



# GROWING CLEAN ENERGY MARKETS IN INDIA WITH GREEN WINDOWS



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# INTRODUCTION

The last decade has seen a spectacular growth of renewable energy in India. From 2010 to the end of 2019, India's installed renewable energy capacity grew fivefold to reach 86 gigawatt (GW).<sup>1</sup> India's strategic decision to prioritize renewables has had a big impact in providing much needed clean energy access to millions, while creating significant employment opportunities for the country's growing workforce.

Despite the remarkable growth so far, the road ahead is much steeper. India aims to achieve another five-fold increase in renewables to a whopping 450 GW by 2030.<sup>2</sup> Most long-term projections see India's grid growing even larger to 2,400 GW, with as high as 1,000 GW of renewable energy by 2050.<sup>3</sup> Even near-term targets are challenging. New solar capacity addition has slowed down from 9.4 GW in FY18 to 6.5 GW in FY19 and just 2.9 GW in the first half of FY20.<sup>4</sup> To achieve its 175 GW by 2022 target, India's installed renewable energy capacity needs to double in the next two years.<sup>5</sup>

Availability of finance at appropriate terms, for all market segments, is one of the key factors influencing clean energy growth. The 2022 renewable energy target needs an investment of around USD 80 billion.<sup>6</sup> This equates to annual investments of over USD 25 billion every year from FY20 to FY22. Much higher investments are needed to accomplish India's clean energy commitments under the Paris Agreement– of the order of USD 330 billion between 2019 and 2030.<sup>7</sup> With the current level of annual clean energy investment being approximately USD 10 billion, the country would have to triple the investment rate and at least maintain that level for this decade.<sup>8</sup>

Availability of finance is even more crucial for smaller-scale clean energy projects in underserved markets such as off-grid and rooftop solar, that are lagging, in part, due to lack of access to long-term, reasonably priced credit. 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 that address risk perceptions of investors, financing may not keep pace with government targets and consumer demand. It is in this context, institutional clean energy finance solutions called “Green Windows” can have a transformative impact in catalyzing clean energy investment and spur market growth.

A framework for catalytic finance – including Green Windows - was developed in 2018 starting with market assessment and stakeholder consultations. At the UNFCCC Climate Conference in Madrid in December 2019, the Ministry of New and Renewable Energy (MNRE) announced plans to implement the first Green Window in India hosted by the Indian Renewable Energy Development Agency (IREDA).<sup>9</sup> IREDA, with support from knowledge partners NRDC and CEEW, is now developing an operational plan which includes the mission, the mandate, target market segments, performance metrics, and a roadmap for implementation of the Green Window.<sup>10</sup>

In this issue brief we describe the Green Window concept, its operationalization, and market impact in India.



Photo Credit: NRDC, 2019

**In last decade India's  
installed renewable  
energy capacity grew  
fivefold to reach**

**86 GW**

## GREEN WINDOW CONCEPT

India has a long history of clean energy lending. IREDA, a public sector company established in 1987, is a global pioneer in this space. Other government-owned institutions such as National Bank for Agriculture and Rural Development (NABARD), Small Industrial Development Bank of India (SIDBI) and the State Bank group have also been active lenders to clean energy. However, often these lenders compete for share of the same market that favors few large-scale highly creditworthy projects.

To grow the size of the clean energy market, stakeholders, led by MNRE, have identified setting up dedicated “Green Windows” within or alongside of key public sector financial institutions. The Green Window approach positions public finance as an activator of greater private investment for mission-defined sectors by using strategies that include risk mitigation, aggregation of small projects to diversify risk and to scale, strategic public-private co-investments, demonstration projects and market development activities. Each Green Window will have an expert team with access to a dedicated ring-fenced pool of low-cost capital that can be leveraged to attract private investment for clean energy. Institutions with Green Windows would therefore transition from solely being financiers to mobilizers of investment.

