort of pilot opportunities for Green Bank development in emerging economies

Through this scoping project and a series of stakeholder interviews, several candidates for early Green Bank development have surfaced along with partners and pathways to achieve that goal. This first cohort of promising Green Bank initiatives includes Southern Africa, Malaysia, the Philippines, India, Chile and Colombia (and possibly Morocco, Indonesia and Kazakhstan). In all cases alliance of organizations and capacities will be required to effectively develop the Green Bank model as a new and dynamic element of the climate finance architecture.

Countries (or sub-national jurisdictions) are complex and come with their own unique challenges. Any approach to Green Bank development is inherently local, and there is no "turnkey" approach for Green Banks. Most jurisdictions have challenges as well as opportunities present in their existing enabling environments, and approaches to Green Bank development will have to be tailored accordingly.

Several countries are identified here that are promising locations for potential "proof of concept" pilot Green Bank initiatives, based on the nature of their existing institutions, human capacity, relative political and regulatory stability, domestic investment environments, capital markets and other factors. In addition to supportive enabling environment characteristics, such as political stability *(see box on the following page)*, many of the countries below have demonstrated interest in increasing their leadership on low-carbon investment, and have already expressed a desire to explore innovative new green finance initiatives.

Creation of a new Climate Finance Unit at the Development Bank of Southern Africa

The Development Bank of Southern Africa (DBSA) has launched an initiative to create a "Green Bank" via formation of a new Climate Finance Unit as a division of DBSA with its own ring-fenced balance sheet and dedicated operations. This decision to create this Unit was based on certain internal discussions between the DBSA's executives and the DBSA's Board and relevant Government Departments (in particular the Department for the Environment) to seek a more effective and targeted operating model.

Transformation of the Green Technology Finance Scheme in Malaysia

GreenTech Malaysia's Green Technology Financing Scheme (GTFS), a member of the Green Bank Network, has recently secured another round of public funding. The Malaysian government has committed RM 5 billion, or USD 1.17 billion to continue the GTFS. It has been announced that the new funds will support "GTFS 2.0."[87] GTFS is currently exploring the possibility of forming a more specialized innovative green financial institution that will scale up and accelerate the

growth of green investments in the country. Several entities are working with the GTFS and the Malaysian government to develop the potential for transforming the GTFS into a Green Bank type entity capable of addressing financing barriers and mobilizing private sector funds to address these investment gaps.

Characteristics of Pilot Proof-of-Concept Green Bank Initiatives

Developing countries are important markets for low-carbon infrastructure investment – in the coming years more than 60% of the sustainable infrastructure financing gap is likely to be concentrated in middle-income countries.[88] Green Bank approaches will vary based on the nature of existing institutions, human capacity, political and regulatory stability, domestic investment environments, capital markets and other factors. It would be useful to develop criteria to help inform understanding of where the Green Bank model could be most effective. There are, however, certain social, political and financial characteristics of developing nations that would provide the best fit for early application and demonstration of the Green Bank model.

Political & Social Characteristics

- Strong existing local institutions
- Economic & political stability
- Climate leadership
- Control of corruption

Financial Systems

- Good credit rating
- Developed banking sector and capital markets
- Local expertise & capacity
- Large climate investment gaps

