The Lab

India Innovation Lab for Green Finance

Sustainable Energy Bonds

Instrument Analysis

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The India Innovation Lab for Green Finance is a public-private initiative in India that brings together experts from government, financial institutions, renewable energy, and infrastructure development to identify, develop, and accelerate innovative investment vehicles for green growth in India.

AUTHORS AND ACKNOWLEDGEMENTS

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Sustainable Energy Bonds

DESCRIPTION —

Sustainable Energy Bonds (SEBs) are debt instruments that target impact investors and include an impact assessment mechanism.

GOAL —

To drive impact investment to sustainable energy in India by offering debt exposure, sufficient returns, and standardized impact measures for impact investors.

SECTOR —

Renewable energy, energy efficiency projects for buildings or in industries, projects for increasing energy access

PRIVATE FINANCE TARGET —

Grant/public finance, impact investors, commercial investors

CONTEXT

Sustainable energy projects in India – renewable energy, energy efficiency, and sustainable urbanization projects – are capital intensive with long lifetimes and low operating expenditures.[1] Long-term debt financing of five years or more is a key requirement to accelerate the sustainable energy market in India. Further, the sustainable energy sector in India is in early stages, with a negligible operational track record of projects, which deters investments in this sector. Since many sustainable energy projects are small-scale projects, the transaction costs associated with these investments turn out to be higher than those of the loans extended to large projects.

While equity capital has been forthcoming, there is a lack of access to debt capital. There are several sustainable energy companies that are capitalized with equity and have proven that their model works. However, they are not able to raise debt at appropriate terms, which limits their ability to scale.

India has a huge market for raising finance for sustainable energy, which could amount to nearly USD 4 billion: including USD 3 billion in the industrial segment for decentralized renewable energy and energy efficiency, and USD 1 billion in the energy access segment. Since the sustainable energy sector is very broad, in this report we have limited our analysis to rooftop solar projects in the commercial and industrial category to demonstrate the potential of SEBs to mobilize finance.

One of the possible sources to accelerate investments to sustainable energy projects is by channeling impact capital through appropriate financial instruments. However, impact investors would want to ascertain that their investments create real impact on the ground, and they seek standardized impact measures for projects to do so.

Sustainable Energy Bonds (SEBs) aim to drive impact investment to sustainable energy in India by offering debt exposure, sufficient returns, and standardized impact measures for impact investors.

Sustainable Energy Bonds (SEBs) aim to drive impact investment in the sustainable energy space by offering debt exposure, sufficient returns, and standardized impact measures to impact investors. SEBs provide an investment pathway and a standardized impact reporting framework for impact investors that will help channel more impact capital. Specifically, these bonds can catalyze investment by addressing the following barriers to impact investment:

- *Lack of information about projects*: The sustainable energy sector is still growing. Inadequate information and no or little track record of operational projects make it difficult for the investors to assess the risks. SEBs create a pipeline of investible projects, thus creating a track record for subsequent investments.
- *High transaction costs*: The small size of sustainable energy projects leads to high transaction costs. SEB addresses this by aggregating small-size projects, thus reducing transaction costs.

[1] Sustainable energy is a broad term that includes decentralized renewable energy for increasing energy access, community and telecom loads oriented mini-grids, lighting only pico and micro grids, solar home lighting systems, solar pumping, renewable energy and energy efficiency applications for Industrial segments, energy efficiency in homes, buildings and industries etc.

- *Lack of standardized impact measures and a reporting framework:* Impact investors want accurate and robust measurement of the impacts created on the ground by their investments, and also want to ensure that the standardized impact measures are accessible to them. SEB provides this information in a standardized manner.

1. INSTRUMENT MECHANICS

SEBs are characterized by a defined use of proceeds, known coupon payments, and a specific monitoring and verification protocol for reporting the impact generated by investments.

SEBs are a class of debt instruments (Non-Convertible Debentures or NCD[2]) meant for impact investors looking for exposure in debt issuances, that are used exclusively to finance sustainable energy assets and to track the impact of investments. SEBs are being floated by cKers Finance, who is also the India Lab idea proponent.

SEBs can have domestic or foreign issuances. In a foreign issuance, the non-banking finance company (NBFC) issues the SEBs which are subscribed by a special purpose vehicle (SPV) located outside India. The SPV works as the investment vehicle, pooling the impact investors and subscribing to the SEBs issued by the NBFCs. However, in both the foreign and domestic issuance structures, the NBFC is a locally placed entity, i.e. placed in India.

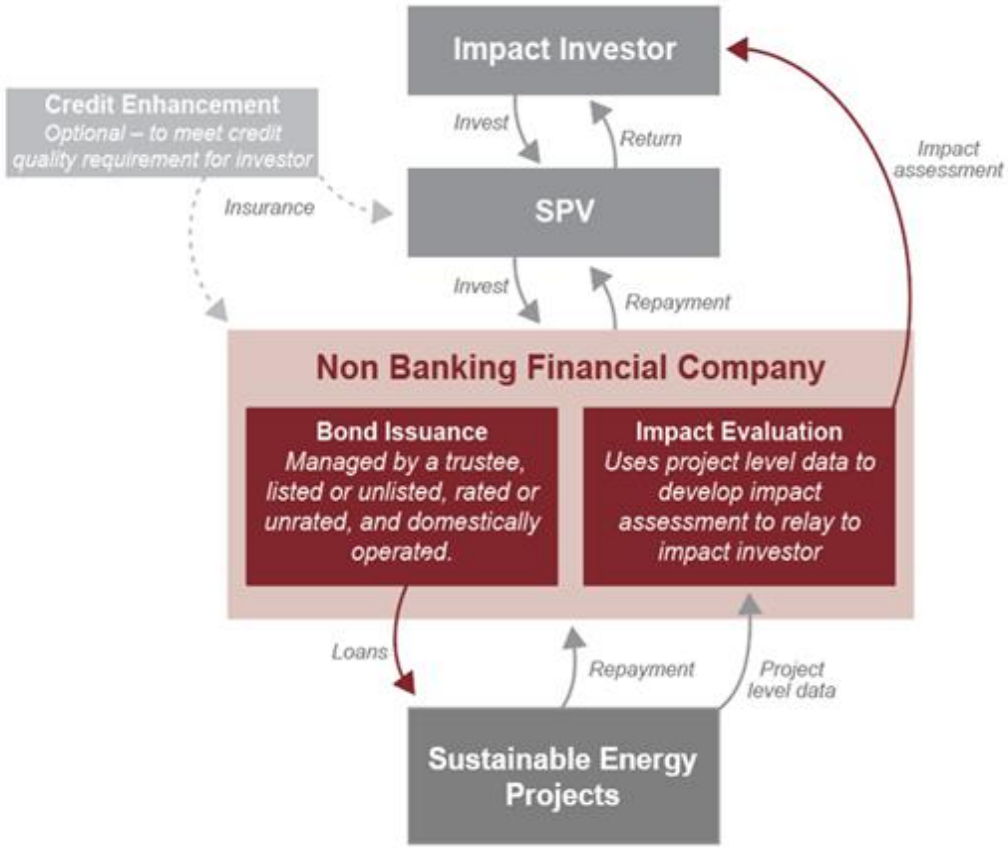
In a domestic issuance, the investor can directly purchase SEBs without using a SPV. Thus, additional layers in the SEB structure may not be required in the case of domestic issuance. Further, unlike a foreign issuance, a domestic issuance will not have currency risk, as the subscription and coupon repayments would be made in the same domestic currency.

