CLIMATE POLICY INITIATIVE

Transitional Foreign Exchange Debt Platform: Paths to Enable Foreign Currency Debt to the Rooftop Solar Sector in India

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June 2018

A CPI Design Case Study for the US-India Catalytic Solar Finance Program

Acknowledgements

The authors of this report would like to acknowledge Stephen Morel, Pauline Idagho and Laura Anderson (OPIC), Ankur Gupta (HSBC), Pawan Nagpal, Mukund Santhanam (Deutsche Bank), Akash Chopra, Ravinder Gupta (ICICI Bank), Sunil Agarwal (Tata Cleantech Capital), along with other banks and renewable energy companies interviewed, for their time and contributions.

We would also like to thank Elysha Davila, Angel Jacob and Tim Varga for internal review and graphics.

Descriptors

Sector	Distributed Renewable Energy
Region	India
Keywords	Rooftop solar, Distributed renewable energy, Foreign currency risk, Foreign debt
Related CPI Reports	FX Hedging Facility
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About CPI

With deep expertise in policy and finance, Climate Policy Initiative works to improve the most important energy and land use practices around the world. Our mission is to help governments, businesses, and financial institutions drive growth while addressing climate risk. CPI works in places that provide the most potential for policy impact including Brazil, Europe, India, Indonesia, and the United States.

CPI's India program is registered with the name, "Climate Policy Foundation" under Section 8 of the Companies Act, 2013.

About U.S.-India Catalytic Solar Finance Program (USICSF)

The US - India Catalytic Solar Finance Program (USICSF) was conceived when Indian Prime Minister Narendra Modi visited the U.S. in June 2016.

Broadly, the aim of the program is to provide an impetus to the Distributable Renewable Energy (DRE) sector in India through development of financial interventions that can mobilize private capital at scale, thus assisting in India's policy targets of achieving 40 GW installed capital in the DRE sector by 2022.

Executive Summary

Low access to debt capital remains one of the key barriers to achieving the Indian government's target of 40GW of rooftop solar installations by 2022. Foreign capital can help bridge the gap in debt availability for rooftop solar, however, foreign currency debt exposes rooftop solar project sponsors to the risk of foreign exchange rate fluctuation.

Specifically, rooftop solar sponsors are reluctant to use foreign currency debt due to a variety of factors:

- International investors are unable to hedge the risk that arises due to currency mismatches when debt is in USD while cashflows are in INR
- There are issues related to poor credit quality and credit history of small-scale project developers that preclude these developers from accessing hedging instruments from commercial hedge providers that would otherwise allow them to access foreign debt
- India's managed foreign exchange policy makes currency risk hedging instruments expensive

Taken together, there are market gaps for small-scale rooftop solar project sponsors accessing the most commonly used hedging instruments i.e. cross-currency swaps, options and call-spread strategies. These barriers may be circumvented by either reducing the credit risk exposure to the borrowers by the hedge providers in the form of guarantees, or by transferring the foreign currency from the borrowers to another stakeholder by routing the loan through an intermediary.

This instrument design case study for the US-India Catalytic Finance Solar Program (USICSF) explores solutions to enable foreign currency debt to the Indian solar rooftop sector through the lens of a case study of debt investment by the Overseas Private Investment Corporation under the US-India Clean Energy Finance Facility program[1].

Analyzing all the pertinent constraints to the stakeholders in this case study (including borrowers, hedge providers, donor entities, guarantors and the lender) we propose a solution that appears most feasible: A Transitional Foreign Exchange (FX) Debt Platform. We also identify and assess alternative, but noteworthy solutions, which may be successfully implemented under different contexts and preconditions.

Proposed Solution: Transitional Foreign Exchange Debt Platform

The Transitional FX Debt Platform entails routing foreign currency debt from OPIC through a local Indian private sector financial institution as the intermediary, on to the borrowers in INR. Figure ES1 illustrates the structure of this solution. We find that the following elements would be critical to the success of such a platform:

- **Local intermediary:** The local Indian private financial institution that acts as an intermediary would manage the foreign currency risk arising from the mismatch in currencies of its assets and liabilities through the financial markets or through its internal treasury desk. We find that the cost of raising the credit profile of small-scale rooftop sponsors through guarantees to the foreign currency hedge providers –

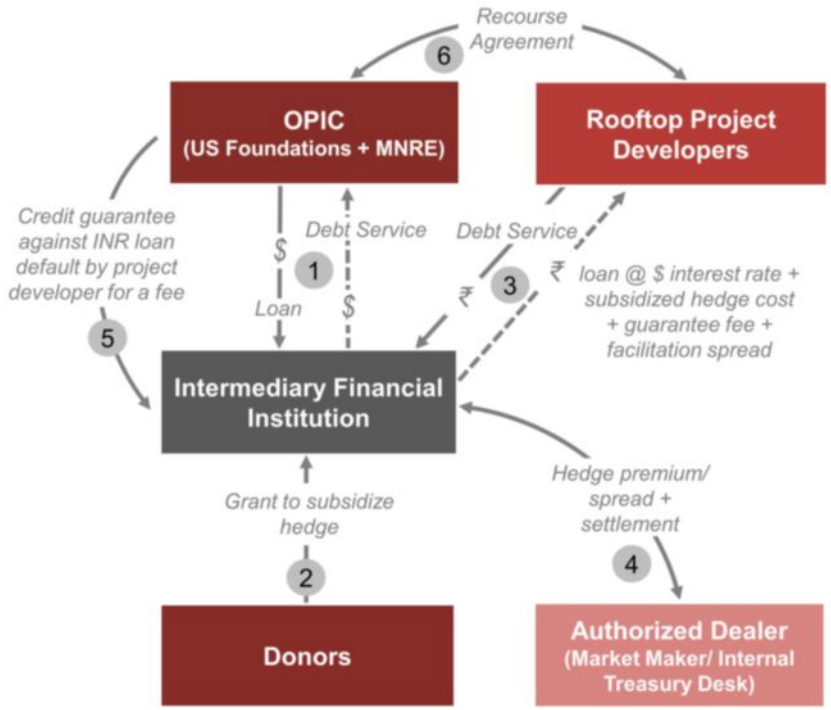
[1] http://usicef.org/

either funded or unfunded – is too high, and the structure unprecedented for donor stakeholders to act as guarantors. Hence, we propose this approach of routing loans through an intermediary local financial institution.

- **Credit guarantee:** The credit risk exposure of the intermediary to the end borrower would be partially or completely mitigated by means of a credit guarantee offered by OPIC against the payment of a guarantee fee. This ensures that the credit risk exposure to the borrower would ultimately sit with OPIC, while the partial risk-sharing between OPIC and the intermediary also helps develop the local debt markets in lending to the rooftop solar sector.
- **Donor grants:** We propose that donor grants from philanthropic sources under USICSF be provided to the intermediary financial organization. This is due to the inefficient market pricing of USD-INR swaps, which makes it likely that the landed cost of INR debt to the intermediary (including cost of hedging, guarantee fee, cost of USD debt, overheads and profit margins) exceeds domestic benchmark rates. To minimize the risk of moral hazard, stipulations should be made that INR loans to borrowers are made at a predetermined range of rates linked to a domestic benchmark rate. Further, owing to the Government of India's mandate of not passing donor grants to private sector institutions, we recommend that the donor grants be sourced from philanthropic foundations or development finance institutions.