Policy & Regulatory Framework

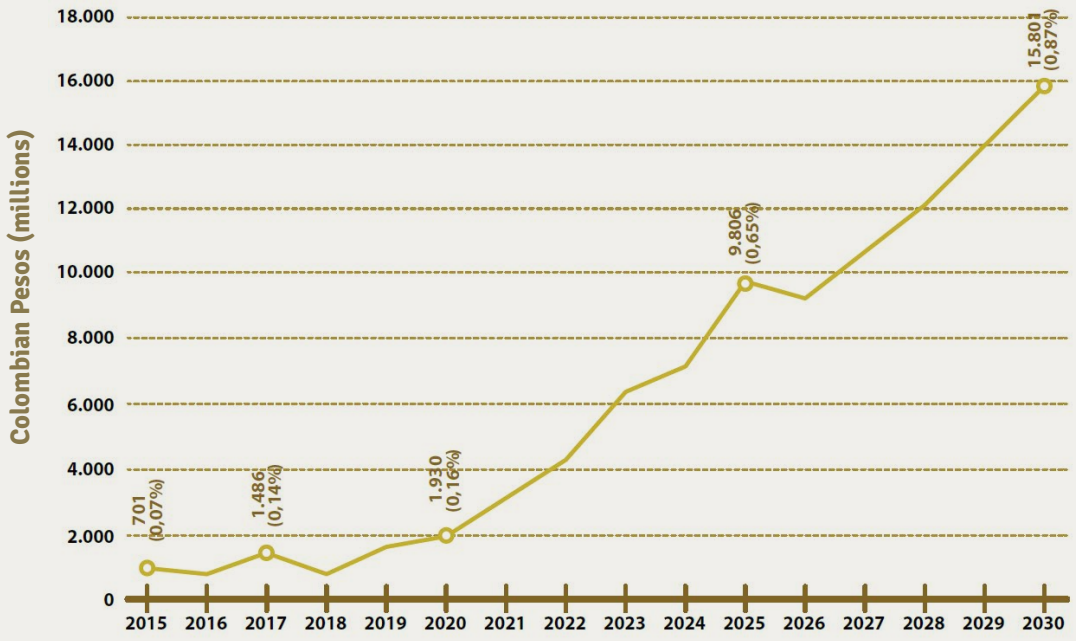
- Stable policy and regulatory frameworks
- Regulatory quality
- Energy markets that provide clear market signals
- Stable and equitable energy market structures

> **"Investors and financiers are generally risk-averse in green investment, especially in the case of novel technologies and business models. Investors and financiers also lack relevant knowledge and expertise to evaluate a green investment opportunity. Green Banks can address these gaps by absorbing risk and providing critical knowledge and expertise."**
>
> **–Syed Ahmad Syed Mustafa, Vice President Green Growth, Green Technology Financing Scheme, Malaysia**

Development of green finance opportunities in Colombia

Colombia is positioning itself as a leader in climate change mitigation and adaption, and increasingly recognizes the importance of green finance and investment. There is high-level interest in exploring new green finance initiatives in both the government and private sectors. The government of Colombia and the private finance community launched the "Green Protocol" initiative in 2016 to facilitate the convergence of various existing green finance efforts. The Green Protocol covers a wide range of aspirations, including promoting sustainable resource use in facilities and supply chains, generating financial lines and products aimed at sustainable development, incorporating environmental and social risk in investment decisions, and disclosure related to green and brown investments.[89] Colombia also recently launched a carbon tax on fossil fuels.[90] Any Green Bank initiative would need to be designed to complement existing efforts work with the local stakeholders to fill gaps in the existing climate finance system.

Figure 14: Climate Investment Need in Colombia[91]



A Green Bank opportunity in Morocco, under private sector leadership

A major private bank in Morocco (Attijariwafa Bank) is currently seeking accreditation with the Green Climate Fund (GCF) and evaluating the establishment of a regional Green Investment Bank, which they hope to be partially capitalized by the GCF. Attijariwafa bank is the undisputed market leader of Morocco's banking and financial services industry and has operations in over 20 countries mostly in francophone Africa. Attijariwafa intends to leverage its experience and scale to catalyze additional climate friendly investments in both Morocco and across its African operations. To do so, the bank is considering ring-fencing part of its institution as a home for specialized capacity with a mandate to act as a market maker for climate friendly initiatives.

Philippines

There is high-level interest in a Green Investment Bank approach in Philippines from serveral key political champions. The Philippines also has a strong NGO/advocacy community engaged in the topic of climate finance, and a growing interest in shifting investment away from coal-fired power generation.