The Green Windows concept, although developed locally in India, is based on the globally successful green investment bank model. Several national and subnational governments including South Africa, United Kingdom, Australia, Japan, and the states of Connecticut and New York in the United

States, have established green investment banks as publicly capitalized, domestically focused, specialist financial institutions specifically established to crowd in private capital to investments in low-carbon climate resilient infrastructure including renewable energy.<sup>11</sup>

## GREEN WINDOW VALUE PROPOSITION

Green Windows will build upon the strength of the host financial institution and complement its existing scope of business. Ways in which Green Windows can amplify the impact on clean energy markets are summarized below:

- i. **Expand clean energy investment:** Public capital from taxpayer funds is neither sufficient nor efficient in financing India's renewable energy goals and ensuring a rapid transition to a clean energy economy. Therefore, the Green Window is designed to drive, and ultimately rely on, private sector investment. Green Windows would leverage limited public funds to attract domestic and international investors to increase the total volume of capital invested in clean energy. A Green Window would aim to recycle the public funds and return on its capital into its operations for investing back in the market. Experience from global Green Banks indicates that Green Windows may be able to leverage three to four times investment for every public rupee used.<sup>12</sup>
- ii. **Attract international capital:** India, a rapidly growing economy and one of the biggest investment opportunities for global investors, is still perceived as high-risk market. Green Windows can act as intermediaries in attracting international climate finance for low carbon infrastructure in India. Green Windows, by virtue of being backed by strong domestic financial institutions, can alleviate this risk perception.
- iii. **Develop underserved clean energy market segments:** In India, large utility-scale renewables have garnered a major share of investment so far. Distributed energy resources (DER) such as rooftop solar, energy efficiency, and off-grid renewables add resilience to the grid and improve electricity distribution efficiency. Green Windows can support growth in underserved DER markets by aggregating smaller projects and by improving risk-return profiles. Green Windows can also help finance emerging technologies by demonstrating commercial viability in these segments.
- iv. **Provide market development services:** A critical barrier to customer adoption of clean energy solutions is lack of clear information on the value, the process and the options for purchase, information on and comparison between providers, and other information needed to make a confident purchase decision. There is no central point to find this kind of information. Green Windows can gather and publish such information, serving as

### Box 1: Indian Financial Sector and Clean Energy Financing

The Indian economy is the third largest economy in the world in terms of GDP at purchasing power parity (PPP) exchange rates, with an estimated GDP in PPP terms, for 2018 of \$10.49 trillion.<sup>29</sup> Under current regulation, 100% FDI is allowed under automatic route for projects of renewable power generation and distribution subject to provisions of The Electricity Act, 2003.<sup>30</sup>

Other than Banks, Non-Banking Finance Companies (NBFC) have been significant lenders to clean energy projects in India. Recent developments in the Indian domestic financial markets have brought the focus on the NBFC sector especially with regards to their exposures, quality of assets, and asset-liability mismatches. Gross non-performing assets of the NBFC sector as a percentage of total advances increased from 5.8% in Fiscal Year 2018 to 6.6% in Fiscal Year 2019.<sup>31</sup> Overall, experts note that there has been a squeeze on bank lending to NBFCs resulting in fewer funds for on-lending by NBFCs.

Lending to clean energy projects has been further impacted by risk aversion due to lingering delays in payment by distribution companies and renegotiation of Power Purchase Agreements (PPA) in Andhra Pradesh and other states.

a single repository for all resources relevant to a clean energy market.

**v. Help meet, and exceed, India's climate goals:**

Green Windows can help mainstream sustainable finance by integrating climate change impact in all its financial investments. Green Windows would be well-positioned to track and drive greenhouse gas emission reductions by their project selection criteria and develop the underserved clean energy segments to grow to commercial scales. Overall, Green Windows can contribute significantly to help meet and even exceed the country's clean energy and climate goals.

## NURTURING CLEAN ENERGY MARKETS WITH GREEN WINDOWS

Each Green Window will assess various clean energy market segments to evaluate the risk return profile and design suitable instruments to address the market gaps. For illustrative purposes, an initial suite of products and financial instruments under the Green Window could include the following:

- **Credit Enhancement:** The Green Window can attract more private capital at affordable rates through credit enhancements. Financing structures, such as loan loss reserves or loan guarantees, help improve the risk-return profile of clean energy projects making them viable for commercial investors and enabling more capital to flow to such projects. Credit enhancement can provide security to a lender and allow investors to become familiar with new market segments and improve deal economics for the borrower. IREDA's proposed Credit Guarantee Mechanism for rooftop solar is a good example of credit enhancement for underserved markets.<sup>13</sup> Such a facility will provide required comfort

to commercial banks and NBFCs to lend to renewable energy service companies RESCOs. This product can potentially leverage about five-six times the initial capital from commercial lenders.<sup>14</sup>