Under the Transitional FX Debt Platform, each dollar of donor grant capital invested in the Platform enables $17 to $34 of additional foreign debt into the solar rooftop sector.

Figure ES1: Structure of the Transitional Foreign Exchange Debt Platform



Future work towards implementation includes further multi-stakeholder negotiations, identification of the intermediary institution, market research to scope financial metrics and costs of implementation, and development of actual term-sheets and contracts.

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1. Introduction

1.1 Context

While foreign debt can help drive the growth of the Indian solar rooftop sector towards meeting targets set by the Government, the risk of fluctuation of foreign currency, and market barriers in hedging this risk, limits adoption of foreign capital.

In order to meet rapidly growing electricity demand, the Government of India has set a target of installing 40 GW of rooftop solar power by 2022. This is a significant increase from the 0.7 GW of installed capacity at the end of March 2016 (The Hindu, Aug 2017).

The Indian rooftop solar power industry has grown steadily in recent years, due to the declining cost of installations and favorable government policies. However, the growth rate of rooftop solar installations remains slower than what will be required to achieve India's targets, which given current growth rates, are unlikely to be met (Livemint, May 2017). Low access to debt finance remains one of the key barriers to the growth of the sector (CPI, Sep 2016).

Foreign debt capital, by supplementing limited sources of domestic debt, can play a role in bridging this shortfall in available debt finance. However, foreign debt capital introduces foreign exchange (FX) risk given the mismatch in the currencies of the assets and currency of liabilities. This risk, then, presents a challenge to scaling up foreign debt capital for the solar rooftop and distributed renewable energy (DRE) sector. Project sponsors typically hesitate to take on foreign currency debt to finance projects due to a variety of reasons[2]:

1. Some international investors or lenders often do not know or are unable to handle the risk that arises from a currency mismatch.
2. In the case of small-scale rooftop solar developers, issues related to the poor credit quality and lack of credit history, along with the lack of liquid collateral, preclude these developers from purchasing hedges from commercial hedge providers, making the FX risk impossible to hedge.

Further, India's managed FX policy, where the rupee is not fully convertible, makes the market solutions for hedging FX risk expensive and distorts the cost of FX flows into the Indian solar rooftop sector (Livemint, May 2018). Were INR fully convertible on capital accounts, market solutions would be more efficient. Hence the landed cost of foreign currency debt, after accounting for the cost of hedging FX risk, often exceeds domestic rupee interest rates.

[2] source: unstructured interviews with applicants to the US-India Clean Energy Finance Facility (https://www.usicef.org/)

1.2 Design case study – background

This paper seeks to understand the barriers related to use of foreign currency debt for rooftop solar in India and provide solutions. It uses the lens of a case study related to proposed lending by the Overseas Private Investment Corporation through US-India Clean Energy Finance (USICEF).

The US-India Catalytic Solar Finance Program (USICSF) is a joint program between the Government of India and a consortium of philanthropic foundations to explore and implement innovative financial interventions to catalyze private investment into the solar rooftop and distributed renewable energy sectors in India. In a series of design case studies, Climate Policy Initiative (CPI) is investigating possible interventions to ease the most important barriers to financing solar rooftop projects and make additional capital available.

The series of design case studies uses lessons from the U.S.-India Clean Energy Finance (USICEF)[3] initiative. USICEF is India's first project preparation and pipeline development facility to help promising distributed solar projects develop into viable investment opportunities. USICEF's project preparation support is funded by leading foundations and the Indian Ministry of New and Renewable Energy. USICEF provides essential early-stage project preparation support to prepare solar projects for long-term financing from the Overseas Private Investment Corporation (OPIC), the India Renewable Energy Development Agency, and other financial institutions and banks.

Typical borrowers under the USICEF program – solar project developers with revenues less than USD 30mn – are currently underserved by the incumbent debt markets. Under the USICEF program, this debt shortfall is aimed to be bridged by OPIC playing the first-mover role. Enabling the inflow of this foreign debt would bring in additional capital to this underserved segment of distributed renewable energy project developers, while simultaneously reinforcing the confidence of domestic lenders in the sector through positive signaling. However, the OPIC financing being denominated in a foreign currency (USD) exposes the project sponsors to foreign currency risk. They face several barriers to access commonly available currency risk hedging instruments, including both availability and cost (these barriers are elaborated upon in Section 2). As such, this design case study seeks to find institutional structures that mitigate the barriers associated with hedging the FX risk in this case (associated with the poor credit profiles of the borrowers), thereby enabling the inflow of foreign currency debt. The paper also seeks to identify solutions to ease the friction of more generic instances of foreign capital inflows, and conditions under which such solutions would be feasible.

Section 2 of the report sets the background for the necessity of an intervention for the case study. Section 2.1 details the three most commonly used hedging instruments in India, along with the barriers to access faced by the borrowers under this case study. Section 2.2 discusses the different mechanisms through which an intervention could tackle these aforementioned barriers. Section 2.3 talks about the constraints posed by the various

[3] https://www.usicef.org/

stakeholders and regulations pertinent to the case study, which the recommended solution must satisfy.

Section 3 discusses the Transitional Foreign Exchange Debt Platform – the proposed solution, including its structure, innovative features, and economic considerations. Section 4 summarizes other noteworthy solutions to enable foreign currency debt, and the preconditions under which such solutions could be successfully implemented. Finally, in Section 5, we discuss the next steps towards successful implementation of the Transitional Foreign Exchange Debt Platform.

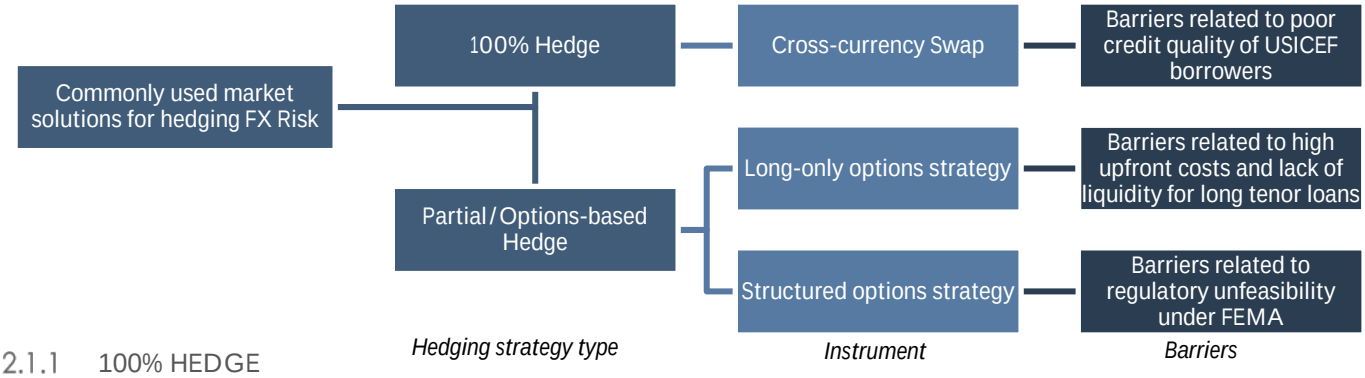
2. Commercial Hedging Instruments, Market Gaps, and the Need for Intervention

An exploration of commonly available and legally permissible market mechanisms for hedging currency risk reveals that gaps exist for small-scale rooftop solar developers in accessing each of these solutions.

