

# Clean Energy for All

## Framework for Catalytic Finance for Underserved Clean Energy Markets in India





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The Natural Resources Defense Council (NRDC) is an international environmental organization with more than 3 million members and online supporters. Since 1970, our scientists, lawyers and other environmental specialists have worked to protect the world's natural resources, public health, and the environment. NRDC works in the United States, China, India, Canada, Latin America, as well as on global initiatives to address climate change, protect nature, and promote healthy people and thriving communities. In India, NRDC works with local partners on transformative solutions to advance clean energy and climate resilience. [www.nrdc.org](http://www.nrdc.org)

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### **Editorial Team**

#### **Authors & Researchers**

NRDC Team

Poonam Sandhu, Sameer Kwatra, and Bettina Bergoo  
Project Directors: Doug Sims and Anjali Jaiswal

CEEW Team

Kanika Chawla and Arjun Dutt  
Project Director: Arunabha Ghosh

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# Executive Summary

Through robust policies and initiatives, India's Ministry of New and Renewable Energy (MNRE) has laid the foundation for a clean energy expansion. For example, the National Solar Mission has boosted India's large-scale solar energy market from a mere 17 megawatts (MW) in 2010 to more than 20 gigawatts (GW) in 2018.<sup>1</sup> To achieve this growth, several public financial institutions, along with private banks and non-banking financial companies (NBFCs), provided debt to the utility-scale renewable energy sector. These factors, combined with declining equipment costs, have resulted in impressive growth in investment and deployment in utility-scale renewable energy, especially over the past three years.

Still, financing remains a key barrier in scaling clean energy markets. This is especially true for smaller-scale clean energy projects in underserved markets such as off-grid and rooftop solar.<sup>2</sup> Rooftop solar, for instance, has reached only 1.2 GW of installed capacity as of 2018, well below the 40 GW by 2022 target.<sup>3</sup> Stakeholders agree that this gap is at least partially due to lack of access to long-term, reasonably priced loans. Similarly, the next generation of clean energy solutions such as battery storage, electric vehicles, and solar-wind hybrid technologies also need policy focus to establish local “bankability” to increase comfort for lenders. Without policy initiatives especially that addresses risk perceptions of investors, financing may not keep pace with government targets and consumer demand.

Stakeholders also warn that rising domestic interest rates threaten the viability of existing utility-scale clean energy projects, most of which take on variable rate domestic loans but receive cash flows from long-term power purchase agreements, usually at a fixed tariff. These loans get riskier if rates rise, and some may turn into “stressed” assets for banks, deterring further lending to the sector.

Given that banks already have high exposure to the power sector, there is limited debt capacity to fund the amount of new generation needed to meet renewables targets, including India's target of 100 GW of solar energy by 2022.<sup>4</sup> An active domestic debt capital market would allow banks and NBFCs to fund new loans, refinance existing loans, and recycle their capital. It would also help developers raise debt by issuing bonds. Raising foreign debt has challenges since foreign currency risks need to be assumed by local players, given the widespread unavailability of long-term currency hedging products.

Around the world, catalytic financing is emerging as a solution in the clean energy sector. Catalytic finance leverages limited public and donor (e.g., multilateral and impact investment) capital to attract private investment. Because this approach positions public finance as an activator of greater private investment, it is termed “catalytic”.<sup>5</sup> Catalytic finance strategies include risk mitigation, aggregation of small projects to diversify risk and to scale, strategic public-private co-investments, and market development activities. A characteristic of catalytic finance is that each public or donor unit of investment should be dedicated to mobilizing multiples in private investment. This way, public finance activates—or catalyzes—greater commercial investments to the “underserved” segments of the clean energy markets in India. This report presents a framework for implementing catalytic finance solutions through green windows or a green fund as developed through stakeholder discussions in India. The table below explains how green windows will serve to change status quo and help grow the market.

Status Quo	Green Windows (GWin)/Green Fund (GF)
Public financial institutions (FIs) focus on providing debt (40% of renewable energy lending) but do little to crowd in other lenders	Through GWin/GF, public FIs focus on crowding in lenders not currently in the market, increasing their impact
Public FIs are hesitant to use their balance sheet to take risks on underserved and emerging markets	Through ring fenced GWin/GF, public FIs take on increased risks to grow and mature markets while protecting their balance sheets
Concessional credit lines for rooftop mainly go to blue chip customers that already have access to credit	With sectoral expertise, and funds for pipeline development, concessional credit lines reach underserved rooftop markets
New technologies like storage are slow to become bankable due to high risk perception by commercial capital	Strategic co-investments by the GWin/GF alongside commercial capital, accelerates bankability
Banks reach sectoral lending limits and have asset-liability mismatch. NBFCs may not be able to sell down assets	GWin/GF focus on facilitating refinancing by portfolio assignments, securitization and the bond market
Small, diverse projects are risky and costly to finance	GWin/GF drive standardization and provide warehousing facilities to create homogeneity and scale



## METHODOLOGY AND PURPOSE

The Natural Resources Defense Council (NRDC) and the Council on Energy Environment and Water (CEEW) have collaborated with CKinetics and Climate Policy Initiative (CPI) to understand current market barriers in access to finance. Our extensive primary and secondary research included consultations and a series of workshops with government officials, key developers, project financiers, and utilities.

Over 40 finance experts have been consulted from both public and private institutions in India and the international community.<sup>6</sup> This group includes commercial banks, private equity, and impact investment funds, as well as multilateral and bilateral development financing institutions, international climate funds, and philanthropic grants and impact investments. The aim of consultations was to better understand the market's constraints on providing capital and to identify incentives to make capital available for underserved and emerging technologies for clean energy markets.

The purpose of this issue brief is to present stakeholder views on expanding finance for underserved clean energy markets. The culmination of these efforts is a framework for implementing catalytic finance solutions in India focused on a pilot green window or green fund.

## KEY TAKEAWAYS

Key takeaways from the research and stakeholder consultations are:

1. To maintain momentum in India's clean energy market, more investment is needed across the sector. Access to finance is especially challenging for "underserved" segments such as rooftop solar that have specific targets but are struggling to meet them. Financing is also scarce for emerging technologies such as, energy storage and electric vehicles that need financing to scale.
2. Public financial institutions provided an estimated 40% of clean energy financing in 2017. Yet the bulk of this financing is made through direct lending to large-scale projects, and very little investment was designed to crowd in commercial funds through catalytic solutions.<sup>7</sup> To more effectively mobilize private capital, especially for smaller-scale projects, public institutions should go beyond direct lending to bring in more private investment for underserved sectors through catalytic finance. A starting principle for catalytic finance is that each public sector or donor unit of investment should be dedicated to mobilizing multiples in private investment in the short, medium and long terms. Because this approach positions public finance as an activator of greater private investment, it is termed "catalytic".
3. India's clean energy market has had some success with catalytic solutions. The Solar Energy Corporation of India (SECI)'s payment security mechanism leverages public funds to increase private finance.<sup>8</sup> Also, Energy Efficiency Services Limited (EESL) has a strong focus on removing systemic barriers to scaling up energy efficiency markets, such as high transaction costs and low-ticket sizes for energy efficiency projects. To pursue these goals, EESL has successfully attracted private domestic and international capital to invest in India.<sup>9</sup> In another catalytic strategy, the government recently used seed capital to attract the UK government as a co-investor in a new clean energy private equity fund.<sup>10</sup>
4. Stakeholders in India expressed that a catalytic strategy would be most valuable if it works to provide affordable debt to underserved markets, builds portfolios that can be securitized, and facilitates investment by retail and institutional investors. International stakeholders noted that catalytic strategies that address foreign currency conversion risk and the lack of project pipeline will help attract significantly more funds into clean energy markets in India.
5. Catalytic approaches to clean energy markets – including the use of public and donor funds for credit enhancement, co-investment, warehousing and securitization, deepening the bond market, and developing capacity– can be implemented in the form of multiple "green windows" or a single "green fund". Green windows are platforms dedicated to developing and deploying catalytic financial instruments that are set up within or alongside of existing financial institutions such as the Indian Renewable Energy Agency (IREDA) and the National Bank for Agricultural and Rural Development (NABARD). A green fund is a large pool of capital seeded by the Indian government and other donors and managed by a specialist fund manager that pursues diverse catalytic strategies. Over time, catalytic approaches could mobilize two to seven times the capital invested by the government, expanding the capacity of private banks, institutional and retail investors, and other domestic and international lending sources to increase investment from \$6 to 10 billion per year to the \$15 to 20 billion per year required to achieve India's clean energy targets.<sup>11</sup>



## Value Proposition for Green Windows and Green Funds

While the green window and green fund approaches are not mutually exclusive, they present slightly different value propositions, as examined below.