- **Co-financing:** When co-investment occurs alongside a more experienced and patient clean energy investor, new investors gain better understanding and confidence with the new technology and/or business model. The Green Window can directly invest in clean energy projects—through senior or subordinated debt—in partnership with private investors for new technology projects that private capital would shy away from. If a project is only able to secure financing for a portion of the total costs, the Green Window can provide gap financing that is needed to close the deal by way of co-investments. This kind of instrument can effectively utilize low-cost public capital to offer credit at financially viable terms to market segments such as mini and micro grids, battery storage, and electric mobility.
- **Warehousing and securitization:** Small DER projects have higher transaction costs relative to their value, which makes them relatively more expensive and lead to inefficient use of capital for many investors. Moreover, these projects may differ in terms of credit-profiles, technology and location. This makes the projects relatively expensive to underwrite for a commercial lender compared to large clean energy projects. However, pooling or bundling such loans will help diversify risk, achieve scale and make these projects more attractive to lenders. A Green Window can accomplish this by underwriting loans and building a portfolio. Over time with a track record of performance, the Green Window could consider other interventions such as credit enhancement, and securitization and offloading to capital market investors to attract a new set of investors such as mutual funds into this market segment.



Photo Credit: NRDC, 2019

**Table 1. summarizes select clean energy market segments and indicative catalytic solutions that the Green Window can provide.<sup>15</sup>**

Market Segment	Opportunity	Market Gaps	Green Window Solutions
Rooftop Solar	<ul style="list-style-type: none"> <li>The rooftop sector saw record high growth in fiscal year 2019.</li> <li>A cumulative annual growth rate of more than 100% is required in the next three years to achieve the 40 GW target.<sup>16</sup></li> <li>While capex is still the dominant business model in the rooftop market, RESCO model has gained traction over the last few years.</li> </ul>	<ul style="list-style-type: none"> <li>Higher transaction costs due to disaggregated markets and low-ticket sizes</li> <li>Off-taker credit risk</li> </ul>	<ul style="list-style-type: none"> <li>Advisory services for improving bankability</li> <li>Fee-based credit guarantee mechanism</li> <li>Bulk procurement and aggregation techniques</li> </ul>
Clean energy access in rural and agricultural markets	<ul style="list-style-type: none"> <li>Kusum scheme has identified rural and distributed renewables as a focus for India</li> <li>Farm sector and non-farm market opportunity of USD 50 billion exists for clean energy innovations powering livelihoods in rural India</li> </ul>	<ul style="list-style-type: none"> <li>Disaggregated market and small ticket size</li> <li>Lack of awareness and capacity</li> <li>Policy uncertainty</li> <li>Bankability of projects</li> </ul>	<ul style="list-style-type: none"> <li>Advisory services</li> <li>Refinancing distributed renewable energy portfolios of direct lenders to provide liquidity support</li> <li>Buyout securitized portfolios to free up capital for reinvestment</li> </ul>
Energy Storage	<ul style="list-style-type: none"> <li>Estimate by NITI Aayog shows a potential market size of \$300 billion for energy storage in India by 2030.<sup>17</sup></li> <li>In 2018, India's total energy storage market from stationary applications was around 24 GWh. During 2019-2025, the cumulative potential of energy storage is estimated to be between 270 to 365 GWh.<sup>18</sup></li> </ul>	<ul style="list-style-type: none"> <li>Lack of competition in markets</li> <li>Access to affordable financing instruments</li> <li>Limited local experience and knowledge of energy storage</li> </ul>	<ul style="list-style-type: none"> <li>Market development services</li> <li>Capacity building and training</li> <li>Co-investment</li> <li>Bulk procurement and aggregation techniques</li> </ul>

## Investment Philosophy

Globally, green banks have demonstrated that financing underserved or new market segments and thus expanding clean energy markets is not just environmentally beneficial but also commercially viable.<sup>19</sup> Green Windows can aim to grow their capital through their investment and pricing decisions. However, unlike typical commercial financial institutions, Green Windows would be driven primarily by their mission to grow clean energy market in India and bring in private and commercial investors.

Based on needs of the Indian market and learning from global best practices, the Green Window could focus on supporting projects that contribute to low-carbon infrastructure and climate-related goals.<sup>20</sup>

The investment criteria of a Green Window may include the following:<sup>21</sup>

- Projects must contribute to market transformation and demonstrate that they can materially and sustainably expand markets in terms of scale, improve private sector participation, confidence in clean energy investments, and other similar aspects.
- Transactions must demonstrate leverage and the ability to crowd-in commercial investment.
- Projects funded include those that although are technically and economically feasible, may not be able

to secure financing from commercial investors due to specific risks. Co-investments and other risk mitigation products offered by the GW will serve to mitigate these risks and attract such investors.

- The Green Window would blend concessional and market priced capital to maximize public benefit over time.