2.1 Current hedging instruments and market gaps

This section details the instruments available in the Indian financial markets most commonly used to hedge foreign exchange (FX) risk, and permissible under the Foreign Exchange Management Act, 1993 (RBI, 2000). It also summarizes corresponding barriers to employing these instruments for a currency hedging strategy for the case study under consideration.

Figure 01: Pathways to enable foreign currency debt

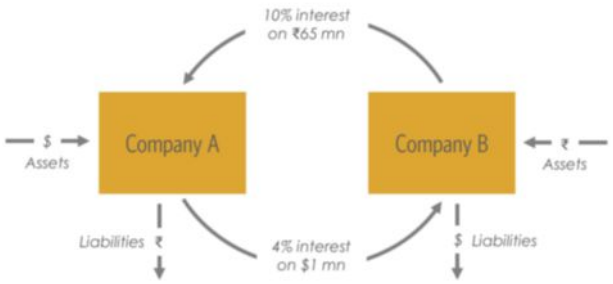


2.1.1 100% HEDGE

Cross-Currency Swaps

A cross-currency swap is an over-the-counter derivative in the form of an agreement between two parties to exchange interest payments and principal on loans denominated in two different currencies. In a cross-currency swap, a loan's interest payments and principal in one currency is exchanged for an equally valued loan and interest payments in a different currency. In the case where both of the loans are fixed rate loans, the interest rates are mutually decided between the two parties, and the difference between the two rates is called the "spread" of the swap (Hull J, 2008).

Figure 02: A sample USD-INR cross-currency swap



Company B has USD liabilities and INR assets, while Company A has INR liabilities and USD assets. They enter into a swap where Company A pays Company B 4% interest rate on USD 1 mn, whereas Company B pays Company A 10% interest rate on INR 65 mn (the prevailing exchange rate being 65). The spread of this swap is 6%.

The most common cross-currency swap traded in interbank markets is a mark-to-market swap. In this swap, notional exchanges are regularly made throughout the life of the swap according to FX rate fluctuations. This is done to maintain a swap whose mark-to-market value remains neutral and does not become either a large asset or liability due to FX rate fluctuations throughout its life.

Under the Reserve Bank of India's Foreign Exchange Management Act, cross-currency swaps may only be sold by Indian financial institutions categorized by the Reserve Bank of India as Category 1 Authorized Dealers (AD1).

Market barriers to access

Cross-currency swaps entail a high counterparty credit risk. Swaps, by design, entail a regular exchange of notional cash flows[4] throughout the lifetime of the swap. The net flow of cash during each of these exchanges could, depending on the market fluctuations, be from either counterparty to the other. This exposes both sides of the swap to the risk that the other side defaults on its payments – in other words, counterparty credit risk (Yu H, Kwok Y, 2002). Swaps with longer expirations of 10 years or more have especially high credit risk because of the possibility of markets fluctuating by large amounts over the course of such long periods of time. Since market makers/authorized dealers typically enter into back-to-back swaps so as to net off their liabilities and earn a spread in the process, default on one of the swaps can expose them to financial loss.

Swap sellers are not willing to expose themselves to the high credit risk of small rooftop project developers. The typical borrower under the USICEF program has revenues of under $30 mn and works in the relatively early stage fields of solar rooftop and distributed off-grid renewable energy. Since these businesses are typically young, they lack sufficient credit history, and thus have poor associated credit ratings. According to CPI's primary research conducted with authorized swap dealers for this case study, poor credit ratings coupled with the small size of operations result in these dealers being unable or unwilling to take on the counterparty credit risk associated with these businesses.

2.1.2 PARTIAL/OPTIONS-BASED HEDGES

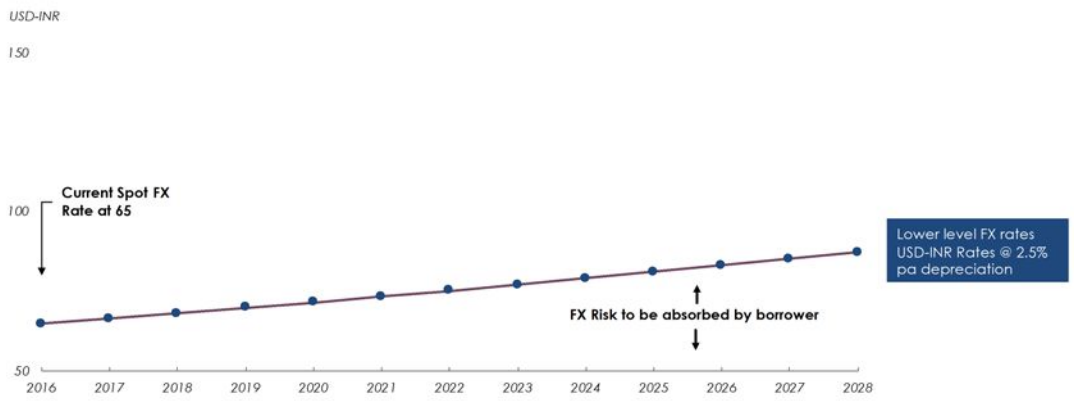
A second currency hedging tool is a contract that grants the buyer of that contract the right, but not the obligation, to buy or sell a specified currency at a specified exchange rate (the "strike") on or before a specified date (the "expiry")[5]. For this right, the buyer pays a premium to the seller, the amount of which varies depending on the number of contracts if the option is bought on an exchange, or on the nominal amount of the option if it is done on the over-the-counter market (Hull J, 2008). This model, which can take the form of long-only options or structured options (discussed respectively in the following sections), is one of the most common ways for corporations, individuals, and financial institutions to hedge against adverse movements in exchange rates.

[4] In interest rate swap transactions, the notional is the amount of principal of the underlying debt security. When this principal is separated from the obligation to pay interest, it becomes the notional or fictitious principal that generates the cash flow traded in the swap arrangement.
[5] http://www.nasdaq.com/investing/options-guide/definition-of-options.aspx

Long-only options strategy

In the long-only options approach, the borrower hedges their currency risk by purchasing a series of call options. These call options are structured so as to give the borrower the right to purchase USD equal to the debt obligation at each payment leg, by purchasing the options for the corresponding dollar amount with expiry as the corresponding date. The strike is chosen to be either the currency's spot rate at the time of initiating the loan, or lower. The premium for all these options is paid upfront.

Figure 03: sample risk allocation using a long-only options hedging strategy.



In this case, the borrower absorbs a risk of up to 2.5% annual secular depreciation. In case the depreciation exceeds 2.5%, the depreciation up to 2.5% is borne by the borrower and the excess depreciation is reimbursed by the options seller.