We have created a generic structure for an SEB to help channel debt for sustainable energy. In our analysis, we used an example of a foreign issuance of an SEB extending debt to finance a rooftop solar project in the commercial and industrial segments.[3]

2 The NCDs can be both rated/unrated depending on the credit quality sought by the impact investor. NCDs that have higher rating are considered safer. It means that an NBFC has the ability repay an investor on time and hence from the impact investor point of view a rated NCD carries lower default risk. However getting a rating for the NCD has implications and hence the decision of keeping the NCDs rated/unrated depends on the impact investor and the NBFC.

3 cKers Finance has finalized the legal and the commercial construct of the SEB, but is sharing the details of the legal and commercial structure only with the prospective impact investors as this information is proprietary.

Figure 1: Structure of an SEB



1.1 CHARACTERISTICS OF SUSTAINABLE ENERGY BONDS

1.1.1 Use of proceeds

Investments would be routed through an NBFC (in this case cKers Finance) in the form of an SEB, which assures returns to the investors. This routing at the NBFC level allows aggregation of small projects, thereby overcoming the barrier of high transaction costs for small project sizes.

The proposed structure of SEBs consists of an SPV, which acts as an investment vehicle/holding company registered in a Double Taxation Avoidance Agreement (DTAA) country to avoid double taxation issues. This structure provides a tax efficient method of investment and reduces the impact of taxation on the cost of lending by the SEB.

This SPV invests in the NBFC registered in India, using the Foreign Portfolio Investment (FPI) route.[4] As per our proposed structure:

- The impact investor will invest in the SPV.[5]

4 The FPI route allows the entry of foreign funds in India for investments in the country's equity stocks and bonds.

5 The impact investors can invest in the SPV in the form of 1) equity, 2) quasi equity like CCDs and hybrid instruments like preference shares, or 3) debt.

- The SPV will subscribe to the listed or unlisted SEB which is issued by the local NBFC.[6]
- The NBFC will then either on lend to sustainable energy projects or will evaluate the existing portfolio and will go for off-balance sheet funding.[7]
- The loans are extended to sustainable energy projects. These projects will make the principal and interest (coupon) payments to the NBFC that are then passed on to the investor as agreed upon in the term sheet between the NBFC and the investor.
- Impact investors get returns though coupon payments on the NCD. The proceeds of the issuance and repayments are managed by a trustee.
- The NBFC conducts impact reporting using pre-decided indicators for the investor, at a mutually agreed-upon frequency.

1.1.2 Management of proceeds and tracking/monitoring

All the proceeds will be earmarked against sustainable energy projects, which would be tracked and monitored by the trustee. The presence of the trustee in the NCD structure helps to ensure the safety of the investors. More information is provided in Appendix 6.1.

1.1.3 Standardized impact monitoring, reporting and verification (MRV)

A key feature of SEBs is the standardized monitoring, reporting, and verification (MRV) of the impact of investments, a highly sought-after measure for impact investors. The NBFC that issues the SEB will manage the monitoring, reporting and verification of the impact of investments, by using data obtained from sustainable investment projects at predetermined intervals throughout the project lifetime. An independent third party will manage assurance and will check if the proceeds have been used for the intended purpose and if the reported impact has been achieved.

For our case – the SEB finances rooftop solar projects in the commercial and industrial segments, and the proposed indicators for impact measurement and reporting include: capacity of energy installed, GHG/ CO_2 emissions avoided, sustainable energy generated, and investments catalyzed by leveraging the capital.

The indicators listed above were chosen based on a series of discussions with the potential impact investors. We have developed a detailed section describing each of the indicators and the methodology used to arrive at the indicator. The methodology, analysis and results are discussed in detail in Appendix 6.2.

1.1.4 Assurance for impact investors

Another important aspect of an SEB is the attribution of the impact created by the sustainable energy projects to the investors who have invested in the SEB. Since the NBFC may have many types of capital in its capital structure, the impact generated by the SEB would have to be attributed to the investors who have invested in the NBFC through the SEB. We explain this further in Appendix 6.3.

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6 SEBI's guidelines on the issuance of listed/unlisted NCDs in India: http://www.sebi.gov.in/legal/circulars/may-2017/listing-of-non-convertible-redeemable-preference-shares-ncrps-non-convertible-debentures-ncds-through-a-scheme-of-arrangement_34965.html

7 Off-balance sheet financing means a company does not include a liability on its balance sheet. It is an accounting term and impacts a company's level of debt and liability. Off-balance-sheet financing may be used when a business is close to its borrowing limit and wants to purchase something, as a method of lowering borrowing rates, or as a way of managing risk. This type of financing may also be used for funding projects, subsidiaries or other assets in which the business has a minority claim.

1.2 FINANCIAL SUSTAINABILITY: INVESTORS TARGETED AND STRATEGY TO PHASE OUT PUBLIC FINANCE

SEBs target impact investors, with some public finance support required in the initial stages of development.

The target investors for SEBs are 1) primarily impact investors 2) initial catalytic investors including grant/development finance, in the initial stages of development, and 3) commercial investors.

As the SEB concept is yet to take off and the sustainable energy segment (in our case – rooftop solar power) is relatively new with a minimal track record, the SEB will require public finance support in the initial stages of development.

This public finance support will be extended to cover the cost of providing credit enhancement and to cover the cost of monitoring, verification, and reporting of the impact indicators in the initial stages of use of SEBs. In the later stages, this cost may likely be borne by a subsequent set of investors. This cost will be ~ 4% of the size of the SEB as per the model proposed by the India Lab Secretariat. Public finance support may be required only in the initial stages and can be phased out by the end of the tenor of the SEB (typically five to seven years). We explain this further in Appendix 6.4.

2. INNOVATION

SEBs will create credible benchmarks for impact evaluation, lower transaction costs, and de-risk small-scale lending, making it unique in the sustainable energy sector.

2.1 BARRIERS ADDRESSED: CREATES A LENDING TRACK RECORD, ESTABLISHES IMPACT BENCHMARKS, AND LOWERS TRANSACTION COSTS

SEB is an innovative mechanism as it addresses the existing barriers to private finance in the sustainability sector by standardizing and reporting on impact benchmarks, creating a lending track record, and lowering transaction costs via aggregation of small-scale projects.

2.1.1 Providing evidences and benchmarks

Due to the nascency of the sustainable energy market, mainstream lenders are able to see enterprises making unit economics but not at scale. Lenders also lack the in-depth understanding of the various risks associated with lending in sustainable energy segments. SEBs can channel impact-seeking capital into the sustainable energy sector, which will help the sector create a track record of projects in the initial stage, which can then serve as benchmarks for future investments. Thus, SEBs provide a platform for an impact investor to have stable returns while monitoring the impact created through standardized impact reporting.