A developing Green Bank opportunity in India

A Green Bank initiative is underway in India, with key stakeholders in the government expressing interest in the Green Bank model as part of India's broader efforts to increase low-carbon finance. NRDC and CPI are working with local partners in India at the Council on Energy, Environment and Water (CEEW) on the Green Bank initiative, and NRDC released a report on the Green Bank opportunity in August of 2016.[92]

Chile potential for first Green Bank in Latin America

In Chile there is growing interest in a Green Bank initiative to drive increased investment in low-carbon infrastructure. NRDC completed an issue brief on the Green Bank model in Chile in 2016.[93] More recently, the UK Prosperity Fund provided funding for additional research on potential Green Bank products in Chile. This has lead the Chilean Production Development Corporation (CORFO), with some additional resources from the Corporacion Andina de Fomento (CAF) to work on a Green Bank effort, analyzing the potential in Chile.

Kazakhstan looking to increase its green profile

Leaders in the Kazakhstan government have expressed interest in becoming leaders in the green finance space. The central Asian country is a major petroleum producer, and relies mostly on coal for energy generation. Nevertheless, Kazakhstan has set a goal of becoming one of the top 30 most competitive economies in the world by 2050. Kazakhstan is exploring reviving the country's cap and trade program, and new policies to increase energy efficiency. Stakeholders in Kazakhstan have reached out to the CGC specifically with interest in exploring the Green Bank model to help meet climate change mitigation targets.

Early stage exploration in Indonesia

Indonesia is noted by many as a promising early opportunity for a Green Bank initiative due to its political, social, financial and energy characteristics. CPI has a strong team in Indonesia and close ties with government leaders interested in increasing climate finance levels, and current work is focused on scaling up green financial products. In addition, early-stage explorations are underway with local stakeholders around the general Green Bank concept.

9 Lessons from U.S. Green Bank creation indicate the need for top-down and bottom-up strategies

In the U.S. general Green Bank communication, outreach and advocacy were paired with on-the-ground implementation and technical expertise to create actual Green Banks

Green Bank creation efforts in the U.S. were fueled by two integrated lines of action – high-level efforts to educate policymakers and increase general awareness, and detailed technical assistance in specific locations to create the new institutions. The seeds of the Green Bank movement in the U.S. were laid in 2009 with initial federal legislative efforts. The movement expanded to states and industry through years of work on the first pillar of the Green Bank movement: outreach and education, via news coverage, professional conferences and other strategies.

Education, white papers and speaking engagements are only a step towards creating Green Banks. This effort must be paired with the delivery of technical assistance and project management in each specific location. Education and increased general awareness of Green Banks opens the doors to conversations with policymakers about Green Bank creation, but those conversations must be followed up by the delivery of detailed know-how related to local market needs, institutional design, capital sources, product design, and legal action. Actual institution creation (rather than notional support) is a hands-on, boots-on-the ground effort that involves coordinating state officials, lawmakers, regulators, bankers, industry participants and NGOs. Without this local drive, coordination and technical support, Green Bank creation efforts typically stall.

Examples of success are a critical element of Green Bank outreach

The best way to convince others to develop Green Banks is to point to those who have already done it. As Green Banks can be a new concept in some jurisdictions, more data points for operating successful Green Banks help local actors understand the potential. Track records of effective institutions and products are by far the best sales tools for Green Bank expansion. Over the last few years in the U.S., the number of locations seeking to build new Green Banks has grown at a far greater pace than from 2011-2014, drawing on the success and visibility of the growing community of Green Bank institutions. Once awareness and momentum is established, efforts can shift to local institution creation efforts via technical assistance.

Early pilots and success in an actual country will be necessary proof point for broader adoption

Internationally, in developing countries, much work is still to be done to raise awareness of the potential of the Green Bank model to bring the climate finance architecture quickly to the scale needed to achieve national climate goals. While there is a strong and vocal community of global actors seeking to deploy innovative clean energy finance solutions in the developing world, the

specific concept of Green Banks applied to developing countries is fairly new. Therefore, efforts for broad education and awareness-building are necessary if Green Banks are to be created in nations across the globe.