Value Proposition	Green Window	Green Fund	Discussion
Diversify investors and increase investment (domestic and international)	X	X	Both the green window and green fund approaches would leverage limited public funds to crowd-in domestic and international investors to increase the total amount invested in clean energy. The green window(s) would be set up in or alongside different institutions (e.g., IREDA, NABARD) to deploy catalytic instruments in each institution's targeted sectors; whereas the green fund would centralize catalytic activity on a single platform.
Increase access to finance for underserved markets and support emerging technologies to be market-ready	X	X	Both the green window and green fund approaches would support growth to underserved markets and emerging technologies. The green window approach is more specialized with respect to the sectors targeted by the host public financial institutions (e.g. rural sector, or small business sector), whereas a green fund could be more efficient in increasing deal volume and generating economies of scale due to its centralized structure.
Boost the Indian market's reputation in finance innovations	X	X	Both the green window and green fund approaches boost the reputation of the Indian market globally.
Speed to market and ease of implementation	X		Green windows may be easier to set up in the Indian context since they can rely on the resources of their host institutions. Green windows will likely need new operational governance guidelines to ensure they have the ability to actually crowd-in capital. Creating a new and independent green fund would require more coordination and planning to set up.
Leverage strengths of existing public financial institutions hosting the green window	X		The green window approach leverages the existing host institution's brand, infrastructure, networks, and understanding of specialized market players. The green fund would be new with little brand recognition and few relationships.
Create mission-driven institutional culture to "crowd-in" mainstream capital	X	X	Both approaches seek to bring in new expertise and perspectives that prioritize stimulating new capital for underserved markets, rather than competing with private financiers. The cultural shift could happen faster in a newly created green fund. In green windows, small, new teams would operate within a larger institution and its existing culture.
Strengthen market confidence		X	A green fund managed by an independent fund manager for a could more easily attract private capital than green window managed by public financial institution's existing management insofar as it could instill more confidence in investors in terms of a successful track record and independence from government.
Extend financial access to small projects	X	X	Both the green window and green fund approaches could target increasing financing to small projects and developers.
Track and collect clean energy data for better analytics	X	X	Both the green window and green fund approaches could improve market data tracking and aggregation. The green fund approach may be more limited since it would focus on the activities of a single institution, whereas the Indian government could collect data from multiple green windows for a more comprehensive view of the clean energy market.
Achieve climate targets	X	X	Both approaches have the potential to help achieve targets for distributed renewable energy, but a green fund may be more efficient and effective given its scale.



## I. BACKGROUND

India is an emerging economic powerhouse and global clean energy leader. With an annual gross domestic product growth of 6–7% expected through at least 2030, India is one of the world's fastest-growing economies and is now the world's third-largest energy consumer.<sup>12</sup> India is working to combat climate change while sustaining rapid development and providing energy for cities and villages, which are home to more than 200 million people without access to modern energy.<sup>13</sup>

The government of India has set an ambitious near-term renewable energy goal of 175 GW by 2022. Under the Paris Agreement, India has committed to cutting emissions intensity by 33% to 35% below 2005 levels by 2030 and to achieving 40% of installed power capacity from non-fossil sources by the same year.<sup>14</sup> The 2018 National Electricity Plan further reaffirms India's plan to expand renewable energy capacity to 275 GW by 2027, with solar energy accounting for the largest share of renewable electricity generation.<sup>15</sup>

India has made impressive strides to achieve domestic clean energy targets. The wind market has more than doubled in recent years, from approximately 13 GW of installed power in 2010 to 34 GW by June 2018.<sup>16</sup> Market projections indicate that at the current rate of installation, the Indian market is on track to reach the goal of 60 GW of wind power by 2022.<sup>17</sup> Starting from a very low base of 17 MW of installed solar power in 2010, the Indian market installation jumped over a thousand-fold to over 23 GW of solar energy by June 2018.<sup>18</sup> However, there is still a long way to go to reach the 2022 solar target of 100 GW.

The foundation of India's robust clean energy market has been strong policies and programs, and yet challenges remain in policy, finance, and markets that need to be addressed. The initial combination of innovative reverse bidding, supportive policy environment in terms of demand certainty through setting renewable energy targets, mitigation of land and evacuation risks, and centralized tax and subsidy schemes helped drive investment. For example, as a part of the National Solar Mission, the government invested up to 30% of the project cost to establish utility-scale solar parks.<sup>19</sup> Most projects are built with debt financing, so expanding the debt market is critical for accelerating clean energy deployment.

Also supporting this framework is an array of public sector undertakings. Led by the Indian Renewable Energy Development Agency (IREDA), National Bank for Agriculture and Rural Development (NABARD), Small Industries Development Bank of India (SIDBI), and SECI, these public institutions primarily operate as lenders to the market, implementers of schemes, or both.

To keep up the momentum, more investment is needed in the clean energy market overall. Access to finance, especially debt, is a challenge for the underserved subsectors, such as rooftop solar, that have specific targets but are struggling to meet them. Financial access challenges also exist for emerging technology sectors that will need financing to scale, such as energy storage and electric vehicles.





## II. THE FINANCING CHALLENGE

### A. Access to Finance for Underserved Clean Energy Markets

Despite the success in financing utility-scale renewable energy, distributed renewable energy (DRE) systems, such as off-grid and rooftop solar, are struggling to achieve scale. The distributed energy market is an example of an underserved sector that needs additional financing and focus to achieve its potential. As of May 2018, the total installed rooftop solar capacity reached only 1.2 GW, with capacity addition well below the pace needed to achieve India's 40 GW target of installed capacity by March 2022.<sup>20</sup>

While non-finance barriers – such as supportive policy, consumer awareness, and grid integration – exist and need to be addressed, feedback from the market is that financing is still a major issue. In the initial stages, finance has largely been extended to utility scale projects or, in the rooftop segment, to large rooftop developers for projects with creditworthy blue-chip commercial and industrial customers that have relatively easy access to finance. Major barriers constraining lending to non-blue chip and residential rooftop segments include small project size; lack of technology performance track records; lack of credit transparency history of the residential, industrial, or small and medium enterprise (SME) commercial customers; payment risk associated with the off-taker (buyer) of electricity; and inconsistent net metering policies that vary from state to state. These factors increase risk and transaction costs.

Most financial institutions cannot expand into new lines of business unless they are profitable and low risk, or unless they receive relevant technical assistance and can access low-cost risk mitigation tools to enable them to “learn by doing” the first few deals.<sup>21</sup> Stakeholders therefore advise that the focus should be much more on mitigating risks than on providing concessional finance. Cost-related interventions should be short and focused with a very clear objective and designed to not distort risk-return balance.

### B. Availability of Finance for Emerging Technologies

To achieve India's clean energy targets, financing markets must be able to quickly and reliably fund “emerging technologies,” defined as the next generation of clean energy technologies, such as battery storage, electric vehicles, offshore wind, and solar-wind hybrid technologies. When new technologies first enter a country, local financiers are unfamiliar with them. Even if a technology is mature and bankable in other geographies, a domestication process occurs with local financiers to establish local “bankability” before loans are issued. Without a policy focus on accelerating this process, financing may not keep pace with government targets and consumer demand.

### C. Availability of Long-Term Fixed Price Debt

Stakeholders underscore the limitations and risks for clean energy projects associated with the kinds of debt the domestic market can supply. The underlying issue is that domestic financiers find it challenging to meet the needs of the sector and provide long-term, fixed price loans of up to 15–18 years because their source of capital is short-term deposits of 3–5 years. The risk for the banks is that loans become unprofitable as interest rates move up, which causes banks to offer variable interest rate loans to clean energy projects, effectively passing this risk through to projects. However, the finely tuned capital structure of clean energy projects has limited ability to absorb increased interest costs when rates move up. Many developers do not hedge this risk. An environment with rising interest rates could stress debt servicing capacities and may deter further bank lending to the sector.

#### **NBFCs and Distributed Renewable Energy**

NBFCs can play a critical role as intermediaries, especially for distributed renewable energy (DRE) solutions. Since decentralized energy demand is granular and distributed geographically, it can have high costs of customer acquisitions and servicing, including operations and maintenance. Regional NBFCs that are cost competitive against the larger centralized institutions can strengthen the ecosystem to facilitate growth in the market. Leading NBFCs are operationally structured to mobilize larger volumes of transactions and have experience with small and medium enterprise (SME) credit lines.