The net implication of such a structured call options purchase is to hedge the currency risk exposure of the borrower up to the foreign exchange rates at which the call options have been struck. That is, if the currency depreciates up to the level of the strikes, the loss arising from this depreciation would have to be borne by the borrower. However, if the currency depreciates beyond this level, then it is compensated for that additional difference by the seller of the option.

If, on the other hand, the currency appreciates beyond the initial spot level, the borrower would accrue the upside benefits arising from the appreciation of the currency.

Such a strategy entails a trade-off between the protection against the FX risk offered, and the price of purchasing the hedge – the lower the protection offered, the lower the hedging cost.

Market barriers to access

A long-only options strategy has two main barriers for typical USICEF borrowers that make them inappropriate for rooftop solar:

1. **Adequate FX risk protection under a long call options strategy is costly and unsustainable for typical USICEF borrowers.** Long call only options-based strategies provide optimal downside risk protection while leaving the upside benefits of currency appreciation to the borrower. Empirical historical analysis of long-term fluctuation in the USD-INR rates indicates a long-term trend of depreciation of the rupee, thus the expected payoff of downside protection is higher than the expected

payoffs from the upside benefits, using a Black Scholes Pricing[6] approach. Accordingly, the cost at which such a strategy would become economically viable, offers a level of protection that does not provide project sponsors enough confidence to absorb liquidity shocks arising from currency depreciation.

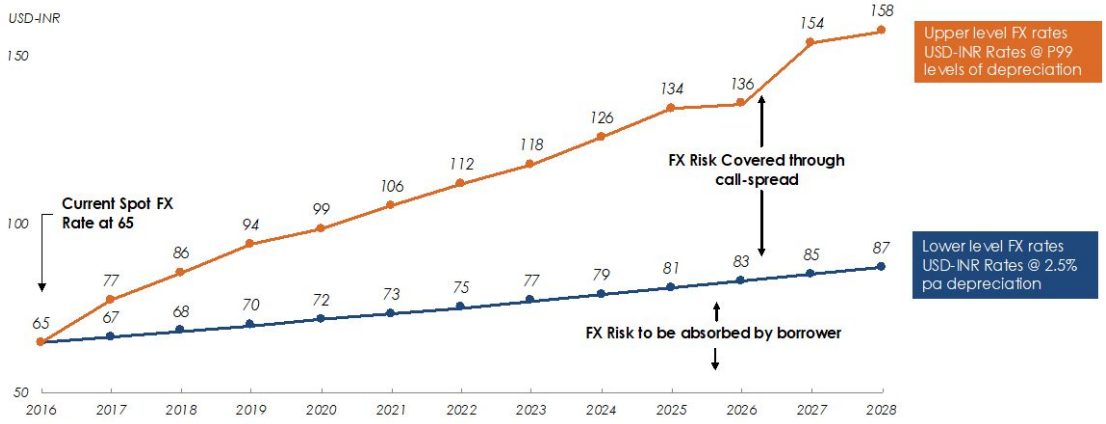
2. **The tenors available in the market for long call options are too short compared to the loan durations of these borrowers.** Long-term USD-INR currency options are mostly limited to 5-7 years, creating a mismatch in the tenors of the debt and hedge.

Structured options strategy

This approach was designed under the India Innovation Lab for Green Finance as part of the FX Hedging Facility (India Lab, 2017).

A bear call FX spread is a type of options strategy used when a decline in the price of the currency is expected. It is achieved by the borrower (hedge purchaser) selling call options (going short[6]) at a specific strike price while also buying (going long[7]) the same number of calls, but at a higher strike price. The maximum profit to be gained using this strategy is equal to the difference between the price paid for the long option and the amount collected on the short option.

In such a strategy, to hedge the currency depreciation risk associated with an underlying loan, the borrower may fix two protection bands based on their risk appetite and comfort levels. The lower band may be chosen as the maximum annual secular currency depreciation that the borrower is willing to absorb, and the upper level may be chosen to be sufficiently high enough so that the odds of the currency depreciating beyond this level is a black swan event[9] such as a P99 level[8] of depreciation.



Now, for each payment period of the debt service, the risk of currency depreciation may be hedged by simultaneously underwriting two options contracts. The first is a long call option at a strike equal to the lower band of protection, and for a notional amount equal to the debt payment for that leg. On the other hand, you simultaneously go short on call options with the same expiry at a strike equal to the upper band of protection.

The end result of such a strategy is to ensure that the risk of depreciation up to the lower band, and the tail risk beyond the upper band of protection lies with the borrower; further, it ensures that the risk of depreciation beyond the lower band and up to the upper band is hedged

[6] https://www.cs.princeton.edu/courses/archive/fall09/cos323/papers/black_scholes73.pdf

Market barriers to access

Typical rooftop solar project developers cannot access structured options based hedging solutions due to Reserve Bank of India regulations, as well as due to a lack of risk management savvy.

As per the Reserve Bank of India Master Circular on Risk Management and Inter-bank Dealings,[9] structured options hedging mechanisms are defined as "cost reduction structures" and may only be used by:

1. Listed companies and their subsidiaries, joint ventures, and associates who have common treasury and consolidated balance sheets; or

2. Unlisted companies with a minimum net worth of INR 2 billion.

Since project developers borrowing under the USICEF program do not meet this size threshold, they are not able to access such cost reduction structures.

Further, while a bear call spread hedging strategy can ensure judicious allocation of risk tailored to the needs of the borrower and their capacity to pay, it leaves some open currency risk exposure that requires active management and monitoring. The typical borrower under the ICEF program may not have the required financial sophistication and internal risk management systems for this monitoring. RBI regulations (discussed further in Section 2.3 preclude the possibility of third-party risk management.

2.2 Interventions to enable access to FX hedging solutions

The barriers faced by small-scale rooftop solar developers in employing foreign currency debt may be overcome by transferring the foreign exchange risk to a willing intermediary or through structures that reduce the exposure of hedge-providers to the credit risk of the developers.

The market gaps discussed in Section 2.1 do not allow the borrowers in the case study to directly employ any of the existing market solutions for hedging FX risk.

As detailed in Section 2.1 the barriers for rooftop solar project developers to employ options-based strategies include lack of availability at relevant expiries, high costs, and regulatory restrictions. Further, partial hedging strategies require active risk management, which is outside the scope of the borrowers' ability. These barriers are too difficult to overcome through any new institutional structure or intervention.