To focus this effort, an initial cohort of pilot countries for Green Bank creation can be a focal point for proof of concept for successful application of the Green Bank model. Much like how the creation of the first U.S. Green Bank in Connecticut formed the linchpin for the U.S. Green Bank movement, a similar data point in the developing world must serve as a proof point for the concept as a whole.

10 Key elements of an international Green Bank initiative

Stakeholders offered input on the role of Green Banks in scaling-up climate finance in developing countries

Based on more than 50 stakeholder interviews across the international climate finance space[94] and CGCs April 2017 Green Bank scoping session which convened a wide range of climate finance thought-leaders,[95] experts spoke to a clear opportunity and early demand from nations to support creation of their own Green Bank entities.

The series of interviews and the scoping session showed broad agreement that business-as-usual will fall far short of what is needed to fill the finance gap and achieve Paris climate goals. It was recognized that public capital alone will not fill this gap and that the immediate challenge for Green Bank advocates is to determine how the combination of public and private capital can best create a very significant, rapid increase in funding of the clean power platform. This is especially urgent in countries that lack the GDP to provide adequate capital from their own economies. Equally important, the stakeholder input emphasized that moving private capital quickly and at scale will require market conditions that support both competitive returns and affordable low-carbon energy for consumers. As countries grow their economies, energy has to be both clean and affordable. Green Banks were also viewed as a flexible model suited to supporting country and market-specific approaches.

Major Themes

As stakeholders explored the conditions around which might Green Banks be promising institutions in an emerging markets context, the following key points emerged.

- **Speed** – Given the scale of the investment gap needed to achieve international climate goals, the current pace of investment falls far short of what is needed to meet climate goals in developing countries (and globally).

> **"The opportunity of the GIB model to expand in emerging markets is sizable. In spite of the very different institutional frameworks and levels of development of financial markets, the core proposition of an expert, specialist green financing entity designed to achieve the specific public policy goal of crowding in private capital to verifiably green investments has the potential to be necessary and compelling in a wide swath of countries. NRDC's work in Asian and Latin America generally indicate that where a public banking sector exists, understanding it and negotiating its landscape will be the critical activities in evolving the GIB idea."**
>
> **–Doug Sims, Director of Strategy and Finance, Center for Market Innovation, Natural Resources Defense Council**

- **Scale** – Huge amounts of private capital are needed to realize clean energy market potential, but much of this capital sits on the sidelines due to perceived risk and lack of familiarity with clean energy investment. Bridges are needed to crowd in private capital quickly and at scale if developing countries are to succeed in implementation of NDCs.
- **Focus** – The mechanisms, market structures, actors and activities that must exist in order to connect capital with project demand at the wholesale and retail levels are incomplete in at least some, if not perhaps most, emerging economies. Green Banks, because they offer dedicated focus and an integrated approach and can use patient capital or take on non-return generating market costs, can offer solutions, paired with capital, to build the bridges needed to make the market more efficient. In addition, Green Banks can galvanize interest among existing actors in the public and private sectors.
- **Local Solutions** – The specific structure of local Green Banks – e.g. whether formed via a new purpose-built entity or as an adaptation of an existing institution should be determined based on considerations such as: local gaps, market conditions, and government mandates. While finance is inherently global, capital deployment is local.
- **Wholesale & Retail Bridges** – In general, financing investors tend to provide capital to institutions that in turn fund projects, or to invest in projects that directly touch the end-user. We call the former wholesale; the latter, retail. Creating effective Green Bank institutions, whether stand-alone or additive to existing ones, will require assessing where in the capital supply chain a Green Bank should focus on building the bridges necessary to achieve scale and speed of investment.
- **New or Adapted Dedicated Capacity** – The group recognized that Green Bank creation must suit the existing social landscape of institutions in a given country or region. No two situations are likely to be identical.