NBFCs can help scale up small project financing. NBFCs have experience with smaller ticket sizes and specialized loans. To finance smaller projects, public financial institutions often partner with both banks and NBFCs and route funds through their balance sheets.



Compounding the debt market challenges, are sectoral and company-level lending limits that banks must adhere to as per the regulator's prudential norms.<sup>22</sup> Annual lending to renewable energy from domestic banks is approximately ₹400–680 billion (\$6–10 billion). In 2016, the total invested in the Indian clean energy market was ₹618 billion (\$9.3 billion), nearly exhausting lending limits.<sup>23</sup> Yet, a major financing gap still exists. To reach India's clean energy targets, more than ₹1–1.3 trillion (\$15–20 billion) is required per year in investment – or ₹5.7 trillion (\$83 billion) in total through 2022.<sup>24</sup>

Given that domestic banks already have high overall exposure to the power sector, which includes both renewable and thermal power, it would be unrealistic to expect the banks to double their annual lending, even assuming an investible pipeline of projects is available.<sup>25</sup> More importantly, small DRE project sizes mean smaller loan ticket size and higher transactional costs for banks with typically high fixed costs. Non-Banking Finance Companies (NBFCs) are usually nimbler, with lower fixed cost structures, and are an important source of capital for these smaller deals, but also need nurturing and support (see text box on page 7). International sources of capital, including lines of credit by development finance institutions (DFIs) such as multilateral and bilateral institutions, have further provided about \$1–2 billion a year.<sup>26</sup> However, these institutions continually shift their priorities. As the Indian market matures, fewer resources may be made available by these DFIs and other sources of finance must be mobilized. Therefore, institutional mechanisms should be put in place to serve the needs of the current and future 'underserved' clean energy markets in India.

### III. EMERGING SOLUTION: CATALYTIC PUBLIC FINANCE

In clean energy markets around the world, an emerging solution to financing challenges is “catalytic finance”. Catalytic finance leverages limited public and donor (e.g., multilateral and impact investment) capital in a way that attracts private investment. A starting principle for catalytic finance is that each public sector or donor unit of investment should be dedicated to mobilizing multiples in private investment. Because this approach positions public finance as an activator of greater private investment, it is termed “catalytic”.<sup>27</sup>

Underserved and emerging clean energy technologies present a higher level of risk, actual or perceived, than private capital is willing to bear. To overcome these challenges, catalytic finance is used to mitigate risks in these market segments to attract private capital and scale up investments. It employs strategies such as risk mitigation, aggregation of small projects, strategic public-private co-investments, and market development activities. Such strategies have been effective in international markets in demonstrating the business case to private investors and play a significant role in transforming underserved markets.

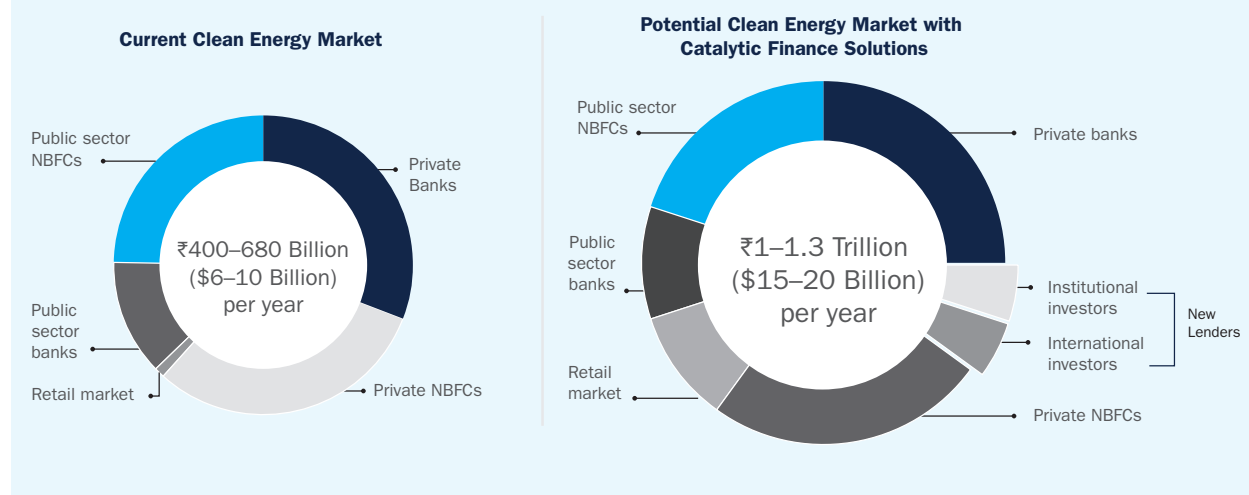
Catalytic solutions are critical to increasing the availability of finance for clean energy projects, especially for underserved markets that are struggling to meet targets, such as rooftop solar energy. Figure 1 illustrates the potential of catalytic solutions in the Indian clean energy market to increase the amount of finance by expanding the capacity of private banks, retail banks, and retail investors. Figure 1 represents an indicative projection based on annual lending to the renewable energy sector from domestic banks (₹400–680 billion or \$6–10 billion per year) as compared to the ₹1–1.3 trillion (\$15–20 billion) per year in investment needed to achieve India's clean energy targets by 2022.<sup>28</sup>



**Figure 1: Catalytic Finance Effects on the Indian Clean Energy Market**

The set of graphs in Figure 1 shows the indicative potential of catalytic finance solutions in unlocking additional investments in the clean energy market in India. The chart on the left shows the current average annual clean energy investment with an approximate split of the market players. The chart on the right is an illustration of the potential to scale up the investment level by attracting new participants, such as institutional and international investors and deepening the domestic retail debt market.

Catalytic finance solutions work through diverse, complementary strategies. They can, for example, promote the recycling of capital by banks and NBFCs by facilitating the buying and reselling of loan portfolios; crowd in pension funds by enhancing bonds to investment grade; and reach minimum investible ticket sizes for institutional investors through the aggregation of small projects. Initially, a catalytic solutions provider has an impact that is limited to the capital it directly mobilizes through the deals in which it participates. But as its success grows, the financing techniques and technologies become mainstream and the market takes off by itself, resulting in larger volumes of capital.<sup>29</sup>



## A. Examples of Catalytic Finance Solutions

Effective catalytic solutions are carefully designed to meet their objectives and local market conditions. The private sector must retain sufficient risk and have positive incentives to discourage careless and risky behavior. To be effective, catalytic solutions employ rigorous due diligence to avoid facilitating financing for “bad” or “unbankable” projects. Projects are fundamentally not bankable, for example, when a developer is demonstrably unqualified (even if provided with technical assistance or capacity development), a customer is a poor credit risk (even when nontraditional credit metrics are considered), or a technology has a clear record of failure or is too expensive to be competitive in the foreseeable future.

Below are key examples of “catalytic” solutions that can be used to grow clean energy finance markets:

**Credit Enhancement:** To expand the market beyond utility-scale and high credit projects, credit enhancement instruments can be effectively used to mitigate perceived risks of untested business models, small projects, and unrated borrowers or offtakers. Differing perceptions of risk stem from information asymmetry, and credit enhancement should be provided by a party that best understands the risk. Examples of credit enhancement products include loan loss pools, first loss reserves, credit guarantees, and other risk sharing mechanisms. These instruments allow transactions to move forward to create a track record and help discover true credit risk. For example, under a credit guarantee structure, capital is provided to cover a certain portion of a lender’s losses, up to a specific lending threshold. How often and under what circumstances the guarantee is called upon creates data on actual risk. As evidenced by the experience of green investment banks and other catalytic green finance vehicles globally, these kinds of products can mobilize many multiples of private investment per unit of public or donor fund invested. Credit enhancement products can also enhance access and availability to financing via the bond market for underserved market segments.



For example, certain classes of investors, such as domestic pension and insurance funds, can only invest in bonds above a certain investment grade as per their regulatory requirements and low risk appetite. Similarly, credit enhancing portfolios of loans to renewable energy companies will give confidence to investors and facilitate recycling of capital by banks, allowing them to invest in additional projects.

**Co-investment:** For emerging technologies like battery storage, public co-investment in the form of, for example, subordinated debt, mezzanine debt or equity in a project shifts a portion of the risk to a public actor to enable private investors to participate. When co-investment occurs alongside a more experienced and patient clean energy investor, new investors gain experience and confidence with the new technology and/or business model.