There are thus two potential paths forward:

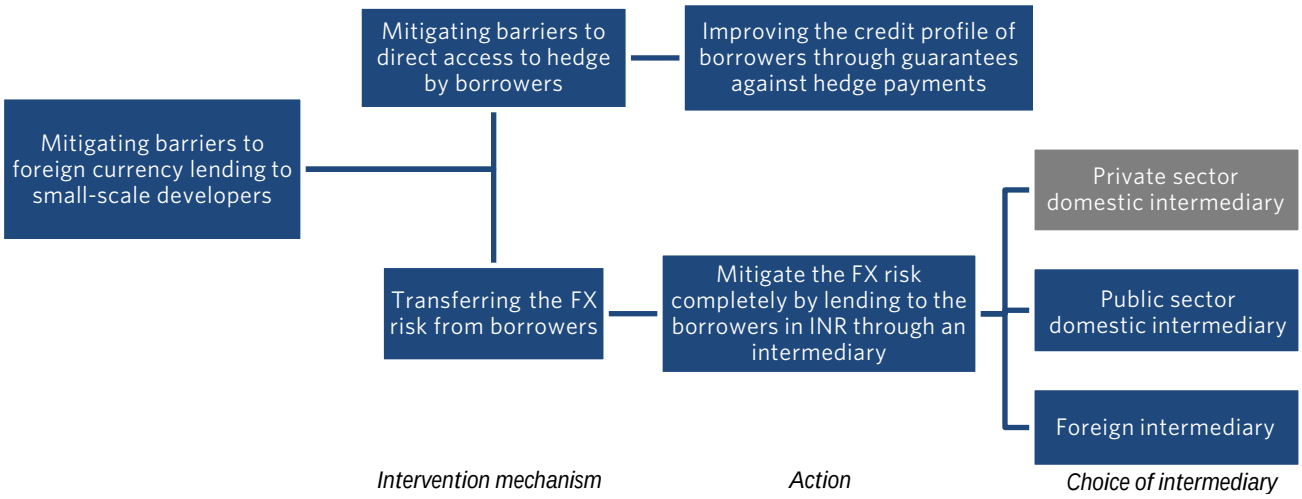
1. Structures that reduce the exposure of hedge providers to credit risk of the developers and hence allow developers direct access to cross-currency swaps. Counterparty credit

[7] http://www.dewi.de/dewi/fileadmin/pdf/publications/Magazin_28/07.pdf
[8] https://www.investopedia.com/terms/b/blackswan.asp
[9] https://rbi.org.in/scripts/BS_ViewMasCirculardetails.aspx?id=9891#a1

risk currently prevents rooftop solar developers from direct access to cross-currency swaps. A new intervention that addresses this risk by enhancing the credit profile of borrowers through guarantees could help overcome this barrier.

2. Structures that eliminate the currency mismatch in borrowers' assets and liabilities by lending to project developers in INR. Since the lender in this case – OPIC – is mandated to lend only in its home currency i.e. USD, this would require loans to be intermediated through a financial intermediary. This Intermediary Financial Institution (IFI) could be either a public sector domestic institution, a private sector domestic institution, or a foreign institution.

Figure 05: Mechanisms to enable access to FX hedging solutions



While both solutions are feasible, specific constraints around OPIC lending and Indian regulations discussed in Section 2.3 indicate that the second path forward is the most immediately actionable for the purpose of this design case study.

2.3 Constraints to potential interventions

As discussed in Section 1.2, this design case study focuses on potential lending by the Overseas Private Investment Corporation (OPIC)[10] as an anchor partner for USICEF program towards the scaling up of small and medium scale enterprises in the solar rooftop and distributed renewable energy sector.

As a U.S. Government Development Financial Institution, OPIC is mandated to lend in USD. Under the USICEF program, OPIC expects to provide dollar loans ranging, on average, between USD 1 mn and USD 10 mn each, at a fixed interest rate linked to the prevailing US Treasury rates. Although it may not lend in local currencies, there is however a provision for OPIC to provide credit guarantees against its beneficiaries, in addition to the loan.

To be eligible for an OPIC credit guarantee, the borrower would have to meet two separate U.S. ownership requirements:

1. At least 25% beneficial U.S. ownership (OPIC terms this the "US Nexus" requirement, and all projects that OPIC finances have to meet this threshold)

2. At least 10% ownership from a U.S. citizen or green card holder, U.S. entity at least 50% U.S. owned, OR a foreign entity at least 95% U.S. owned (OPIC terms this the "US Eligible

[10] https://www.opic.gov/

Investor" requirement. This is an added requirement for local currency guarantees). The second requirement could go toward meeting the first requirement.

Further, the local financial institution as the purchaser of the guarantee would have to be a private sector organization organized under the laws of India.

Apart from these constraints posed by the presence of OPIC as the lender under this case study, primary and secondary research threw up a few other constraints, which eliminate several innovative institutional solutions to the problem at hand. The most noteworthy amongst these are as follows:

1. The Reserve Bank of India (RBI) regulations prohibit synthetic hedges, in other words, currency risk management products that lack a corresponding underlying foreign currency liability/loan. This regulation is important because it makes intermediating the hedge (without the loan) through a third party as the middle-person infeasible, and requires that the loan itself be routed through an intermediary.
2. The Reserve Bank of India's Foreign Exchange Management Act restricts hedging of currency risk offshore and limits hedging options to those offered by Authorized Dealers. This eliminates the possibility of structuring a solution where the currency risk is hedged offshore, where several exotic currency hedging derivatives are available.

Based on these constraints, we have identified the most feasible structure for the case study, along with recommendations for other structures that may be feasible in other contexts of foreign currency debt inflows.

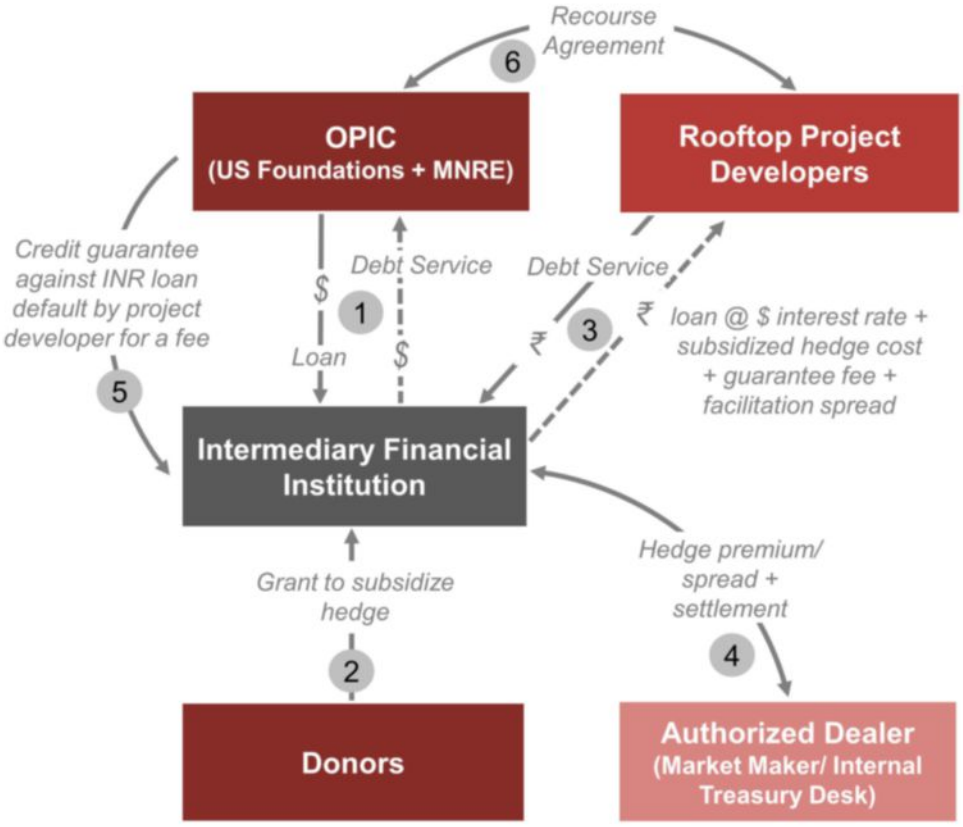
3. Proposed Solution – Transitional Foreign Exchange Debt Platform

This section discusses the proposed solution for enabling foreign currency debt, titled the Transitional FX Debt Platform. Section 3.1 describes the structure of this solution in detail, along with all the involved cash flow legs. Section 3.2 describes the innovation exhibited by this solution in meeting the barriers discussed in Section 2.1, and the risks to implementation. Section 3.3 discusses the various component costs of the transaction, and calculates the donor grants required and the impact this donor capital can achieve in mobilizing private finance.