2.1.2 Providing for ways to establish a track record in servicing debt

Relatively only a few rooftop solar players have raised and serviced debt from cash flows due to lack of evidence and benchmarks. Hence, mainstream lenders are reluctant to invest in the rooftop solar segment as they seek track records of operational projects. This creates a vicious cycle where lack of evidence leads to lack of track record and vice versa.

By attracting impact investment in sustainable energy projects in initial stages, SEBs establishes a track record of debt servicing and impact assessment. The track record creation ensures identification of the risks associated with small scale lending in sustainable energy, and a proper under-writing methodology can be created for the projects.

This bridges the gap between early stage finance requirements and long term commercial finance and builds more effective demand for investment in the sustainable energy sector, thus opening the door to a wider range of investors and types of investments.

2.1.3 Lowering transaction costs

Projects in this sustainable energy sector and its sub-segments are relatively smaller size compared to those usually handled by pure-play project financiers. Hence, in the absence of scaled-up businesses offering aggregation models, mainstream lenders do not see a return on effort in tapping these sub-segments because of following key reasons: 1) small scale of lending and 2) high transaction cost involved with small-scale lending.

The SEB provides a financing model wherein small-scale loan can be aggregated thus reducing the transaction cost and the also lower the final cost of lending. As the SEB concept becomes stable, it can attract commercial finance as well.

2.2 UNIQUE VALUE ADD: CATERING TO SMALL-SCALE PROJECTS IN SUSTAINABLE ENERGY

SEBs are the only instruments in the sustainable energy space that cater to small-scale projects, with an issuance size of around USD 5 million.

Sustainable energy projects are generally small-scale projects and require a specific focus. There have not been many instruments or institutions that cater to the requirements of these small-scale projects and provide debt finance, because of high transaction cost involved in small-scale financing.

SEB is the only instrument that is meant specifically for financing small-scale projects in the sustainable energy sector. In its first issuance, SEB will have a size of USD 5 million to cater to the financing needs of small scale projects. This will provide an impetus to channel more debt finance.

Going by size of the issuance, the closest comparable instrument is green bonds. However even green bonds have an issuance size of USD 50 million or more.

2.3 CHALLENGES TO INSTRUMENT SUCCESS

The high rate of lending for rooftop solar projects can make SEBs unattractive to the sector. Thus, an SEB will have to lend at a rate at par or more competitive than existing lines of credit[8] to rooftop solar projects. Further, the high cost of the monitoring, reporting, and verification (MRV) of impact indicators when seen in the context of SEB's small issuance size of ~USD 5 million, impacts the financial sustainability of the SEB. The objective of an SEB is to provide debt finance to rooftop solar projects at a rate that is both attractive to the sector and which also makes the SEB financially sustainable.

[8] Compared to loans offered by SBI-World Bank[8] (1 year MCLR[8] + 20 to 50 Basis points) and PNB–ADB[8] (1 year MCLR + 30 to 50 Basis points) to the rooftop solar sector.

To make an SEB competitive and sustainable in initial issuances, public finance support will be required to cover the cost of providing credit enhancement to improve investor confidence, and the cost of reporting the impact of investments. In this section, we discuss the rationale for using public finance and also provide an estimate of the amount of public finance support required for the first issuance of an SEB.

To make an SEB competitive and sustainable in the initial issuances, public finance support will be required to cover the cost of providing credit enhancement to improve investor confidence, and the cost of reporting the impact of investments.

2.3.1 Public finance required to support the cost of providing credit enhancement

In our case example of an SEB for rooftop solar power, lacking information on the capital structure of cKers Finance, we started with an assumption that the cost of funds for cKers Finance is at the same level as that of the coupon rate of an SEB. The expected cost of funds for an SEB turns out to be 12%, and considering an additional 2% cost for operations and profit, the lending cost for rooftop solar projects using an SEB may be 14% or higher.

A high rate of lending of 14% or more can impact the financial sustainability of the rooftop solar project, due to weak coverage for the debt repayments, and eventually not attract project developers.

We have presented a case where SEBs are financing rooftop solar projects in the commercial and industrial consumer category. The lending in the rooftop solar projects in the commercial and industrial consumer category has been limited to only few projects with beneficiaries (commercial and industrial consumers) that have a high credit rating. The high credit rating requirement has been a hindrance for most of the commercial and industrial consumers. Therefore, Debt Service Coverage Ratio[9] (DSCR) from such investments would not be to the comfort level of the NBFC which is issuing the SEB. This will result in a high rate of lending to the rooftop solar projects, making the SEB unattractive.

To keep the cost of the financing low, we propose to use credit enhancement at the SEB level so that the cost of funds for the SEB can come down and hence this will allow the SEB to lend to the rooftop solar projects at a lower rate (say at a target lending rate of 10%).

Since providing credit enhancement has a cost, we propose that public finance be used to support the cost of providing credit enhancement at the SEB level. We have provided more details in Appendix 6.4.

This will improve the DSCR because of lower rate of lending from SEBs, and will result in the improved credit quality and reduced probability of default / reduced risk of default).

We have worked out the cost required to support the credit enhancement so the DSCR at the portfolio level of the NBFC is maintained at a level of comfort. As per our calculations the grants required for paying the credit enhancement are as follows.

9 Debt-Service Coverage Ratio (DSCR) is a measure of the cash flow available to pay current debt obligations.

Table 1: Public support requirement for credit enhancement

Rate at which SEB can extend debt to a project	Maximum credit enhancement required in a year during the tenor of the loan (DSCR 1.7x) IND AA	Present value of credit enhancement required for duration of the loan as a percentage of the initial loan raised [10]	At 4%/ pa cost of providing & maintaining credit enhancement over 7 years for 1.7x
10%	14%	43%	1.72%

Hence, for an SEB to lend at a rate of 10% to a project, the cost of providing and maintaining Credit Enhancement over seven years at 4% per annum the public finance support required is 1.72% or ~2% approximately. More details have been provided in Appendix 6.4.

2.3.2 Public finance required to support the cost of impact measurement, reporting, and verification (MRV)

The initial size of an SEB issuance is likely to be in the range of USD ~5 million and will face the challenge of having high fixed costs; like the cost of monitoring, reporting and verification (MRV) of the impact indicators. Based on our primary research, we have found that this cost can be as high as 2% of the size of the issuance. Thus having a high fixed cost of 2% will impact the financial sustainability of the SEB.

To create a cost-effective structure for the SEB, in the initial issuance, public finance support can be used to cover the costs of MRV for the impact indicators. This will allow the SEB to manage the fixed cost in the initial issuance.

2.3.3 Total public finance support and leverage

The total public finance support is 4% - 2% public finance required to support the cost of providing credit enhancement and 2% public finance required to support the cost of MRV.

The SEB has a leverage factor of 25 (100/4) which means that SEB can mobilize USD 25 of private finance for every USD 1 of public finance.