**Warehousing and Securitization:** Small projects suffer from high transaction costs relative to their value, which makes them relatively expensive and an inefficient use of capital for many investors. Warehousing is an aggregation technique used to reduce transaction costs and facilitate investment. For example, small projects, such as distributed solar installations, can be bundled together to reach a scale that is attractive for on-sale of loan portfolios to large financiers. Securitization is the process whereby small loans are aggregated and transformed into standardized, tradable assets. Combined with credit enhancement, warehousing and securitization can be an effective financial tools to overcome barriers that prevent finance from flowing to small and disaggregated projects, including SMEs.

**Deepen Bond Markets:** A deeper and liquid bond market will go a long way to overcome challenges faced by financial institutions. In such a market, banks and NBFCs offload existing assets to institutional and retail investors through securitizations and portfolio sales. Bond issuances can be used to address some common challenges for banks, such as asset-liability mismatches and sectoral lending caps, and free up the balance sheets of banks and NBFCs to reinvest in new projects. Appropriate regulations are a prerequisite to expand the bond market. Once regulatory hurdles, such as permitting investment only in top rated assets, are overcome, risk-averse institutional and retail investors could see clean energy investments as a good opportunity.<sup>30</sup>

**Capacity Development:** Given the rapid speed of clean energy innovation, some mainstream lenders are unfamiliar with new clean energy technologies and business models. To ensure that catalytic solutions are effectively deployed, capacity building and knowledge needs to be strengthened among financial institutions to assess funding requests and structure loans appropriately. At the same time, developers struggle to produce a pipeline of bankable projects in underserved and emerging sectors and may need guidance to prepare funding proposals and documentation as per lender requirements. Developers may be unaware of funding sources other than banks and have difficulty accessing government benefit schemes. A technical assistance program that can build borrower and lender capacities and streamline access to private finance can help accelerate growth of underserved and emerging markets. These facilities could be initially set-up with donor grants or public capital and over a period of time move to a model of user fees to ensure sustainability.

## B. Examples of Early Approaches to Catalytic Finance in the Indian Market

With strong public financial institutions, the Indian clean energy market has had initial efforts in developing catalytic-type solutions. IREDA, NABARD, and SIDBI are specialized financial institutions with deep expertise in key sectors.<sup>31</sup> These and other public financial institutions provided an estimated 40% of total financing to the clean energy sector in 2017.<sup>32</sup> Yet, the bulk of financing is through direct lending to large-scale projects, and very little of the investment is designed to crowd-in other financiers through catalytic solutions. By employing a catalytic approach, the impact of the public institutions to accelerate clean energy deployment in underserved sectors could grow significantly.

Stakeholders have expressed that to be more effective in mobilizing private capital, especially for smaller-scale projects, public financial institutions should continue direct lending as well as go beyond direct lending to expand the clean energy market for underserved market segments to bring in more private investment. Still, there are some examples of the catalytic approach that have been implemented in the Indian market. These efforts have varying levels of success and maturity. Some examples of instruments and institutions using a catalytic approach are discussed below.

## i. Catalytic Instruments

**Credit Enhancement/Liquidity Support for Utility Scale Solar:** In 2015, with MNRE support, SECI established a payment security mechanism (PSM) with a ₹15 billion (\$220 million) fund to ensure payment to utility-scale developers under power purchase agreements with distribution companies to cover off-taker payment delays.<sup>33</sup> The PSM worked to increase the creditworthiness of the developers vis-à-vis their lenders by providing lenders with coverage for 3 months of revenue to make debt payments in case of delay. SECI also entered into a tripartite agreement with the government of India, state governments, and the Reserve Bank of India (RBI), which further bolstered its credibility as a renewable energy off-taker.<sup>34</sup>

**Credit Enhancement for Infrastructure Bond Issuances:** In 2015, India Infrastructure Finance Company Ltd (IIFCL) launched a credit enhancement mechanism for bond issues for the infrastructure sector. For example, based on the partial credit guarantee by IIFCL, Renew Wind Energy was able to enhance its credit to AA level and get preferential terms for its ₹4.8 billion (\$70 million) issuance.<sup>35</sup> The Asian Development Bank and IIFCL financed the credit guarantee via a ₹8.7 billion (\$128 million) facility.<sup>36</sup> According to market views, the high pricing of the mechanism has limited its uptake. In 2018, the Ministry of Finance announced a credit enhancement fund, to be anchored by IIFCL, for raising the credit ratings of infrastructure bonds in India.<sup>37</sup>

**Credit Enhancement for Utility-Scale Solar Bond Issuances:** In 2017, IREDA launched a “Credit Enhancement Guarantee Scheme” to support green bond issuances by utility-scale project developers against commissioned and operationally viable renewable energy projects. The scheme aims to make it easier for renewable energy companies to refinance their debt on better terms. The scheme also aims to bring in more investors to deepen the bond market by raising bond ratings. It operates as a partial credit guarantee for up to 25% of the bond issue, available at fees ranging from 1.8–2.9% to developers of grid-connected solar and wind projects. It will also help projects enhance their credit rating and raise funds at a cheaper rate from the bond market.<sup>38</sup> Since the instrument was recently deployed, the market response has yet to be determined.<sup>39</sup>

## ii. Catalytic Institutions

**Catalytic Energy Efficiency:** EESL is a joint venture of four Indian public sector enterprises that has focused on removing systemic barriers, such as high transaction cost and small ticket size, for energy efficiency financing. To attain these goals, EESL has successfully attracted private domestic and international capital to catalyse growth in the market in India. With initial capital from equity participation by the four government enterprises, EESL has expanded its capital base by accessing low-cost debt from multilateral agencies and issuing green bonds in Indian and overseas markets. EESL has especially been effective with aggregation strategies to create demand that allows suppliers to lower its cost for standardized items, such as LED light bulb programs. This has been a game changer: the price of LED light bulbs dropped significantly, thus mainstreaming LED use.

EESL's business model is a super energy services company or “ESCO” – it pays all upfront costs for energy investments and gets paid under energy services agreements with payments sized to savings. It also provides advisory services when end users front the costs. While it does not provide financing, in part because EESL is not an NBFC, its mission is to catalyze investment in energy efficiency:

“Energy Efficiency Services Limited (EESL) seeks to unlock the market of energy efficiency in India estimated at \$12 billion, resulting in energy savings of about 15% of present consumption. It seeks to create market access, particularly for domestic consumers as well as for public facilities like municipalities, buildings, agriculture, industry, etc. It further seeks to implement business models, handhold private sector Energy Service Companies in the effort to ensure replication.”<sup>40</sup>

Stakeholders view EESL as operating with speed and agility. It operates the largest LED distribution program in the world, through which it has deployed 300 million LED bulbs across the country since January 2015.<sup>41</sup> EESL recently purchased a controlling stake in a British ESCO and a minority interest in a Canadian battery company. Based on its strong track record, EESL is set to receive ₹31 billion (\$454 million) of funding from Global Environment Facility (GEF) for energy efficiency programs to reduce greenhouse gas emissions. The project will receive composite funding from a GEF grant of ₹1.4 billion (\$20 million) and co-financing of ₹30 billion (\$434 million) in the form of loans and equity, including a ₹14 billion (\$200 million) loan from the Asian Development Bank.<sup>42</sup> EESL has used a catalytic approach given its effectiveness in advancing efficiency markets through a flexible and targeted institutional approach to tackling its unique barriers, such



as high upfront costs, reluctance to recognize the value of savings, and inability for individual procurements to drive economies of scale. Based on the EESL model, the Indian market has demonstrated experience in the potential of a catalytic approach to overcome market barriers and can learn from those experiences in expanding catalytic solutions.

**Catalytic Private Equity:** In April 2018, the National Investment and Infrastructure Fund of India (NIIF) partnered with the UK government to launch the Green Growth Equity Fund (GGEF), an alternative investment fund registered with the Securities and Exchange Board of India (SEBI).<sup>43</sup> NIIF's commitment of £120 million has unlocked an equal sized commitment from the UK government. GGEF will be managed by EverSource Capital, a private manager selected in a competitive RFP process. GGEF aims to raise an additional £500 million from international institutional investors to invest in areas such as clean energy, clean transportation, water, sanitation, waste management, emerging technologies, and other similar industries in India. At least a third of the fund is planned to be invested into off-grid strategies and a third to other clean-tech strategies in water, electric mobility, among others.

**Capacity Building:** In July 2018, NABARD announced inauguration of the “Centre for Climate Change” in the Bankers Institute of Rural Development. The aim of the Centre is to address capacity building needs of stakeholders, promote collaboration and networking in the areas of knowledge and technology, and disseminate solutions for challenges emerging from climate change, particularly in climate finance.<sup>44</sup> Establishing the Centre is a good first step towards improving market awareness and facilitating the flow of finance towards clean energy.