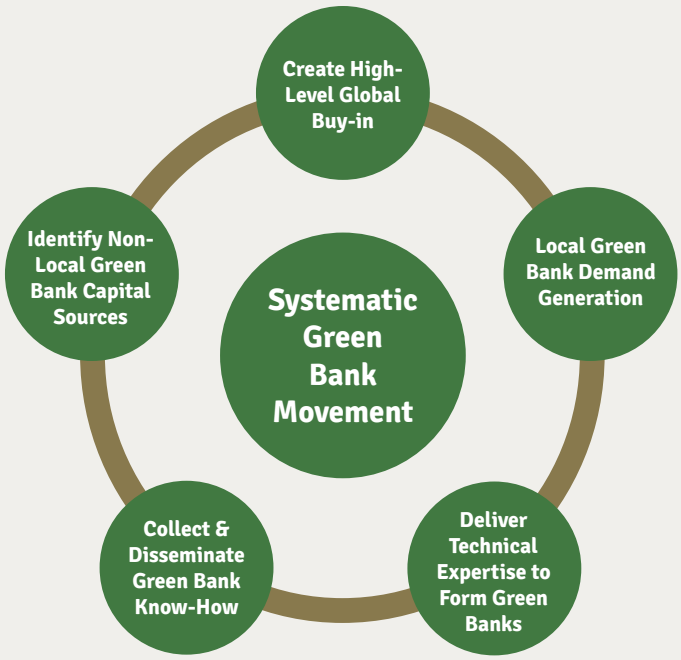
- **Mainstream Green Investment** – The catalytic, market-changing role of Green Banks is a significant attribute of how dedicated institutions can support change at scale, and with speed.
- **Mitigation & Resilience** – Green Banks can offer integrated approaches that address climate mitigation as well as climate resilience to address risk and support investment in resilient assets.

> "International development is a misleading notion. There is simply development and it is all local. Solutions including finance, to be truly sustainable, need to be local as well. Partnerships, not assistance, is the only way forward, and Green Banks, as dedicated local institutions, provide a promising path toward locally-based public-private climate finance partnerships."
>
> –John Wasielewski, Principal, Aligned Intermediary

11 Multiple areas of work needed for systematic Green Bank initiative

Building on lessons learned from the U.S. Green Bank movement, and taking into account elements that must be considered in the global context, key components of a work plan begin to emerge. Multiple actors, working at numerous levels of engagement with stakeholders around the world, must push forward coordinated streams of work to cause systematic change.

Figure 15: Components of Systematic Green Bank Movement



Build support for locally-based institutional architecture among global thought leaders

There must be high-level and persistent engagement with global thought leaders and climate finance actors to build awareness and support for the concept of a Green Bank. The notion of locally-owned climate finance institutional architecture must be transmitted to financial institutions, policymaking bodies, multinational climate finance initiatives, and the broad swath of entities participating in the climate finance space. Top-down awareness and Green Bank support must be built on a global scale.

Create buy-in for Green Banks among policymakers and key actors in specific countries

High-level engagement must be paired with country-specific outreach. Green Banks are location-specific by design and are controlled by local actors. Identifying promising Green Bank candidates, and connecting with critical local stakeholders are essential first steps toward Green Bank creation. This includes engaging with national governments, existing national development banks, large local finance institutions, and NGOs. Local actors may become "hosts" for an eventual Green Banks, or might be critical local partners that can help create buy-in and navigate complex local policy or institutional matters that external Green Bank experts will not be familiar with. This work, if successful, will lead to real Green Bank demand.