3. PILOT AND BEYOND

3.1 ACTIONABILITY: IMPLEMENTATION PATHWAY AND REPLICATION

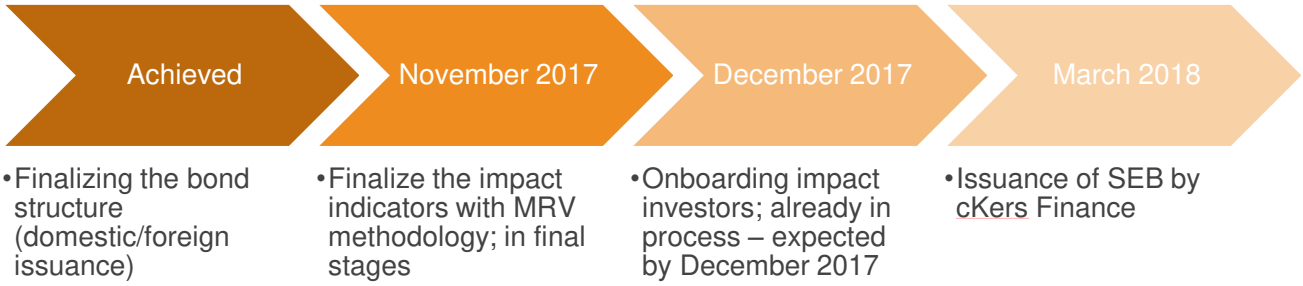
The SEB model provides assured returns to investors, making it highly replicable and scalable.

SEB is a scalable model with a high catalytic potential that does not require new policy or regulations and can be implemented within the existing legal framework in India.

10 Is the cumulative additional cash flows requirements for the DSCR of 1.7x discounted @7%

The idea proponent, cKers Finance, is an NBFC operating in sustainable energy. They are also the implementing agency for a pilot of SEB in India, for distributed renewable energy and are likely to have the first SEB issuance of the USD 5 million. We have been supporting cKers Finance on an initial issuance of an SEB in India in finalizing the impact indicators and are also connecting cKers Finance with the impact investors.

The expected timeline for the first issuance is as follows:



We have also identified several critical milestones for implementation of SEBs, and have indicated progress made so far:

- **Finalizing the bond structure of a domestic and foreign issuance:** cKers Finance has finalized the legal and commercial construct of the SEB they will be issuing and they will share it exclusively with prospective impact investors. As we do not have access to this information, we have presented a generic SEB structure with the proceeds being utilized for rooftop solar projects**.**
- **Finalizing the impact indicators and MRV methodology:** This has been a comprehensive exercise wherein initially we formed a comprehensive list of 25 impact indicators, suitable to sustainable energy. We were able to prune the list of the impact indicators to four indicators with deeper impact investor engagement (based on the use of proceeds in the distributed renewable energy sector. We have provided more details in Appendix 6.2.
- **Onboarding impact investors**: We have estimated that cKers Finance will be able to sign an engagement agreement with the impact investors in one month from the time of Lab endorsement.
- **Issuance of SEB by cKers Finance**: The SEB issuance can happen in 6 months from the date of onboarding of the impact investors.

3.1.1 Replicability

SEBs are a class of debt instruments and therefore have high replicability. SEBs can be piloted in any country depending on the financial market regulations of the country.

3.1.2 Phasing out of public finance support

Public finance support of ~4% of the size of the issuance is recommended during the initial stages of SEBs and can be can be phased out by the end of tenure of the SEB (typically five to seven years).

3.2 IMPACT

With an issuance size of USD 5 million, an SEB can help produce around 10 MU (10 GWh) of renewable energy and abate 9638 tonnes of CO2 per year, and has a leverage factor of 25x.

3.2.1 Environmental and social impact

Pilot:

For cKers Finance' expected pilot issuance of USD 5 million, we've determined the following the expected impact:

Renewable energy capacity addition
For an issuance of USD 5 million for an SEB for rooftop solar power, the expected capacity addition with this capital is ~6.22 MW of rooftop solar power, generating approximately 10.36 MU or GWh of renewable energy per year.

Environmental impact
Table 2 lists the environmental benefits that are derived out of this capacity addition

Environmental impact	(Tonnes)	Tonnes per MW	Tonnes per Watt
CO2 abatement/Year	9638	1,548	0.002
SO2 abatement/Year	32022	5,143	0.005
NO abatement/Year	44769	7,190	0.007

Social impact
With this capacity addition, 82 short term jobs will be created in less than a year, and 22 long-term jobs will be created per year.

At scale:

The Government of India aims to add 40 GW of rooftop solar capacity by 2022. Our estimates suggest that 40% (16 GW) of this target could be achieved in the small and medium enterprise (SME) sector primarily in the commercial and industrial segment and the remaining 60% (24 GW) in the urban and rural sector. This is approximately 24 GW of capacity addition by 2022.

Considering that the SEBs have the potential to finance 5% of this 8 GW for the SME sector, the total private finance that can be mobilized is approximately ~USD 450 million in debt finance in the rooftop solar sector alone, which is just one of the sub-segments of the sustainable energy space (being the target area for using the proceeds of SEB) by the year 2022.

With this debt capital, the expected capacity addition of rooftop solar projects is ~550MW by the year 2022.

Environmental impact
This rooftop solar capacity can help abates 0.8 million tonnes of CO2/year, 2.8 million tonnes of SO2/year and 4 million tonnes of NO/year

Social impact
With this capacity addition, 10000 short term and long term jobs will be created by year 2022.

3.3 CATALYTIC POTENTIAL: PRIVATE FINANCE MOBILIZATION AND REPLICATION POTENTIAL

As discussed in the previous section, the expected private finance mobilization at scale is ~USD 450 million.

In regard to leveraging public finance: we have proposed that 4% of public finance support would be required to make the SEB financially sustainable. Hence the leverage of an SEB in the initial issuance is 25x which means that an SEB can mobilize USD 25 of private finance for every USD 1 of public finance.

4. KEY TAKEAWAYS

SEBs aim to drive debt finance for sustainable energy by attracting impact investors with known returns and improved measurement of the impact of investments.

The financing requirements of the sustainable energy sector is a huge opportunity of approximately USD 4 billion in India. SEBs can provide financial returns to impact investors looking to invest in sustainable energy, along with improved measurement of the impact of investments. In a pilot issuance of USD 5 million, an SEB for the rooftop solar sector can add 6.2 MW of renewable energy sector, generate around 100 job opportunities, and abate 9638 tonnes of CO_2 per year.

SEBs meet the Lab criteria in the following ways:

Innovative: SEBs address the barriers of lack of evidence and benchmarks for impact, lack of a track record in servicing debt, and high transaction costs involved with relatively small scale lending.

Financially Sustainable: Public finance support of around 4% of the issuance size is recommended during the initial stages of an SEB. It can be can be phased out by the end of tenure of the SEB, typically five to seven years.

Catalytic: An SEB has a leverage factor of 25x if public finance is used to support the cost of providing credit enhancement and the cost of monitoring, reporting, and verification.