These initial efforts to use a catalytic approach domestically have seen some success and are instructive. These efforts are building blocks toward a robust catalytic approach that accelerates clean energy deployment for underserved and emerging markets to achieve India's climate targets.

### C. Potential Impact of Leveraging Catalytic Capital

The impact of each catalytic finance solution depends on market characteristics and the instrument deployed. For example, New York Green Bank invested in an aggregation and warehousing facility for residential solar rooftop projects, which helped mobilize a 7 times greater private investment.<sup>45</sup> Similarly, to reach underserved markets, Australian Clean Energy Finance Corporation (CEFC) designed a senior debt facility to finance an innovative solar thermal project for desalination and irrigation.<sup>46</sup> The CEFC's commitment to financing a portion of the project helped mobilize private investment from global investment firm Kohlberg Kravis Roberts, resulting in a private to public investment leverage ratio of 2.5:1.

At scale, the overall impact of catalytic finance could significantly boost clean energy to achieve India's goals and develop underserved markets. Conceptual analysis indicates that an initial capital of ₹13.6 billion (\$200 million) from a variety of sources, including government budgetary allocation, can potentially mobilize ₹81.6–217.6 billion (\$1.2–3.2 billion) in total investment over 10 years.<sup>47</sup> The methodology for this impact analysis assumes a mobilization ratio ranging between 2:1 and 7:1 for a green fund in India. Once catalytic finance is implemented, this mobilization ratio can be refined further.<sup>48</sup>

To reach the \$200 million needed, a \$50 million investor commitment for seed funding, in the form of patient or concessional government or public financial institution equity, is needed for the green fund.<sup>49</sup> In other words, it is reasonably expected that a green fund would “crowd in” at least 3 times the seed funding amount in additional contributions from development finance institutions and/or commercial capital.<sup>50</sup>

In addition to the direct financial impact on specific projects, catalytic finance can stimulate a wider transformative impact on underserved market segments by demonstrating the economic case for investing in those markets. In doing so, catalytic finance showcases a bigger market opportunity. Once the economic case has been demonstrated in a competitive financial sector, private players can be expected to spot the opportunity for investment and move in, independent of the availability or participation of catalytic instruments. For example, the UK-based Green Investment Group, which was established as the UK's green bank, contributed to transforming the UK's offshore wind market. The Green Investment Group played a catalytic role early on in attracting institutional investors to the offshore wind fund when the sector was nascent, and the market subsequently developed on its own as more private financiers recognized the opportunity. Today, the UK has one of the leading offshore wind markets in the world.<sup>51</sup>

## IV. IMPLEMENTING CATALYTIC FINANCING IN THE INDIAN MARKET

To implement catalytic financing, government officials and stakeholders active in the Indian market have recommended two potential complementary options. The first is multiple green windows within existing institutions. The second is a single new green fund sponsored by one or more public sector undertakings. Each option is described below.

### A. Multiple Green Windows Option

Green windows are conceived of as platforms dedicated to developing and deploying catalytic finance instruments set up within or alongside of key public sector financial institutions. Building on international experiences with green funds, each green window would have three main components.

**First, each green window would have a clear mandate to mobilize additional private capital to expand the clean energy market within the purview of the relevant financial institution.** It would supplement and deepen the clean energy-related technical, financial, and market-building capacities of its host financial institution. Each green window would have a dedicated team combining expertise in clean energy and experience in developing risk mitigation products, capital markets, project finance, deal structuring, and credit appraisals. In addition to its transactional work, each green window would be a trusted informational platform for information on reducing perceived risk and transaction costs and educating banks and other investors about the risks and opportunities presented by the sector.

**Second, each green window would have access to a dedicated pool of low-cost capital, either directly or through the host financial institution, to be used for implementing risk mitigation products (e.g., first or second loss credit guarantees).** These products would catalyze investments by private and international investors, such as domestic banks, NBFCs, institutional investors, and foreign investors. To ring fence green window activities and protect the host institution's balance sheet, the green window could be set up as a trust or other appropriate special purpose vehicle. Low-cost risk mitigation products will help private sector banks offer competitively priced loans to underserved clean energy markets. For the host institution, fee-based, non-interest income earned through risk mitigation instruments from the green window would be a strategy to diversify business away from the traditional income of interest on loans. Even though they will be low cost, the instruments would be carefully structured to ensure that sufficient risk is retained by public financial institutions and borrowers benefitting from the instrument to avoid lax or poor decision-making.

**Third, each green window would be subject to prudential regulations and evaluated by the host institution on its ability to increase private investment in its targeted subsectors, rather than on the success of the lending activities of its host institution.** Each green window would support the institution's overall developmental mission, and due to the ring-fenced pool of capital, would be structured so as not negatively impact the institution's balance sheet. In other words, the incentives of the expert team would be aligned with the green window's mission: how much capital did the green window mobilize and crowd-in toward underserved clean energy projects.





## Preliminary Exploration of Sources of Capital

In response to government and stakeholder requests, international consultancy Climate Finance Advisors was commissioned to conduct primary research, interviews, and desktop research with nearly 40 domestic and international financial institutions to determine whether and under what conditions this financial actors could provide capital/be a source of capital for two specific risk mitigation instruments which could support the market. The research includes consultation with a diverse set of financiers, including private sector sources, such as commercial banks, private equity, and impact investment funds, as well as donor institutions, such as multilateral and bilateral development banks, international climate funds, and philanthropic grants and impact investments. The research explored the appetite of these financial actors for capitalizing a pilot catalytic instrument as a “green window” with funding in the range of \$5–10 million as well as a catalytic “green fund” at the \$200 million level.

In general, most development or philanthropic sources of capital were open to exploring ways to support the developing of risk mitigation instruments that could help to fill financing gaps for the solar markets in India, particularly the solar commercial and industrial segments. Philanthropy can deploy grants or patient, low cost capital, sometimes called, “impact” capital or investments. Impact capital can support catalytic solutions to develop markets for underserved and emerging markets that ultimately support commercial investment, which allows grant capacity to be focused on the most marginalized communities.

For the green fund concept, while “return expectations” are yet unknown, the role and function that is envisioned for this fund (e.g. “to ‘crowd-in’ private capital by using its funding to lowering risks for other investors”) implies that it will provide some form of risk sharing, or provide its funding with some level of “concessionality” (e.g. differences in price, tenor, rank or security (or combination) to lower perceived risks for other investors). While this does not necessarily imply differences in pricing (which would impact overall return profile of the fund), it does imply that the green fund’s funding is bearing more risk, which any outside investor would need to consider carefully before providing seed capital.

For the “green window” and specifically the potential to seed a pilot risk mitigation product such as a credit guarantee, there are some sources of private capital that may have an interest in acting as hosts, including domestic commercial banks. If domestic commercial banks host one of these instruments as a green window, they are likely to be required to put in some of their own capital, but in return they may require some form of risk sharing from public, development and/or patient sources to share the risks those

institutions may perceive for target markets for any guarantee or other catalytic instrument. Further, most multilateral development finance institutions actively work with emerging market financial institutions to establish guarantee mechanisms for a variety of sectors, including those in clean energy, and SMEs. These sources of capital, as well as philanthropic sources of capital are potential sources to seed a green window.<sup>60</sup>

In terms of whether there is a gap in financing options for small, distributed clean energy investments, local stakeholders indicated that the banking sector – and in particular the availability of debt for sustainable and/or clean energy investments – has been tight over the last few years. A facility that can be concessional in the pricing of its instruments in the market – at least in the initial stages – could go a long way to support and catalyze investment in this segment of the clean energy market in the short term (although such a facility should seek to minimize concessionality, and seek, wherever possible, to provide commercially oriented funding).

As part of the research, in terms of sources of seed capital for a either a (i) green fund, or (ii) a green window in an existing financial institution, stakeholders indicated that these two types of mechanisms designed to target small scale clean energy investments could be particularly attractive to the nearly 100 climate funds with mandates to focus on climate change.<sup>61</sup> Stakeholders also cautioned that, in general, larger international investors may continue to be reluctant to make these types of investments without some form of guarantee or risk sharing mechanisms (from public or donor sources) because of perceived risks and high transaction costs investing in the Indian market.<sup>62</sup>

Stakeholders in India noted that a either the window or the fund would be most valuable (e.g., provide “additionality”) if it: (i) considers providing a source of cheaper debt for the sector initially, (ii) helps to build portfolios to securitize (in the later years), and (iii) is a conduit for channeling green investments for a variety of investors (whether institutional or retail).