Identify and draw in potential Green Bank capital sources

Local Green Banks are likely to at least be partially capitalized by domestic funds. But it will be of equal importance to draw in capital for the Green Bank from outside the country. This means a concerted effort to engage with DFIs and climate funds and other potential investors will be essential. Where capital providers commit funds to a Green Bank, local actors can proceed with Green Bank creation with greater confidence. Capital providers will need to be educated on the Green Bank model, presented with examples of how their capital might flow into and eventually be returned from the Green Bank, and given an opportunity to identify the attributes of a Green Bank that would lead to investment.

Deliver technical expertise in specific countries to build Green Bank institutions

Developing a Green Bank needs to be tailored closely to the needs of the local jurisdiction, and existing models offer examples for new Green Banks to follow.[96] Once capital is identified and there is location-specific Green Bank demand, technical expertise must be provided to support the design, creation and operation of the Green Bank. This work includes a market needs assessment, developing core products and financing strategy, designing the institution, building a business plan and pro forma financials, and supporting the start-up and implementation of the Green Bank organization. This work will likely include management of the local Green

Bank initiative, which includes stakeholder management, political strategy and legal analysis, as needed. Countries are likely to have local expertise to support elements of this work, but specific knowledge on Green Bank creation will come from focused technical experts. Past Green Bank creation efforts have shown that this kind of technical expertise and support needs to be sustained over a number of years.

Collect and disseminate Green Bank know-how and foster a community of interested actors and Green Banks to build network effects

Finally, the outcomes, best practices and lessons learned from Green Bank creation and activity need to be systematically collected, organized and disseminated. This will create a feedback loop, where initial education and awareness is supported by hard examples and facts, which reinforces momentum. This has been a clear pattern of success in the U.S., where an increasing number of data points and examples of Green Bank institutions and transactions has created a snowball effect, giving greater confidence to actors throughout the ecosystem that Green Banks can be a powerful and effective tool. The Green Bank Network is already well-positioned to lead on this effort at a global scale.

12 Green Bank development requires a collaborative effort

The scale and urgency of the climate finance challenge in developing countries is enormous. Creating a replicable Green Bank model for scaling up climate investment to achieve national climate goals through a re-tooled climate finance architecture will require the combined efforts of a consortium of expert organizations. A core group of non-profit organizations is in the process of developing a collaborative framework to advance the goal of establishing and supporting the first generation of national (and sub-national) Green Banks in emerging markets, with a view to facilitating the design and capitalization of 4-6 institutions that can be operational by approximately 2020 and serve as models for replication by others.

These groups recognize that Green Banks may be created through an existing institution or via a new purpose-built institution. Determining the best approach will require careful consideration of country-specific conditions. Initial non-profit and intergovernmental organizations involved in this collaborative effort include the Coalition for Green Capital (CGC), Rocky Mountain Institute (RMI), Natural Resources Defense Council (NRDC), Climate Policy Initiative (CPI) and the Organization for Economic Cooperation and Development (OECD) and are joined by several partners from the for-profit consulting community (Climate Finance Advisors and Rick Nogueira). These groups recognize that extending the Green Bank model to the developing world is an enormously ambitious goal that will take time, and require expanding our effort to include an international community of collaborators. In addition, integrating this emerging collaboration with the work and role of the Green Bank Network is a clear priority and opportunity.

Appendix

April 21 Roundtable Attendees

Matt Baker
Hewlett Foundation

Athena Ballesteros
Growald Family Fund

Bettina Bergoo
Natural Resources Defense Council

Laurence Blandford
Center for Clean Air Policy

Paul Bodnar
Rocky Mountain Institute

Georg Borsting
Norwegian Ministry of Foreign Affairs

Barbara Buchner
Climate Policy Initiative

Andrea Colnes
Coalition for Green Capital

Michael DeLucia
Macquarie Group

Asger Garnak
Danish Energy Agency

Ilmi Granoff
ClimateWorks Foundation

Sven Hodges
US Department of Energy, formerly Council on Environmental Quality

Reed Hundt
Coalition for Green Capital

Bert Hunter
Connecticut Green Bank

Christopher Flensborg
Skandinaviska Enskilda Banken

Sean Kidney
Climate Bonds Initiative

Kevin Knobloch
Tufts University, former US Department of Energy

Jay Koh
Global Adaptation & Resilience Investment Working Group; NY State Energy Research and Development Authority; Columbia University