## CAPITALIZING A GREEN WINDOW

India is recognized globally as vital to fighting climate change. With large clean energy and infrastructure needs, India offers attractive options for international and domestic financiers to participate in capitalizing Green Windows. Given its objectives, a Green Window will likely need a portion, or all, of its sources of capital to be patient, in the form of concessional equity and debt. Once operationalized, the Green Window may also be able to attract commercial capital, provided that some patient and/or concessional capital anchors the fund and is used for risk-sharing among initial investors.

Primary research, commissioned by NRDC, with nearly 40 domestic and international financial institutions indicated that the Green Window approach of targeting underserved and emerging clean energy segments could be particularly attractive to several climate-aligned financial institutions with mandates to focus on climate change. We summarize key capital providers that could potentially provide capital to Green Windows in India.

### *The Green Climate Fund and Other Climate Funds*

The Green Climate Fund (GCF), established under United Nations Framework Convention on Climate Change (UNFCCC), aims to catalyze a flow of climate finance to invest in low-emission and climate-resilient development. The Fund's investments can be in the form of grants, loans, equity or guarantees. Every project the GCF Board agrees to fund must be endorsed, expressed via a "no-objection" letter, by the National Designated Agency, which is the Ministry of Environment and Forests for India. In India, NABARD, SIDBI, Yes Bank, and IDFC have been selected as the Accredited Entities (AE) with the GCF Applicants have the choice to go with any AE serving that location. All proposals from India require a no-objection letter from the MOEFCC. In 2018, through NABARD as AE, Tata Cleantech Capital Limited (TCCL) secured \$100 million line for Rooftop Solar PV of which 50% has already been disbursed.<sup>22</sup>

The Global Environmental Facility (GEF), established in 1992, is another global fund that supports developing countries to meet the objectives of the international environmental conventions and agreements. GEF has financed clean energy projects in India and can be a source of co-capitalization for Green Windows.

### *Development Banks*

Multilateral and bilateral organisations aim to impact the clean energy sector beyond business as usual trajectories

#### **Box 2:** Capitalizing the Development Bank of Southern Africa (DBSA) Climate Finance Facility

The Development Bank of Southern Africa (DBSA) has many similarities with Indian NBFCs such as IREDA and NABARD. Wholly owned by the South African government, the DBSA is accountable to the Ministry of Finance and has an independent board of directors. With the objective of transiting the country to a greener economy, the South African government established a Green Fund within the DBSA in 2012.<sup>32</sup> The Green Fund had a successful run financing 55 low-carbon development projects.<sup>33</sup>



To further scale up its climate mainstreaming efforts, the DBSA decided to set up a dedicated Climate Finance Facility (CFF) and applied for Green Climate Fund (GCF) funding in March 2018. The GCF subsequently approved seed funding of \$55.6 million which is matched by the DBSA and will together make up two-thirds of the initial capitalization of the CFF. For the remaining third, DBSA and its partners have garnered additional interest from large institutional investors and development finance institutions.

The CFF is a lending facility that aims to address market constraints, play a catalytic role with a blended finance approach, and to increase climate related investments in the Southern African region. The CFF is based on the Green Bank model and adapted for emerging market conditions. It offers globally significant proof-of-concept value to middle- and lower-income nations seeking to address market barriers and quickly scale up the high levels of private investment required by Paris climate commitments.

The CFF Programme aims to fill market gaps and crowd-in private investment, targeting commercially viable technologies that cannot currently attract market-rate capital at scale. It will focus on infrastructure projects that mitigate or adapt to climate change and utilize two main instruments: subordinated debt / first-loss, and credit enhancements such as tenor extension to projects that are commercially viable but not currently being financed by the private sector banks. The CFF will not fund projects that could be funded solely by commercial banks. Projects will be required to demonstrate that they are focused on technically and economically feasible transactions where there is market interest but limited capital availability.<sup>34</sup>

and have been a significant source of capital for clean energy financing in India. Multilateral development banks (MDB) actively work with emerging market financial institutions and support them with grants, equity and concessional loans for development and growth of sectors and markets that are vital to sustainable economic development in the host countries. This philosophy is aligned with the Green Window mission, making Green Windows an attractive investment opportunity for MDBs.

## Impact Investment

According to the Global Impact Investor Network (GIIN), impact investments are “investments made with the intention to generate positive, measurable social and environmental impact alongside a financial return.”<sup>23</sup> Impact investments are well suited to support projects in newer technologies such as electric vehicle charging facilities or battery swapping business ventures as these have not yet attained full commercialization. Impact investors bring patient equity with typically longer investment time frames and moderated rate of return expectations and can be an ideal co-investor in Green Window projects.