Actionable: An SEB can be launched within six months from Lab endorsement.

5. APPENDICES

5.1 ROLE OF TRUSTEE

The NCD deed trustee ensures the rights of the NCD holders majorly though the following (action role defined as per the Security Exchange Board of India (SEBI))

- Calling for the periodical reports from the body corporate, i.e., issuer of debentures.
- Taking possession of trust property in accordance with the provisions of the trust deed. (c) Enforcement of security in the interest of the debenture holders.
- Ensuring on a continuous basis that the property charged to the debenture is available and adequate at all times to discharge the interest and principal amount payable in respect of the debentures and that such property is free from any other encumbrances except those which are specifically agreed with the debenture trustee.
- Exercising the due diligence to ensure compliance by the body corporate with the provisions of the Companies Act, the listing agreement of the stock exchange or the trust deed.
- Taking appropriate measures for protecting the interest of the debenture holders as soon as any breach of the trust deed or law comes to his notice.
- Ascertaining that the debentures have been converted or redeemed in accordance with the provisions and conditions under which they are offered to the debenture holders.

5.2 METHODOLOGY FOR SELECTION OF IMPACT INDICATORS

5.2.1 Desktop research and primary research, Part 1

We started with creating a comprehensive list of impact indicators that the impact investors may pick and choose based on the investment mandate followed by them. This list provided a detailed definition of each metric including the formulae for measurement and frequency of measurement.

However, upon sharing the list within the working group, proponent and also with a wider set of audience, it was found that the impact requirement in the sustainable energy project space is aligned towards the causality and direct measures along with the major emphasis upon the costs of measurement.

Thus, we decided to revisit the impact metric sheet along with further literature review. This enabled pruning of the list of metrics to be used for impact evaluation in the sustainable energy space in the current form. The major factors for pruning of the list were following – cost and the associated method of assessment, feedback received and the literature review of the existing frameworks.

The three filters helped us to reduce the list of 25 impact indicators to 7 major indicators that are marked by low cost, ease of measurement – direct impact assessment with high acceptability based upon the feedback. The selected indicators cut across the following major categorization – the renewable energy capacity addition, environmental, catalytic and social impact. Based upon the feedback, we have added inclusiveness under the catalytic impact category to the list of shortlisted impact indicators.

This methodology helped us to come up with a list of indicators that can be used for comparative analysis of different investments in the sustainable energy space. Based upon the cost as the barrier – a list of 14 indicators are able to pass through the filter of low cost and direct tracking measurement filter. With the remaining being limited by the associated medium to high costs. Combining this with the feedback received from the core working group members and other experts in addition to the comparative study of other frameworks (e.g.

GOGLA[11], GIIN[12]) the list was pruned to 7 must-have indicators. Thus the approach takes into account the cost, primary research and literature approval as the means of shortlisting the matrices for the proposed framework.

Description of the filters-

1) Cost – This filter is based upon the associated cost and ease of measurement for a particular impact indicator. This filter plays an important role as the dual role of cost and ease of measurement is important to create a harmonized framework for the comparative analysis. As the projects in the sustainable energy space can vary from very small (few KWs) in size to large (several MWs) projects along with the different type of product, technology often varying with the concerned project/company. Thus, costs need to be managed as the fixed costs of measurement need to be kept low as the investments size can vary. Also a large number of associated data points need to be managed from the collection point of view for both accuracy and cost. Thus it become an important parameter.
2) Feedback – The feedback from the experts and the members of the CWG was used for shortlisting important impact matrices. This filter enabled the voice of the industry/ experts to become a part of the framework. This further helps in harmonizing the metric to the needs of the investors.
3) Comparative analysis/ literature review – This enabled us to shortlist only those matrices that have been found to be relevant for the sustainable energy space. Thus providing a literary backing to the shortlisting of the indicators. Based upon these filters, we have selected the following indicators (Table 3):

Type of indicator	Indicator	Unit
Renewable energy capacity	Capacity installed	MW
Environmental Impact	GHG/ CO2 emissions avoided	Tons of CO2 avoided
	Sustainable energy generated (kWh or Mega Joules per annum)	kWh or mega Joules
	Cost savings/ fuel savings	INR/$ savings
Social impact	Energy Access (No. of beneficiaries: urban and rural)	Absolute number
	Employment generated (direct and indirect)	Absolute number
Catalytic Impact	Investments catalyzed by leveraging the capital	$ terms or multiple (X)

5.2.2 Primary research, Part 2

For the 7 indicators shortlisted in the first part of the primary research, we contacted 40+ impact investors to get their view on the suitability of the indicators for SEB lending in the rooftop solar space through a questionnaire. Out of 40+ investors 10 impact responded to the questionnaire out of which 4 indicated their preference for the indicators. We analsysed the response received based on 3 criteria;

[11] https://www.gogla.org/sites/default/files/afbeeldingen/gogla-standardised-impact-metrics-for-the-off-grid-energy-sector1.pdf

[12] https://thegiin.org/assets/FINAL_GIIN_cleanenergyreport_PRINTREADY_singles_nocropsFINALFINAL.pdf

- Absolute necessary (AN)– meaning investment decision is totally dependent on inclusion of impact indicator in the reporting framework even if it means spending an extra USD to get the indicator reported. This carries a weight of 2
- Desired (D) – meaning nice to have an indicator to be included in the reporting framework but will not spend USD to get this reported. This carries a weight of 1
- Not required (NQ) – meaning not required for reporting purpose. This carries a weight of 0

According to responses received from investors, in the mix of standardize core indicators, there should be at least some of the indicators that can be used are standard across all of the investments that SEB is making.

Since the India Lab doesn't have access to either of investor base or the project pipeline of SEB, we have gone ahead by using distributed renewable energy (rooftop solar project) as a case example to create a list of Indicators that can be used for rooftop solar projects finance by SEB, though, by nature more generic measures would be needed for cKers Finance.

Being specific to rooftop solar project does not necessarily make them less valuable, but it highlights the reason that several investors are keen to see these indicators in the rooftop solar space which is a good result of the efforts made by us without having information on investor base or the project pipeline.