International stakeholders noted that the primary risk premium for external investors vis-à-vis investing into the Indian market is focused on two main components: (i) the foreign exchange risk that has averaged about 4.5% depreciation annually for several years; and (ii) the commercial pipeline (or lack thereof) risk. Taken together, external investors into the Indian market are translating those risks into approximately 2-3% return requirements above baseline expectations for those investors. A catalytic strategy for international investors could therefore initially consider developing tools to reduce foreign exchange and pipeline risks.

**It is also important that each green window, whether in IREDA, NABARD, or another entity, be well structured and sufficiently resourced to ensure that it will result in neither “green washing” nor inability to execute its mission.** To ensure this, some stakeholders have recommended creating a working group that could be constituted either within MNRE or as an inter-ministry working group that could include representation from other Ministries, such as the Ministry of Finance.

The working group could facilitate the development of a common set of green window principles, including the definition of “green”, the roles and activities of green windows, necessary new operational procedures, the range of investment strategies, and the institutional requirements for receiving funding from the government for green window activities. The working group could also facilitate capacity building, collaboration, and cross learning between green windows.

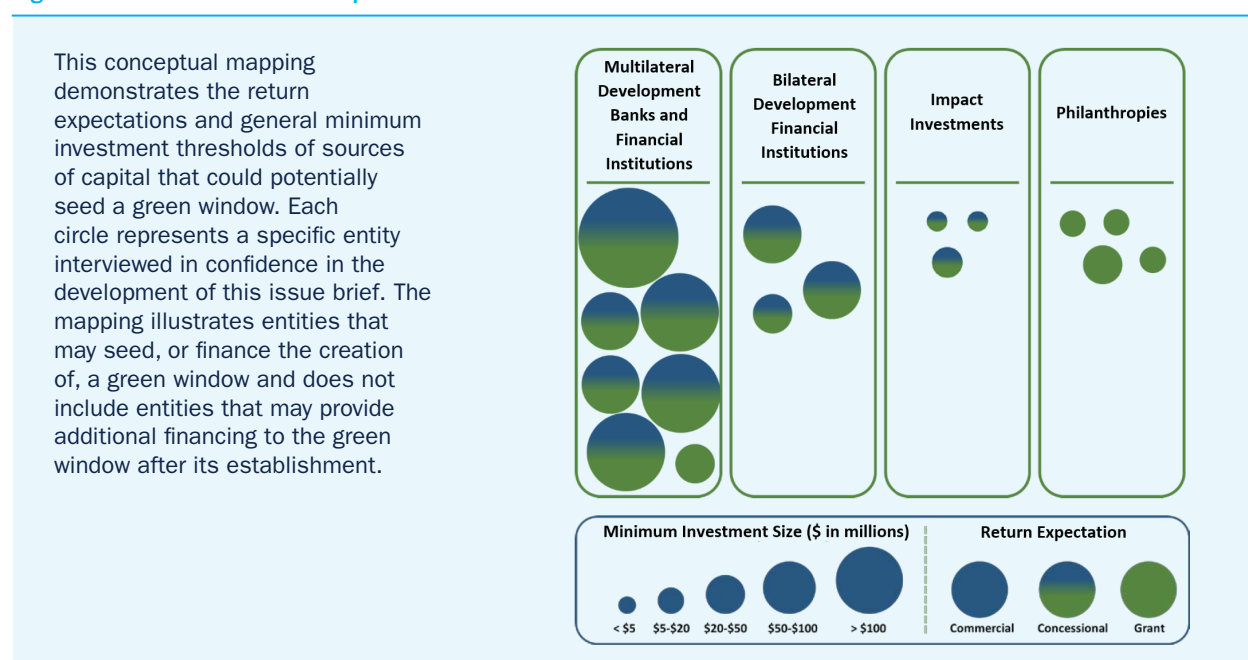
Developing green windows would involve three main steps:

- 1. Draft definitions and operating guidelines for green financing that determine which types of projects qualify as “green”.** The guidelines would further define underserved market segments and/or emerging technologies that qualify for concessional finance. Each green window would target sub-sectors under the host institution’s purview. Since “green washing” or passing off projects without proper verification is a concern for investors, a verification framework or guidelines would be developed. In the absence of internationally accepted “green” criteria, some large investors, such as bilateral and multilateral organizations as well as the Green Climate Fund and bodies facilitating markets for green bonds, have specified their own criteria. In India, as a securities regulator, SEBI has issued guidelines for “green bonds”. Credit rating agencies also offer “green tagging” of debt and financial assets based on internationally-accepted principles. Most of these guidelines are similar, but at times there are country-specific differences. Thus, the green window working group would ideally promulgate internationally accepted criteria defining “green projects” to reach the broadest range of investors with a common understanding of qualifying “green projects”.
- 2. Form “green teams” within each green window that have the specialized skill-set to undertake catalytic financing.** Green teams in public financial institutions would comprise specialists with clean energy sector experience to enhance in-house expertise in assessing technologies and barriers to bankability. Furthermore, these finance, engineering, and other sector professionals would be able to structure financial products tailored to the needs of diverse projects. Lastly, the compensation of these expert teams would align with the growth needs of the sector, and their performance would be measured against the green window’s success in achieving its specific mission.
- 3. Secure sources of capital to be used for catalytic finance, such as providing guarantees or technical assistance.** For example, for a \$20 million instrument, seed capital could be as low as \$5 million.<sup>52</sup> This capital would need to be patient (i.e., in the form of a grant or long-term, low cost debt) and most likely from an Indian government source.<sup>53</sup> The analysis also indicates that once the seed capital is provided, additional foreign capital could be sourced from multilateral development banks, bilateral development finance institutions, or “impact” funds through concessional debt, additional grants or patient equity.<sup>54</sup> Development finance institutions may be especially interested in participating if Indian commercial financial institutions also provide a portion of the capital, since they actively support expansion of credit by local banks to key sectors such as SMEs and clean energy, as described in Figure 2.





Figure 2: Potential Sources of Capital to Seed a Green Window



In analyzing whether to participate in the green window, potential investors will require understanding of:

- The regulatory and authorizing legal frameworks for the green window's operations
- The green window's capabilities, based on the professional expertise of the green team managing it, to structure specific financial instruments
- Whether the green window will deploy co-financing or otherwise share in the financing risk/return of the instrument(s)
- How executing and deploying the instrument will impact risk-related elements that may directly impact the green window and its host institution

Expert stakeholders would be included in developing these areas, including the Reserve Bank of India for specialized items.

## B. Single Green Fund Option

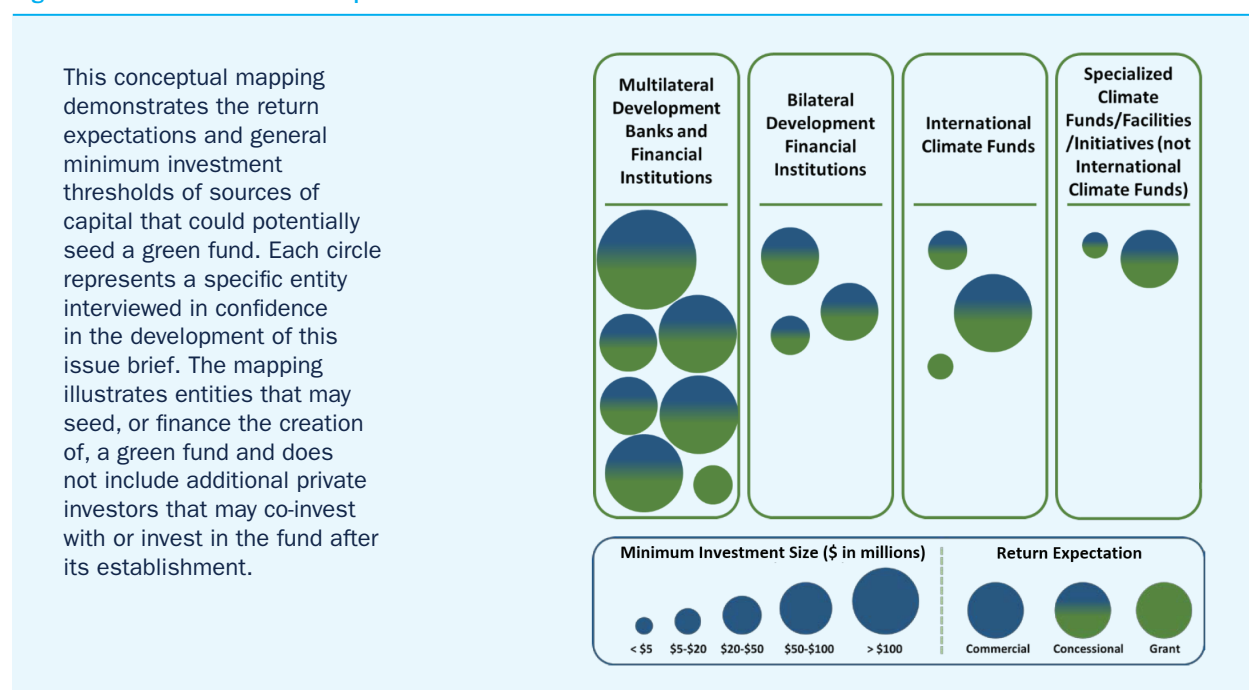
**A second option for developing specialized catalytic finance vehicles could be a single, centralized green fund.** The fund would seek to achieve the same outcomes as the green windows, but as an independent entity. Unlike a green window scheme, in which separate windows target market segments within its host institution's purview (e.g., agriculture and rural for NABARD and SMEs for SIDBI), the fund would be empowered to develop products and strategies for any clean energy subsector permitted under its charter. Internationally, green funds, also known as green banks, have been effective in deploying catalytic finance.