Alex Kragie
Coalition for Green Capital

Ruth Ku
US State Department

Sameer Kwatra
Natural Resources Defense Council

Rachel Kyte
SEforALL

Gaia Larsen
World Resources Institute

Elizabeth Littlefield
Former President OPIC

Enrique Nieto
Inter-American Development Bank

Caroline Ott
Rocky Mountain Institute

Jeff Schub
Coalition for Green Capital

Doug Sims
Natural Resources Defense Council

Brendan Shane
C-40

Todd Stern
Former US Special Envoy for Climate Change

Tim Stumhofer
ClimateWorks Foundation

Stacy Swann
Climate Finance Advisors

Lynn Tabernacki
OPIC

John Wasielewski
African Guarantee Fund, Aligned Intermediary

Angela Whitney
Hewlett Foundation

Helena Wright
E3G

Rob Youngs
Coalition for Green Capital

Ali Zaidi
Morrison & Foerster, Stanford University, Columbia University; Former White House Office of Management and Budget

Scoping Project Interviews & Contacts

Sean Kidney	Climate Bonds Initiative
Aaron Atteridge	Stockholm Environment Institute
Rob Youngman	OECD
Joanne Jungmin Lee	IRENA
Angelica Afanador-Ardila	Ecofys
Carlin Rosengarten	Yale University
Isabel Cavelier	Mission 2020
Cecilia Tam	Asia Pacific Energy Research Centre
Mahua Acharya	Global Green Growth Initiative
Elie Chachoua	Climate Action Network
Renzo Mendoza	GGGI
Paul Bodnar	Rocky Mountain Institute
Max Tattenbach	Arctas Capital
Don Gips	Albright Stonebridge, Blackstone
Nilmini Rubin	TetraTech
Richard Kauffman	Energy & Finance for New York State
Abyd Karmali	BAML
Mike Eckhart	Citi
Jay Koh	Lightsmith Group & Columbia University
Kentaro Yoshida	JICA
Amal Lee Amin	Inter-American Development Bank
Alexis Bonnel	Agence France de Developpement
Kruskaia Sierra-Escalante	World Bank, IFC
Nuwan Suriyagoda	World Bank, PPIAF
Rayke Berendsen & Mikkel Kallesoe	FMO
Linda McGinnis	Former World Bank
Timothy Afful-Koomson	African Development Bank
Davinah Milenge Uwella	African Development Bank
Josh Bushinsky	Former Overseas Private Investment Corp.
Athena Ballestros	Growald Foundation
David Sandalow	Columbia SIPA
George Polk	Tulum Trust
Ilmi Granoff	ClimateWorks Foundation
John Morton	Former US Overseas Private Investment

Larry Rodman	Alligned Intermediary
Aaron Wolf	Alligned Intermediary
John Wasielewski	Alligned Intermediary, Africa Guarantee Fund
Rob Richardson	Clifford Chance
Saf Yeboah-Amankwah	McKinsey & Co.
Fransje van der Marel	McKinsey & Co.
Todd Stern	Former US State Dept.
Pablo Montes	World Wildlife Fund
Doris Arevalo	Bancoldex
Clara Sofia Gomez Botero	World Wildlife Fund
Eduardo Atehortua	Deloitte
Martin Ramirez	Independent/Frankfurt/UNEP
Javier Sabogal	Ministerio de Hacienda Colombia
Sebastian Lema	Departamento Nacional de Planeacion
Isabel Mantilla Naranjo	Asobancaria
Santiago Madrinan	CECODES
Alvaro Concha	Inter-American Development Bank
Gabriel Umana	Fasecolda
Josh Bushinsky	Formerly OPIC

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