The responses received are as follows (Table 4):

Requirement	Unit	Packard Foundation	PROPARCO	IFU	Caspian
Capacity installed	kW	AN	AN	AN	D
GHG/ CO2 emissions avoided	$mtCO_2$	AN	AN	D	AN
Sustainable energy generated	kWh	AN	AN	NR	AN
Cost savings/ fuel savings	INR or $	NR	D	NR	D
Energy Access (No. of beneficiaries: urban and rural)	N_{peo}	D	D	NR	AN
Employment generated (direct and indirect)	N_{emp}	NR	D	AN	AN
Investments catalyzed by leveraging the capital	X*$	AN	AN	D	D

The result of the analysis are as follows (Table 5):

Requirement	AN	D	NR	Total score	Comments
Capacity installed	3	1	0	1.75	Must have
GHG/ CO2 emissions avoided	3	1	0	1.75	Must have
Sustainable energy generated	3	0	1	1.5	Must have
Cost savings/ fuel savings	0	2	2	0.5	Not required
Energy Access (No. of beneficiaries: urban and rural)	1	2	1	1	Desirable
Employment generated (direct and indirect)	2	1	1	1.25	Desirable

Investments catalyzed by leveraging the capital	2	2	0	1.5	Must have

Where in,

- Maximum possible score for indicator is 4;
- Critical score is <=1.5; and
- For same score higher weightage is given to the indicator with higher number of AN, followed by number of D and followed by NR respectively

Hence the final list of indicators are as follows (Table 6):

Requirement	Total score	Comments
Capacity installed	1.75	Must have
GHG/ CO2 emissions avoided	1.75	Must have
Sustainable energy generated	1.5	Must have
Investments catalyzed by leveraging the capital	1.5	Must have

Each of these indicators is described in detail are as following (Table 7):

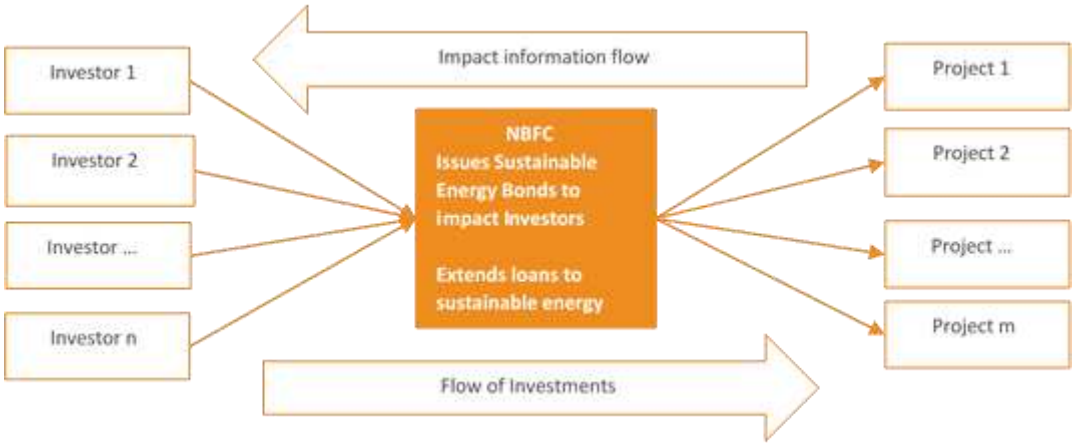
Indicator:	Capacity installed	Sustainable energy generated	GHG/ CO2 emissions avoided	Investments catalyzed by leveraging the capital
Data unit:	**kW**	**kWh**	**mtCO2**	**X*$**
Description:	Amount of clean capacity (kW) to be facilitated by SEBs	Energy generated by the projects financed by the SEB in a year	Amount of reductions in greenhouse gas (GHG) emissions over the lifetime of products or services sold during the reporting period , reported in CO2 equivalent	The amount of investment capital mobilized/ secured using the investors capital and influence. Shows the acceptance of the business model or technology or the investee's financial viability
Measuring methodology:	Computed by multiplying the number of units sold of sustainable energy product here rooftop solar module (or N) by the average annual energy generation capacity of the product (or Eavg.)	Computed as the product of Capacity Installed (or kW) multiplied by the number of hours (or H) of operation of such capacity in a year	Computed by multiplying the energy generated (or kWh) from the projects facilitated by the SEB with the difference of the GHG emissions in the post and pre project scenario during the year. In this case the post project scenario the emission factor used is for the rooftop solar projects (or EFSol)	Total funding secured (committed/secured) i.e. the annual change in the financing mobilized added to the (re) investments at the company level to which the loans have been extended.

			and the pre-project scenario the emission factor is for the baseline sources fuels like, grid power, diesel, kerosene etc. (or EFbase)	
Formulae	N*Eavg.	kW*H	kWh* (Efsol-EFbase)	
Measurement technique:	Direct (desktop based monitoring)	Direct (desktop based monitoring)	Direct (desktop based computation)	Direct (desktop based computation)
Justification of the choice of measurement methods and procedures actually applied:	Can be measured and reported through desktop data collection and analysis from the project portfolio of capacity facilitated by the SEB in a year. Hence is an easy, accurate, direct and cost effective measurement technique	Can be measured and reported through desktop data collection and analysis from the project portfolio of capacity facilitated by the SEB in a year. Hence is an easy, accurate, direct and cost effective measurement technique	Can be measured and reported through desktop data collection and analysis from the project portfolio of capacity facilitated by the SEB in a year. Hence is an easy, accurate, direct and cost effective measurement technique	Can be measured and reported through desktop data collection and analysis from the project portfolio of capacity facilitated by the SEB in a year. Hence is an easy, accurate, direct and cost effective measurement technique
Limitation	None	Energy production data from the developers/ investees verification is difficult but manageable.	GHG emissions reduced in the field conditions tend to vary widely and are influenced by factors like - usage patterns, maintenance etc.	difficult to establish the causality of the additional capital influx to the impact investments

Cost of measurement verification and reporting (MRV): Considering that the proposed employ a direct desktop based MRV; the expected cost will have following components:

- Internal cost of having a resource to run the MRV process,
- External cost of having an independent third par verifying entity

5.3 METHODOLOGY FOR ATTRIBUTION OF IMPACT



The figure above represents the flow of money from various investors using the NBFC route into the projects primarily in the sustainable energy space. As represented by the figure above some of the investors are seeking both returns as well as the assessment of the impact created over a period of time. This mix of investors both impact seeking and non- impact seeking present at a NBFC level that further invests into projects starting at varied points of time presents a problem of the attribution of the impact and the associated costs of the impact assessment. This can be formulated as below (Table 8):

Set	Constituents
Impact Indicator	$\{I_1, I_2, I_3, \ldots I_K\}$
The impact investors	$\{S_1, S_2, S_3, \ldots S_N\}$
The Project set	$\{P_1, P_2, P_3, \ldots P_M\}$
The impact seeking investors	$\{S_1, S_2, S_3, \ldots S_N\}$
The non-impact seeking investors	$\{NS_1, NS_2, NS_3, \ldots NS_Y\}$

1) Impact created for an Indicator I_i by all the project set $\{P_1, P_2, P_3, \ldots P_M\}$ is $\sum_{j=0}^{M}(I_i * P_j)$,
2) The Impact created for a project P can be represented as follows
   $\{I_1*P, I_2*P, I_3*P, \ldots, I_K*P\}$

3) Total impact created at the NBFC level is represented using the following set of the impact sum per indicator for the overall projects
   $\{\sum_{j=0}^{M}(I_1 * P_j), \sum_{j=0}^{M}(I_2 * P_j) \sum_{j=0}^{M}(I_3 * P_j), \ldots., \sum_{j=0}^{M}(I_K * P_j)\}$

4) Total investments at the NBFC can be represented as
   $\{\sum_{i=1}^{N} S_i + \sum_{j=1}^{Y} NS_i\}$ i.e. {Impact seeking capital + Non Impact Seeking capital}

5) Impact due to the SEB
   $[(\sum_{i=1}^{N} S_i) / \{\sum_{i=1}^{N} S_i + \sum_{j=1}^{Y} NS_i\}]^* \{\sum_{j=0}^{M}(I_1 * P_j), \sum_{j=0}^{M}(I_2 * P_j) \sum_{j=0}^{M}(I_3 * P_j), \ldots., \sum_{j=0}^{M}(I_K * P_j)\}$
   This is segregated by each impact indicators.