**Based on preliminary analysis, the fund could be established with an initial funding commitment by the government and would operate as a revolving fund.**<sup>55</sup> Government funding should comprise 50% or less of the fund so that it is not a state-owned entity. The fund's mission would be to "crowd-in" private capital by using catalytic finance. The fund would select a third-party investment fund management team based on a competitive process that would independently manage the fund and potentially also contribute investment capital.

**The fund would require significantly more capital than a pilot green window – in the range of (\$100–200 million) in total – with investors making investments of \$25–50 million each, as described in Figure 3.** Multilateral and bilateral funders would be the most likely investors in the fund, particularly if the government pre-commits cornerstone funding. This strategy has proven effective in attracting the UK government as a co-investor in the GGEF, as discussed in Section III.B.2. Private investors would be

unlikely to participate in the seed round of the fund but could be interested in co-financing, especially if there is a strong private manager and independent governance structure to ensure market orientation and accountability. If successful, private investors could join in later rounds.<sup>56</sup>

**Figure 3: Potential Sources of Capital to Seed a Green Fund**



In analyzing whether to participate in the green fund, potential investors will require an understanding of:

- The legal structure, role in authorizing the fund, and mission of the public financial institution or fund manager seeking to operate the fund
- The governance and organizational capabilities of the public financial institution or fund manager seeking to operate the fund
- The market size, investment and co-financing potential for the target sectors and segments the fund wishes to address
- The legal and tax implications for foreign and domestic investors into the fund
- The fund's mission, investment thesis, risk appetite and time horizon for activities
- Other sources of seed capital, and the requirements, constraints or limitations of those sources

Structurally, the fund could be established as a private company or trust, either by the government of India or by a public financial institution (such as IREDA); or as a joint venture between financial institutions (similar to EESL) or between public financial institutions and private sector entities.





**To facilitate a diversity of lending, equity, and technical assistance activities, the fund may have to be set up across multiple entities managed under a common scheme.** The fund's catalytic financing product offerings could be undertaken by a new non-deposit taking NBFC that could operate as a purely private sector entity, provided that direct or indirect government ownership (through a government company) is less than 51% of the fund's shares.

**To the extent that the fund is mandated to provide grant-funded technical assistance, it could form a non-profit "Section 8" company.<sup>57</sup> To the extent it seeks to invest in equity, an alternative investment fund (AIF-1 or AIF-2) could also be formed to ease compliance with regulatory requirements.** The fund would be empowered to directly invest in and provide financing to a variety of clean energy technologies in India. Further, the fund would also provide a multitude of services, such as credit enhancement, loans, and warehousing facilities, among others. As an integrated scheme, the fund would be able to provide loans, accept grants, attract long-term patient capital, invest in equity, provide viability gap funding, and make other investments.<sup>58</sup>

**Table 1: Potential Investors for Catalytic Finance**

Table 1 demonstrates the types of investor institutions that were surveyed, reviewed, and researched in the development of this issue brief. The table summarizes the return expectations and potential investment sizes of the nearly 40 confidential entities interviewed across the investor institution types.<sup>59</sup> The table also includes the tenors of potential investments, which represents temporal return expectations: patient loans provide longer time horizons for returns of capital than market-based loans.

The return expectations, investment sizes, and tenors of each type of investor institution determines the appropriateness and feasibility of the investor in seeding – or financing the creation of – the two catalytic financing strategies. Some investor types can potentially seed both green windows and green funds, while others are better suited to seed one specific strategy. While many private-sector investors may not seed the creation of a catalytic finance strategy, the strategies are designed to attract additional private sector financing after their establishment.

Ownership	Investor	Return Expectation	Investment Size (\$ in millions)	Tenor	Type of Catalytic Finance Investment
Public	Multilateral Development Banks	Concessional	\$50–500+	Patient	Both
	Bilateral Development Finance Institutions	Concessional	\$20–100+	Patient	Both
	Specialized Climate Funds, Facilities, and Initiatives	Concessional	\$5–100	Patient	Both
	International Climate Funds	Grant – Concessional	\$20–400+	Patient	Green Fund
Private	Impact Investors	Concessional – Commercial	\$1–20	Patient to Market-based	Green Window
	Philanthropy	Grant	\$1–50	No return expectation	Green Window
	International Commercial Banks	Commercial	\$20–100	Market-based	Not seed funder, but potential future investor
	Private Equity, Venture Capital, Infrastructure Funds	Commercial	\$20–200+	Market-based	Not seed funder, but potential future investor
	Asset Managers	Commercial	\$20–200+	Market-based	Not seed funder, but potential future investor
	Domestic Private Commercial Banks	Commercial	\$20–100	Market-based	Possibly green window tranche funder but more likely potential future investor
	Institutional Investors and Pension Funds	Commercial	\$20–100	Market-based	Not seed funder, but potential future investor

Source: Commissioned Climate Finance Advisors Study (2018).

**Table 2: Value Proposition of Green Windows and Green Funds**

While the green window and green fund approaches are not mutually exclusive, they present slightly different value propositions, as examined below.

Value Proposition	Green Window	Green Fund	Discussion
Diversify investors and increase investment (domestic and international)	X	X	Both the green window and green fund approaches would leverage limited public funds to crowd-in domestic and international investors to increase the total amount invested in clean energy. The green window(s) would be set up in different institutions (e.g., IREDA, NABARD) to deploy catalytic instruments in each institution's targeted sectors; whereas the green fund would centralize catalytic activity on a single platform.
Increase access to finance for under-served markets and support emerging technologies to be market-ready	X	X	Both the green window and green fund approaches would support growth to underserved markets and emerging technologies. The green window approach is more specialized with respect to the sectors targeted by the host public financial institutions e.g. rural sector, or small business sector), whereas a green fund could be more efficient in increasing deal volume and generating economies of scale due to its centralized structure.
Boost the Indian market's reputation in finance innovations	X	X	Both the green window and green fund approaches boost the reputation of the Indian market globally but at different scales.
Speed to market and ease of implementation	X		Green windows may be easier to set up in the Indian context since they can rely on the resources of their host institutions. Green windows will likely need new operational governance guidelines to ensure they have the ability to actually crowd-in capital. Creating a new and independent green fund would require more coordination and planning to set up.
Leverage strengths of existing public financial institutions hosting the green window	X		The green window approach leverages the existing host institution's brand, infrastructure, networks, and understanding of specialized market players. The green fund would be new with little brand recognition and few relationships.
Create mission-driven institutional culture to "crowd-in" mainstream capital	X	X	Both approaches bring in new expertise and perspectives that prioritize stimulating new capital for underserved markets, rather than competing with private financiers. The cultural shift could happen faster in a newly created green fund. In green windows, small, new teams would operate within a larger institution and its existing culture.
Strengthen market confidence		X	A green fund managed by an independent fund manager for a could more easily attract private capital than green window managed by public financial institution's existing management insofar as it could instill more confidence in terms of a successful track record and independence from government to investors.
Extend financial access to small projects	X	X	Both the green window and green fund approaches could target increasing financing to small projects and developers.
Track and collect clean energy data for better analytics	X	X	Both the green window and green fund approaches could improve market data tracking and aggregation. The green fund approach may be more limited since it focuses on the activities of a single institution, whereas the Indian government could collect data from multiple green windows for a more comprehensive view of the clean energy market.
Achieve climate targets	X	X	Both approaches have the potential to help achieve targets for distributed renewable energy, but a green fund may be more efficient and effective given its scale.