3.1 Solution structure

The Transitional FX Debt Platform involves an intermediary private sector local financial institution that borrows in USD from OPIC and offers INR loans to borrowers. This intermediary would hedge its FX risk exposure through its internal operations or through cross-currency swaps, and use credit guarantees by OPIC to transfer the credit risk exposure to the borrowers to OPIC. Further, public grants may be used to subsidize transaction costs and ensure parity of the landed cost of debt with domestic benchmarks.

Figure 06: Structure of the Transitional FX Debt Platform



As Figure 6 demonstrates, the central player under this structure is a private sector Indian financial institution (bank or non-banking financial institution) that can enter into cross-currency swaps or use other tools to hedge currency risk. Identifying and establishing an

intermediary to play this role requires negotiations between the lender (OPIC), donors (MNRE and/or US Foundations), and the potential intermediaries. Once established, this intermediary and the other stakeholders would mitigate currency risk in order to enable foreign debt in the following steps, which correspond to Figure 6:

1. Once an investment decision is finalized after following due process by both OPIC and the intermediary, OPIC, the intermediary and the end borrower would enter into a tri-partite agreement, under which OPIC would lend in USD to the intermediary at a fixed interest rate.
2. Due to the inefficient market pricing of USD-INR swaps as explained in Section 1.1, it is likely that the landed cost of INR debt to the intermediary (including cost of hedging, guarantee fee, cost of USD debt, overheads and profit margins) exceeds domestic benchmark rates. We propose that donor grants available under the USICSF program be provided to the intermediary financial organization under the stipulation that the INR loans to borrowers be made from a pre-decided range of rates linked to a domestic benchmark rate. More details on ascertaining the amount of grants required, ways to mitigate moral hazard, and impact assessment are discussed in Section 3.3.
3. The intermediary would make a corresponding loan to the end borrower in INR at a fixed interest rate (from a predecided range) on the back of this loan.
4. The mismatch between the currency of the assets (INR loan) and liabilities (USD loan) exposes the intermediary to FX risk. Taking advantage of its access to a wide variety of hedging instruments due to high credibility as well as financial expertise, the intermediary can hedge this risk in the financial markets or through its internal treasury operations.
5. OPIC – an international AAA rate entity – would further provide a credit guarantee to the intermediary against the risk of credit default by the end borrower on its INR loan, against the payment of a predecided guarantee fee by the intermediary. This credit guarantee could be either a full or a partial credit guarantee.

3.2 Innovations to overcome market barriers

The Transitional FX Debt Platform successfully circumvents the constraints of relevant stakeholders. However, it may only be successfully implemented given the willingness of donor entities to provide grants to private sector institutions.

The Transitional FX Debt Platform circumvents several of the barriers to FX hedging faced by the borrowers in the case study. Some salient features of the structure are:

1. **By providing borrowers with INR loans originating from international institutions, borrowers will be able access foreign debt without being hampered by their inability to purchase FX hedging solutions thanks to their poor credit profiles.** Foreign debt has a key role to play in growing the Indian rooftop solar market, but currently, small-scale developers cannot access foreign debt – which is often at better rates than any domestic alternatives available to them – without taking on currency risk, which

borrowers are unwilling to do. This solution allows borrowers to access foreign debt without currency risk.

2. **Currency risk is borne by the entity best suited to mitigate it.** Currently, rooftop solar project developers lack access to currency risk mitigation solutions that would allow them to access foreign debt. This solution overcomes this barrier and places currency risk with an intermediary. Further, the higher credit profile of the intermediary reduces the cost of hedging solutions for these loans, as the financial expertise and added risk appetite of the intermediary may allow them to explore diverse hedging mechanisms. This ensures added efficiencies.
3. **OPIC has a mandate of investing only in private sector organizations.** Selecting a private sector financial institution as the intermediary ensures adherence to this constraint.
4. **The use of a credit guarantee by OPIC to the intermediary encourages the intermediary to take exposure to the nascent solar rooftop sector, helping develop the market**. The guarantee may be either a full or a partial credit guarantee. In the case of a full credit guarantee, the credit risk exposure to the borrower is borne entirely by OPIC, but a partial credit guarantee would encourage risk-sharing of the exposure between OPIC and the intermediary. Thus, not only is the objective of additional lending to the segment of small-scale developers achieved, but simultaneously, domestic lenders are encouraged to take exposure to the sector for future lending activities.
5. **To minimize the risk of moral hazard arising from misuse of public donor grants, it would be important to design a transparent process for selecting the intermediary.** Beyond adherence to minimum thresholds for credit ratings and size of assets and operations, such a process may be designed by inviting bids from a host of interested private sector financial institutions for grants, and selecting the lowest bidder.
6. **For successful implementation, grants will need to be sought from sources other than the Government of India, such as philanthropic foundations**. This is because of the reluctance of the Government of India in providing grants to private sector intermediaries. However, a public sector intermediary would not be feasible on account of OPIC's mandate of lending only to the private sector.

3.3 Solution economics

The Transitional FX Debt Platform can leverage $17 to $34 of additional private finance for an underserved market segment at market-comparable rates for every $1 of public finance.

Table 01 details the various component costs (indicative) towards the landed cost of debt (excluding grants) at which the intermediary can provide INR loans to the project developers under this structure, excluding any external monetary support. The range indicated takes into account differing credit profiles of the borrowers – a borrower with a higher credit rating would receive loans at lower interest rates.

Table 01: Calculation of pre-grant landed cost of debt

Component	Indicative cost (annual %)	Comments
USD interest rate charged by OPIC	3.8% - 4.3%	Assuming a US treasury rate of 1.3% (average 3 month rate) and hypothesized OPIC lending rate to a AA intermediary at (USD treasury rate + 2.5% - 3%) (Source: interviews with OPIC and the USICEF facility)
USD-INR 15 year cross-currency swap spread	6.15%	Indicative market quote using primary research
100% credit guarantee fee charged by OPIC	1.50%	Hypothesized figure using past transactions (source: primary research)
Facilitation fee charged by intermediary to account for transaction costs and profit margins	0.50%	Hypothesized indicative figure using primary research
Total	**11.95% - 12.45%**	

We see that, without any external monetary support, the range of landed costs of debt calculated in Table 01 is higher than the average interest rates at which commercial loans to the solar rooftop sector are available in the market. This suggests the need for concessional/grant finance to ensure parity with market benchmark rates. As comparison, there are three major lines of credit providing concessional debt financing to the solar rooftop sector in India:

1. State Bank of India – World Bank Grid-connected Solar Rooftop Program[11] offers debt at a rate between 8.15% and 8.45% per annum depending on the credit rating of the borrower w.e.f. 1st November, 2017
2. Punjab National Bank – Asian Development Bank Grid-connected Solar Rooftop Program[12] offers loans at rates between 8.45% and 8.65% per annum.
3. IREDA – KfW Renewable Energy Program offers loans at rates at 11.5% per annum for tenors exceeding 4 years

Market scoping suggests that market rates of lending to the rooftop solar sector by banks are closer to the most conservative of these three lines i.e. the IREDA – KfW Renewable Energy Program. Further, interviews with market participants suggest that the first two lines of credit offer highly concessional loans that have the effect of distorting the market in a way that is not sustainable in the long-term. Thus, to ensure parity with this conservative market benchmark while using public capital prudently, the Transitional Foreign Exchange Debt Platform could target lending at rates close to the market benchmark rate set at 11.5%, using grants to bridge the gap with the landed cost of debt to the intermediary. This target market benchmark, and the associated need (if any) of public grants needed, may be determined in the future in consultations with all the relevant stakeholders. It is important to note that, the primary problem the Transitional Foreign Exchange Debt Platform aims to solve for is the lack of access to debt faced by the target segment of project developers, rather than the cost of debt.

[11] https://www.sbi.co.in/webfiles/uploads/files/SBI_WORLD_BANK.pdf
[12] https://www.pnbindia.in/Rooftop-Solar-Power.html

We find that the Transitional Foreign Exchange Debt Platform could employ grant capital effectively, leveraging $17-$34 of private finance for an underserved sector at market-comparable rates for every dollar of public finance used.

Using calculations from Table 01, the estimated grant capital requirement is between 0.45% and 0.95% of the debt capital annually. Thus to subsidize the inflow of USD 200 mn of foreign capital inflows via OPIC loans, the requirement for donor capital for an average tenor of 15 years could range between USD 8.2 mn and USD 17.3 mn[13]. Assuming a project debt: equity ratio of 70: 30, this implies a leverage ratio of public finance to private finance of 1 public to 17 to 34 private.

[13] Assuming a discounting rate of 7%

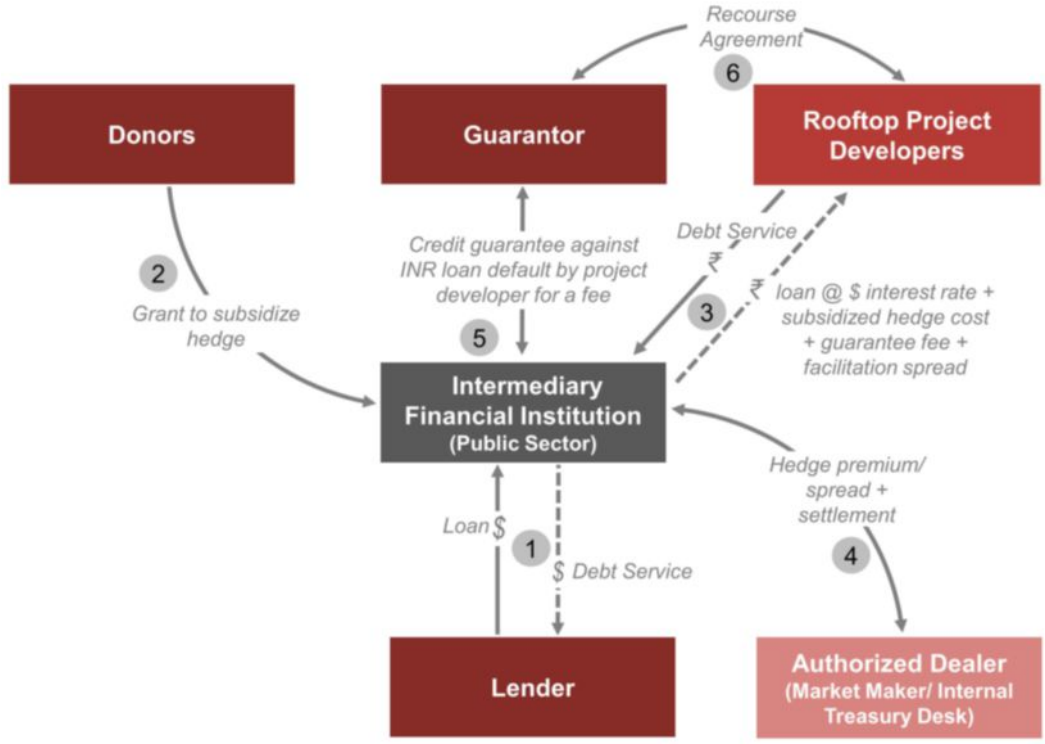
4. Noteworthy Alternative Solutions

Section 2.2 details existing solutions for mitigating FX risk and why borrowers in rooftop solar cannot access these solutions. Section 3 summarizes the rationale for the Transitional FX Debt Platform as the recommended structure for this case study. CPI has explored other potential solutions as well, and this section details three such alternative institutional structures, the reason for their incompatibility with the constraints of the current case, and preconditions under which the structures may be successfully implemented.

4.1 Alternative A

4.1.1 STRUCTURE

Figure 07: Structure for Alternative A



Alternative A follows exactly the same structure as the Transitional FX Debt Platform, with two notable exceptions: 1. The intermediary financial institution would be a public sector entity; and 2. The guarantor for the credit guarantee against the credit risk of the borrower may not necessarily be the lender[14]. As such, all the cash flow legs remain similar to those described in Section 3.1, and the economics similar to those described in Section 3.3.

4.1.2 PROS AND CONS

OPIC's mandate of not lending to public sector institutions precludes this structure from working in the given case. However, such a structure could be successful in the case of other foreign currency lenders that do not possess such mandates, and in the presence of a credible guarantor such as a development financial institution, sovereign or a private sector guarantor like GuarantCo.

Alternative A has the added benefit of being able to utilize grants from Government sources, something that the Transitional FX Debt Platform was incapable of doing owing to the private sector intermediary in the structure, and the associated reluctance of the