6) The impact attribution per impact investor can be represented as follows
   For the impact investor i can be given as follows
   $[S_i / \{\sum_{i=1}^{N} S_i + \sum_{j=1}^{Y} NS_i\} * \{\sum_{j=0}^{M}(I_1 * P_j), \sum_{j=0}^{M}(I_2 * P_j) \sum_{j=0}^{M}(I_3 * P_j), \ldots., \sum_{j=0}^{M}(I_K * P_j)\}]$

Thus the pool needs to separate both the projects that the NBFC has extended loan not just for returns but for impact creation vs other non- impact seeking loan to projects. These terms have to be made a part of the contract agreement of the SEB product that seeks both monetary

returns and the impact created information. This may enable a proper impact assessment both ex-ante and ex-post of the bond investment agreement between impact investor and the NBFC. This problem can be easily navigated based using the explanation below that takes away the complications possible owing to the time related movements in the investments, loan, project COD and other dynamic variables.

What is peculiar with SEB is its combines the standards returns of the bond with the promise of the impact evaluation a process not well established and that suffers from the non-standardization of the associated framework. ***Thus it actually exhibits behavior of an OTC mutually negotiated contract – non standardized and investor specific***.

Based on the corporate strategy and the identification of the project pipeline inclusive of the type, size, and exposure limit per project can give the rough figures for the expected impact to be generated can be indicated ex-ante which are monitored and verified during the execution of the portfolio and provided/expressed as impact created in terms of the unit of measure per $ of impact investment (*covering the promise part of impact to be created*).

Since it is always a problem of negotiating and matching mutual interest and hence becomes a static problem for the NBFC to solve at the portfolio level.

Further this can also provide the details of the associated costs for impact M&V as with the standardization of the M&V may provide the measurement and verification cost for the indicators. These both combined can help to standardize the contract and also produce the desired impact study framework.

This can help to provide a standardization to an over the counter product, which is essential in the face of the associated issue size being small in comparison to other similar instruments like the Green Bonds which are typically of the size USD 100 million and above. Thus the costs of M&V (which are also standard, depending upon the type and class of the issue) and other issuance costs spread typically are approximately 40 basis points for the green bonds.

This structure would require RFP proposal for M&V to be finalized to be a part of the contract that will enable finalizing the cost of M&V for the impact. The proposed structure is likely to take care of the impact attribution problem being a dynamic issue.

5.4 MAKING SEB FINANCING ATTRACTIVE TO ROOFTOP SOLAR SECTOR

The higher rate of lending to rooftop solar can make the SEB unattractive to the project developers/investors.

The objective of the SEB is to create a line of debt investment in the sustainable energy space that is both attractive and at sustainable level for the end users i.e. projects being financed

Assumption[13]:

This will enable the uptake of the line of credit backed by the SEB as the source of funds by the target market segment. Thus based on the existing lines of credit for the rooftop the viable cost of debt to the projects would be about 10% to 11% (based on the primary research and also in

[13] Our analysis predicts the public finance support required for enhancing the coverage of cash flows to 1.7 x for both the principal and interest due during the year. This as per the India Ratings paper that states that enhancing the rating of the bonds, that uses underlying/ marked cash flows, upto AA, enables the bonds marked against the cash flows to raise the debt at around 8% to 9%. However, our approach, in lack of the information on capital structure of cKers Finance assumes the cost of funds for the NBFC to be at the same level as the coupon rate of the bonds which depresses the actual requirement of the grant support. that may also be required in the form of concessional equity capital/ other form or as a part of the PRI investments by the Impact investor

comparison loans offered by SBI-World Bank[14] (1 year MCLR[15] + 20 to 50 Basis points)/PNB–ADB[16] (1 year MCLR + 30 to 50 Basis points) to the rooftop solar sector.

However, NBFC that is issuing SEB can lend at approximately ~14% or more. The cost of funds to SEB comprises (Table 9).

Particulars	Unit	Remark
Impact investment cost (USD)	5%	based on primary research
Hedging cost	7%	USD/INR swap of 2 years
operational cost including profit margin	2%	based on primary research

Public finance support will be required to make lending through SEB to rooftop solar projects competitive

This means that the SEB can extend debt only at ~14% or more which is not attractive to the rooftop solar sector. We have therefore discussed the role of public finance in reducing the rate at which SEB can extend debt through:

- Using blended finance
- Using credit enhancement

5.5 USING BLENDED FINANCE

Blending public finance at the NBFC level can reduce the rate at which SEB can extend debt to the project developers to a competitive rate; however, the public finance support required is very high

The interest subvention is a form of waiver of some percentage of interest rate charged to promote a particular industry or for the cause of any general public concern.

Blending public finance (grants/0%debt) can be one of the ways to reduce the rate at which SEB can extend debt to the rooftop solar projects. For reducing the rate at which SEB can lend, is by having an interest subvention facility designed as part of the loans extended by the NBFC. In this case, the blending public finance/0% debt at the NBFC level will reduce the rate at which SEB can extend debt to the rooftop solar projects.

Calculations for the size of grants i.e. pubic finance @ 0% rate of interest to subsidize/ subevent are as follows **(Table 10).**

[14] https://www.sbi.co.in/webfiles/uploads/files/SBI_WORLD_BANK.pdf

[15] Marginal Cost of funds based Lending rate (MCLR) is the marginal cost of funds based lending rate (MCLR) refers to the minimum interest rate of a bank below which it cannot lend, except in some cases allowed by the RBI.

[16] https://www.pnbindia.in/Rooftop-Solar-Power.html

Rate at which SEB can extend debt to a project without subvention	Level of subvention provided through blending	Rate at which SEB can extend debt to a project post subvention	Amount of public finance (grants/0% debt) at the SEB level	Blending as a % of total size of SEB
14%	4%	(14%-4%) 10%	33%	50%

As shown above, for 4% subvention in the cost of debt for the project, the amount of blending required 33% (which is 50% of the size of the SEB). This means for every 1$ of public finance, 2.5$ (impact capital/private finance) can be mobilized and the effective cost of debt for the project is 10% is attractive to the rooftop solar project. The amount of public finance is worked out as follows:

W*12%+(1-W)*0% = 8%

Where 12% is the cost of funds to the SEB without considering the operational cost and profit margins of 2% as shown in table 1

Where W represents the percentage of impact investment @ 12% in the SEB and W= 8/12 = 66.67%

Hence, the Amount of public finance (grants/0% debt) at the SEB level is 1-W=4/12 is 33.33%

This 33% public finance is 50% of the SEB size = (4/12)/(8/12)=50%.