## Philanthropic Sources

Philanthropies can play a significantly constructive role by providing the initial seed capital for the green window. This will help create a low-cost capital base along with the promoting institution's own capital. Additionally, they can extend grant funding to help build capacities of project developers that maybe start-ups or SMEs and may lack resources to prepare funding proposals. The US-India Clean Energy Finance (USICEF) initiative is a good example of philanthropic organizations coming together to create a fund for advancing distributed solar and energy access in underserved regions of India, by supporting early stage development.<sup>24</sup>

## Recurring Public Charges

In India, one of the largest environmental funds, formerly known as the National Clean Energy Fund, was created by applying a cess on coal consumption. While the fund has now been repurposed for compensating states for a unified sales tax that was rolled out in 2019, it set a good precedent for utilizing recurring public charges for protecting the environment and fighting air pollution and climate change. Similarly, some state-level Green Banks in other countries, such as the Connecticut Green Bank in the United States, levy a small charge on utility ratepayers which is aggregated and used for greening the grid and promoting clean energy.<sup>25</sup> Green Windows in India can benefit from a recurring source of capital that continues to accelerate clean energy transition.

## MEASURING SUCCESS

The overall objective of a Green Window can be maximizing the amount of clean energy generated (or energy saved) per rupee of public funds at risk and deploying funds profitably.

Preliminary analysis indicates that a \$50 million commitment for seed funding in a Green Window, in the form of government or public financial institution equity, can mobilize up to \$3.2 billion in total investments over a 10-year

period and help create self-sustaining clean energy market in India.<sup>26</sup> With this expected investment, over the period 2019-2030, as high as 43 million tons of CO<sub>2</sub> can be avoided because of Green Window investments accelerating public and private investment in clean energy.<sup>27</sup> The impact of multiple Green Windows could be additive as each one could target different market segments based on the core strengths and business strategy of the host institution.

In addition to mobilizing investment, there are multiple measures of direct and indirect benefits of a Green Window. Green Banks across the world use a combination of metrics to measure and report their impact which can be adapted for monitoring and reporting performance of a Green Window.<sup>28</sup>

Some of these are listed below:

- **Capital mobilized** – the amount of total project costs mobilized for each rupee committed by the Green Window; growth in clean energy finance market; improved (over baseline) terms of financing including reduction in cost of funding per megawatt.
- **Clean energy capacity installed** - total amount of clean energy installed; amount of clean energy generated and/or saved over a year and estimated lifetime of a project; savings to investment ratio; number of distributed renewable energy projects supported.
- **Public benefit generated** – there are several ways to estimate and report the overall co-benefits resulting from green window investments. Examples include:
  - i. Direct, indirect, and induced jobs created by new renewable energy installations;
  - ii. Avoided greenhouse gas emissions
  - iii. Additional number of households with access to clean energy services
  - iv. Reduction in coal imports
  - v. Improvement in air quality

Since Green Windows would often co-invest with other financial institutions, they may track total impact of the projects and not just the impact attributable to them.

## CONCLUSION

India can make energy accessible, affordable and clean by ensuring the growth of critical market segments with investments in new technologies such as battery storage, electric vehicle charging infrastructure, and by developing distributed renewables and energy efficiency markets.

Established financial institutions in India such as IREDA, SIDBI and NABARD are well placed by their existing mandates and mission for setting up Green Windows as subsidiaries or units to focus on critical clean energy market segments. IREDA, as a pioneer, has the expertise and has

announced plans to establish a Green Window that focuses on market segments that need support to grow. The IREDA Green Window once implemented could potentially open the doors for many others to follow and play a pivotal role in India's clean energy transformation.

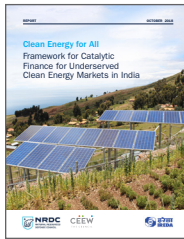
India needs multiple Green Windows, hosted by its financial institutions, to address risk and attract investment. Green

Windows can demonstrate successful development and growth of niche clean energy markets by dedicating resources and offering financial products designed to suit the needs of projects in these market segments. As the country enters a new decade, Green Windows can be India's strong action toward establishing flourishing, self-sustaining, clean energy markets for decades to come.

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## Highlighted Resources



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



### 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>



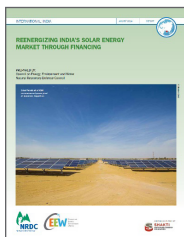
### Greening India's Financial Market: How Green Bonds Can Drive Clean Energy Deployment

<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>



### 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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