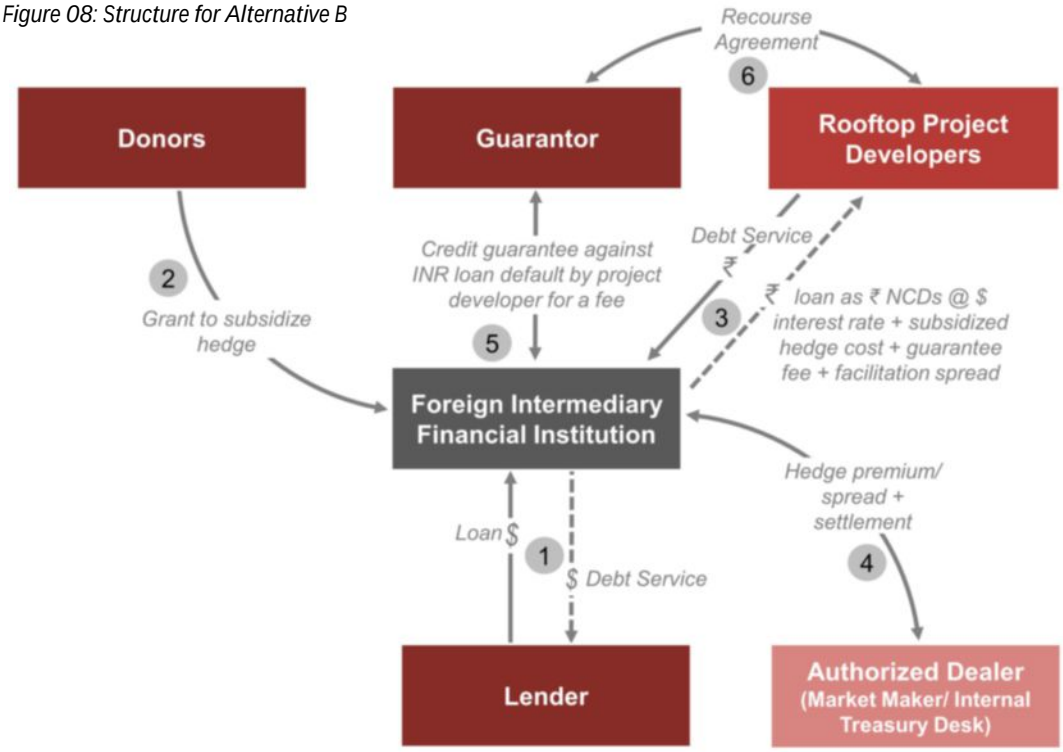
[14] GurantCo (http://www.guarantco.com/) is a noteworthy alternate choice of guarantor.

Government of India in providing grants to private sector institutions, as determined through interviews with the Ministry of New and Renewable Energy – an anchor partner in the USICSF program.

4.2 Alternative B

4.2.1 STRUCTURE

Figure 08: Structure for Alternative B



Alternative B follows exactly the same structure as the Transitional FX Debt Platform, with the notable exception that the intermediary financial institution would be a foreign entity rather than an Indian private sector entity. This intermediary may then lend to the local borrowers in INR in the form of a non-convertible debenture[15]. Further, the guarantor for the credit guarantee against the credit risk of the borrower may not necessarily be the lender in this structure[16]. As such all the cash flow legs remain similar to those described in Section 3.1, and the economics similar to those described in Section 3.3.

4.2.2 PROS AND CONS

Due to the Government of India's reluctance to provide grants to foreign entities, the success of such a structure is contingent upon international donors who may subsidize the foreign-domiciled intermediary, and international guarantors to provide the necessary credit guarantees to mitigate the credit risk exposure of the intermediary.

Further, the geographic dislocation of the lender and the borrowers might bring in inefficiencies into the due diligence process and transaction.

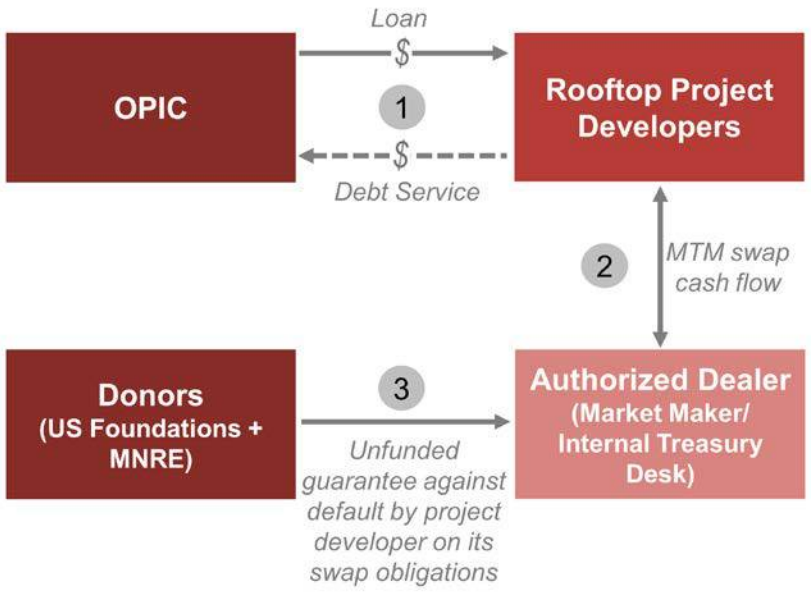
[15] Debentures are long-term financial instruments which acknowledge a debt obligation towards the issuer. Some debentures have a feature of convertibility into shares after a certain point of time at the discretion of the owner. The debentures which can't be converted into shares or equities are called non-convertible debentures

[16] GurantCo (http://www.guarantco.com/) is a noteworthy alternate choice of guarantor.

4.3 Alternative C

4.3.1 STRUCTURE

Figure 09: Structure for Alternative C



Under this structure, the borrowers would borrow in USD from the lender (OPIC), and purchase a hedge (swap) from an authorized dealer. A highly credit-worthy (AAA rated) donor/guarantor entity would provide a backstop guarantee to the authorized dealer, guaranteeing payments against the borrower's liability on the swap in the case of a default. This would allay the credit risk concerns of the authorized dealer.

4.3.2 PROS AND CONS

The reluctance of authorized currency hedging dealers to enter into contracts with rooftop solar project developers stems from a lack of confidence in the ability of project developers to honor the swap obligations over a long term period. Interviews with these authorized dealers indicate that the presence of a mechanism that guarantees the fulfilment of these obligations would suitably allay these concerns.

This structure thus eliminates the need for an intermediary, a credit guarantee, and the associated transaction costs, bringing in efficiencies. Further, the use of an unfunded credit guarantee instead of upfront donor grants makes the use of grants probabilistic, and also minimizes the possibility of misappropriation of public funds.

However, since the liabilities under such a guarantee are potentially limitless and cannot be quantified ex ante, interviews with donor stakeholders have indicated a reluctance in providing such guarantees. This is the limitation to implementing such a structure. Such a structure may be successful in the presence of a credible donor entity willing to provide such an unfunded guarantee.

5. Next Steps

The Transitional FX Debt Platform would enable foreign debt for India's rooftop solar market by mitigating a key barrier – currency risk. However, as a complex solution requiring involvement from multiple stakeholders, there are several next steps towards implementation. These include, in the near-term, the following:

- Identifying a permissible spread to be charged by the intermediary over the base dollar interest rate, keeping in mind the prevailing constraints, and competitive market forces.
- Negotiations with private sector banks and NBFCs to determine the most suitable intermediary for such an institutional solution. These negotiations would need to take into consideration achieving maximum impact using given donor grants, the ability/willingness of the institution in taking exposure to the solar rooftop sector, and the operational capability of the institution in playing this role. Currently discussions are underway with Tata Cleantech Capital, Deutsche Bank and ICICI Bank.
- Further market research to quantify the requirement for grant capital and the impact/leverage it may achieve.
- Identification of sources of this grant capital towards achieving their program-related developmental objectives.
- Developing term-sheets and agreements towards actual implementation of the facility.
- Collaboration with the Natural Resources Defense Council, Council for Environment, Energy and Water, and cKinetics to explore how this solution may be aligned within a Green Bank framework currently under development.

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