We see that to create desired level of subvention so that the rate of lending from SEB is attractive the amount of grants (public finance/0% debt) is very high (50%) which may make this concept a non-starter for the agencies/organizations that provide public finance support.

5.6 USE OF GRANTS (PUBLIC FINANCE/0% DEBT) TO SUPPORT CREDIT ENHANCEMENT

Public finance support of 1.72% to support credit enhancement can enable the SEB to extend debt to the rooftop solar projects at a competitive rate

Another way to reduce the rate at which SEB can extend debt to a rooftop solar project could be through use of credit enhancement. Credit Enhancement is an assurance to the investor that the debt servicing will be covered/insured to the extent of the coverage decided/insured in the contract. This partially/ fully covers the repayments to the debt investor and thus enhance the credit quality of the issuance by the debt issuer. This improvement in the credit quality/reduced risk is used by the issuer to reduce the typical costs of borrowing.

At the NBFC level, the credit enhancement will reduce the cost of borrowing for the NBFC and will also provide the impact investors adequate comfort and confidence about the cash flows from the operations. Thus having credit enhancement will allow the NBFC to extend debt through SEB to a rooftop solar project at ~10% which is lower than the cost of funds for the NBFC.

However providing credit enhancement has a cost. This cost is typically 2-3% of the amount that is being insured (incase of SEB the size of the issuance or ~USD 5million). The cost of the

providing credit enhancement of 2%, to 3%[17] per annum are typically for loan sizes of INR 100 crore and more.

Since cKers is relatively new NBFC with a small issuance size of SEB, we have considered an additional 100 Basis points and have also worked out the credit enhancement requirements at 4% cost (Table 11).

Rate at which SEB can extend debt to a project	Maximum Credit enhancement required in a year during the tenor of the loan (DSCR 1.7x) IND AA	present value of Credit Enhancement required for duration of the loan as a percentage of the initial loan raised [18]	At 4%/pa cost of providing & maintaining Credit Enhancement over 7 years for 1.7x
10%	**14%**	**43%**	**1.72%**

Hence, for SEB to lend at a rate of 10% to a project, the cost of providing & maintaining credit enhancement over 7 years at 4% per annum the public finance support required is 1.72%

To demonstrate how the above calculated public finance support would work in the favor of the SEB (debt provider) and the equity provider, we have worked out an example wherein the NBFC through SEB, can lend at 10% to a rooftop solar project in the Commercial & Industrial category.

Following are the assumptions for the rooftop solar project in the Commercial & Industrial category (Table 12):

Particulars	Unit	Remark
Lender		is the NBFC who provides debt to the project through SEB
Investor/Project Owner		who invests equity in the project
Type of project		rooftop solar
Size of project	1 MW	for sake of calculation this has been used as an indicative capacity, with an assumption that the SEB would be lending to the C&I consumers which can install MW scale projects
Capital costs	Rs. 53 million/MW	reference cost based on the applications received in ICEF
SEB Loan tenor	7 years	Based on primary research
CUF	19%	Generic normative CUF of solar energy project in India specified by CERC for purpose of tariff calculation
Debt/equity ratio	70:30	Typical Debt Equity ratio seen in energy sector, also generic normative debt equity ratio for solar energy project in India specified by CERC for purpose of tariff calculation
Cost of electricity for C&I sector	Rs 6.5/KWh	minimum average tariff in the Commercial and Industrial category, reference tariff based on the applications received in ICEF
Operating and maintenance costs	Rs 0.7 million	reference cost based on the applications received in ICEF
Rate of interest charged by the SEB to the project	10%	Targeted lending rate that will enable the NBFC raising SEB to compete against the existing of lines of credit

[17] Based on the IREDA cost of credit enhancement i.e. 190 Basis points to 300 Basis points for bonds BBB and above

18 Is the cumulative additional cash flows requirements for the DSCR of 1.7x discounted @7%

With the above set of assumptions the results are as follows (Table 13):

Rate at which SEB can extend debt to a project	Min DSCR	Average DSCR	Equity IRR	Public finance support required providing & maintaining Credit Enhancement over 7 years for 1.7x as computed above
10%	1.12	1.33	17.74%	**1.72%**

Thus it can be seen that a public finance support of 1.72% (so that the SEB can extend debt to a project at 10%) can make the proposition viable for both the debt provider; i.e., SEB and the equity provider.

However the case example we have taken may not be the representative of the whole NBFC as we are demonstrating it at the individual project level[19]. If the portfolio of project financed by SEB comprises project with similar credit quality (DSCR enhanced to 1.7x) then it can be concluded that the public finance support calculated at the project level can actually upkeep interest of the investors investing in the SEB or in the NBFC.

Using public finance support to cover the MRV cost

Public finance support of ~2% to support the MRV cost can also make lending through SEB competitive

The other major cost associated with the SEB is the impact measurement, reporting and verification (MRV) costs of the impact indicators. The M&V forms a part of the impact reporting framework associated with the SEB issue. To help support initial few bond issuance the 0% grants are proposed to be used for sustaining the M&V costs. As per the primary research the costs of M&V are to be capped at about 2% to 3% of the issue size for SEB.

Thus the total blending of the 0% grants required is to the tune of about 4% of the issuance size of the SEB. Thus covering both the PCG & M&V costs.

For further reduction in SEB cost the grant money may be used for covering the cost of hedging through instruments like the FXHF. The FX Hedging Facility is a customizable currency hedging product that lowers currency hedging costs by slicing the risk of adverse currency

[19] The credit enhancement required for a particular credit rating above the company/ projects rating (an indicator of the credit quality) are a complex mix of the available track record of repayments by the company, management quality, sector outlook, financial assessment and a trend analysis to the larger macroeconomic variables to gather the probable shortfall in repayments. This along with the offtaker/ grantor risk, operational risk etc. that may impact the cash flows from an important part of the credit quality assessment. However, sustainable energy space in particular the distributed renewable sector suffers from a shortfall in the available information to gather the above mentioned information owing to the rapidly evolving landscape marked by swift changes in technology, scale, unit economics, government policies and adoption of the technology. This deficiency of the information is likely to result in higher risk perception of the sector and thus higher costs of debt. Thus it is proposed to use a typical distributed renewable energy project model that may replicate the requirements of the credit enhancement at the portfolio level for an NBFC that will be raising the SEB. The approach is based on the coverage improvements with the credit guarantee/ enhancement resulting in reduced probability of default / reduced risk of default in repayments or the improved credit quality. However, the portfolio of the NBFC is likely to be marked by the additional complexities like geographical spread of the portfolio, credit evaluation matrix used, lending practices and operational efficiencies along with other factors like the legal landscape in which the NBFC operates and thus some differentiation from the underlying projects. We have also assumed that the cost of funds for SEB is equal to the cost of funds for NBFC.

fluctuation into different tranches and allocating it to different stakeholders, while maintaining the exposure of the borrower to manageable levels and thus provide a possible reduction in the cost of the SEB.