## V. CONCLUSION

To scale clean energy, especially for underserved markets, strong policy frameworks and incentive structures need to be adopted. Catalytic finance can help propel India's emerging and underserved clean energy markets.

The analysis and landscape mapping in this issue brief provides a framework that identifies directional options for capitalizing and establishing catalytic finance approaches in India. Catalytic finance can leverage limited public funds and unlock broader private investment. The green window and green fund approaches each offer solutions to overcome financing barriers and can play a significant role in achieving India's clean energy targets, combating climate change, and protecting public health.

The concepts and ideas presented in this report were discussed at a roundtable of policy makers, representatives from public financial institutions, private sector lenders, developers of rooftop solar projects, foundations and multilateral funders. Stakeholders at the roundtable agreed that setting up green windows offering catalytic finance solutions in existing financial institutions would increase focus on the unique needs of underserved segments of the clean energy market in India.

Policy makers, too, endorse the concept of green windows and believe it will give comfort to investors that their funds will be used for the intended purpose of financing clean energy. Participants stressed that the time has come for green windows and they should be set up at scale and not as a pilot. Bilateral finance institutions and philanthropic funds around the table expressed interest in supporting green windows and the catalytic solutions they will offer. Public financial institutions at the workshop gave examples of existing initiatives they have undertaken that grow the clean energy markets and conform to the concept of catalytic financing, but also recognized the need for institutional mechanisms to provide requisite focus and scale. Additionally, commercial financiers indicated that the availability of catalytic solutions would help them enter deeper into the clean energy markets.

The roundtable concluded with the consensus that the concept of offering catalytic solutions via green windows should be operationalised. Public financial institutions need to take the lead in announcing their intention to implement green windows as there is clearly a need, rationale and funds that can support the concept, and that the mechanism can be effective in bringing catalytic finance solutions to market and helping to achieve the true potential of clean energy in the country.



## ENDNOTES

- 1 Ministry of New and Renewable Energy, *Physical Progress (Achievements)* <https://mnre.gov.in/physical-progress-achievements> (accessed June 15, 2018).
- 2 The term “underserved” refers to market segments that have not received financing proportionate to their potential. This could be due to inadequate policy focus, inherent risk perception, credit quality, disaggregation, or other factors. A good proportion of such market segments are commercially viable and, with support from catalytic finance, able to scale up to their true potential.
- 3 Some analyst analysts suggest that total rooftop capacity may only reach between 10 to 15 GW by 2022. See Bridge to India, “Bridge to India cuts rooftop solar forecast to 10.8 GW by 2021”, <http://www.bridgetoindia.com/press/bridge-india-cuts-rooftop-solar-forecast-10-8-gw-2021/> (accessed June 15, 2018); Bloomberg New Energy Finance, *New Energy Outlook 2018*, <https://about.bnef.com/new-energy-outlook/> (accessed July 2, 2018).
- 4 RBI, Sectoral Deployment of Bank Credit, [https://rbi.org.in/Scripts/BS\\_PressReleaseDisplay.aspx?prid=44074](https://rbi.org.in/Scripts/BS_PressReleaseDisplay.aspx?prid=44074), April 2018; Bloomberg New Energy Finance BNEF, *Accelerating India's Clean Energy Transition*, <https://about.bnef.com/blog/accelerating-india-clean-energy-transition/>, November 2017.
- 5 Catalytic finance need not be solely funded by the government. It can make use of “blended finance” – defined by OECD as the strategic use of development finance for the mobilization of additional finance towards sustainable development in developing countries. Blended finance includes development, and donor funds – to mobilize private capital flows to target markets. These blended structures can have a substantial impact by shifting the investment risk-return profile for private investors by using flexible capital and favorable terms. OECD Blended Finance Principles <http://www.oecd.org/dac/financing-sustainable-development/development-finance-topics/OECD-Blended-Finance-Principles.pdf>
- 6 In addition to the stakeholder discussions and roundtables in 2017 and 2018, additional targeted research on catalytic finance was done in 2018. In response to government and stakeholder requests, international consultancy Climate Finance Advisors (Climate Finance Advisors Study) was commissioned to conduct primary research, interviews, and desktop research with domestic and international financial institutions to determine whether and under what conditions this financial actors could provide capital/ be a source of capital for two specific risk mitigation instruments which could support the market.
- 7 The Indian market has many active public financial institutions, and this list is not meant to be exhaustive, including IREDA, NABARD, SIDBI, State Bank of India (SBI), Power Finance Corporation (PFC), PTC India Financial Services Ltd.(PFS), IIFCL, SECI, among others are important institutions that can play a vital role and need additional, focused research as catalytic solutions are developed; Bloomberg New Energy Finance BNEF, *Cheaper Capital Lets IPPs Flex Muscles in Indian Auctions*, December 2017.
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  - 48 The calculations assume a private investment to public investment leverage ratio ranging between 2:1 and 7:1 based on reported experience of other leading green banks, including 2:1 (Australia CEFC), 2.5:1 (UK GIB), 3:1 (NY Green Bank) 7:1 (Connecticut Green Bank) and 7:1 (Japan Green Finance Organization). See table below.

Methodology, Inputs and Summary Calculations		Notes
Capital required to meet remaining target	\$83 billion	As per BNEF estimate (Bloomberg New Energy Finance, <i>Accelerating India's Clean Energy Transition</i> , November 2017)
Ratio of private to public investment	2:1 to 7:1	Range based on international experience; leverage ratio varies greatly by product and markets; for some products, such as warehousing and aggregation, this ratio is around 10:1, while for other debt products it is usually around 2:1.
Initial catalytic capital	\$200 million	From a combination of government funds and other sources of capital including multilateral development banks and bilateral and multilateral development financial institutions.
Repayment and reinvestment period	Initial capital begins to be repaid and reinvested starting year 6. Repayment year 6 to 10 as 10%, 15%, 25%, 25%, 25% respectively. Total impact aggregated over 10 years.	

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- 56 For example, after three years of successful offshore wind investments, the UK-based Green Investment Group was able to attract pension and sovereign wealth funds into the first offshore wind fund which invested in UK assets and was the largest renewable energy fund in the world.

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- 60 Most MDBs and many DFIs provide both (i) guarantees to local emerging market financial institutions to enable those FIs to lend into a new sector, such as distributed generation, and (ii) help seed guarantee mechanisms housed within FIs or public agencies which can be used for providing these instruments in the market(s), which facilitates greater access to capital to local projects. Philanthropic sources are driven more by social and environmental impact rather than return expectations and may be open to providing capital directed towards clean energy access for high risk, marginalized segments. In order to not distort market return expectations philanthropy funds can be bundled with other sources of capital.
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## Notes

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## Notes

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## Highlighted Resources



### Accelerating Clean Energy in India: More Financing and More Jobs

<https://assets.nrdc.org/sites/default/files/accelerating-clean-energy-india-fs.pdf>



### Setting Up a Green Bank A Solution to India's Clean Energy Finance Barriers

<https://assets.nrdc.org/sites/default/files/india-green-bank-clean-energy-finance-barriers-fs.pdf>



### Greening India's Financial Market: Opportunities for a Green Bank in India

<https://assets.nrdc.org/sites/default/files/india-financial-market-opportunities-green-bank-report.pdf>



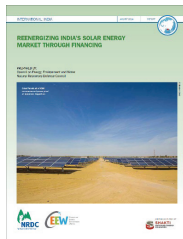
### Greening India's Financial Market: How Green Bonds Can Drive Clean Energy Deployment

<https://assets.nrdc.org/sites/default/files/india-financial-market-green-bonds-report.pdf>



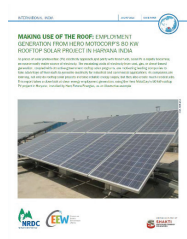
### Surging Ahead: Scaling India's Clean Energy Market Through Jobs and Financing

<https://assets.nrdc.org/sites/default/files/india-renewable-energy-jobs-IB.pdf>



### Reenergizing India's Solar Energy Market through Financing

<https://assets.nrdc.org/sites/default/files/renewable-energy-solar-financing-report.pdf>



### Making Use of the Roof: Employment Generation from Hero MotoCorp's 80 kW Rooftop Solar Project in Haryana India

<https://assets.nrdc.org/sites/default/files/renewable-energy-solar-jobs-hero-IP.pdf>



### A Second Wind for India's Energy Market: Financing Mechanisms to Support India's National Wind Energy Mission

<https://www.nrdc.org/sites/default/files/renewable-energy-wind-financing-IP.pdf>



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